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Volume I

ANIMAL PROTEIN FOODS SYSTEM

Increasing Efficiency of Production, Processing and Marketing

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List of Acronyms and Abbreviations

AERI	Agricultural Economics Research Institute, MALR
APRI	Animal Production Research Institute, Agricultural Research Center
CAPMAS	Central Agency for Public Mobilization and Statistics
EEC	European Economic Community
FSDP	Food Sector Development Program
GOE	Government of Egypt
LE	Egyptian Pound – LE 3 35 = U S $1 00 during the study
MALR, MOALR	Ministry of Agriculture and Land Reclamation
PBDAC	Principal Bank for Development and Agricultural Credit
Pt	Piaster = 1/100 of Egyptian Pound
U/AES	Undersecretary for Agricultural Economics and Statistics, MALR
U/AH	Undersecretary for Animal Husbandry, MALR
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USFGC	United States Feed Grains Council

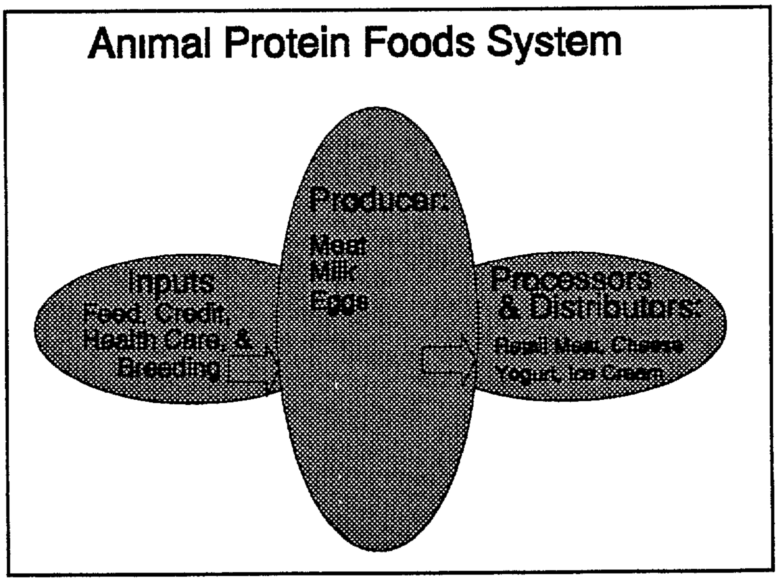
List of Conversion Factors

1 Feddan (Fd)	=	1 03008 acres = 0 42 hectares
1 Feddan	=	24 kirats
1 Ardeb	=	12 kala
1 Hemel	=	225 kg straw

Animal Protein Foods System
Increasing Efficiency of Production, Processing and Marketing

Executive Summary

The *animal protein food sector* is the system of businesses and institutions that produce and deliver red meat, milk, poultry meat, and egg products to the consumer   The system consists of input, farm producer, and processor/distributor businesses   The group of **input** businesses provide products and services to livestock and poultry farm producers   Example products and services are feeds, hatching eggs, baby chicks, animal health and breeding services, and credit   The group of **farm producer** businesses is made up of livestock and poultry farms that produce meat, milk, and eggs   These enterprises are sheep and goat, feedlot, dairy, broiler, and layer operations   Except for poultry layer and broiler operations that are largely commercial, most farm producers are small and near subsistence levels   As individuals they produce relatively meager amounts of marketable surplus   But in the aggregate they supply most of the market   Farm producers sell to **processor/distributor** businesses consisting of collectors, processors, wholesalers and retailers   Some farm producers also sell directly to consumers   Processors slaughter animals, distribute meat, and manufacture cheese, yogurt, and fermented milk.



On small farms, livestock and poultry are an integral part of the farming system   Poultry are largely used as scavengers that provide meat and eggs   Livestock use otherwise unused plant materials as well as crops regularly grown for their support   To the small farmer, livestock and poultry are a source of meat, milk, cheese, yogurt, fuel, fertilizer, and income   Their manure is used for fuel and fertilizer   In addition, they are a store of wealth and provide considerable social prestige

On small farms and in villages men handle the buying, selling, breeding and calving of livestock   Men gather and load the manure and fertilize fields   However, men and women jointly make decisions concerning livestock investment, financing inputs, and production management (Soliman, Zaki, and Rashad, 1987)   Women handle almost all other activities   Women feed livestock and often harvest clover, and collect grain and straw for that purpose   Women milk the cows, separate the milk, make cheese, and market the excess products   Women also handle most of the activities with the scavenger poultry flocks, pigeons and rabbits

The larger commercial poultry operations produce an important part of poultry meat and egg supplies   In comparison, the larger commercial dairy and meat operations produce a small part of total red meat and milk production.   Most poultry operations are specialized   In contrast, most dairy and small feedlot operations are not specialized and are part of mixed farming systems Almost all production is by multi-purpose native cows and buffaloes Mutton (goats and sheep) production is not specialized except in the more arid grazing areas

Animal protein foods are eaten by consumers for the pleasure of taste and texture In the diet they are a source of supplemental high protein, energy, calcium, iron and other minerals and vitamins On average, animal protein foods account for about 15% of the protein in the Egyptian diet Protein from legumes and cereals account for most of the remaining protein consumed Animal protein foods, such as cheese, are part of the staple diet while baked goods, using eggs and special products, as ice cream, are important desserts

The Objective

The overall objective of this study is to assess the feed-livestock-poultry sub-sectors to identify constraints on their performance and recommend policy and institutional reforms to promote more efficient production, processing, and marketing of meat, milk, and eggs

The objective of the study is accomplished through a systems approach by (1) depicting the animal protein food sub-sector as a production and distribution system, (2) developing the economic (demand and supply) relationships suggested by the make up of the system, and (3) describing and assessing the current feed/meat/milk/egg operational technology and economic-financial relationships Information from these study team activities are used in organizing a simple spreadsheet model to project prices, production, and consumption of red meat, milk, poultry meat and eggs under different policy scenarios and to assess the impact of selected policies

The Situation

The long term concern is that demand is growing rapidly for animal protein foods This is occurring because population is expanding at around 2 5% per year and in the past 10 years nominal per capita income has been progressing at around 6 5% per year

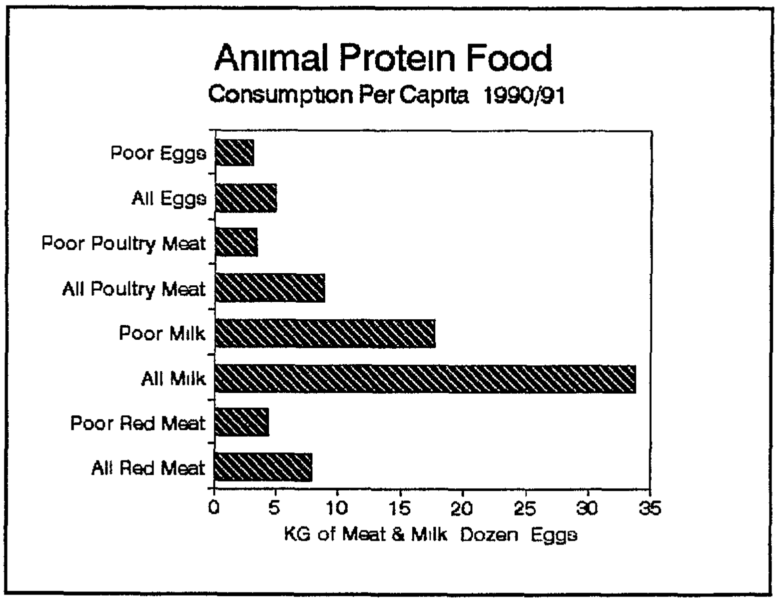
The immediate concern is with the falling per capita supplies and consumption of red meat, poultry meat, and eggs This decline in average annual supplies has taken place since 1986 Industry and government expert opinion indicates that the decline is due to economic reforms leading to the reorganization of animal protein food business operations Beginning in 1986 policy reforms were made to create an environment for a market economy in the food systems sector This included removal of many subsidies, production cost increases, and consequently reduced demand Most businesses are now reorganizing to operate in the more uncertain and competitive environment The nearby table shows the average

Declining Per Capita Supplies of Animal Protein Foods Since 1986 Are of Concern to Policy Makers

Average Annual Percent Change

Year	1976-86	1986-93
Per Capita Supply		
Red Meat	3 4%	-1 7%
Milk	-3 4%	2 3%
Poultry Meat	2 8%	-4 7%
Eggs	4 5%	-3 0%

annual per capita change in the supply of red meat, poultry meat, and eggs The 1976-86 period is compared to the 1986-93 period Meat and egg per capita supplies have on average fallen since 1986 as the commercial part of these sectors are re-organizing However, the milk sector has remained stable Dairy does not yet have an important commercial sector and the buffalo cow herd which produces most of the milk supply has increased slightly since 1986 This sector did not participate extensively in the various subsidy programs and was probably not affected by the subsidy eliminating reforms after 1986 Their feed distribution quotas were at a lower priority than those for other livestock enterprises Differing evidence from the 1990/91 Household Expenditures survey shows that per capita milk consumption has declined since 1974/75 and is lower than the estimates shown here



The second immediate concern is with the poor who are at some risk in not having access to enough animal protein food The 1990/91 Household Expenditures survey indicates that about 10% of the population has total household expenditures of less than LE 1600 per year This group consumes about half the average levels of meat and milk and about two-thirds of the average level of egg consumption Details of the per capita consumption of red meat, poultry meat and eggs are shown in the nearby graph Overall animal proteins account for approximately 15% of the protein in the national diet "The value of dietary animal protein goes beyond its proportionality in diets, because it contains amino acids essential to human health that are deficient in cereals Thus the consumption of even small amounts of animal products corrects amino acid deficiencies in human diets that are largely cereal-based, permitting more of the total protein to be utilized This is of particular importance to very young children" (Raun, Nielsen, and Gollin, 1992) Further, "quality foods such as those derived from animal sources have major importance for optimizing human performance in chronically mild-to moderately malnourished populations" (Diaz-Briquets et al, 1992) This risk has led researchers to recommend, "a social role of the government through the implementation of gradual target-oriented nutritional programmes" (Soliman and Eid, 1992)

In brief, the long run concerns of providing adequate animal protein foods without price inflation and with some stable base of production require continuous monitoring of the industry and the provision of optimum governmental policies The immediate concerns of declining per capita supplies and the ensuing risk to the poorest 10% of the population are based on problems that might be solved through support to the industry in its efforts to reorganize and to operate efficiently in the developing market economy

How Can the Situation Be Improved?

The long term concerns of the animal protein food industry may be solved through the increased production of poultry and milk This is possible because the commercial poultry meat industry can be restructured to be competitive and the commercial egg and milk industry are already cost competitive

In most countries, as incomes increase poultry meat and eggs have helped reduce the pressure on resources for the supply of other animal protein foods For example, as the demand for meat has grown, commercial poultry production has filled the gap caused by the high demand for animal protein foods and the slow growth of beef and mutton production

There is a unique advantage in commercial milk production Milk production costs are competitive because the desert climate provides an exceptional environment for high milk production Throughout the world the highest levels of milk production per animal are achieved in the dry, open desert environment In addition, supplies of roughage as berseem, concentrates as maize, and high protein feeds as cottonseed meal are available in the nearby Nile valley and delta Supplies of concentrates and other inputs are available as imports from close-in ports Based on budgets estimated for this study, dairy animals are the most efficient ruminants for utilizing the crop residues from the irrigated farm production systems in Egypt

Currently, the production of poultry meat is not as efficient as it could be For example, the estimated cost of producing one kilo of liveweight poultry meat in Egypt is LE 2 90 to 3 05 Comparable costs in the U S are approximately LE 2 00 This is largely due to lower feed/meat conversion rates and lower death losses in the U S Commercial egg production is not subject to the same inefficiencies Egg production costs are running around LE 1 6 to 1 8 per dozen which is only slightly higher than comparable costs in other commercial egg producing countries

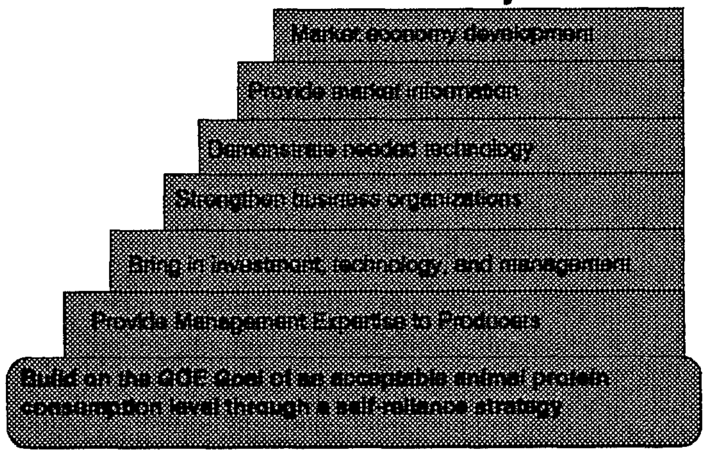
Commercial milk production is relatively efficient with costs that are comparable to other low cost areas in the world For example, the current (November 1993) estimated border price of milk is Pt 71 while cost estimates on commercial farms, at the same time, are around Pt 53 to Pt 64 This is on farms with high yielding dairy cows that produce more than 18 kg per day Besides having a competitive advantage commercial milk production also has a processing advantage Currently, milk processing facilities are running at about half capacity

Results for the immediate concerns can more likely be obtained through increased fed beef production Within the limits of available feeder cattle Egypt may increase beef production With imported grain inputs and local crop residues more production can be developed The approximate cost of fed beef production in Egypt is LE 6 to 6 5 per live-weight kg compared to LE 5 90 per kg in the U S However, the market for fattened beef is limited and only fills a niche at the high end of the market The market for conditioned animals fed on growing rations is larger but lower priced

What Steps Can Be Taken to Ensure Recovery and Maintain Growth in the Animal Protein Foods System?

The Government of Egypt (GOE) has a goal and strategy for the animal protein food system This is the foundation from which steps can be taken to improve the efficiency and production of the animal protein food system The GOE goal is to "realize an acceptable per capita animal protein consumption level by international standards " This is to be accomplished,"not through domestic self sufficiency in livestock products but through a strategic level of production which strengthens the buying and bargaining powers on the international markets "

Steps to Improve The Performance of the Animal Protein Food System



The GOE strategy is planned with the concept that the relative economic advantage of all protein sources should be taken into account beginning with the inputs industries through the processing and distribution industries The system is complex because livestock and poultry development operates within all the existing farming systems The Ministry of Agriculture and Land Reclamation will use the tools of research, extension services, organization, and legislation to achieve agriculture resource development, curb production wastage, improve product quality, and further privatization and investment in the poultry and livestock industry

The operation of the strategy is to further develop resources through the production of vaccines and animal medications, control quality of feeds, milk, eggs, and meat, promotion of commercial dairy farming, and support of organized marketing To curb wastage the operational strategy is to make full use of wastes from slaughterhouses, dairy processing, other farm commodity processing, and to reduce spoilage and loss in commodity handling Also, wastage will be reduced through the control of diseases and parasites Finally, legislation will be supported to (a) encourage vertical integration of broiler production and thus indirectly reduce the marketing of live broilers and (b) reduce the handling and trading of raw milk. In the area of privatization and investment, legislation is being considered to offset subsidies on imported animal and dairy products A detailed discussion of these alternatives and plans for the national strategy is provided in the "Production and Marketing of Animal Protein" report issued by Special Council of the President's Office This animal protein food system analysis indicates several steps that are supportive of the GOE goal and strategy for the sector These steps are

Provide management expertise to producers using experts from international poultry and milk companies Donor sources can probably make experts available from operating companies who will provide management expertise and work directly with producers Both management and technology could be applied in a more effective, low cost way in the poultry industry In the milk industry, high producing breeds and crossbreds can be used effectively along with targeted marketing of specific products On a larger scale, operating companies, especially those who sell hatching eggs and feed inputs, are available for workshops, conferences and on site visits to train Egyptians in the management areas

Bring in effective investment, technology, and management by supporting domestic and international joint venture investors in completing feasibility analyses of investments in commercial poultry meat and milk production In addition, assess the alternative financial instruments that can be used to finance these projects For example, can bonds or stocks be sold to raise funds for investment or can loans on a profit share basis be arranged? Can several small farmers be organized to produce on a commercial basis?

Joint venture investors can provide the know-how in integrating poultry operations from production through marketing They can also help develop either a privately owned or a cooperative gathering network among small farmers for fresh milk, and white and cottage cheeses The Ministry of Agriculture and Land Reclamation has regional rural sociologists who can identify rural leaders that can support the development of the network necessary to gather marketable surplus for urban consumer markets and processors Solving the marketing problem will provide further incentives for expanding supply and encourage the adoption of more productive animals and better management techniques

Strengthen producer organizations with management and organizational support to augment their skills in being industry spokespersons and in gathering and providing market information to the industry Currently, producers are probably not organized or do not perceive their organizations as a means of communicating policy positions to the legislature In the developing market economy it will also be useful for the industry organizations to promote and carry-out national promotion for their commodities and products

Demonstrate technologies as bulk grain handling to the feed industry to reduce losses and transport costs As the animal protein food system grows, larger amounts of feeds and feed ingredients will be required Such large volumes cannot be moved easily or stored in sacks Other technologies as packaging and cold storage can be demonstrated

Organize government agencies to provide market and technical information in an open transparent way As the market economy develops, national information is necessary for planning operations and investments At least an annual survey of livestock numbers and slaughter are needed to assess the supplies that are moving to market In addition, information on daily market prices at the retail, wholesale, and farm level are necessary to locate market opportunities and assess the efficiency of distribution The ministry has already started analysis and market information provision with the publication of the "Poultry and Eggs Situation and Outlook Report" by the Commodity Analysis Division of the Agricultural Economic Research Institute, and the "Red Meat Situation and Outlook Report" and "Dairy Situation and Outlook Report," through the National Agricultural Research Project Finally, regular calculations on costs and returns to meat, milk, and egg production, processing, and distribution need to be completed on a regular basis to assess the financial health of the industry

Continue with policy changes to develop a market-economy environment for the animal protein food system as a means of assuring continued investment, reorganization, and updating of management and technology Both domestic and foreign investors and managers are attracted to areas where market forces determine prices and available capital

Based on the analysis of the study it is important that trade be open to allow imports of meat, eggs, and milk products that are priced at full cost world market prices This "fair competition" policy will provide discipline to the development of the animal protein food system and helps ensure that the industry is sustainable as public sector subsidies are reduced It is also important in establishing output prices that are realistic for determining the value of businesses that are being de-nationalized

However, care must be taken to ensure that these imports are priced at full cost of production and transport If meat, eggs, or milk products are being sold on the world market and imported here at below cost (dumping), this will constrain the development of animal production, input processing, and marketing firms

To ensure imports are priced at full world market values will require adapting the current legislation or developing further "anti-dumping" legislation to comply with GATT The executing agency will need to act quickly and must therefore have clear protest procedures and communications on import price decisions Measures of world prices, both "fair" and subsidized can be obtained from the GATT organization It should be noted that this is not a basis for banning imports of red meat A substantial deficit of red meat exists and the market and the welfare of the consumer would be seriously disrupted without imports of red meat Further, imports are a source of less expensive meats that are purchased by the poor that are at risk from lack of affordable animal protein products

To further the development of the market economy and to be in line with the GATT it will also be useful to lift the "pocket veto" on imports of poultry Imports are necessary to cause a restructuring of the industry so that it is competitive at world market levels The simulation model used in this study indicates that imports spread out over the year that are within the 10% to 20% range of production will not unduly lower prices and thereby impede production Further, it leads to a higher level of consumption and build up of consumer acceptance that cannot otherwise be obtained

As the market economy evolves and as the commercial sector of the animal protein food system expands, tax incentives and selected de-regulation will be helpful in market development Currently, incentives are needed to encourage the development of a market for chilled and frozen poultry meat As this market develops proportionately fewer live birds will be purchased at retail and slaughtered A similar situation exists with cow milk. Buffalo milk is preferred to that from more productive cows Consequently, promotion efforts will be necessary to develop the less preferred product

On the whole, it appears that Government of Egypt is gradually setting in motion macro-policies that enable a market economy, initiating an agricultural policy for food security, putting privatization and entrepreneurship into practice, and developing and importing applicable technology To make a market economy effective, programs will be necessary for implementing a national food system survey on an annual basis, operating a food system marketing information scheme, and conducting an academic system that trains business managers and provides practical adaptive technological research

1 Introduction

1 1 The Role of Animal Protein Food in the Diet

Animal protein food is a small part of the average Egyptian diet Cereals and legumes are the most common foods By weight animal protein foods make up about one-tenth of the diet Animal protein food is red meat, milk, poultry meat, eggs, and fish This study does not emphasize fish because a further in-depth study of the fisheries sub-sector is planned

Red meat is commonly used to improve the flavor of other foods Flavoring is provided by juices and sauces from meats Low income families consume less than 8 kg of meat per year per person In contrast, average meat consumption is around 17 kg per year For the poor, meat consumption is often animal fat and edible offal used for flavoring and on occasion inexpensive imported livers and frozen meat

Milk is consumed fresh with about half the milk converted to cottage cheese and butter Cottage cheese is mixed with other foods and butter is used as a spread or to make butter oil Buffalo milk, with its high butterfat content, is the preferred milk drink and for making ghee The remainder is used to make white cheese, which is used in sandwiches and as part of the main meal to lend texture and flavor to complementary foods

Poultry meat is usually consumed as a whole bird Chickens are purchased live and slaughtered at the retail point or at the family dwelling This is convenient because a single bird can be used to serve throughout the days' meals without the necessity of refrigeration Eggs are usually consumed as ingredients in other foods with about one third being consumed as whole boiled or fried eggs

From a nutritional standpoint animal protein is used to supplement protein from cereals and legumes Animal protein accounts for about 16% of all protein consumed and is not a significant energy source, accounting for only 5% of the total calories

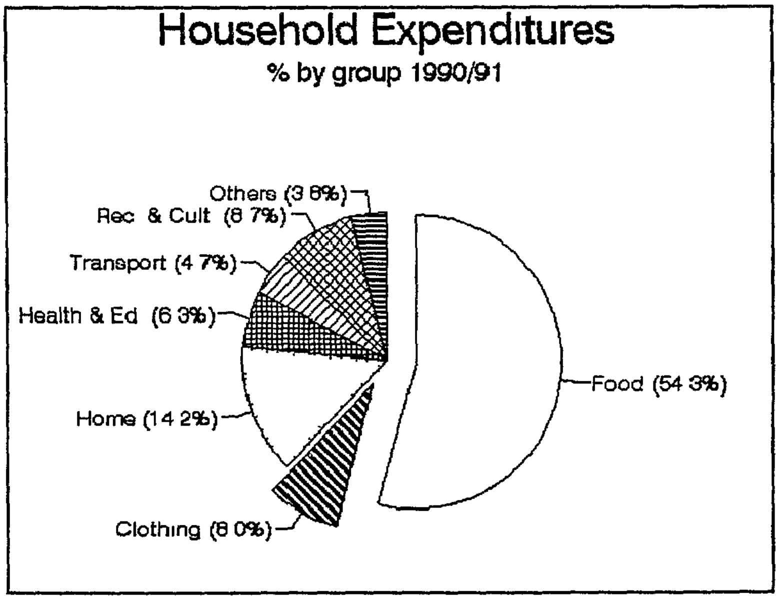
Protein quality is very important here The cereal-based diets often have deficiencies in essential amino acids Balanced diets can be achieved by conscious attention to the combinations of incomplete proteins With cereals, animal proteins, legumes and other simulated supplements can be used Cereals/legume combinations that satisfy the requirements of protein are often bulky and not suitable for vulnerable groups Cereal/animal protein combinations are more expensive and, often too costly for low income groups

Animal protein, even in small amounts, is helpful in the diet to improve the utilization of protein in the diet Average protein intake is more than adequate at 85 grams per person per day However, empirical studies show that a shortage of about 17% of dietary protein as net protein utilized (NPU) occurs This could be improved with small amounts of animal protein These studies also show that subsidized prices of essential food items such as cereal legumes, oils, and sugar may shrink the consumption of animal product commodities Because animal protein food consumption is sensitive to income, shortages of NPU are more likely to be reflected in the low to middle income classes of the population Within this group the most vulnerable are the growing children, mothers bearing children, and lactating women

Since the effects of nutritional deprivation fall on children the ensuing impacts on development can be carried across generations and last for centuries Hence the impacts of nutrition cannot be easily incorporated into economic models

Animal protein food supplies micro nutrients and facilitates the absorption of trace elements For example milk provides calcium, phosphorus, riboflavin, and "B2", meat provides iron, thiamine, "B1", B12", and "B6" In addition, animal protein foods are associated with the absorption of iron Consequently, programs that fortify cereals with iron can be made more effective if animal proteins are available in the diet

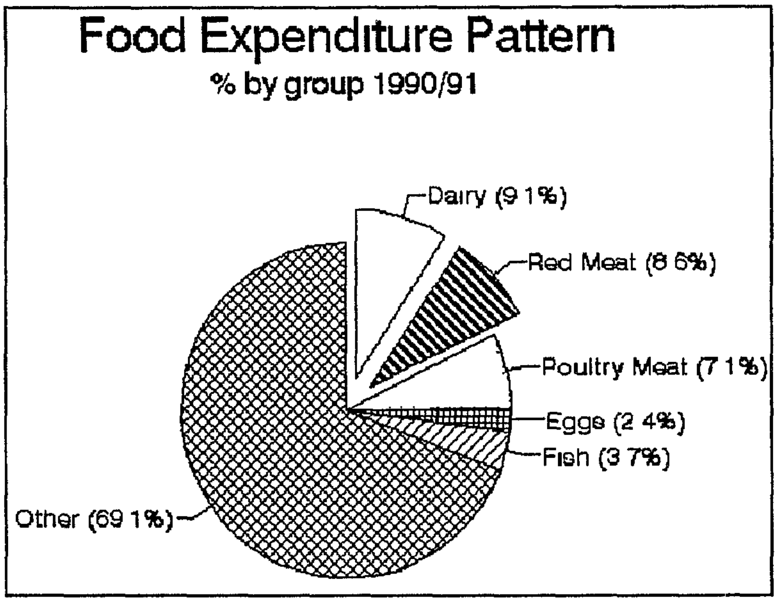
1 2 Food as Part of Household Expenditures



As shown in the chart over half of total household expenditures are spent on food Total per capita household expenditures amount to LE 859 5 per year as is reported by the 1990/91 Household Expenditure Survey Animal protein products represent 16% of this total while the other food items represent 37 5% of total expenditures Housing and furniture account for 14 2% of total expenditures Recreation and culture is next at 8 7%, this group includes sports, restaurant eating, cigarettes, etc Surprisingly, about 4 5% points of this aggregate is reportedly spent on tobacco Clothing ranks fourth at 8% of total expenditure Except for cigarettes these expenditures are in line with other developing countries As the food system becomes more productive and satisfies the market lesser portions of the total expenditures will be devoted to food and a larger portion left for other expenditures

1 3 Animal Protein Food Expenditure as Part of Total Food Expenditures

Within the food bill of the average household, about 31% of the expenses go for animal products The total expended for food is LE 466 3 per capita as reported by the 1990/91 Household Expenditures Survey Poultry products are at the top of this bill valuewise as they absorb about 9 5% points of the total Dairy products follow with 9 1% and red meat with 8 6% Although red meat is preferred, less expensive cheeses, eggs, and poultry account for most of the daily intake of animal protein



1 4 The Role of Livestock and Poultry in Farming

Livestock and poultry production is relatively intense and concentrated on smaller subsistence-like farms Production is confined largely to the irrigated cropping areas Other parts of the country are desert and cannot support the natural forage for intensive grazing A few animals, mostly sheep and goat herds, and camels, are produced extensively in the desert areas and in low rainfall areas along the Mediterranean coast

Livestock and poultry are both complementary and competitive with crop production (Fitch and Soliman, 1981) In their role as consumers of crop residues they are complementary They convert otherwise unused plant materials to food products For example, straw and maize forage consumed by livestock cannot be used directly for human consumption Poultry, as scavengers, use lost plant materials such as grain dropped in harvest Livestock and poultry also utilize unused or low valued labor not absorbed in other enterprises The density of family labor per animal unit decreases as farm size increases (Soliman, Mahdy, and Ibrahim, 1992) Family labor is largely used in milk production Meat production is a secondary activity generated by calves produced in the production system

Livestock are not used extensively for power as in the past During the last ten years most of the oxen have been sold for slaughter Pumping is now primarily powered by electric and diesel engines Heavy plowing is often completed with rented tractors

Livestock and poultry compete directly with crop production because they consume food grains as corn, barley, wheat, and pulses Livestock also compete directly for land use because a large portion of land during the winter is devoted to the production of berseem clover This land could otherwise be used for cotton, wheat, beans, and selected vegetable crops During the summer roughages are not produced as extensively and there is often a seasonal shortage of forages

Livestock (mostly buffalo) are usually kept by farmers for the production of milk. Milk is consumed fresh by the household and converted to ghee and white cheeses Some small amounts of marketable surplus are produced and sold in the village or to the network that moves the product to concentrated urban areas A few farms are totally commercial and sell to processors or to the large urban markets of Alexandria and Cairo Red meat is produced from cows that no longer produce milk and are sold for slaughter, and from the annual crop of calves that more frequently are now being held on the farm for a year or more and grown to heavier weights A few commercial feedlots buy young buffalo calves and feed them to heavier weights These are usually sold directly to butchers or government slaughter houses

A wide variety of poultry is kept on farms Chickens are kept mainly for eggs, pigeons, rabbits, ducks, turkeys, and geese for meat Farm flocks consist of small, hardy breeds that bring a premium price for both eggs and meat Farmers keep pigeons much like chickens that scavenge plant material adding supplemental feeds as needed Growth in the farm flocks is limited by crop production since this is their major source of feed Commercial production that can depend more on imported feeds and other inputs now accounts for about two-thirds of the production of eggs and one-half of the chicken meat Commercialization has also spread to the production of ducks, geese, rabbits and turkeys

1 5 The Concept, Definition and System Approach

The *animal protein food system* is a name given to all the businesses and institutions that produce and deliver red meat, milk, poultry meat, and eggs, and their products to the consumer As described in this study the animal protein food system inputs sector is a group of businesses that produce, import, gather and deliver animal health and breeding services, credit, feeds, hatching eggs, baby chicks, and other inputs to beef and buffalo, and poultry producers

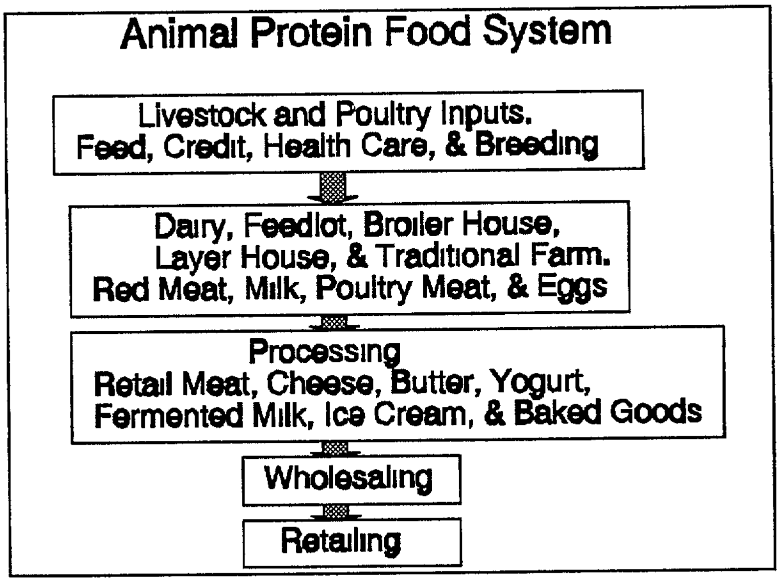
A system approach is used to describe and analyze the animal protein food sector At the operating level this sector provides inputs to livestock and poultry farming and markets their outputs In this role it is key to livestock and poultry farm profits At the national level the animal protein foods system provides food security, economic transformation support, and direct contributions through added employment, income, and foreign exchange earning exports

In general the components of the animal protein system are four sub-systems, which are sequentially inputs, production, processing and distribution The later also includes wholesaling, and retailing as shown by the nearby figure

The term "animal proteins food system" was chosen for this study as a designation for the economic sub-sector encompassing all the businesses and institutions that service and provide animal protein foods

1 6 The Animal Protein Food System and Farm Sector Development

In its role as provider of inputs for livestock production and meat, milk and egg marketing, the animal protein food system is key in determining the prices that the livestock and poultry farm producer both pays for purchased inputs and receives for his production The livestock and poultry inputs sector uses a number of natural resources and water to produce livestock and poultry farm inputs as feed, fuel, and power The costs of natural resources and the efficiency



of production, manufacture and distribution of livestock and poultry inputs determine supplier costs The prices farmers pay for these livestock and poultry inputs depend in part on the supplier costs, relative market power of buyers and sellers, and government policies

The processing and distribution sector of the animal protein food system assembles and converts live animals, raw milk, and eggs into food ingredients and foods that finally are retailed to the consumer Provided by the food protein system, through processing, storage and transport, these marketing activities change the form, time of availability and place of access for livestock and poultry products for both domestic and foreign consumers The efficiency and effectiveness of marketing and processing activities play a major role in determining the farm value of livestock and poultry products

In some cases, commercial farming will supply poultry and livestock inputs as feed and breeding services In addition, the consumer products sector provides industrial by-products, as cottonseed meal, to the livestock and poultry farm

In brief, the animal protein food system is key to what livestock and poultry farmers pay for inputs and receive for slaughter animals, milk and eggs It determines livestock and poultry farm value and income, and drives production Further, it is a significant part of economic development since the food and fiber complex, often called agribusiness, is a dominant part of the economy

1.7 The Animal Protein Food System and the National Economy

The first and most important role of the animal protein food system in the economy is to help provide <u>national food security</u> The animal protein food system produces and develops markets for livestock and poultry production inputs that improve farm production and productivity The growth in availability and use of pesticides, credit, machinery, feeds, improved breeding stock, animal health care products and hatchery facilities support increasing livestock and poultry production needed for a growing population and possibly for exports (or import replacements) that feed the increasing need for foreign exchange At the same time, the animal protein food system must market meat, milk, and eggs that must be stored, transported, processed, wholesaled and retailed to meet the needs of an expanding market – a market that is driven by increasing incomes and urbanization Often, the market is for different foods than are traditionally consumed as market promotion functions occur

Animal Protein Food System

Animal protein foods system as a part of greater agribusiness is playing a special role in economic transformation from the Egyptian farm based economy to one that is more industrial and service based If the animal protein food system can produce enough to satisfy the household quality protein needs at lower cost, more money is left in the household budget for investment and consumption in the rest of the economy In addition, the livestock and poultry inputs and consumer products sectors are part of a natural frontier of industrial development in high technology production of inputs as superior baby chicks, artificial insemination, feed additives, and credit based on livestock collateral, as well as food and food ingredient manufacturer Often these are the first vestiges of industrialization and job sources for the unemployed and underemployed in rural areas

As the animal protein food sector successfully contributes to economic transformation, it will probably become a smaller part of national employment and economic activity As animal protein food production and processing becomes more successful, it can satiate consumers growing food protein needs at a low cost As a result, a smaller portion of consumer income is required for the necessities of high quality food protein and more household income will be available for consumption and investment in other areas of the economy Even though the animal protein food sector is expected to fall as a portion of the total economy as development ensues, its direct contributions through employment, income, investment, and exports are always significant

2 Animal Protein Food Demand and Consumption

As the economy shifts to one that is more market oriented it is likely that higher levels of economically "superior goods" will be emphasized and promoted in the market Superior goods are those that increase as personal and household incomes increase Animal protein foods, vegetables and fruits are the more important superior goods in the diet Indeed, one measure of the standard of living is the level of economically superior goods produced and consumed

A demand analysis must also consider the economically "inferior goods" because they are the items that often support the poor The consumption of inferior goods increases as incomes decline Selected animal protein food imports are "inferior goods" purchased by the poor For example, nearly half of the frozen red meat imports are purchased by individuals with per capita expenditures of less than LE 1600 per year

This section discusses the major economic factors that affect demand The first part discusses the regular movement of prices, consumption, and production Simple relationships are developed between the prices of animal protein food, and the available supplies (consumption) and income Supply relationships are developed between lagged prices and production These relationships are used to develop a simple spreadsheet model that is used to project retail prices, per capita supplies, and production of red meat, milk, poultry meat, and eggs The projections are based on data generated by this study and base data provided by the Central Agency for Public Mobilization and Statistics

After the projections have been presented a more in depth discussion covers the relationship between income and the consumption of animal protein food Data from the 1990/91 Household Expenditures survey are used as a basis of these estimates and graphics display In addition, alternative data from the "food balance sheets" are used for a discussion of year to year movements of per capita consumption Socioeconomic and policy factors affect consumption and are discussed in this section In addition, the country's demography and population trends bear on the market mechanism

2 1 Projecting the Demand for Animal Protein Food

The projected demand for red meat, milk, poultry meat, and eggs is based on a fundamental set of relationships between retail prices, per capita consumption, and income (private expenditures) The formal equations are summarized in the following table

Animal Protein Food Demand Relationship Coefficients

Dependant Retail Price Variables in Pt per Kg or per Egg	Constant	Per Capita Consumption of Red Meat (Kg)	Per Capita Consumption of Milk (Kg)	Per Capita Consumption of Poultry Meat (Kg)	Per Capita Consumption of Eggs (Kg)	Per Capita Private Expenditures (Kg)	Dummy for reform period (0-1)	R^2
Beef	394 03	-49 38				897	72 3	98
Standard Error		10 80				003	25 7	
All Milk	79 58		- 71		-1 19	13	17 5	80
Standard Error			32		33	01	7 7	
Chicken	103 75			12.04		47	5 1	97
Standard Error				5 30		02	19 4	
Egg	4 56				- 10	016	8	95
Standard Error					03	001	9	

In order to make long term projections, supplies were projected using simple lagged price relationships Beef prices were lagged 3 years in the red meat production relationship However, all other prices were lagged by only 1 year The demand and supply relationships together are referred to as a recursive model and were used in this case to simulate prices, production and consumption of red meat, milk, poultry meat and eggs for the future period from 1994 through 2003

Animal Protein Food Supply Relationship Coefficients

Dependant Production Variables in (000) Metric Tons	Constant	Retail Beef Price Lagged Three Years Pt /Kg	Retail Milk Price Lagged One Year Pt /Kg.	Retail Chicken Price Lagged One Year Pt /Kg	Retail Egg Price Lagged One Year Pt /Kg	Dummy Variable for Reform Years (0-1)	R^2
Red Meat	314743 8	177 2				-6118.22	75
Standard Error		26 8				17537	
Milk	1454 4		5 85			66 16	89
Standard Error			46			41 89	
Poultry Meat	317 4			24		61.24	66
Standard Error				06		22 86	
Egg	1234 9				119 84	1147 62	83
Standard Error					19 11	211 91	

The relationships above all have the expected sign and the price/quantity coefficients are all significant However, the relationships are used here as indicators of direction and are not considered to have high explanatory power The data used for fitting may not be based on unbiased samples In fact, none of the livestock and poultry data are thought to be based on statistically accurate sampling procedures Data used in this analysis are shown in Annex 1 The period fitted was from 1976 through 1993 The adjustment period to reforms was considered to be 1987 through 1990 and the dummy variable was given a value of 1 for those years and 0 for all others The price and per capita expenditure data are in nominal terms

The projections have been made under three different scenarios The first scenario assumes that population and private expenditure growth remains at the average for the 1976-1993 period Imports are held at their 1993 levels at about 30% of production for red meat and 33% for milk In scenario I no imports of poultry meat or eggs are assumed The assumptions made for the three different scenarios are shown in the nearby table

Assumptions Made for the Projections of
Animal Protein Food Under Scenario I,II & III

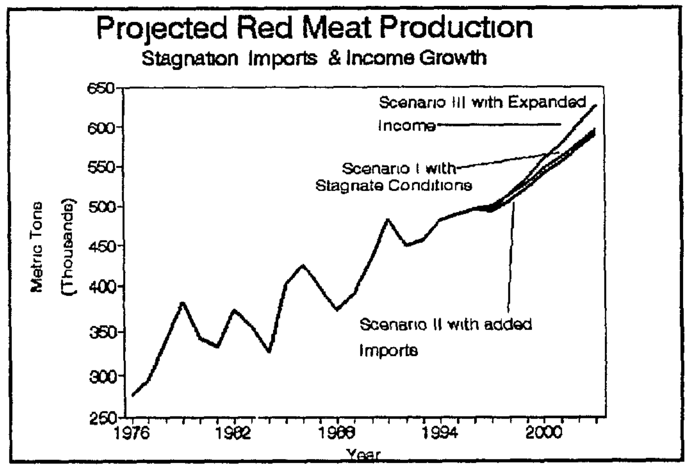
	Scenario I	Scenario II	Scenario III
Per Annum Growth of			
Population	2.7%	2.3%	2 3%
Private Expenditure	6 5%	6 5%	8 5%
Imports as a % of production			
Red Meat	30%	40%	40%
Milk	33%	35%	35%
Poultry Meat	0	15%	15%
Eggs	0	15%	15%

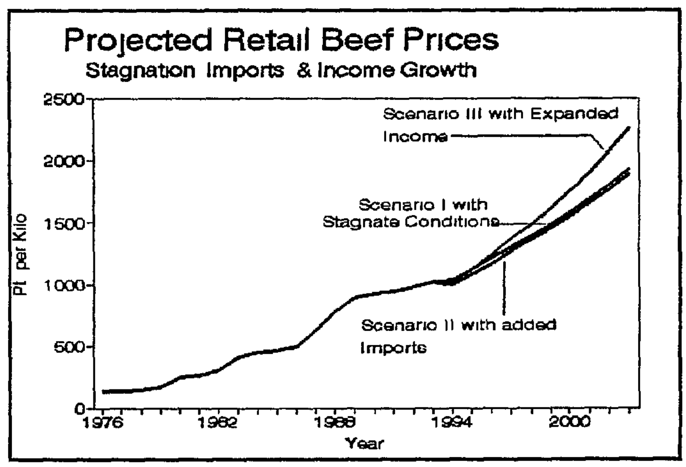
Red meat, milk, poultry meat, and egg per capita supplies or consumption, production and prices are simulated for 1994 through 2003 in the following graphs The simulation is made from the relationships described above Scenario I is intended to portray conditions that are similar to current economic conditions Scenario II is intended to represent conditions where population growth slows and imports of poultry meat and eggs occur Scenario III continues with imports of poultry meat and eggs, a slowing population growth but assumes higher private expenditure (income) growth The following graphs show the results of the simulation along with the historic graph from 1976-1993

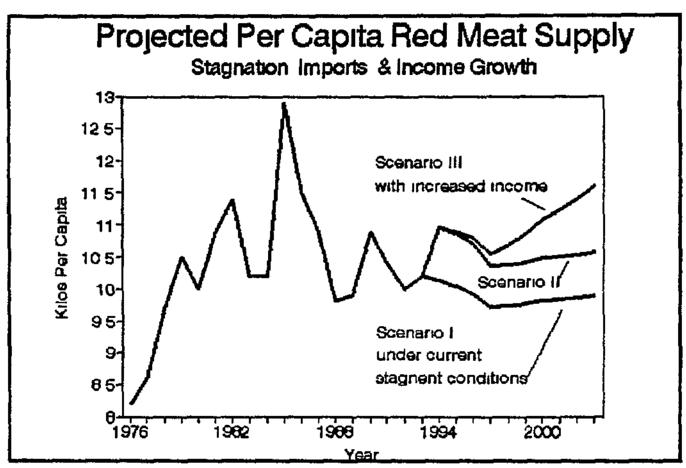
2 1 1 Red Meat Production, Prices, and Per Capita Supplies

Red meat production continues to trend up at about long term trend rates under Scenarios I and II Due to the use of lagged prices, a cycle is traced out from 1993 through 1997 After that period production under Scenario III begins to rise more rapidly because increased growth in private expenditures (income) stimulates demand to rise encouraging higher prices that boost production The lag between a price rise and production response is due to the time it takes to respond after making the decision to increase production For example, if the producer decides to increase production, it takes time first to raise a female calf to breeding age, then a 9 to 10 month gestation period before the calf is born and at least another year before the calf can be grown to a weight satisfactory for slaughter The increase in per capita supply between Scenario I and Scenario II is due to the decrease in population growth and expanded imports Expanded imports of red meat are less likely as imports are now relatively unrestricted

Red meat production, perhaps because it is largely a by-product of milk production, appears to be stable with per capita supplies remaining near current levels under Scenario I Some increase in imports can occur without causing a large impact on total production However, at the margin, feeding for fattening and maybe even growing would be affected

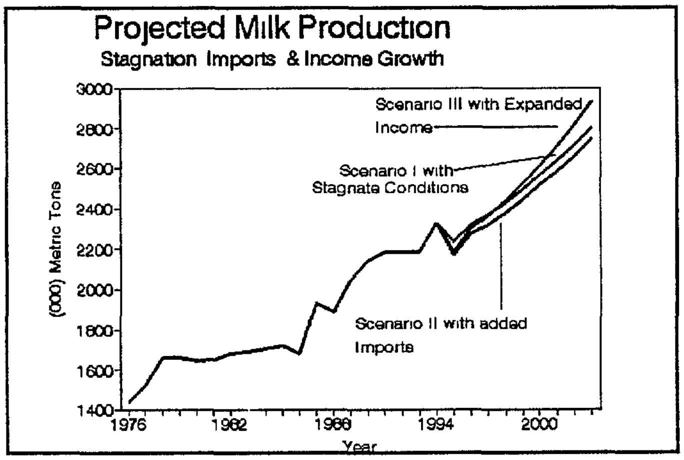




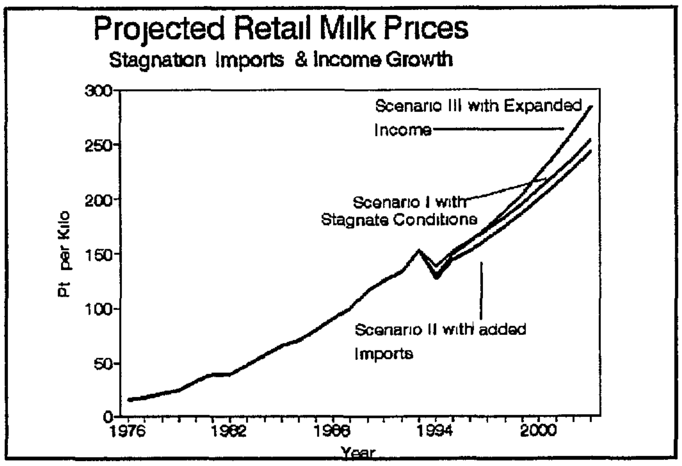


2 1 2 Milk Production, Prices and Per Capita Availability

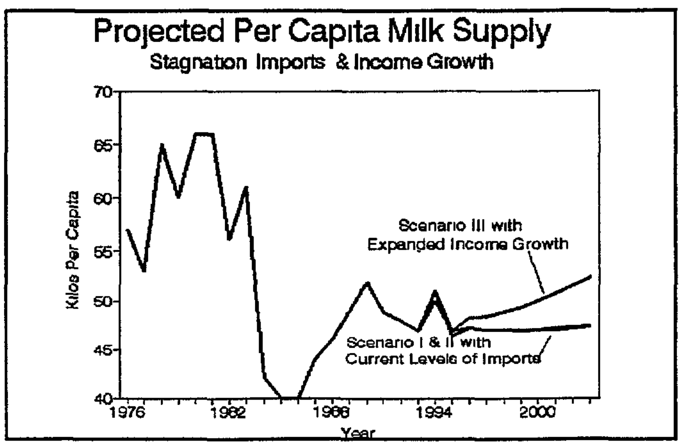
Milk production is responsive to milk prices in the near-term apparently because producers can sell cows for slaughter when milking is not profitable Currently, there is a practice by the "flying herd" managers of purchasing cows in milk and selling them for slaughter at the end of the milking season Flying herds are located near large urban centers and produce milk for sale to nearby customers Milk production can also be controlled to some extent by varying the available feed



Surprisingly, milk prices are quite sensitive to imports and added production As shown by the nearby chart a reduced price is evident with a 2% increase in the proportion of imports These reduced prices affect production the following year Milk prices are also affected by income but not as strongly as the response for red meat

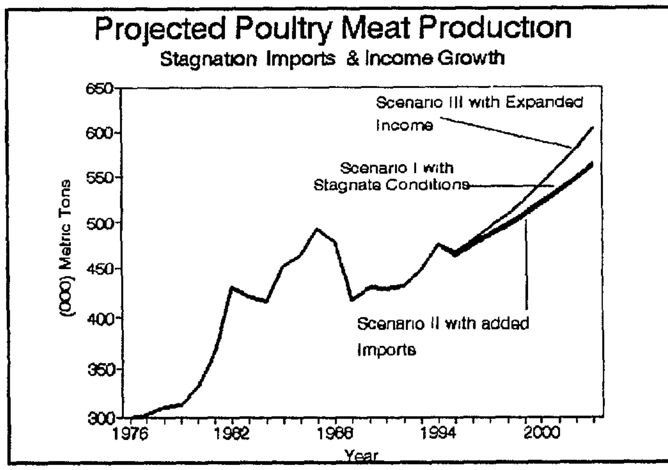


The real concern here is the gradual downward drifting of projected per capita milk supplies Historically, the downward trend is probably due to urbanization and the replacement of milk in the diet with other more convenient and storable foods However, our analysis in Section 2 2 3 shows a strong income elasticity of demand (1 29) for milk so we consider the figures from 1962-1984 to be suspect The acceptance and more widespread use of more productive dairy cows could shift supply and halt this ongoing downtrend trend in per capita supplies of milk. Farming is going through major changes with the sales and slaughter of draft animals and farmers can thus replace local breeds, which were dual-purpose types, with specialized dairy breeds

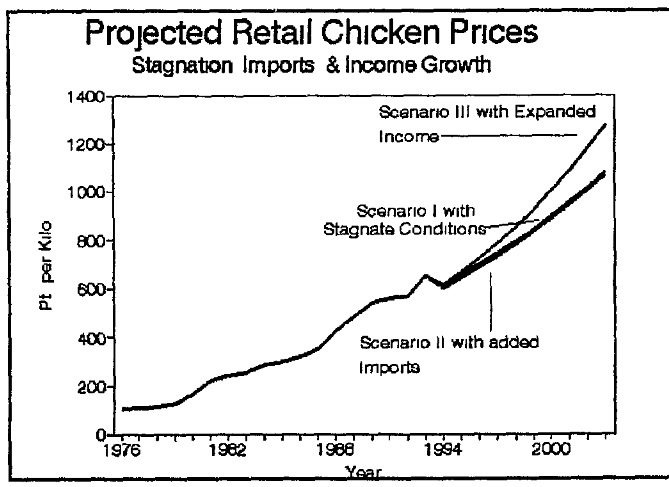


2 1 3 Poultry Meat Production, Prices and Per Capita Supplies

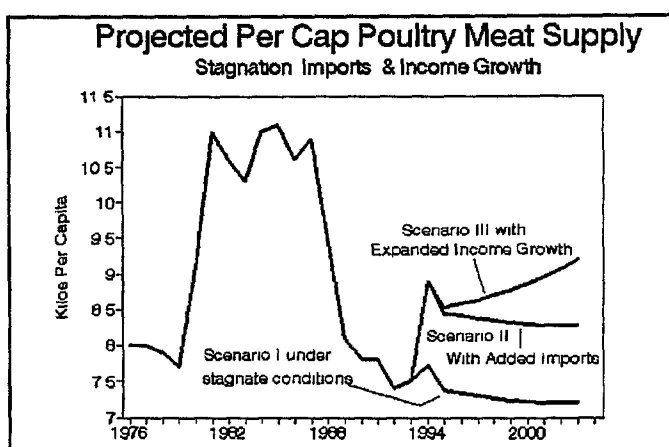
Two major points can be demonstrated with the nearby graphs First, imports that amount to as much as 15% of production can be introduced and have only a small impact on poultry meat prices Secondly, poultry meat consumption has dropped precipitously since the middle 1980s and is projected to continue declining through 2003 under Scenario I assumptions



To offset this decline, the poultry meat industry can reorganize, bring in new capital and management, and aggressively develop urban markets for dressed birds To prevent further consumer dissatisfaction and to discipline the poultry meat industry to be more competitive, imports could be allowed entry on a "fair competition" basis A number of other alternatives could be followed but with the successful conclusion of the General Agreement on Tariffs and Trade, it will probably be beneficial to participate in the world poultry trade

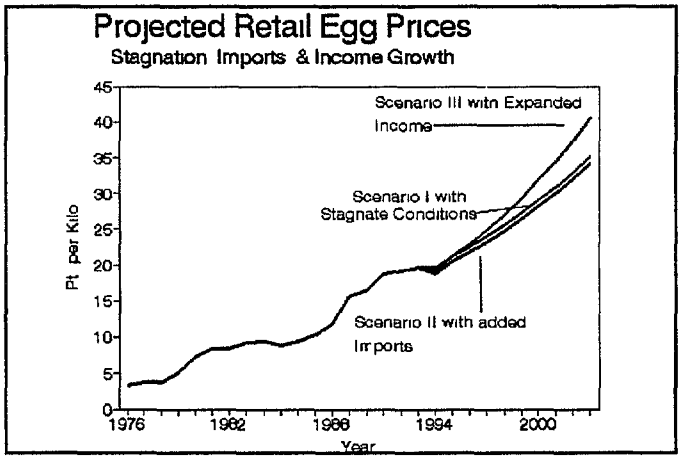


The poultry meat industry in Egypt has had to reorganize as feed subsidies have been dropped This has eliminated a number of operators and left the entire industry with overcapacity However, this does not represent complete restructuring Vertical integration is needed to be competitive with other international poultry producers Processing companies have integrated backward through contracting and forward by developing packaging, dressed bird and piece sales, and cold storage and transportation At this point, it appears that the poultry meat industry could be reorganized to be substantially more competitive Indeed, poultry meat could even be competitive with the preferred red meats

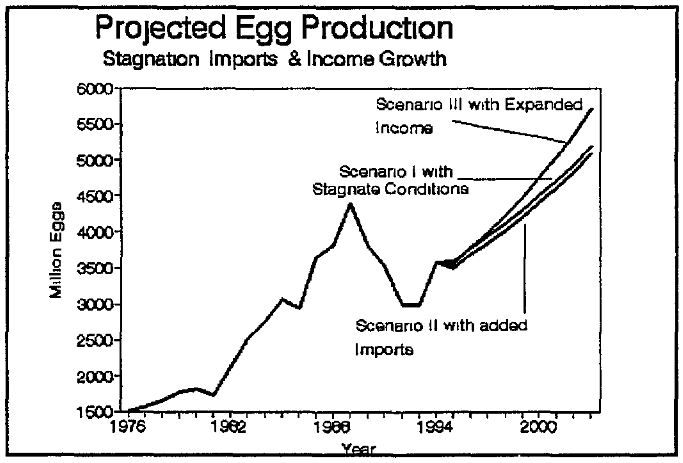


2 1 4 Egg Production, Prices and Per Capita Supplies

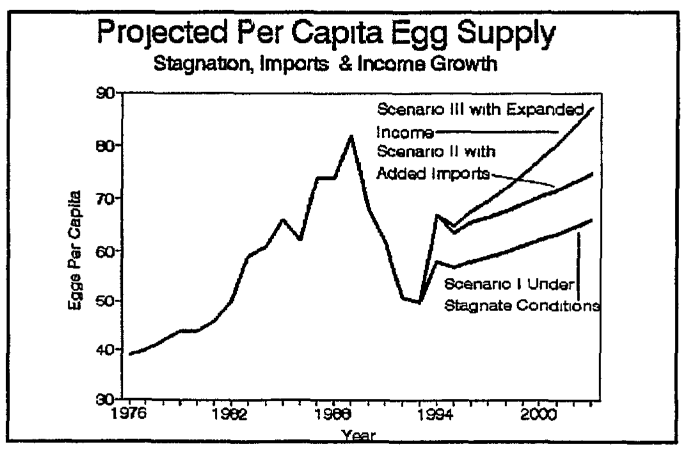
Egg production, prices, and per capita supplies appear to make progress under all three projected scenarios As noted in the supply section of this report, egg production appears now to be cost competitive and comparable with international standards



As shown by the nearby chart egg production declined after the economic reforms were introduced in 1986 Recently production has begun to recover In addition, as shown by the prices chart, consumers are continuing to demand larger quantities of eggs and are willing to pay higher prices To the consumer, eggs are competitive with other animal protein foods The analysis shows a statistically significant substitution of eggs for milk products



Some problems of consumer acceptance do exist among urban consumers who prefer local farm eggs that have "more taste " There are also problems with finding suitable packaging and transportation over long distances Also, a specific market has not been developed for fluid and dried eggs



The changes in total egg production are reflected in the per capita supplies since imports have not been used to offset the decline in local production This is unfortunate for the consumer and producer The consumer has missed the satisfaction of higher levels of consumption and eggs have lost market share Local producers will now have to develop a larger market share if they wish to produce and sell additional eggs Undoubtedly, consumers have replaced eggs with more convenient processed foods

2 2 Consumption Response to Income and Other Related Consumer Behavior

The animal protein production sector is very responsive to changes in the economy This sector has been affected by a number of changes associated with the move to a market economy Changes in policy and the economic system since 1986 have been very rapid causing the animal protein sector to adjust accordingly Both supply and demand have been affected, supply by the reductions in subsidies on feed and demand by changes in consumer's income and tastes and preferences associated with urbanization

Animal protein foods are particularly sensitive to income Supplies are affected positively through the ensuing price increases as incomes increase Higher prices encourage increases in both sources of supply, imports and production Demand increases with income and economic development because animal protein foods are generally considered by consumers as economically superior goods That is why consumers prefer to buy proportionately more animal protein food when their incomes are higher Generally, animal protein food consumption is relatively elastic with respect to income Income elasticities are close to 1 for red meat, milk, poultry meat, and eggs (Shapiri and Soliman, 1985, Emam, 1989) Elasticities of consumption with respect to price also appear to be somewhat elastic That is why consumption may respond more than proportionately to price changes As a result, when shortages occur as has been the case in 1993, prices may increase dramatically until consumption can be adjusted and replaced with a substitute As discussed later, since 1976 price increases in animal protein foods have not been as rapid as inflation

When shortages occur in one food group, such as red meat, price increases are held in check by the availability of substitutes from other animal protein foods and with other non-animal food products For example, there is a statistically significant substitution between eggs and milk (cheese) There also appears to be an observable substitution between poultry meat and red meat Perhaps in a more indirect way milk and eggs substitute for meat Finally, from a dietary point of view, legumes and cereals substitute partially for animal protein food Through this mechanism changes in prices and/or purchasing power have a widespread impact directly and indirectly on the products in the whole food system

On average, animal protein food price increases have about matched inflation, even as supply shortages have developed For example, between 1976 and 1993, the per annum rates of growth in retail prices appear to have been high, but the rate was somewhat less than inflation Milk prices have increased an average of 14% per year, meat prices increased 12 75%, and poultry products (broiler and eggs) expanded by 11% This contrasts to the average annual increase of the Central Price Index (CPI) over the same period of 16 3%

2 2 1 Measuring the Animal Protein Food Consumption Response to Income

The demand relationships shown earlier were developed using time series data and are not particularly suited for explanation To achieve a higher level of explanation, relationships between consumption of animal protein foods and income were estimated using data from the 1990/91 Household Expenditures Survey To some extent, the use of cross sectional data implies prices are more or less fixed, at least for the time period of the survey As a result the income effect can be more directly measured To account for the varying proportions of households over the different levels of income, a weighted regression method was applied

In this case, there is probably less variation in consumption for low-income families than high-income families The variation in consumption of animal protein food for low-income families is restricted by their budget which is not the case for higher income families As noted above it was thought that a weighted regression method might be more appropriate for this level of heteroskedastic disturbances (Kementa, 1986)

Four proposed forms of the quantity-income relationships were fitted for each commodity They are linear, logarithmic, double logarithmic and an inverse function The relationships or equations used quantity as dependent and income as independent

2 2 2 Red Meat

Red meat consumption in Egypt is composed of locally produced fresh meat and imported frozen meat The findings in this section are important because they indicate that the poorest segments of the population purchase imported frozen red meat and consider it as a superior good The wealthiest segments of the population consider imported frozen red meat as an inferior good and purchase less as their incomes rise

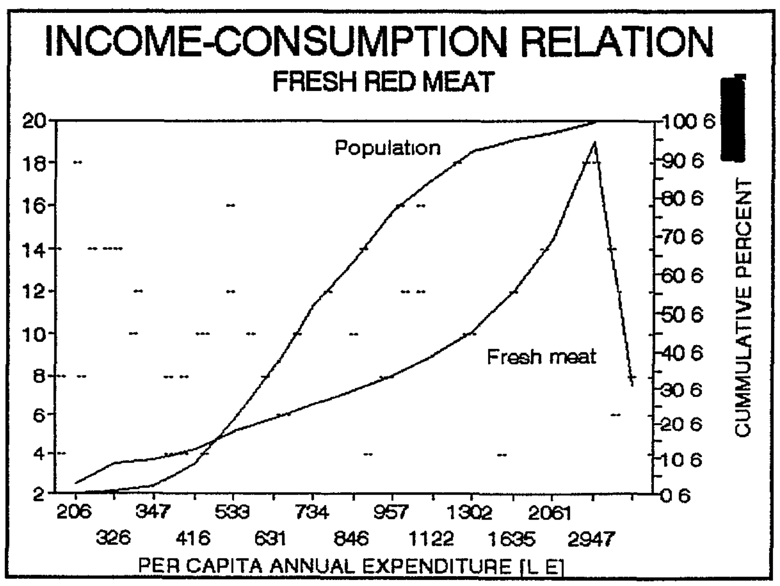
The best fitted form of Engel's curve for fresh red meat is the double log function with a constant statistically significant elasticity of 0 765

$Q^{\wedge} = -3\ 16956 + Y^{0\ 7651}$

$N = 14$, $SEE = 0\ 06$, $R^2 = 0\ 99$

where, $Q^{\wedge}$ = estimated per capita fresh meat consumption (kg), Y = annual per capita household expenditures (LE) and SEE = standard error of estimate

This relationship indicates that a 10% increase in per capita household expenditures (purchasing power or income) leads to an approximate 8% increase in locally produced fresh red meat consumption This result indicates that fresh meat is very responsive to income but on average not necessarily a superior good



The inverse equation form with quantity and income in logs is the best fitted quantity-income relationship for frozen red meat All coefficients are statistically significant This shows consumer behavior associated with increases in purchasing power It passes through three stages where frozen red meat is considered as superior, necessary, and inferior The equation is

$$Q^{\wedge} = 4\ 6467 - 0\ 6533\ \mathrm{Ln}\ Y - 659\ 3138/Y$$

$N = 14$, SEE = 8 24, $R^2 = 0\ 77$

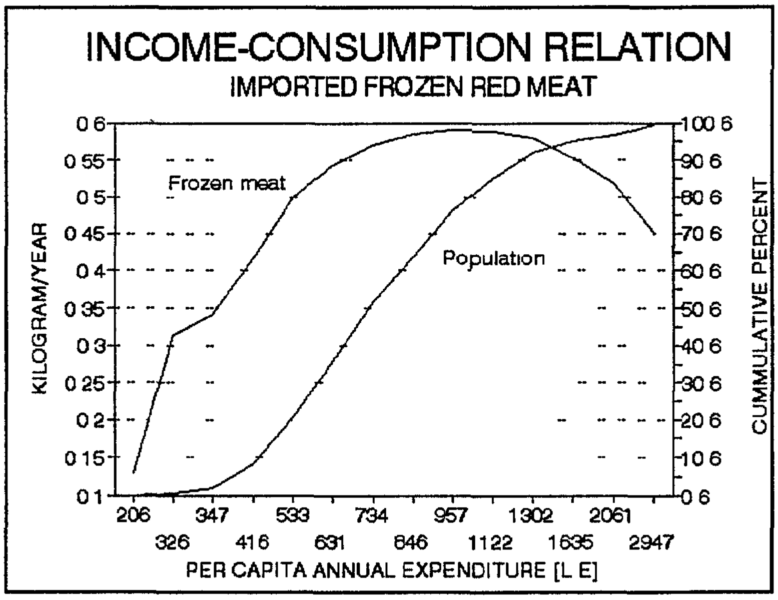
The following text table shows about 9% of the population (those with up to an annual expenditure of LE 1600/family/year, that is about LE 320/person/year) consider imported

Expenditure (Income) Elasticity
For Frozen Red Meat
By Income Level and Percent of Population

Annual Average Expenditure Level LE	Household Expenditure (Income) Elasticity %	Percent of Population %
<1000	2 55	
1000-1200	1 37	
1200-1600	1 25	
1600-2400	93	
		9%
2400-3200	58	
3200-4000	39	
4000-4800	25	
4800-5600	04	
		68%
5600-6800	- 07	
6800-8000	- 14	
8000-10000	-.25	
10000-12000	- 33	
12000-14000	- 43	
		23%
Total/ Average	09	100%

frozen meat as a superior good A 10% increase in the purchasing power of this group leads to an increase in the consumption of frozen meat by 25% These are the poorest segment of the population They consume between 2 5 kg and 4 kg/person/ year of red meat This group must buy the cheapest meats and they are very dependant on less expensive imports

About 68% of the population consider frozen meat a necessary commodity to compensate for the absence of fresh meat They tend to have more meat These are the income classes between LE 2400-5600/household per year Within this class, 13% consider frozen meat a full substitute for fresh meat, while 15% consider this type of meat a partial substitute for fresh meat



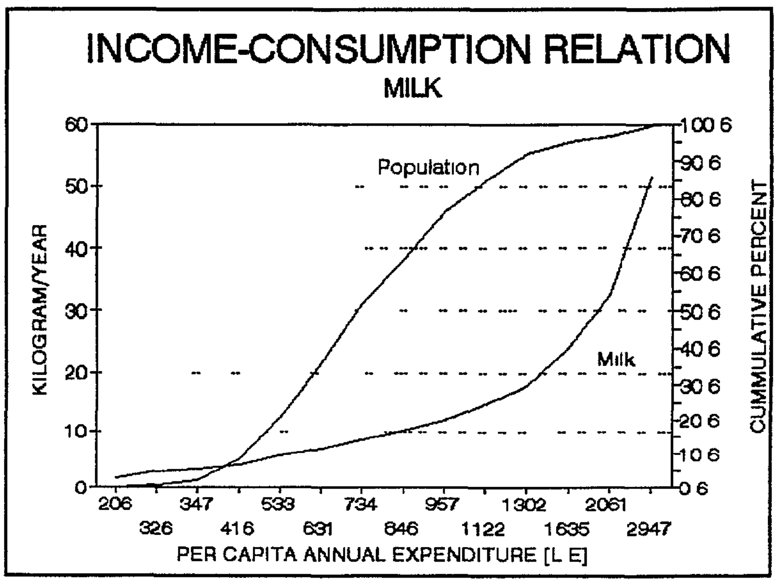
The top one-fifth of the population (annual expenditure over LE 6800/household/year) consider frozen meat an inferior good This group appears to prefer fresh locally produced red meat They are able to afford a diversity of foods and will substitute other foods as a protein source

2 2 3 Milk

The double log form is the best fit for milk consumption in relation to income The resulting statistically significant constant elasticity is 1 29, that is a 10% increase in income per capita leads to 13% increase in milk consumption The milk consumption-income relationship is

$Q^{\wedge} = -6\ 3960 + Y^{1.29}$

N = 14, SEE = 209, $R^2 = 0\ 96$



Unfortunately, the availability of milk products in the market, either through imports or local production, has decreased Estimates from the 1990/91 Household Expenditures Survey in comparison with the same survey in 1974/75 show the most severe decline of the three or four available estimates However, all the available estimates show a general decline in milk consumption At this point, the increases in real per capita income are not enough to support substantial increases in consumption, prices or ensuing production

It should be noted that the production system for milk is changing since cattle and buffalo are not used as extensively for power as was the case in the 1970's During the last 10 years a large part of the oxen and native female cattle have been slaughtered As shown by the nearby chart as income increases a substantial market expansion for milk could occur

2 2 4 Poultry Meat

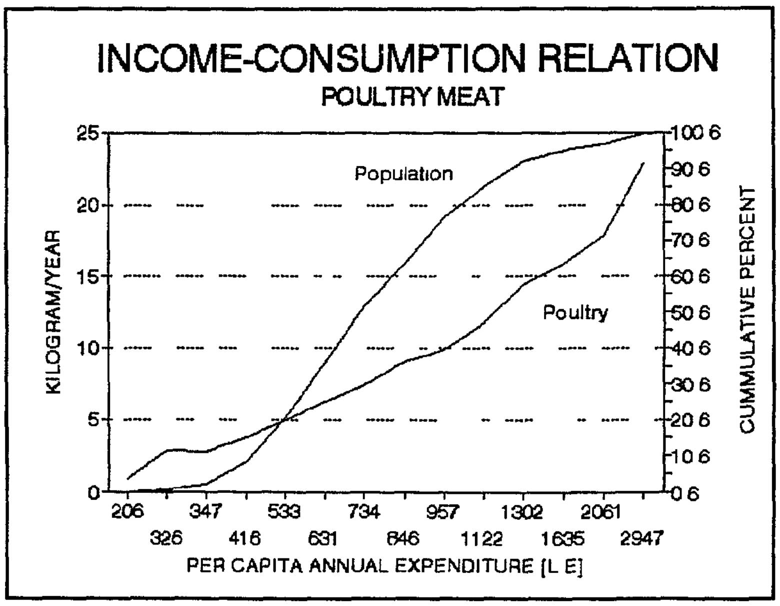
Due to the relatively low price of poultry in comparison to red meat, consumption can easily increase if poultry meat is available The double log form is the best fit for this relationship The resulting statistically significant constant elasticity is 1 13 Elasticity from this form does not vary by income level An increase in per capita household expenditure (income) of 10% leads to a more than proportional increase of 11 3% in poultry consumption This result, to some extent, confirms that the poultry industry will benefit from any positive economic growth in terms of market expansion

The resulting Engel's Curve for poultry is

$Q = 0\ 2008 + Y^{1\ 1257}$

$N = 14$, $SEE = 0734$, $R^2 = 95$

Because of its high association with income and potential low cost production, poultry meat is important to the animal protein food sector Indeed, based on the estimates shown in Annex 1, per capita consumption of poultry now exceeds that for red meat However, until the poultry meat industry completes the restructuring process and imports are made available to the consumer it will not achieve its full potential The poor segments of the population would likely benefit from poultry imports similar to the situation with frozen imports of beef



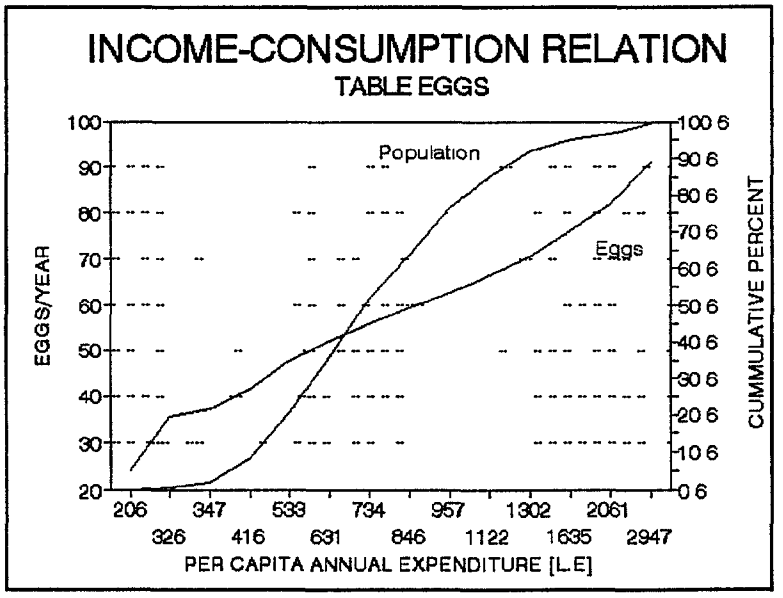
2 2 5 Eggs

The best fitted statistically significant relationship for consumption and income is the logarithmic function that shows a decreasing rate of response with respect to income, that is the higher the income level is, the lower is the relative increase in consumption

$Q^{\wedge} = -109\ 8822 + 25\ 1465 \text{ Ln } Y$

$N = 14$, $SEE = 3\ 79$, $R^2 = 0\ 9648$,

Only 1% of the population (those with < LE 1000 income/household/year) consider eggs as a superior good About 20% of the population increase their consumption of eggs between 6 and 7% with a 10% increase with their income (up to expenditures of LE 2400/household/year) Two-thirds of the population increase their consumption by 4% for each 10% additional increase in income (>2400 up to LE 6800/ household/ year) The rest of the population increase egg consumption by only 3% with a 10% increase in their income



The following table shows the decreasing rate of response with respect to income

Expenditure (Income) Elasticity For Eggs
By Income Level and Percentage of Population

Annual Average Expenditure Level LE	Household Expenditure (Income) Elasticity %	Percentage of Population %
<1000	1 08	
1000-1200	72	
1200-1600	71	
1600-2400	65	
		9%
2400-3200	56	
3200-4000	48	
4000-4800	42	
4800-5600	40	
		68%
5600-6800	39	
6800-8000	36	
8000-10000	33	
10000-12000	32	
12000-14000	30	
		23%
Total/ Average	09	100%

Eggs have apparently been more available than poultry meat and the industry appears to be expanding its market more successfully than poultry meat At least the egg market is showing some signs of satiation at the higher income levels

2 3 Other Sources of Production and Consumption Estimates of Red Meat, Milk, Poultry Meat, and Eggs

Estimates of per capita availability of red meat, milk, poultry meat, and eggs have been completed for this study and are shown in the previous charts with projections They are also shown in Annex 1 There are two other sources of similar data published on a regular basis **(1) the Food Balance Sheet (FBS)** which is published annually by MOALR and **(2) Household Budget Survey (HBS)** which is published periodically by Central Agency for Public Mobilization and Statistics

The FBS source has some limitations in analytical studies because major components of the estimation procedure are linear transformation of fixed technical coefficients These components are Production, domestic consumption, losses, and feed and industrial use Exports and imports are taken as primary data Production is important as the share of domestic output in consumption

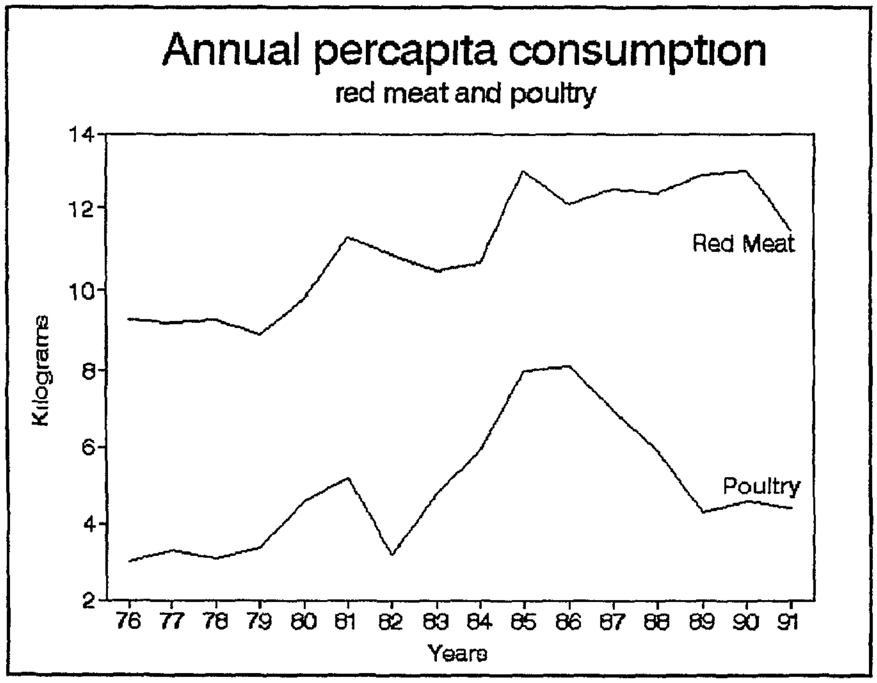
There is available evidence that production has regular variation which is observable as cycles and trends (Soliman and Nessren Abdel Aziz, 1984, Emam, 1986) These cycles are observed through time series analysis of slaughter in official slaughterhouses There is also a significant proportion of slaughter completed outside the official slaughterhouses The estimate of the livestock inventory is calculated through a constant linear trend by MOALR and a quadratic equation estimated by CAPMAS (see Chapter 4)

The apparent growth in production is the result of the estimated fixed technical coefficients and the constant growth rate estimate for the inventory (Chapter 4) The only primary data the FBS uses are import and export estimates They are officially recorded from the monthly Bulletin of Foreign Trade (CAPMAS)

The Household Budget Survey is published by CAPMAS about every ten years HBS provides primary data on consumption levels from extensive and representative samples It is noteworthy that the HBS is costly and is completed each 10 years The 1980/81 survey was not completed from a statistically representative sample and is therefor considered biased Accordingly, the last three intervals available over the last three decades are 1964/65, 1974/75, and 1990/91

This section will present the output of both sources However, it is noted that the FBS source covers periods which used different procedures for estimation The first ended in 1986 by publishing tables, while the second period covered the time span from 1987 to 1991 which appears to have a step-wise movement However, it is hard to trace the source of deviations because the procedures applied in the second period were not necessarily systematic

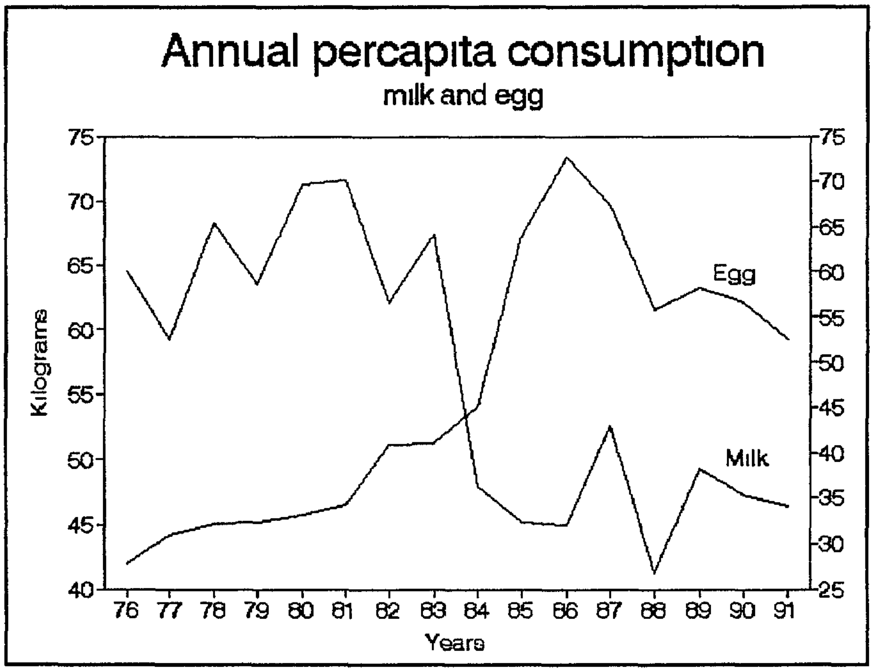
2 3 1 Food Balance Sheet Estimates (FBS)



Red Meat: Red meat includes beef, mutton, goat, and camel meat Per capita consumption trends have increased by almost 30% in 1991 compared to 1976 However, the increase was a gradual one The average annual consumption in the second half of 1970s and the first half of 1980s was 9 2 kg and 11 3 kg respectively, which resulted in an annual increase of 20% However, the trend growth rate dropped to 10% in 1990 and the beginning of the 1990s This resulted in an annual consumption of 12 5 kg/per capita Increases in per capita consumption of red meat was due to an increase in supply because the government increased imports of red meat and implemented the subsidized meat distribution program through the cooperative stores (Veal Project) in 1980s

Poultry Consumption of poultry meat showed different trends compared to red meat Per capita consumption of poultry has increased steadily from 3 kg to 4 8 kg over 8 years (1976 to 1983) Then a remarkable increase with an average of 7 3 kg was observed over the following 4 years (1984-1987) However, the per capita consumption has decreased again to about 4 8 kg

The sudden increase in poultry consumption was mainly due to a boom in this sector, where a heavy feed and credit subsidy program was implemented However, after the phasing out of the indirect subsidy policy, the production of commercial enterprise sector declined Accordingly, obligatory restrictions on imported frozen poultry were applied drastically to ensure a stable and relatively high price for the domestic industry which had to adjust to a much higher cost structure



Eggs The annual per capita consumption of eggs has increased from 27 8 to 52 6 eggs throughout the period of the study The period from 1985 to 1987 was considered the peak whereby the annual per capita consumption reached an average of 68 eggs This situation is similar to that for broilers where government subsidies on feed, credit, baby chicks and energy were enjoyed After removing the subsidy, per capita consumption of eggs dropped to 55 eggs/year Importation of table eggs further saturated the market Importation of fertile eggs to fulfill the demand for baby chicks reached more than 100 million eggs/year

Milk. Milk consumption showed a different trend The level of consumption has increased during the first 6 years to reach 71 6 kg/year, whereas in the recent years it has decreased to 46 3 kg The increase during the early 1980s was mainly due to import dumping to the Egyptian market rather than local production increases

2 3 2 Household Budget Survey (HBS)

Per capita consumption of four commodities (red meat, poultry, eggs and milk) was estimated from HBS surveys of 1964/65, 1974/75 and 1990/91 and is shown in the table below

Per Capita Consumption of Animal Protein Food

Commodity	1964/65	1974/75	1990/91
Red meat (kg)	8 17	7 88	7 74
Poultry (kg)	3 80	2 67	8 20
Eggs (units)	39 17	37 75	57 62
Milk equivalent (kg)	47 57	42 50	31 85
Total Per Capita Expenditure at Constant Prices (LE)	53 00	80 50	68 20

Per capita consumption for both poultry and eggs has increased remarkably over the last 30 years, whereas red meat consumption remains almost the same with a slight decrease as shown in the 1990/91 survey Milk consumption decreased dramatically from almost 48 kg to 32 kg The poultry industry sector (broiler and eggs) which was established in the 1960s, has been developed significantly during the 1970s and the 1980s

Red meat consumption has shown a pattern of stagnation during the last two decades This is mainly due to supplies from domestic producers that move through production cycles However the cyclical variation is limited by the feed constraint on the upper side and the need for animals that will consume otherwise unusable crop residues

In some cases the HBS survey seems to reflect part of the cycle However, on average the supply of domestic production of meat ranges between 6 5 kg to 8 kg/per capita/year and more or less represents the bounds of the cycle The other source of variation stems from imports, and is consequently affected by the policies

Unfortunately milk and milk products have faced dramatic changes over the last three decades Based on the milk equivalent products that were included in the HBS Survey, consumption has declined Because the physical quantities recorded were fresh milk, white cheese and fatless cheese (cottage cheese), imported milk products including other commodities were not necessarily included in the survey These results are more or less suggested in other parts of the study

Most of the financial subsidy and the distribution of concentrate feed mix were for red meat rather than milk. This trend is also due to the nature of this sector as most of the supply is provided by small conventional farm system which has not had access to markets For this and other reasons they have not applied modern technology

Until recently, large quantities of dry skim milk were received as donations and may have unduly impeded improved prices These imports were used to provide powdered milk to processing plants to produce cheap products This was done with social goals in mind

Now after subsidies have been phased out and with a market economy beginning to develop conventional producers are still having difficulties with the market For example, processing plants, in the collection stage, give priority to bulk supply coming from the commercial farms In addition, the conventional farmers cannot easily reach the points where concentrates feed mixes are produced Finally, distribution stores are not able to provide credit facilities for the small amounts that are required on a frequent basis by the conventional farmer

The consumption pattern in the previous table is shown in relation to deflated per capita expenditures The decrease in red meat and milk consumption in the 1990s is not only due to the production constraints mentioned earlier but also to changes in purchasing power As noted earlier there appears to be some substitution from red meat to poultry meat and from milk products to eggs

2 3 3 Regional Consumption Pattern

Except for the first HBS survey, red meat consumption based on domestic supply in urban regions exceeds consumption in rural areas In the urban regions, the consumption of imported frozen meat has dropped significantly in the 1970s, even though it increased slightly in the 1990s In the rural areas, the consumption of frozen meat increased significantly over time The change of the consumption pattern of frozen meat is related to the change in policies over this period (Soliman, 1983)

In the 1960s the importation and distribution of frozen meat was restricted by the Ministry of Supply Frozen meat at that time was highly subsidized (75% subsidy) This partially explains the high consumption of frozen red meat in urban areas versus none in the rural areas

In the 1970s, the consumption of frozen meat decreased due to several factors (see the earlier section) Most importantly, the government has reduced the subsidy This was also associated with a negative experience from the consumer point of view The consumer had the opinion that the government was importing low quality meat

Consumption of Animal Protein Food Shown by the Household Expenditure Surveys,1964/65, 1974/75, 1990/91

Commodity	Urban 1964/65	Rural 1964/65	Total 1964/65	Urban 1974/75	Rural 1974/75	Total 1974/75	Urban 1990/91	Rural 1990/91	Total 1990/91
Red Meat									
fresh	7 67	7 63	7 65	9 15	6 31	7 54	8 03	6 69	7 28
frozen	1 55	—	0 67	0 74	0 03	0 34	0 88	0 13	0 46
Total	9 22	7 63	8 32	9 89	6 33	7 88	8 91	6 82	7 74
Poultry	3 43	4 14	3 8	2 50	2.80	2.67	10 8	7 33	8 2
Eggs	44 79	34 28	38 07	40 22	35 83	37 75	67 56	49 65	57 6
Milk									
Liquid	17 48	11 81	14 29	18 67	8 83	13 23	15 31	8 9	11 7
White Cheese	1 99	0 39	1 08	2 02	1 13	1 52	2 33	0 45	1 27
Cottage Cheese	2 94	8.2	5 91	2 92	6 37	4.86	2 38	3 73	3 14
Milk Equiv	39 14	54 27	47 51	40 3	44 67	42 50	35 36	29 12	31 8

Frozen meat is available now throughout the country In light of the new pattern, the rural areas are now consuming a significant proportion. The phasing out of the subsidy raised the relative price of frozen meat However, it is still much cheaper than the domestic fresh meat The consumer slightly raised the consumption of frozen meat and lowered domestic consumption of meat in comparison with the 1970s This trend was more drastic in rural areas as compared to the urban regions

With respect to poultry products (meat and eggs) the large increase in production over the 1980s, in comparison to the 1960s and the 1970s, caused a substantial jump in consumption in both the rural and urban areas in the 1990s

As for milk and milk products, the consumption levels in both rural and urban areas decreased In spite of the downward trend, cottage cheese in the rural regions is still the major milk product consumed Milk equivalent consumption has decreased from 8 kg in the 1960s to 3 7 kg in the 1990s This may have been due to a shortage in production A major concern of rural people has been to raise cash by offering their milk products for sale rather than consumption Noteworthy is the fact that income from milk and milk product sales is the main daily cash source for the rural family (Soliman e al, 1987)

3 Marketing

3 1 Introduction

Marketing is the performance of all business activities involved in the flow of goods and services which make the product acceptable to the consumer Marketing performance is important because a major part of family income in Egypt (about 54%) is spent on food Savings through lower-cost food or increases in the quality of food provided through marketing contribute to the well-being of the consumer It is also important because many people here earn their livelihood from the animal protein food system Market performance is measured by the efficiency of business activities that add product value by providing the products in the form and place and at the time and price that the consumer wants The business activities in marketing can be roughly classified as exchange, physical and facilitating functions

The marketing of animal protein food products begins as the commodities leave the farm and ends when the products reach the consumer It is more than buying and selling Rather, it is a series of important business activities that transform a farm producer's milk, meat, and eggs into hundreds of products which are used by millions of consumers It gives milk, meat and eggs value by providing the products in a form desired and at the location and time convenient for consumer purchasing Thus, marketing can be considered to be the performance of all business activities involved in the flow of meat, milk and eggs which make the product acceptable to the consumer in the form (kabobs, ice cream, or baked goods), time (shopping hours), location (corner market in Cairo), and price (LE per kilogram)

3 2 Marketing of Animal Protein Food in Egypt: A Transitional Economy

Egypt is becoming an urbanized nation with a market economy This is paving the way for commercial production and processing of animal protein food This gives rise to the important need to develop new markets in urban areas especially for frozen poultry meat, cooled milk, packaged eggs, and portion cuts of beef The past problems of food supply are shifting to issues of distribution and from commodities to nutrition As improvements in income and technology continue to become more general throughout the economy, more food is processed and packaged A commercial animal food production industry is emerging keyed to consumer preference for new products At the same time a national marketing system appears to be emerging with a number of animal food products as cheese, ice cream, processed meats, and packaged eggs

3 3 The Perfect Market Concept

Just as physical scientists have benchmarks to use in analyzing a problem, similarly the market systems analyst has a benchmark -- the perfect market The physical scientist uses a definition of a perfect vacuum or absolute zero in temperature The market systems analysts uses the perfect market The concept of the perfect market assumes that all buyers and sellers have perfect and complete knowledge of demand, supply and prices, and that buyers and sellers act rationally based upon this knowledge In the simplest case, all buyers and sellers are located at a single point in space and are doing business at the same time In such a market a uniform price prevails It must be emphasized that the perfect market does not exist in reality, but is used as a reference point from which to analyze less than perfect markets

The perfect market has three components

Space Based on field observation and discussions with industry representatives prices of red meat, milk, poultry meat, and eggs, for the most part, reflect transport costs That is, transport costs are being added to prices as they are incurred This is not entirely the case for red meat because government slaughterhouses and distributors often price their product uniformly regardless of the region to which it is delivered

Time. None of the animal protein product prices, at this point, account for the cost of storage Frozen red meat and poultry meat are priced at the same level regardless of length of the storage period The market has not reached a stage of development where a price premium is carried in the market for holding the product from one point in time to another The fresh meat, milk, and egg markets are more developed These markets demonstrate seasonal prices Monthly retail prices for animal protein commodities are shown in Volume II, Annex 6

Form All animal protein food prices seem to include the costs of processing to a degree For example, the team traced the price of white cheese from the price of its milk equivalent and processing costs were covered by the increase in price from fluid milk to white cheese Milk and meat product prices are shown in Volume 1, Annex 17 4 and 17 5

In order to identify complex marketing problems, it is necessary to divide the marketing system into small definable components -- two basic methods for dividing the marketing system exist The first method segments the system into various functions This is called the functional approach The other method breaks down the marketing system into its various institutions and defines institutional performance This is known as the institutional approach This report discusses both the functional and institutional approach but emphasizes the institutional approach throughout

3 4 The Institutional Approach

This report focuses on the various agencies and business structures that perform different marketing functions The institutional approach attempts to answer the "who" part of the "who does what" in the marketing question The functional approach attempts to answer the "what" in the question of "who does what "

Marketing institutions are the wide variety of business organizations that have been developed to operate the marketing machinery The institutional approach considers the nature and character of the various middlemen and related agencies and also the arrangement and organization of the marketing machinery

3 4 1 Marketing Middlemen

Middlemen are those individuals or business concerns that specialize in performing the various marketing functions involved in the purchase and sale of animal protein foods as they are moved from traditional farms, dairies, feedlots, broiler houses, and layer operations to mostly urban consumers Our concern here is with the place in the marketing processes that the middlemen occupy and not the way in which they have organized marketing functions for doing business

Another group of organizations falling in this general category are the trade associations The primary purpose of a large majority of these organizations in a market economy is to gather, evaluate and disseminate information of value to a particular group or trade organization They may carry on research of mutual interest In many cases they may also act as unofficial policemen in preventing practices the trade considers unfair or unethical Though not active in the buying and selling of goods these organizations can have far reaching influence on the nature of marketing None of the trade organizations in the animal protein food industry appeared to be effective in this sense Trade organizations are just now emerging as part of the development of a more democratic government and the building of a market economy

3 4 2 Use of the Institutional Approach

The recognition of the various kinds of marketing organizations and the way in which they organize themselves provides a useful tool in analyzing marketing problems Very often the "why" of certain marketing practices must be answered in terms of the characteristics of who performed it

One of the important obstacles to market improvement here are the institutions with vested interests in the status quo Most of these institutions do not appear to have the will to develop market information, product inspection, and fair trade practice enforcement On the other hand the small commercial sectors of the animal protein food system are usually made of only a few firms that are in control of market shares and it is not in their economic and financial interest to compete This will cause difficulty in making the adjustments necessary to facilitate the animal protein food system in a market economy

3 5 Measurements of Market Performance

Marketing organizations, agencies and institutions that perform functions that add utility to agricultural products usually have an impact on the cost and price of these products Normally, the functions they perform require resources and thus have a cost The cost may differ among institutions, agencies, middlemen or firms, but is related to the current market development in the country

Two common measures used to assess marketing performance are

- The farmer's share of consumer food expenditures
- The gross marketing margin, sometimes called the farm-retail price spread

These measures can be misunderstood if they are not presented meaningfully For example, gross marketing margin may be low because the marketing activities are carried out efficiently at low cost However, the margin may also be low because the marketing system provides few services

3 5 1 Product Loss and Waste in Marketing

Product Loss and Waste in Marketing is another method of evaluating efficiency in marketing It is the measurement of physical product losses as the commodity moves through the distribution channels from the producer to consumers Marketing efficiency is often measured by yields and physical productivity, much like production efficiency An example of product loss or waste efficiency in the animal protein food marketing system might be a slaughter plant that adds rendering facilities for higher utilization of animals being processed through the plant

3 5.2 Marketing Costs and Margins

Although the marketing chain is somewhat long in Egypt, no particular category of middlemen appears to be performing functions that are redundant The long marketing chain basically stems from the small-farm characteristic of the animal protein food industry which requires large numbers of middlemen to collect the small surpluses produced by many small farmers scattered over the Nile and Delta Valley

There is little evidence of excessively high trading margins for animal protein foods It is estimated that the farmers share of consumer expenditures for these perishable commodities runs from 50% to 65% These margins are not high when compared to those in other countries such as Turkey although the level of services provided is low

3 5 3 Handling of Animal Protein Foods

The animal protein food marketing system is probably more efficient and equitable than it is portrayed At the same time, it is characterized by a number of inefficiencies which are reflected in the high product losses that occur in the feed industry, hatching chick businesses, milk and egg transportation, and the marketing of live birds These losses not only reduce the volume of the produce but also lead to a reduction in the quality and hence, the price the product can command in the marketplace

The absence of bulk handing equipment and procedures increases losses and costs in the feed industry Due to poor quality hatching eggs and the lack of speedy transportation the death loss is high and vigor is low for day-old chicks The marketing of live birds that are slaughtered at retail or at the family dwelling results in the loss of the viscera, feathers, and skin In large urban centers the accumulation from slaughtering chickens may cause a health hazard

The absence of refrigerated transportation and storage facilities limits the amount of milk that can be transported from the surplus rural areas to deficit urban centers Consequently, dairy producers are forced to convert a large part of their milk production to low-value-added products such as yogurt and cheese At the same time, imports of dry milk powder are required to meet the demand for milk products in urban areas The lack of refrigerated transport and storage facilities also affects the quality of the milk that eventually reaches urban areas, since middlemen must add ice and chemicals to preserve the milk during the hot summer months

3 6 The Functional Approach

The functions performed by the marketing system can be divided into fairly widely accepted classifications

3 6 1 Exchange Functions

- Buying (assembling)
- Selling

3 6.2 Physical Functions

- Storage
- Transportation
- Processing

3 6 3 Facilitative Functions

- Standardization
- Financing
- Risk Bearing
- Market Intelligence

3 6 4 Use of the Functional Approach

The functional approach focuses on aspects of marketing that must be performed in order to move products from producers to consumers Some marketing agencies specialize in performing specific functions For example, cold storage warehouses are operated to perform the storage functions A cheese broker may specialize in the selling and market intelligence functions On the other hand, some marketing agencies may perform all the functions to some degree The retailer is a good example of this latter group

Analyzing the functions of various middlemen is particularly helpful in evaluating marketing costs Retailing is usually much more costly than wholesaling The functional approach, however, brings out the greater complexity of retailing by focusing attention on the increased extent to which the retailer must perform his various functions The use of the functional concepts also help in comparing the costs of two similar middlemen Cost comparisons are meaningful only when they are related to the job done

3 7 Red Meat Marketing Structure and Marketing Performance

Red meat is a commercial term that means the meat supply from ruminants such as cattle, buffalo, sheep, goats and camels In Egypt red meat production from cattle and buffalo is tied closely to milk production The milk production system produces calves that are grown for slaughter and cull cows no longer fit for milk production that are slaughtered In short, for the most part, red meat is a product of the milk system

For documentation purposes, pork has been included as a part of red meat Pork production is small and insignificant If pork production becomes more important it should be classed as a white meat

3 7 1 Red Meat Market Structure

The market in Egypt depends on importing around one-third of the final demand Most of the imports come in the form of frozen meat Local production is about two-thirds of the total market supply

Calves fed on growing rations are the main source of local production They are the output of feedlot enterprises that depend mainly on concentrate feed and roughages The producers purchase calves from small farmers Calves can be purchased after the berseem season (May to June) when the prices are low The other season when calves can be purchased is at the beginning of the berseem season (December to January) The prices in this season are high because farmers have enough feed to keep their calves on berseem, particularly short-season berseem The third season when calves can be purchased at moderate prices is during the months of August and September At this time of the year there is no green fodders except "darawa" (green maize) (Emam, 1989)

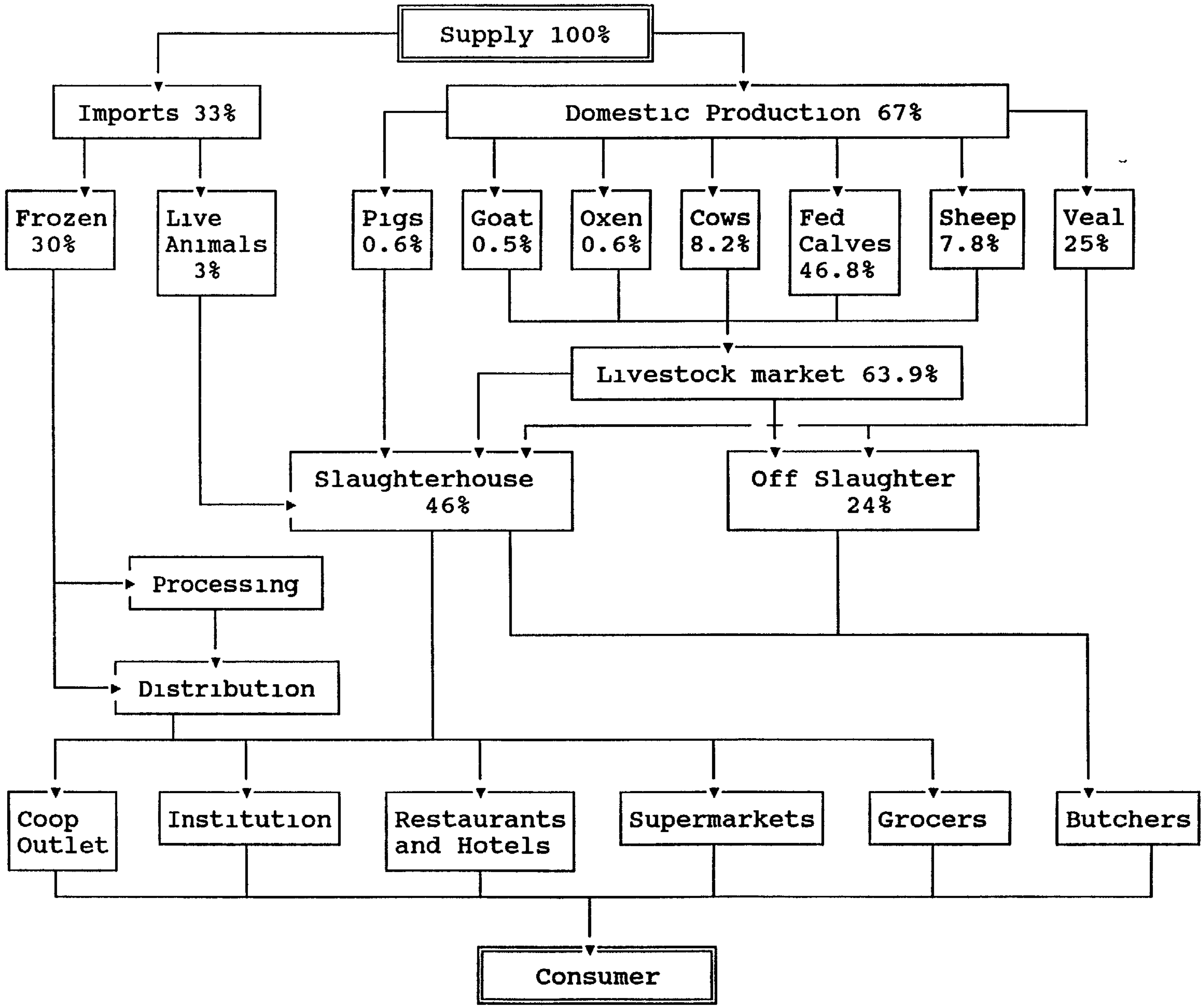
Veal represents 2 5% of the locally produced red meat supply Animals are sold at 2 months of age at an average weight of 70 to 80 kg which yields a 40 kg carcass The reason for selling calves is that farmers prefer not to use the fresh milk for suckling Also, they recognize that the buffalo meat is tough and has less consumer preference than meat from young calves

Stigler has demonstrated through extensive studies that "survival activity over time" is a good indicator of the economic feasible of enterprises (Stigler, 1968) Accordingly, the long term activity of selling veal at an early stage without going through the growing and conditioning process probably has an economic rationale

The policy supporting the growing and conditioning of veal calves up to 400 kg was based on the assumption that veal calves will have a significant impact on the red meat market Quick calculations show that growing and conditioning veal calves to 400 kg will provide the market with about 120,000 tons of meat, whereas, the market would receive only 30% to 40% of this quantity if veal calves are sold prior to the growing and conditioning stage where output is estimated at only 36,000 to 48,000 tons Of note is that under the young veal slaughtering system feed subsidies and loans to producers are not required At present, growing and conditioning of veal calves is being supported with subsidized loans at 9% interest versus the current bank rate of 18% These loans could probably have a much larger impact on animal protein food production if they were made available to the entire livestock and poultry industry including small and large producers

The following figure shows an overall view of the red meat marketing system It shows the source of red meat supplies for the 1990/91 period as well as the organization of the system

Figure 3.1 Red Meat Marketing System



3 7 2 Red Meat Market Definitions

A livestock market can be described as a big yard surrounded by a simple fence It has no physical structures except small rooms for employees The market is usually held on a certain day of the week The clients have to pay fees to the management to enter the markets

The total number of livestock markets has reached about 120 The ownership of these markets has moved from the private companies to the government after the Suez War in 1956

These markets are classified according to their market share and their specializations With respect to the market share, we do recognize here the central markets and the assembly markets The Central markets are located in the governorate capital and are supervised by city councils The assembly markets are found in small towns and villages (Soliman, et al, 1987)

The specialized markets, in a strict sense, do not exist here The only specialized market is the camel market, which is located in Giza However, there are semi-specialized markets such as the dairy buffalo market in Domiat governorate and both Mansoura and Samanood in Dakahlia governorate There is also a dairy cattle market in Shebean El Kom in the Menoufia governorate

The livestock markets or the so-called "red meat markets" are served by three main types of agents The first agent is represented by the wholesale traders and the local traders The second type of agents are the brokers and middlemen who provide market services The butchers are the third market agents who operate at retail level The following table shows the share of the consumer LE spent on red meat that goes to each agent

Percentage Share of the Consumer LE Spent on Red Meat That Goes to Each Agent in the Marketing Chain 1987/88

	Beef Feed lot %	Mutton %	Buffalo Feed lot %	Buffalo Veal %	Cull Cattle and Buffalo %
Consumer	100	100	100	100	100
Retailer	9	21	6	24	7
Wholesaler	11	12	8	8	5
Producer	80	67	86	68	88

Source (Emam, 1989)

The first and third types of agents are considered to be specialized ones Noteworthy is that the wholesale traders in this market cycle represent a sort of oligopoly Some studies refer to 12-15 traders controlling both Cairo and Alexandria markets where 45% of meat is traded Brokers are handling the market information function which is provided to both the seller and the buyer The existence of such brokers is partially due to the absence of a marketing information system and to the dominance and oligopoly of the wholesale traders This situation as well as the oligopoly-like conditions in the processing industry is probably limiting the development of the market

The number of official slaughterhouses has reached 300 They have limited capacity and do not have the standard waste treatment systems, hygiene standards, and cooling facilities that are needed for meat curing and storage Recently, the four slaughterhouses located in Cairo, Alexandria, Giza and Ismailia were automated In 1990 the actual utilization was about 74% of the total capacity

Non-official slaughterhouses exist in Egypt and are called off-slaughterhouses However, the percentage using their services has varied throughout the years In the 1970s, low capacity of the official slaughterhouses has led to the use of the off-slaughterhouses which handled 48% of the production With the establishment of the automatic slaughterhouses in the 1990s, the reliance on off-slaughterhouses has dropped

In analyzing the reasons behind the use of off-slaughterhouses throughout the years, we have to touch on other facts, such as the desire to avoid inspection of animals In some cases, when animals are not complying with the required specifications and in order to slaughter female animals, which is forbidden by the prevailing legislation, the use of off-slaughterhouses is favored

We cannot comment on slaughterhouse services without identifying the grading of meat The purpose of this grading is to identify the type of meat There is a grading that is carried out by government officials This kind of grading is based on objective standards, for example, the carcasses will be stamped with a special stamp that identifies the type and the age of the animal

The other kind of grading is not voluntary and is carried out by individuals (butchers) The butchers are the ones who determine the price and grading of the carcass According to their estimation, 1st grade cuts are 37 4% of weight, 2nd cuts are 44 8% of weight and the offals are 2 6% of weight Unfortunately, there are no standard measures for grading There is an urgent need to have well defined standards through which the profit margins of the butchers are squeezed to more reasonable levels The advantage of having standard grading measures is also to give the consumer confidence in the quality of meat that he buys

There are 110 licensed meat processing plants in Egypt, of which 25 plants are qualified The production of these plants is estimated to be 65,000 tons per year These meat plants are basically using imported frozen meat cuts This is simply because of the high prices of local red meat (Eid, personal communication)

However, field visits to one of the main processing plants (Meatland Company in Ismailia) indicate that the actual utilization of the processing plants account for only one-third of the total capacity Under utilization of this industry sector is mainly due to low demand of processed meat Minced beef represents the highest market share, about 50% of all processed products This is controlled by consumer taste and purchasing power

3 7 3 Red Meat Market Performance

Red meat market structure, as previously described, will probably be subject to market restructuring and reform The performance of the red meat market is not as efficient as it could be This market, in its present structure, does not compare to perfect competition due to

- The absence of market and technical information systems
- Current economic policies that appear to encourage fattening rather than growing and conditioning of veal These policies subsidize loans to selected sectors and not all sectors
- The lack of regulation enforcement with respect to grades and quality standards
- Oligopoly control at the processor and wholesaler levels that dampens the further development of markets

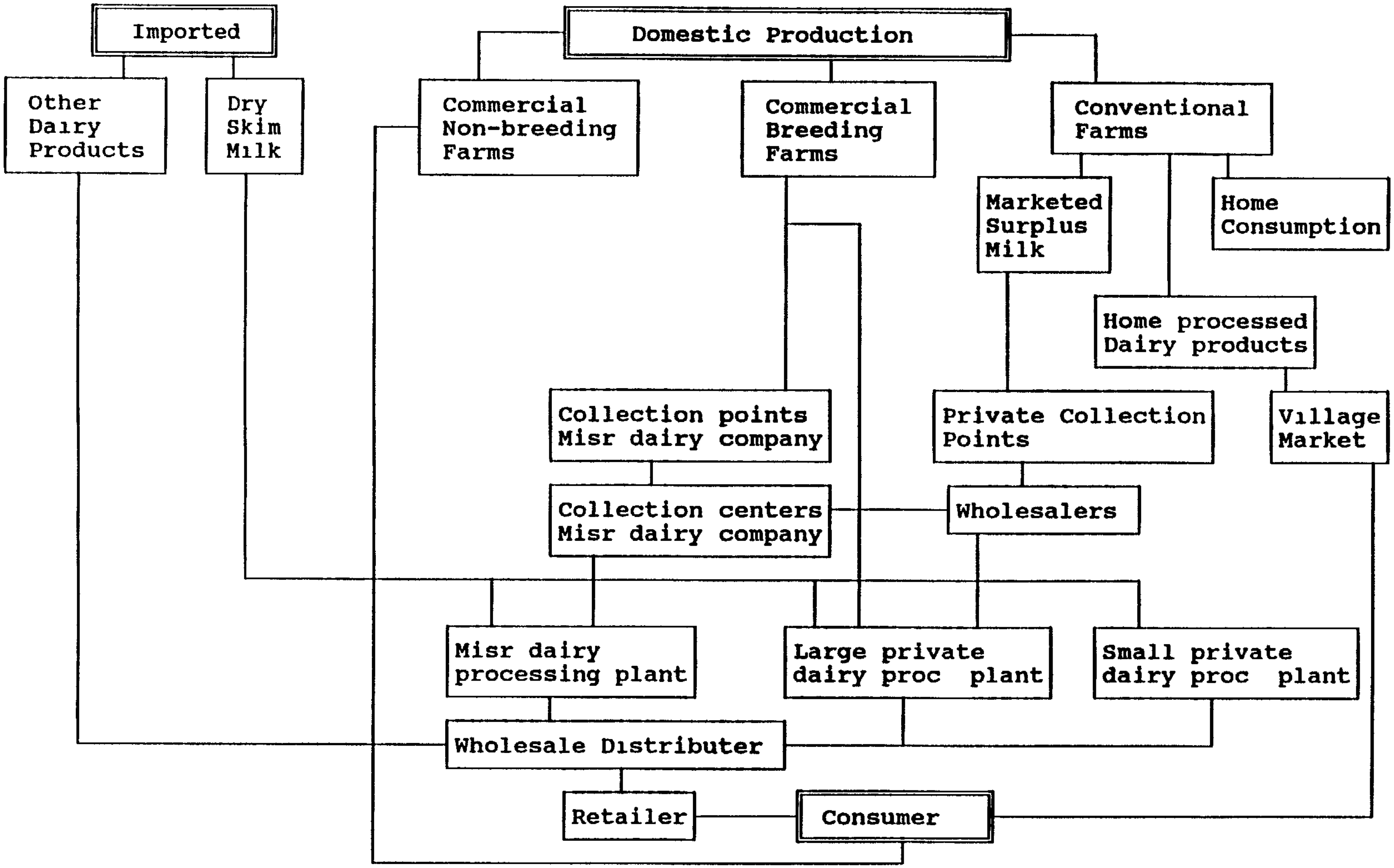
Overall, the red meat market is beginning to develop a commercial sector This sector is small but could be developed further to more effectively serve the large urban markets that are developing Migration of rural populations to urban areas is an ongoing trend

3 8 Milk Marketing Structure and Market Share

3 8 1 Milk Marketing Structure

The demand for milk and milk products in Egypt is mainly covered by local production, which represents 86% of the total market supply Importation of milk occupies only 14% of the total market supply as shown by the following figure

Figure 3.2 Milk Marketing System

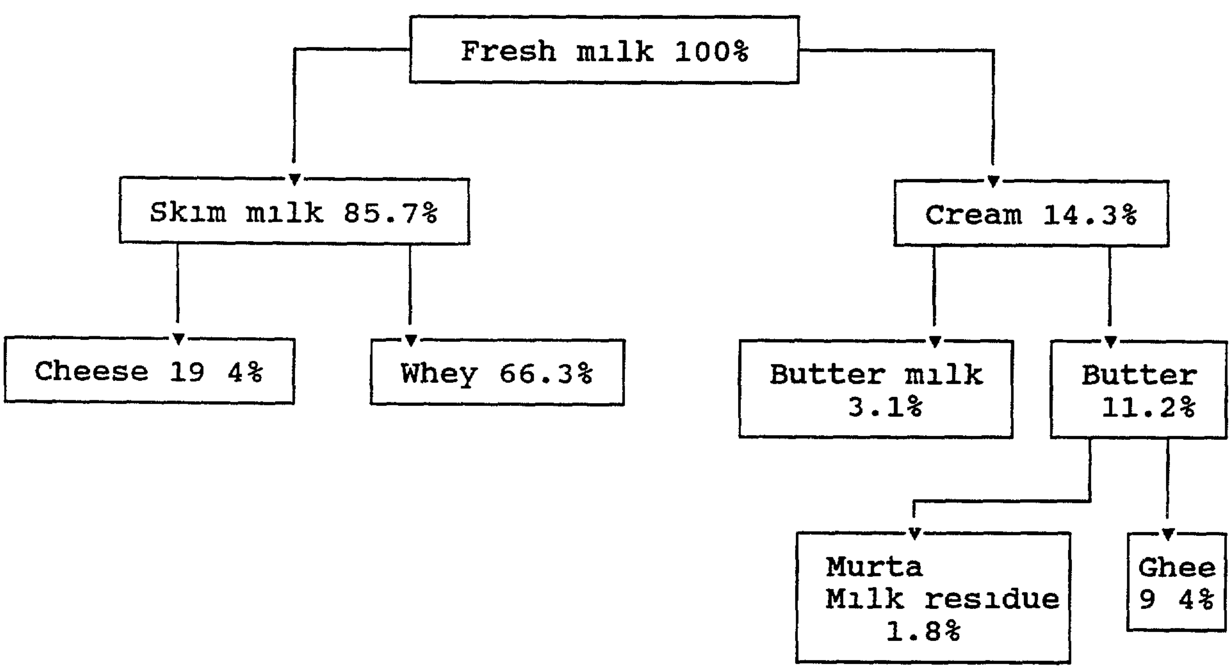


Local production is based on the output of the conventional farm system (70%), the commercial non-breeding farms (12%), and the commercial breeding farms (4%) It is noteworthy to mention that the output of each source is directed differently according to their market share, which mainly depends on the location, size, organizational structure and the level of technology applied Out of 14% imported portion, about 10% is allocated for dairy products whereas 4% comes in the form of skim milk to be used by the processing plants for the manufactured products

3 8 2 Milk Market Performance

The market contribution of the conventional farm system does not exceed 24% of the system's total share, whereas 56% is directed to family consumption and producing home processed dairy products The farm milk, which is obtained by primitive milking methods twice a day, is either boiled and consumed by the farmers or left unboiled for further processing Cream, butter and fatless cheese known as Karish are the kinds of products that can be developed from unboiled milk The disposition of milk is shown in the following figure

Figure 3 3 Technical coefficient of milk processing on conventional farm system



Source Soliman I and Ragab, 1985

The surplus milk will be handled through collection points and/wholesalers that are responsible for the collection of fresh milk from the small conventional farms However, the collection points were not successful in performing their tasks due to a number of different factors

The wholesalers depend on the middlemen who are responsible for collecting fresh milk from the farmers, ensuring that the milk is in good condition and finally delivering it to the wholesale traders

This system is facing a number of problems concerning milk production, collection, and last but not least, the distribution The efficiency and significance of this source in the market mechanism is in question, particularly that the bulk output is mainly consumed by the family The marketing incentives, if applied, will be an important factor in increasing the market share of this sector by encouraging the farmers to double the overall production

The share of the commercial breeding farm system in the local production is only 4% Most of the milk provided from this system (Fresian and Holstein) is directed to industrial processors through collection points (Misr Dairy) and/or other wholesalers

This sector faces many problems, which increases the cost of producing milk. The low productivity of dairy cows, together with the lack of standard breeding and health programs and poor management have contributed immensely to the problem

Increasing this sector's contribution should start from the production process by minimizing the relevant costs This will include the development of modern farm systems and the use of appropriate simplified construction for farm buildings Efficient management and less intensive labor will positively affect the development of this sector The marketing overheads could be better managed by controlling the manufacturing process, particularly the quality control standards and the establishment of the relevant supporting industry

The commercial non-breeding farms are actually of a commercial nature rather than a breeding system, 75% of the production is handled through retailers who receive milk at farm gate and deliver it to the households in the big cities and 25% of the production is delivered directly by producers to the households

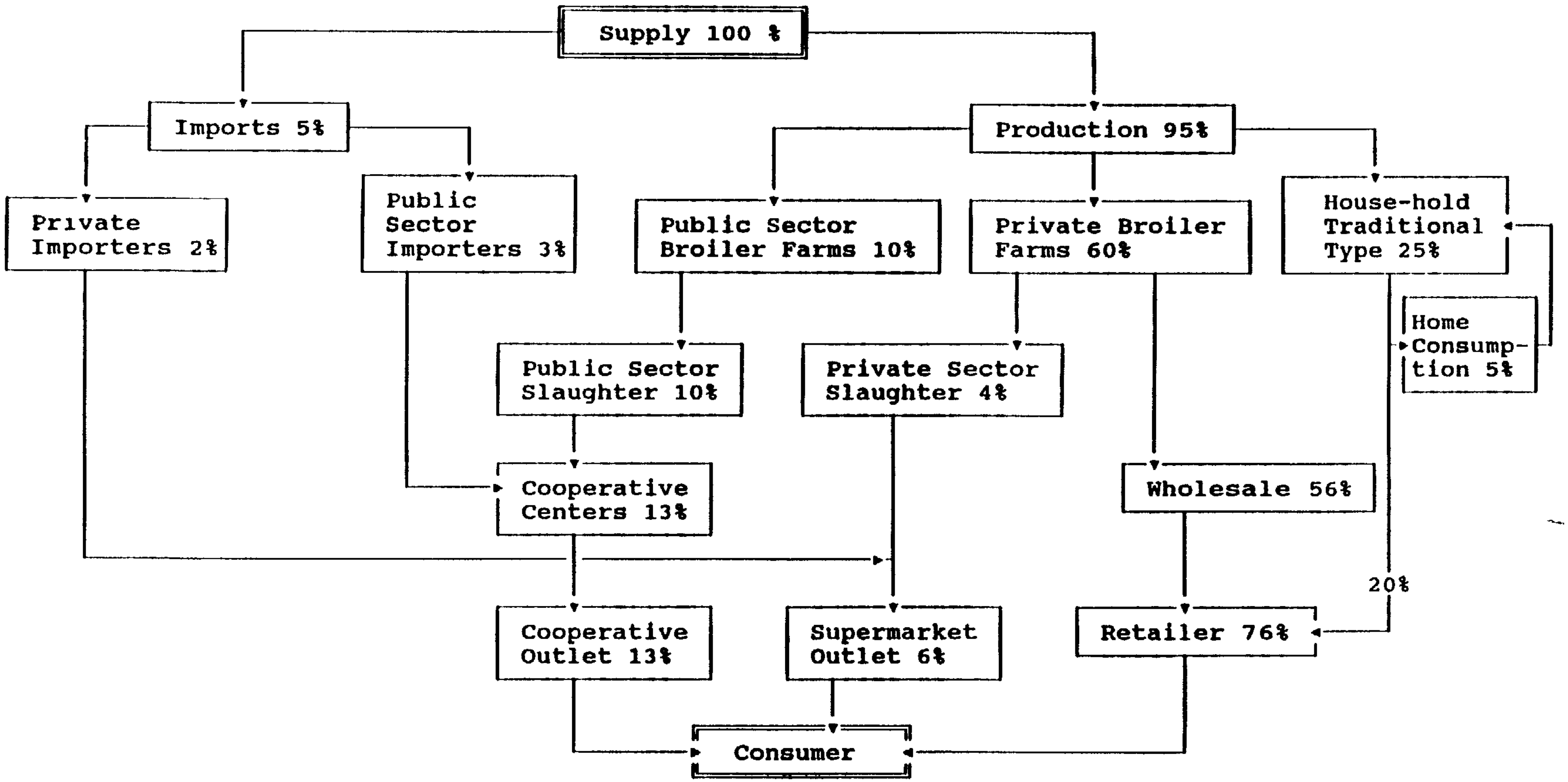
This system could be the basis of a modern commercial breeding system if further developed However, there are many problems that need to be considered, most importantly, is the lack of any control procedures over this milk.

3 9 Poultry Marketing Structure and Performance

3 9 1 Poultry Marketing Structure

Local poultry production in Egypt provides 95% of the total market supply The share of the private sector farms reached 60%, whereas, the public sector farms' contribution was about 10% The traditional household-type system contributes 25% with imports making up the balance (5%) Currently, however, imports are not entering the market

Figure 3 4 Poultry Marketing System



Recently, Egypt imported only 5% of its market demand The public sector's share reached 3% while the private sector contribution in this regard was 2%

The private broiler farms market 56% of their products through the wholesalers, whereas 4% of the production will be slaughtered and packed in private sector slaughterhouses The public sector broiler farms have their own slaughterhouses

3 9 2 Poultry Market Performance

The ideal size for live birds in the Egyptian market is 1 3 kg to 1 6 kg This weight is reasonable for both the consumer and the producer

The wholesale market is controlled by few traders, whose main interest is to increase their profit margin without playing a significant role in the industry The traders work toward squeezing the margins of both the retailers and producers to minimum levels to ensure higher profit margins for themselves Surprisingly, the producers who play a significant part of the industry, get lower profit margins

This oligopoly has been extended to reach the retail level where there are, in many cases, agents working for the wholesaler (Ibrahim, 1992)

There are 19 processing plants owned by both public and private sector The total capacity of slaughterhouses is about 110 million/birds/year and has remained the same over the last 10 years The slaughterhouses are not fully utilized due to several reasons This is largely because there is a preference by the consumer to buy live birds rather than dressed poultry In addition, the high cost of transportation to the slaughterhouses where there is high possibility of death and losses and the noncompliance of some birds to the slaughterhouses specifications, are all reasons of concern

Such problems could be overcome by a set of different rules that could guarantee a reasonable amount of incentives for the agents that are involved in the handling of dressed birds This can be achieved through vertical integration amongst wholesale and production input suppliers such as chicks and feed

The technical aspect is also one of the most important areas that could help in paving the way to full utilization of the mechanical slaughterhouses In the production stage, it is important to produce birds homogenized in weight and size Such measures will fit the handling, transportation and slaughtering specifications

As for the processing stage, applying the Good Manufacturing Practices (GMP) is highly recommended The implementation of the Hazard Analysis Critical Control Points (HACCP) system from the point of receiving the chickens throughout the manufacturing process until they reach the consumer is an advanced step HACCP is considered to be the most reliable and quick method of carrying out the necessary microbiological tests (Nofal, 1992)

For the last 25 years the Egyptian poultry market has lacked two important factors that are the basis of the development of this industry First, the Egyptian market should work toward reaching the level of mass production that guarantees small profit margins per unit of production In the last 25 years and as previously described, the poultry production industry has provided high profit margins to small production units The inefficient performance of the producers was covered by the intensive subsidy programs

Vertical integration among the successive stages of the industry is the second important factor that should be applied in the Egyptian market The purpose of such structure is to shrink the marketing cost, to establish a marketing driven industry and create coordination and consistency in the various production and marketing stages This, consequently, will lead to more stable prices, particularly if associated with a horizontal integration which ensures a lower production cost due to the large production scale There are three different approaches for vertical integration

First Approach Comprehensive poultry complexes that include all the production stages starting from the hatcheries up to the distribution (This represents 10% of the American market)

Second Approach Establishing marketing companies responsible for the distribution of both inputs and outputs (This represents 30% of the American market)

Third Approach Contracted system between the different marketing stages This system implies the existence of a main stage, which is usually the processing stage, that controls the transactions between the producers and the other end of the industry In this system the government is usually responsible for the guarantee and the proper implementation of such contracts (This represents 55% of the American market)

A mixture of both vertical and horizontal structure will fit the Egyptian market The horizontal structure is only here to backup and support the vertical integration The government should consider some functions that are not expected to be fully provided by the private sector such as quality control, financing, veterinary services, marketing promotion, and research

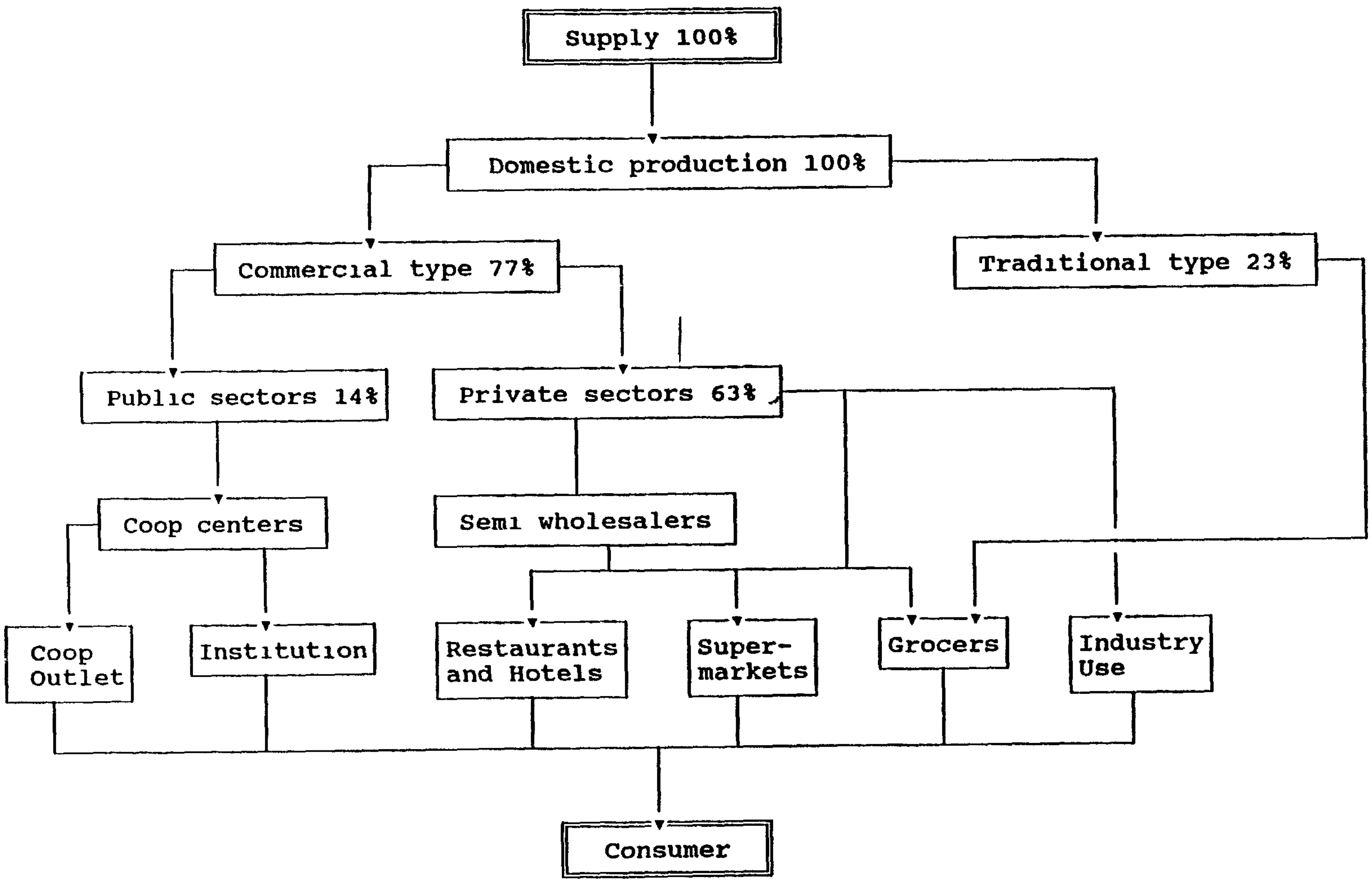
3 10 Table Eggs Marketing Structure and Performance

3 10 1 Table Eggs Marketing Structure

Local table egg production in Egypt is covering the market demand Importation of table eggs has completely stopped since 6 years ago However, Egypt continues to import only fertile eggs for hatcheries in order to produce layer chicks as well as broiler baby chicks

Local table egg production depends mainly on the commercial industry sector, which represents 77% of the total supply The other source of supply is traditional backyard production This sector contributes only 23% Until the late 1960s, this sector used to be the main source of egg supply in Egypt However, this traditional type of production has become oriented to home consumption rather than a commercial business Details of the table egg marketing system are shown in the following figure

Figure 3.5 Egg Marketing System



Output of the commercial sector has varied throughout different phases of development In 1986, the capacity of this sector reached 5,000 million table eggs With the phasing out of subsidies, there was a drop in production of table eggs This has consequently reduced per capita consumption from about 80 eggs to 58 eggs in recent years

The table eggs producers operating in Egypt have established large compound enterprises These compounds usually include a feed mill and hatcheries with a total capacity of 1 million eggs per year In many cases they have their own distribution system without relying on wholesalers

By analyzing the spread of the farm-consumer price over the different phases (Soliman, et al , 1987, Mashoor, 1988), we find that the cost shares are respectively, retail (4 8%), wholesale (5 0%), producer profits (5 5%), feedmill profit (6 8%), feed ingredient cost (30 8%), feed processing cost (7 2%) and the other production cost (39 9%)

This breakdown reflects marketing inefficiency The feedmills under this system get nearly 7% margin, whereas the producer who bears the risk of the manufacturing process gets a margin of only 5 5% This inefficiency is also presented in the cartel that exists between the largest producers who actually control both the prices and the supply in the market in the absence of vertical integration between the other producers

Seasonality is affecting the prices of the table eggs This is due to consumers' preference and experience In winter the demand on eggs increases because of the cold weather and the beginning of the schools In summer the demand for eggs will decrease

3 10 2 Table Eggs Market Performance

The table egg industry needs efficient performance at certain stages of the marketing process, particularly in packing, handling, and quality control

Packing The standard Egyptian egg unit is a carton tray of 30 eggs The fact that the majority of the consumers tends to buy a package of less than 30 eggs increases the selling price A change in the packing size is needed One of the advantages of reducing the standard unit to a dozen eggs, as it is in most countries of the world, is to adjust the cost spread between the retailer and the other agents involved in the marketing process

Handling This particular function requires certain facilities at either the wholesale or retail end-short-term storage The negative results of lacking this storage function in the Egyptian market is felt particularly during the summer

Quality At this stage of development, the market identifies between the size and colors of eggs Brown eggs have slightly higher prices than white ones Also, large eggs are sold at relatively higher price than small eggs

On the other hand, there are some other areas that have not yet received proper attention One of these areas is shell cleanliness and thickness Uncleaned shell could lead to infections, such as Salmonella Most of the eggs available on the marketplace have thin shells and are more likely to be damaged or get infected easily This problem is mainly due to the nutritional regime in the production stage

Another area that needs more attention is freshness of eggs. This is the consumer's main concern According to the international standards, the date of production should be labelled to give the consumer confidence in his purchase

The small farmer project has successfully provided layer batteries with around 96 layers of commercial strains This kind of investment has given high returns on investment (Goueili, et al, 1988)

The government needs to supply certain services to support this sector These marketing services are the marketing information systems for prices, projection of both demand and supply on a daily basis and marketing research Financing the private sector to help it develop the processing industry along with quality control procedures to meet with the international standards are also needed

4 Increasing the Supply of Animal Products in Egypt

4 1 Background

Recursive supply relationships developed in this study were discussed in Chapter 2 of this report Databases concerning the supply of livestock and livestock products (inventories, technical coefficients, offtake) are set out in Volume II, Annexes 1 - 4, 7, 9, and 16 These supply relationships were developed to provide the foundation for a database that could be used to plan and formulate policies for the livestock and poultry sector, as well as to develop a recursive and descriptive model of per capita consumption, production, and prices for forecasting purposes

The sections which follow provide the technical foundations underlying the supply of livestock products as well as a summary of the procedures used by Government of Egypt agencies to estimate animal inventories and supplies First, the production resources and production systems are described Next the various estimates of the inventories and supplies of livestock products are compared and discussed A section detailing production economics then estimates production costs and returns for livestock and poultry, develops border prices calculations for livestock and major feed ingredients and analyzes the comparative advantage of producing animal protein foods in Egypt under various scenarios

4 2 Technical and Economic Foundations

4 2 1 Animal Production Resources

Land Resources The overall strategy of this study is to consider ways and means to maximize the supply of animal protein products to consumers in the most efficient manner while sustaining the most important resources limiting agriculture in Egypt -- the land and water resource base The initiatives launched by the GOE in March 1990 are expected to result in fundamental changes in patterns of utilization of land and water resources The animal industries will also reflect these changes, both directly through more competitive pricing and exposure to international markets and indirectly through changes in cropping patterns The World Bank (1992) indicated that substantial changes in cropping patterns had already occurred over the 1985-1990 period (Table 4 5) and that substantial yield changes are expected in the future (Table 4 6)

The 1990 Agricultural Census estimates that there are about 3 0 million individual land holdings that provide direct support to 17 million individuals The rural sector also supports a sizeable landless population, many of whom hold livestock as a primary or secondary source of income

The government has emphasized horizontal expansion of land area by bringing in 1 9 million feddans of reclaimed land, representing about 25% of cultivable land About 40% of funds allocated to the agricultural sector have been allocated to these horizontal expansion efforts

Cultivable land at 0 13 feddan per head is among the lowest in the world The agricultural land base consists of about 7 5 million feddans of which 7 3 million are in the Nile basin and Delta and 200,000 feddans are under rainfed and oasis conditions Of the 7 3 million feddan in the Nile basin and Delta, 5 4 million are old lands and 1 9 million feddans are new lands, reclaimed or developed since 1952 The total cropped area in 1990 was 12 1 million feddans, giving a cropping intensity of around 180% In the new lands, groundnuts, fruits and vegetables are particularly important

Various reports suggest between 20,000 and 50,000 feddans of land are lost annually to urbanization The rate of urbanization of agricultural land was estimated at 50,000 feddans until 1983 At that point new laws were established preventing the use of agricultural land for urbanization and the rate dropped to 20,000 feddans per year The market price of land for urban use is substantially higher than it is for agriculture Individuals returning from the Gulf Area have savings that they often wish to invest in land, driving prices even higher (Soliman and Rizk, 1991)

The distribution of land ownership by farm size is provided by the World Bank (1992) The primary information is 1985 CAPMAS data (Table 4 1)

Table 4 1 Distribution of Land Ownership, 1985

Ownership Size	% Land Owners	% Area Owned
0-5 feddans	95 5	53 9
5-10 feddans	2 4	10 5
10-20 feddans	1 2	10 2
20-50 feddans	0 7	11 5
50-100 feddans	0 2	7 4
100 and over	0 1	6 5

Source World Bank, 1992, page 8 Original data from CAPMAS, 1985

Agricultural land is generally privately owned although some areas in the new lands are still owned by the public sector

Next, the distribution of livestock by different types of farms is summarized

Livestock Holdings The Chemonics/APCP study (ACPC, 1993) provided summarized data for the summer season of 1991 and the winter season of 1991/1992 for the major cotton producing areas of Egypt The survey covered 750 farms producing cotton and 300 farms for each of the other (competing) crops This study confirmed earlier observations that animal power for on-farm use is becoming rare Animal costs averaged only LE 7 13/feddan of which LE 6 57 was for transportation costs Data indicated a great deal of uniformity across sites with an average of about one breeding cow, one breeding buffalo, 0 6 head of young cattle and 0 6 head of young buffalo per farm In reality, farms tend to have at least one of the large ruminant species Most farms had one donkey for transport Farms tend to have a more uneven distribution of sheep and goat populations The average for three main cotton growing areas is presented in Table 4 2

Table 4 2 Number of Head of Livestock per Farm in Three Cotton Growing Areas (APCP, 1993)

	Types of cotton grown*			
Type of livestock	ELS areas	Giza 75 areas	Other LS areas	Avg all types/areas
Buffalo breeding age	1 17	0 92	1 02	1 02
Cattle breeding age	0 61	0 40	0 66	0 53
Cattle breeding age	1 33	0 76	0 77	0 94
Cattle young	0 58	0 45	0 52	0 51
All donkeys	1 00	0 94	1 16	1 01
All goats	0 51	0 84	2 32	1 11
All sheep	0 96	0 74	2 08	1 14
All camels	0 01	0 01	0 04	0 02

Source APCP, 1993

* ELS is extra long staple, Giza 75 is long staple (LS)

It is estimated that small farms of 5 feddans or less contain about 90% of Egypt's cattle and buffalo population (Table 4 3) It is thought that the frequency distribution of animals by farm size has not changed much over the past 5 years

Table 4 3 Cumulative Percentage of Cattle and Buffalo, 0-5 feddans

	Cattle		Buffalo	
Farm Size (Feddan)	Farms %	Animals %	Farms %	Animals %
0	15	14	12	12
1-3	89	82	87	83
3-5	96	90	95	92
5+	100	100	100	100

Source Unpublished Data, Animal Production, Sector, MOALR, 1989

A much earlier summary of the 1977 National Farm Management Survey is provided by Fitch and Soliman (1982) where the authors chose a sample of 10 villages from the survey to represent the various types of livestock situations which exist in Egypt These sample data were expanded to represent national averages Table 4 4 summarizes this data for animal units per farm, by farm size

The above survey data also indicated that the average value of animals held per feddan was highest for the smallest farm size category and declined for each subsequent size class, indicating livestock assets are relatively more important for small farmers Farms of 3 feddans or less held 64% of total A U 's in Egypt As farm size has continued to decline, we expect that the proportion of A U 's held by the smaller farm categories is at least as large as that in the 1977 survey Smaller farms were found to produce a much higher proportion of total farm output from livestock than larger farm categories Dairy products are relatively more important for small farms than for large farms (Table 4 4, bottom) Also of interest are the types of dairy products produced by the different farm size classes and the proportions sold The bottom rows of Table 4 4 summarize those estimates from the same data set Since that survey, the proportion of value from power has declined precipitously and that of manure has probably declined relative to value produced from live animals and milk (Soliman and Ragub, 1982, Soliman, 1992)

Table 4 4 Summary of Livestock Holdings by Farm Class, 1977

	—	—	Farm	Size	—	Weighted
	0-1	1-3	3-5	5-10	>10	Average
No farms in sample	33	69	23	17	23	
Average size(Feddan)	0 83	1 97	4 06	6.56	21 63	2 13
Total A U per farm	1 26	1 42	2 59	1 70	3 80	1 54
Ave A U /feddan	1 52	0 72	0 64	0.26	0 18	0 63
Percent A U 's in						
Cattle	16	30	25	33	34	24
Buffalo	36	26	35	15	18	31
Sheep/goats	15	5	5	2	5	9
Donkeys	19	23	17	20	16	20
Camels	12	9	8	10	5	10
Other draft	2	6	10	19	20	6
Percent of total						
A U 's by farm size	29 7	34 4	19 8	5 3	1 1	
% of value from.						
Dairy products	35	39	27	18	16	35
Animal power	28	25	29	36	34	27
Live animals	17	15	21	26	29	18
Manure	12	12	17	13	14	13
Poultry products	9	8	5	8	7	8
% final value from						
Fresh milk	15	22	25	66	79	21
Cheese	47	33	40	9	7	38
Ghee	34	40	23	20	5	35
Butter/cream	4	5	11	5	9	5
% processed	85	78	75	34	21	79
% home consumed	77	64	58	39	23	66
Ave milk/cow/year	997	1209	843	643	272	977

Source Fitch and Soliman (1982), p 4

Croppıng Patterns Four major croppıng patterns account for about 80% of Egypt's cropped area These are cotton-short berseem, wheat-maıze, wheat-rıce and maıze-long season berseem The World Bank and APCP teams have both put together estımates of the relatıve profıtabılıty of the major crops and crop rotatıons These are reported ın Volume II Annex, Tables 13 6-13 8 The World Bank team also calculated both economıc and fınancıal rates of return as well as domestıc resource costs for ındıvıdual crops and croppıng patterns

A large number of addıtıonal croppıng patterns are, of course, found ın Egypt Sugarcane, for example, ıs an ımportant crop ın many parts of Upper Egypt and sugarcane tops are an ımportant source of anımal feed durıng the wınter (harvest) season ın those areas Fruıts, vegetables, graın legumes, sorghum and mıllet are also ımportant components of some croppıng systems Most maıze grown ın Egypt has whıte graın and ıs tradıtıonally used for human consumptıon but ıncreasıngly (over 2/3) ıs now fed to lıvestock Introductıon of hybrıd maıze seed ınto Egypt has been slow but could have a potentıally major ımpact ın areas where maıze has hıgh potentıal yıelds ın the maıze-long berseem rotatıon Other publıcatıons (e g APCP's Cotton Supply Response Study and the ongoıng New Lands Study) provıde more characterıstıcs on Egyptıan croppıng systems

Feed Supplıes Gradual lıberalızatıon of crop land allocatıons and prıces has resulted ın substantıal changes ın cropped areas through 1985-1990 (Table 4 5)

Table 4 5 Changes ın Cropped Area, 1985-1990

Wheat	+65%	Long berseem	-13%
Rıce	+12%	Cotton	-8%
Maıze	+11%	Short berseem	-7%

Source World Bank (1992)

The decreased area under cotton reflects producer response to controlled procurement prıces whıch, ın 1991, stıll averaged only 66% of world prıces If the Government of Egypt ıs successful ın achıevıng an agrıcultural growth rate of 3% per annum durıng the 1990s, farm-level feed supplıes from crop resıdues and by-products should ıncrease by about the same percentage and the supply of small farm produced anımals should be able to expand moderately The shıft from hıgh straw-producıng crop varıetıes to dwarf varıetıes ıs already well advanced ın Egypt so ıncreased graın productıon wıll result ın ıncreased cereal straw productıon However, the farm-level economıcs of berseem productıon look less promısıng so overall farm-level feed supplıes wıll probably declıne unless commercıal daıryıng ıncreases rapıdly, ın whıch case the maıze-long berseem rotatıon would ıncrease ın relatıve profıtabılıty and ımportance

Expected ıncreases ın crop yıelds are provıded ın a recent World Bank (1992) report and gıve some ındıcatıon about future farm-level feed supplıes from crop resıdues and by-products These are provıded ın Table 4 6 Agaın, the maıze-long berseem rotatıon should benefıt from these yıeld changes at the expense of most other crop rotatıons but relatıve prıces wıll have more ınfluence on these rotatıons than these yıeld changes alone

Table 4 6 Expected Yield Changes 1991-2000				
Yield/feddan	Unit	1991	2000	% change
Fava beans	Ardeb	6 52	9 00	38
Maize	Ardeb	17 35	26 18	51
Grain sorghum	Ardeb	15 80	25 00	58
Berseem	t	30 00	40 00	33
Wheat	Ardeb	14 50	18 00	24
Sesame	Ardeb	4 33	5 75	33
Peanut	Ardeb	12 50	20 00	60
Sunflower	t	0 82	1 20	46
Cotton	Kentar	5 88	8 28	41
Rice	t	3 16	3 50	11
Sugar Cane	t	42 30	45 00	6
Sugar Beet	t	18 50	22 00	19

Source World Bank (1992), page 92

Our analysis of feed requirements and feed supply for livestock and poultry indicates that in 1992 the aggregate supply of total digestible nutrients (TDN) exceeds requirements by 2 6 million tons and supply of crude protein by 350,000 tons (Volume II, Annex Table 10 38) These surpluses represent 15% of total TDN supply and 11 5% of total CP supply However, when nutrients from imported maize and soybean meal are deducted, TDN surplus is cut in half to 1 3 million tons (7% of total supply) and CP by 72% to 100,000 tons (3% of total supply) After accounting for waste and normal losses, these figures indicate that domestic feed supply is now only marginally adequate or at about equilibrium, and that high energy and protein feeds are not now produced in adequate quantity to meet domestic demand without imports The need for imports of protein and energy feed are likely to increase as demand for animal products and the corresponding demand for feed increases Land use competition between horticultural and industrial crops with forages/grain/oilseed crops will continue to increase the demand for feedstuff imports Less land will be available to produce livestock feed and domestically produced grains/concentrates will become less available for feeding livestock Also seasonal availability of green fodders, hays and crop residues will exacerbate feed supply problems While there may be marginal surpluses of these feeds in the sector, shortages will continue to be a problem in the summer Volume II, Annex 10 provides estimates of feed demand, supply, and use

Despite growing pressure on the land resources, firmly established Egyptian demand for animal products will likely continue, and one way or another ruminants and poultry will be produced or imported to supply the animal products needed to satisfy consumer demand

Increasing production of milk, meat and eggs will require two actions improvement of feed supply and improvement in animal productivity Feed supply has two components food and grain crops/ residues and green fodders To meet future feed requirements, more feed will have to be produced, and crop yields will have to increase -- especially maize Fortunately, such increases will often also bring increased yields of crop residues Thus, crop residues will have to be more efficiently utilized than at present through improved feeding, storage and processing practices And like food and grain crops, green fodder yields can be increased through the introduction of improved varieties and cultural practices

As long as feed resources are available, increasing animal productivity is of paramount importance Besides, the increased product that comes from each animal, increasing animal productivity will also reduce the share of total nutrient intake that is used for unproductive maintenance and increase the share for production Two efficiencies will result a smaller number of animals and a smaller amount of feed will be required to produce a given amount of animal product through livestock intensification Such improvements can be quickly made through use of improved feeding, breeding and health practices

Fortunately, there is some flexibility in meeting feed supply needs As shortfalls of feed grains and oilseed meals arise for poultry, cattle and buffalo, prospects for importing needed grains and concentrates at economic prices are promising World supplies of feed grains and oilseed meals will continue to be adequate Also, imports of these high energy and protein feeds will not interfere with domestic production as commercial broiler, layer, dairy and ruminant conditioning enterprises do not compete with traditional livestock enterprises for domestically produced feeds and employment

As domestic supplies tighten and prices rise, these commercial operations can shift to imported feeds to cover domestic shortfalls This allows domestic agriculture to stabilize production and to expand marketing opportunities This also helps to increase the domestic agricultural product and rural employment In addition, as the demand for high energy feeds rise it may become financially feasible to produce additional maize, oilseed meals and wheat bran (Soliman, 1984)

Manure Production Animal dung continues to be an important resource produced by farm animals in Egypt Although the use of animal dung as fuel appears to be declining, the demand for dung as fertilizer continues to be strong, particularly in the New Lands area and in areas where horticultural crops are expanding The basic calculations we used to estimate manure output by animal type are set out in Volume II, Annex Tables 10 1, 10 5, and 10 40 - 10 42 Estimated manure production in 1991 (Annex table 10 42) is 11 5 million tons on a dry matter basis The main contributors to this supply are buffalo, cattle, small ruminants, and donkeys Time series of production and farm value of manure production are given for livestock in Annex Tables 3 2 and 3 3, while the time series for poultry is given in Annex Tables 5 1 and 5 3

Human Resources and Labor Use Numerous sources of data were referenced for labor use on various livestock tasks Given the decline in use of animals for draft power, labor use is becoming more concentrated around milk production tasks and the expanded use of hired labor on commercial farms producing beef, broilers, eggs and milk.

The rural population of Egypt in 1990 was 53% of the country's population. This had declined from 59% in 1965 Urban population is growing by 3 1% per year with national population growing by around 2.6% per annum

Aggregate Labor Use The approach and aims of this study do not focus on aggregate labor use in the agricultural sector The current use of the GAMS model by IFPRI is a much more appropriate approach as this model allows assessment of labor use by agricultural activity as the crop and livestock sectors adjust to changed patterns of land use based upon market clearing models

However, an aggregate figure of interest is the total demand for agricultural labor (Volume II, Annex Table 12 1) by task and gender This data clearly indicates the large relative inputs of women in livestock labor (43% of total labor required for livestock activities and 71% of all women's labor in agriculture) A recent review of Egypt's agriculture (World Bank,1992) found 47% of Egypt's total active female population engaged in agricultural work. Labor requirements for selected crops were estimated in the APCP survey (APCP, 1993) for men, women and children The average rural wage rate found in this survey was LE 5 8 per day

The World Bank's recent agricultural sector strategy study (World Bank,1992) indicated that 38% of rural income is from sources outside of agriculture, a factor which will make traditional livestock systems less attractive due to their low returns to labor and the daily labor requirements which limit farmers flexibility in working off-farm On the other hand, the availability of livestock to absorb family labor may, for a time, slow migration of labor to urban areas (Soliman and Zaki, 1982, Soliman, 1982)

In the commercial poultry industry, Soliman (1992) reports on a 1986 survey of 32 farms of different scale For an average capacity of 9,500 birds/batch, 50 8 man-days of permanent labor and 3 2 man-days of temporary labor were required per 1,000 birds produced With estimated production of 275 million broilers in 1993, total labor requirements would be in the order of 14 85 million man-days or about 57,000 full-time workers based on 260 days per year The same study estimated labor requirements for table eggs at 1 6 man-days per 1,000 eggs marketed Our projections of commercial eggs marketed for 1993 (Volume II, Annex Table 5 1) is 2,100 million eggs for a total labor requirement of about 13,000 full-time workers based on 260 working days per year Soliman and Ragab (1985) estimated labor required for on-farm processing of 1 kg of milk at 0 40 hours We estimated local processing of milk at about 1 million metric tons or 1 billion kg This would require about 481,000 full-time worker equivalents, assuming 260 8 hour days for a full-time worker per year The same study showed value added by home milk processing exceeded the average wage rate for other livestock activities by 1 5 to 2 0 times

Farm Management Surveys A study by Soliman, Mahdy, and Ibrahim (1992) estimated the opportunity cost of labor on conventional dairy farms using the imputation method for family labor after deducting charges for fixed capital investment Farm size classes were <3 FD, 3-5 FD, 5-10 FD and >10 FD The survey covered villages in Gharbia and Sharkia Governorates for the 1991 crop year (Annex Table 12 2) The opportunity costs calculated were dependent on the amount of hired labor used and average milk yields (adjusted) between cattle, buffalo, and farm size In the calculations for this study we directly cost labor at the prevailing rural wage rates per task. Fortunately, the above study also collected this wage rate data by task, gender and season Market wage rates were determined by a panel survey in 1992 covering the 1991 agricultural year Seasonal variations in the rural wage rate was very large, particularly between men and women but less so for children Summary statistics of rural wage rates from a survey of five village in two Governorates for the 1991 agricultural year are given in Annex Table 12 3 Over the sample, the weighted geometric means by season were

Wage Rates per Operation (Piaster/hr)				
Gender	Winter	Summer	Operation/Piasters/hr	
Male	0 69	0 73	Feeding	0 471
Women	0 56	0 60	Watering	0 342
Child	0 35	0 36	Cleaning	0 664
Ave wage rate	0 53	0 56	Milking	0 856
			Milk processing	0 398
			Ave rate, all tasks	0 548

Converted to a daily basis, these rates are broadly comparable to those used in the cotton supply response study and thus to the wage rates used to estimate berseem costs (Annex Table 12 4) These rates can then be converted into a wage bill for dairy production by adding the hours used per task The survey used the farm size breakdown discussed above and converted the hours used to an animal unit basis The hours of hired labor, priced at the above average wage rate for males is then added The 1977 Farm Management Survey data cited earlier was also used to estimate labor use for livestock production by farm size This is summarized in Annex Table 12 5 A summary of labor use for livestock production is given in Annex Table 12 6

Support Services Animal Health Local veterinary departments in the governorates are directly connected with the Central Authority for Veterinary Service within the MOALR in Cairo In each governorate, there is an organizational structure containing the following governorate sections

Livestock health control
Diseases common to animals and humans
Meat inspection and slaughter houses
Licensing
Parasite control
Sexual health control
Artificial insemination
Veterinary services (insurance, supplies etc)
Veterinary extension

At a lower level, each district contains corresponding offices In most villages, there are units that perform health control, treatment and dealing with infertility problems The governorate department is headed by a Director General assisted by staff in the governorate capital, district and villages The number of veterinary staff existing in each governorate depends on the livestock population, production systems, the services envisaged and the objectives of the livestock component in the governorate Assessment of the needed veterinary manpower showed a shortage in number of veterinarians at the village level

A wide variety of animal diseases are recorded but no serious outbreaks were reported recently The regular reporting of the occurrence of diseases has helped to keep most contagious diseases under control Brucellosis and tuberculosis campaigns are currently going on Drenching against external parasites is also continuing, but budgets for improving these services are often insufficient Facilities for clinical, post-mortem or carcass examination are reasonable, but treatment of sick animals and supply of biological products are insufficient in many areas

Cattle and buffalo insurance is provided to farmers through an independent organization within the MOALR The organization works in close association with local official veterinary authorities in identifying insured animals and in post-mortem examinations

Accessibility to credit for the small farmers is offered by the Village Banks which belong to the PBDAC Rate of lending is affected by the collateral-based system used by these banks Recently, more flexibility is practiced and the PBDAC is providing a variety of credit lines to improve production of dairy farms These lines include the purchase of better replacement animals, the use of AI, the purchase of simple milk processing equipment and choppers for utilizing crop residues in preparing low-cost feed Systems of double lending of suppliers and custom service entrepreneurs and their client farmers as well is available in both foreign and local currencies

Artificial Insemination (AI) The artificial insemination services are the monopoly of and are carried out by the veterinary departments in each governorate In 1990, the number of inseminations in the country reached 40,912 of which 32,691 were for cattle and 8,221 were for buffalo The proportion of inseminated animals is still small in comparison to the total number of cattle and buffalo in Egypt The low adoption rate of AI technique is due to the farmers reluctance to use new technology, low conception rate of about 50-55% and poor services provided by the government AI system In Sakha (Kafr El Sheikh), Beni Suef and Cairo, there are three major artificial insemination centers that produce frozen semen from Friesian and buffalo bulls in addition to liquid nitrogen plants and training facilities Liquid nitrogen can also be obtained from many other places all over the country

AI service is provided at fixed points and through daily runs of about 40 km each The present fee for insemination is as low as LE 1 00 which is highly subsidized There are plans to privatize AI service and to provide it on cost recovery basis

Livestock and Veterinary Extension Services Livestock production departments in all governorates provide farmers with a variety of technical and extension services including promotion of new technologies in animal husbandry and feeding Each department has district representatives and qualified staff in the villages who can serve as livestock subject matter specialists within the Governorate Veterinary Departments Extension Programs are offered to villagers and village-based veterinarians A major change in local extension responsibilities has been a phasing out of the allocation of subsidized feed supplies, primarily the "unified concentrate", cottonseed meal and wheat bran This has taken away one of the major activities of the animal husbandry staff at all levels and weakness in the agricultural research and extension system are now becoming more evident as these functions are all that are left for animal husbandry offices Privatization of AI services would further reduce the extension services role

Ongoing and Planned Initiatives in the Livestock Sector

(i) Data Collection, Processing, Use and Analysis

An earlier, promising effort was started under the USAID Agricultural Policy Component (Project no 263-0152) Situation and Outlook reports were prepared for the various sub-sectors (red meats, dairy, poultry) by the Agricultural Economics Research Institute This effort ended when the project was terminated These reports, however, had limited usefulness to our team because the authors did not present adequate details on the primary sources of data used, how this data was adjusted and manipulated and the relationship of the data to other available time series For example, we were not able to relate data presented in these reports to the other data we compiled for our report

To overcome what is widely seen as deficiencies in livestock data, the Agricultural Economics Research Institute, through the National Agricultural Research Project, is proposing to bring two senior statisticians from the USA to Egypt to help prepare a project proposal for funding The purpose of this project could be to help overcome some of the deficiencies noted in this report Such an effort would require more coordination, cooperation and funding for the AERI, the Under Secretary for Animal Husbandry and the Under Secretary for Agricultural Economics and Statistics as well as a clear understanding with CAPMAS, the apex body for compilation and publication of national statistics in Egypt The USDA statistical team should be provided a copy of this report as background material

(ii) Red Meat Production

The United States Feed Grains Council (USFGC) is sponsoring several projects to increase the efficiency of feedlot fattening systems in Egypt by encouraging open feedlot systems, sponsoring a feedlot demonstration/training project and assisting with importation of selected equipment and consultant services to assist these projects

(iii) Dairy Development

The European Economic Community (EEC) is supporting a large Food Sector Development Program (FSDP) which has dairy industry improvement and rinderpest control as two of its three components The dairy industry development program aims to provide technical services, AI, market information, a dairy board, marketing system development, dairy product quality improvement and a credit line for dairy farmers To date, 20 villages in each of 5 areas have been selected for provision of inputs and technical services

This project is also carrying out an activity related to data collection and market information This will consist of a market reference information system for feed ingredients consisting of international sourcing on price, quality and feeding values This will be through a Feedstuff Marketing Information Office to be set up in the Project Implementation Office in the Animal Production Research Institute In actuality, the project focuses on farm-level production constraints-feeding, breeds (particularly use of AI to introduce exotic bloodlines), veterinary services and management Relatively little attention is being paid to setting up a modern milk marketing system that is linked up to processors

Another program oriented towards technological improvement is the Animal Production Technology Project under the CEMARP (Canada-Egypt Mc Gill Agricultural Response Program) to provide training and extension services in the areas of embryo transfer, artificial insemination and animal health The geographic target area is Kafr El Sheikh in the Nile Delta The project provides training for improvement of cattle breeds at the International Dairy Management Training Center Extension is provided through a series of interventions in the areas of animal health, embryo transfer, artificial insemination, vaccine production and serum, and research in disease control CEMARP has also provided assistance to the Animal Production Research Institute in the areas of embryo transfer and artificial insemination to improve local cattle populations The breeding unit now has the capacity to produce 500,000 straws of frozen semen and 400 embryos per year as well as housing for up to 100 bulls Farmers who own at least 50 head of cattle are eligible to apply for the courses free of charge

(iv) Feed Resources Improvement

A related project, also implemented through APRI, is the Animal Feed Quality Improvement Project, also sponsored by the EEC through APRI The project developed the technology for treating straw and crop residue with ammonia to increase feeding value Supplementation with molasses is also included Information is being disseminated through the Ministry of Agriculture's extension service There are eight APRI centers in the Delta that have facilities for ammonia feed distribution

The GTZ is supporting the non-traditional fodder project in three villages in three governorates Mallawy in Minya, Gameza in Tanta, Gharbia and Geziret El Shaeer in Kalyoubia The project was initiated in 1982 with the Agricultural Research Center in Cairo The objective is to integrate crop by-products in animal feeds at the farm level focusing on rice straw, wheat straw, maize stover and sugar by-products from beet tops, cane tops and molasses The treatments include ensiling, urea treatment and mechanical treatment Extension packages have been implemented through APRI stations

4 2 2 Animal Production Systems

Conventional Livestock Systems Cattle and Buffalo Livestock are an integrated part of the crop/livestock system in which livestock increase in importance as farm size declines (Section 4 2 1, Table 4 3)

Three types of herds are commonly differentiated according to their composition cow-herds, buffalo-herds and mixed herds which comprise both cows and buffalo Table 4 7 shows the frequency of each type of herd in eight villages in four livestock leading governorates in the Nile Delta

Table 4 7 Frequency of Different Herd Types in Four Governorates in the Delta

Type of Herd	Herds	
	No	%
Cows	7	5
Buffalo	51	33
Cows + Buffalo	94	62
Total	152	100

Source A Negm, I Soliman, M. Hamed and A Abdel Aziz 7th Conference of the Egyptian Society of Animal Production, 1986

Analysis of the same sample survey showed farmers tendency to keep buffalo as their main dairy animals (Table 4 8) Buffalo contribute about 70% of the total milk output of Egypt which is estimated at about 2 2 million tons

Table 4 8 Age and Sex Structure of a Sample of Buffalo and Native Cattle Herds in Eight Governorates in the Delta

	% of Population (Buffalo)	% of Population (Cattle)
Females over 2 years	80	46
Young stock (females)	13	14
Young stock (males)	7	40
Total	100	100

Source A Negm, I Soliman, M Hamed and A Abdel Aziz
7th Conference of the Egyptian Society of Animal Production, 1986

On the other hand, male buffalo represented only about 7% of the population as compared to 40% in cattle Male cattle are retained for meat production while it is a common practice to sell male buffalo as veal at a very young age Unpublished data from the Ministry of Agriculture (MOALR) show a serious lack of buffalo bulls This could well be a major cause of low fertility and long calving interval

Data on numbers of cattle of different breeds reflect the proportions of cattle held by various types of farms (Table 4 9) Purebred cattle are usually kept in large commercial farms This would include publicly and privately owned companies, cooperatives and state farms, as well as experiment stations of research institutes and universities It follows that only 3 6% of the female cattle population is held in large specialized dairies

Table 4 9 Distribution of Cattle by Breeds, all Egypt, 1991

	Native	Crossbred	Foreign	Total
Females				
Over 2 years	958	260	42	1260
1-2 years	233	66	12	311
0-1 years	182	62	11	255
Sub-Total	1373	388	65	1826
Males	916	219	31	894
Total	1992	607	96	2694

Source MOALR, Livestock Census, 1991

In a sample of 540 cattle and buffalo farms, about one-third of the farmers kept small ruminants, with the majority having small flocks of sheep and/or goats of less than five head (Table 4 10) Results also showed that the cattle and buffalo farmers keep poultry, mainly chicken, in flocks of six or more birds

Table 4 10 Cumulative Percentage of Sheep and Goats and of Poultry in a Sample of 540 Cattle and Buffalo Farms

Number of Sheep & Goat	%
0	68 7
1-2 heads	87 6
3-5 heads	88 6
6 head +	100 0
Number of Poultry	
6-9 birds	62 4
20 birds	100 0

Source IFAD, Livestock Production Intensification Project
Baseline Survey, Minya, Beni Suef & Fayoum Governorates, 1991

Most surveys show that about one-third of the farm area, regardless of farm size, is usually dedicated to fodder production with provision for other field crops, especially wheat and faba beans in winter and maize and sorghum in summer Egyptian clover or berseem *(Trifolium Alexandrium)* is the main source of livestock feeding in winter Unshaffed green or dry stalks of maize and sorghum, and wheat, bean, and rice straw are fed to animals in the summer During feeding, considerable wastage occurs as feeds are offered to animals untreated (e g chopped, mixed or pelleted) Buffalo and cows in milk may receive limited amounts of grain-concentrate-mixes, but few farmers can afford to purchase these mixes

Some research papers indicated the overuse of clover to make up for the shortage of concentrates It was estimated that about 29 million tons of fed berseem could be spared and consequently a larger area could be saved for wheat which is a competing winter crop (Soliman, and Nawan, 1984, Soliman, 1989)

On small farms, animals are kept in small enclosures connected to the family house Cattle may be used as draft animals, but buffalo are seldom used for this purpose Family labor is used and animals are milked by hand, commonly by women

Females are bred naturally, in most cases to bulls existing in the village Matings are arranged in such a way that cows and buffalo will calve within the clover season (October-May), especially in the early part of it Although current artificial insemination programs are in operation in many governorates, the delivery of AI services and the rate of adoption of this service by farmers are still unsatisfactory Rates of fertility can be improved by a more ambitious artificial insemination project, otherwise the provision of good bulls to farmers or encouraging them to keep more bulls for natural mating may be sought Table 4 11 shows that over 85% of a surveyed sample of farmers in three governorates desired an exotic bull for their cattle and a selected sire for their buffalo An average of about 62% of the farmers wanted their animals to be artificially inseminated, with a higher percentage of 70% in Beni Suef, where a bull stud and an A I center exist

Table 4 11 Attitudes of Farmers Towards Availability of Sires by Governorate Expressed as a Percentage of Sample of 540 Farmers in Three Governorates

Desired Service	% of Farmers
Exotic cattle sire	85 6
Selected buffalo sire	88 7
Artificial insemination	62 4
Desired source of service	
At cooperative	69 4
At private farms	69 4
No response	7 4

Source IFAD, Livestock Intensification Project Baseline Survey Minya, Beni Suef and Fayoum Governorates, 1991

Native cattle are relatively small animals and low milk producers Milk production of the buffalo is much higher than that of indigenous cattle and is rich in fat and solids (see breed characteristics) It is generally known that the young males of native cattle gain more weight per feed unit than buffalo and produce better quality meat Livestock may not provide the best option of investment for a small farmer, but both cattle and buffalo are kept at no financial losses under current farming conditions

Milk is consumed primarily by the subsistence farmers (50% of total production), generally in the form of processed products Fresh milk is usually sold to middlemen at a low price but most products are marketed in processed form Usually, simple products are made (butter, ghee, and cottage cheese) and are sold locally or home consumed (Soliman, 1985 and 1991)

Live animals are sold alive either when cash is needed or when they are culled Buffalo calves are sold for slaughter at a very young age to save their dams' milk for family consumption Lately, farmers and feedlot operators were encouraged by soft loans provided through the National Veal Project, and by the increasing price of meat, to keep buffalo calves for a longer time to reach the weight of 200 kg The collapse of this project apparently has reduced the supply of fattened buffalo calves

<u>Sheep and Goat</u> Natural range lands do not exist in Egypt, therefore small ruminants are either confined in the crop/livestock system in the Nile Valley and Delta or kept in rainfed areas in the north western coast Only 3% of the farmers own about two-thirds of the sheep and goat population with the balance held in small flocks, usually less than 5 head (see Table 4 10) Flocks from individual holdings are frequently pooled and are assigned a hired shepherd for local grazing Matings are made in the pooled flocks where the shepherd usually owns a ram or a buck

About one-third of the sheep and goat population exists in the north western coast of Egypt Animals graze in large flocks on winter rainfed pasture and cultivated barley Flocks migrate regularly south east in the spring and return back in autumn During their trip animals graze on the crop residues at the western border of the Nile Delta and Fayoum Governorate Large numbers of sheep (mainly from the Barki breed, known for its lean meat) are exported alive to Saudi Arabia, especially during the religious pilgrimage season

It can be assumed, based on information from different sources, that sheep and goat females constitute about 80% of the sheep and goat flocks and that 70% of the animals are in the over-one year age category The dominant type of sheep is the Ossimi, which is a local white coat fat-tail breed Sheep are kept for meat production and they are seldom milked Wool production is low in quality and shearing is poor The Egyptian Company for Meat and Milk Production has several farms with specialized higher producing sheep

Small goats with black, smooth, short hair exist in small flocks Mothering instinct and capacity are well developed, but low amounts of milk, net of suckling, may be obtained by the farmer A breed of colored goats exist in the most southern governorates of Egypt This breed is called the "Nubian goat" and is known for its relatively high milk production, heavy weight and high fertility Dairy goats are of the French Alpine dairy breed and give an average of 2 kg of milk/head/day

No commercial sheep or goat farms exist in Egypt with the exception of a 300 goat-farm MALR has a cross bred goat project in Sakha in the Kafir El Shaik Governate

Poultry This smallholder system is principally a back-yard system and contributes a significant proportion of the poultry produced in Egypt Volume II, Annex 4 sets out the breakdown estimated during this study

Backyard poultry keeping is practiced in most parts of Egypt Local breeds are well adapted to low-nutritional standards and harsh environmental conditions Specific local breeds exist in specific governorates such as the Fayoumi breed which originated in Fayoum governorate and is known for its high laying rate and the "Dandrawy Breed" found in the southern regions of Egypt, and which is particularly tolerant of heat

More than one-third of the farmers keep poultry flocks of more than 20 birds (see Table 4 10) Flocks may contain different varieties of poultry Chickens are kept for egg production while ducks and geese are kept for meat Rabbit husbandry faces sanitary and mortality problems

Commercial Dairy and Feedlots Commercial livestock farms are defined as those containing 50 head or more With a very few exceptions, commercial dairies and feedlots exist in all governorates The total number of dairy farms is estimated as 386 farms and the number of feedlots as 416

Nine governorates contain 72% of the commercial dairy farms and 81% of the feedlots These governorates are -

Governorate	Number of Commercial Dairies	Number of Commercial Feedlots
Alexandria	30	2
Behera	64	25
Dakahlia	27	43
Sharkia	21	64
Gharbia	36	26
Kalioubia	31	9
Fayoum	52	16
Giza	14	39
Sohag	2	119
Total	277	337

Source Ministry of Agriculture and Land Reclamation, Agriculture Research Center, Agricultural Economics Research Institute, 1992 Livestock Survey

Recent government policy is to encourage dairy farming in the new lands since these enterprises need land of their own to produce fodder crops, mainly clover and alfalfa On the other hand, feed lot enterprises hardly need land of their own, and therefore, they are not strictly related to new lands Commercial dairy farms comprise about 3% of the dairy animals

There is a wide diversity in the system of production and in the supporting systems of supply and marketing as well as the level of technical and economic efficiency However, there are some features common to all large scale commercial dairies Pure bred Friesians or Holsteins are kept mainly under an intensive production system for milk production The farms are suitably equipped with milking parlors, cooling tanks and sometimes equipment for automatic feeding Artificial insemination is used in most herds of more than 200 cows and semen straws may be imported Most farms keep records and some of them use computerized packages for performance recording and farm management In most cases, the herd consists of 200-500 cows plus followers Some farms grow their own fodder, but concentrates and roughages are purchased Farms are operated by skilled labor and experienced management staff

Milk is sold fresh and cooled at farm gate and cull animals are sold alive Large scale enterprises belong either to specialized companies or cooperatives Some large companies have their dairy processing plants and feed mills Most large dairy farmers are members of the General Cooperative for the Development of Animal Wealth located in Cairo

A variation of this system is relatively smaller farmers located at the outskirts of big cities who keep buffalo and follow a very intensive feeding system to produce high-fat milk (Flying Herds) Buffalo are bought in milk and are sold immediately after drying off (Soliman and Zaker, 1984) Through this system, much of the favorable genotypes are lost

Three different systems could be identified in the feedlot operations (1) **Young native bulls** (sometimes crossbred) are bought at 1-2 years and at an average body weight of 180 kg After feeding for about 200 days, animals are sold at an average live weight of 350 kg Fodders may be fed at the beginning for about four months Purchased straw and concentrates are also used in feeding and fattening Meat produced under this system has the highest price (2) **Young buffalo bulls** were purchased from small farmers through the now defunct National Veal Project at an average body weight of 200 kg and were fed and fattened in feedlots of at least 250 head until they reach 450 kg This system was operated by the Ministry of Agriculture and financed by the PBDAC and the Ministry of Supply which was also responsible for the purchase of fattened animals Heavy subsidies were offered to these feedlots in terms of feed and soft loans Many public and private feedlots participated in the Veal Project until it was stopped in 1990/91 (Table 4 12) Recently, the system was redesigned to be operated by a newly formulated Buffalo Producers Association and is assumed to follow free market rules However, subsidized loans are still provided to the buffalo fattening enterprises Currently, loans are restricted to enterprises with 5 head or more which excludes most farm producers A large number of private sector farms were involved in this system (Table 4 13) (3) **Steers are imported from Ireland** at an average weight of 350 kg and fed mainly on concentrates to reach the weight of 500 kg in about 5 months when they are sold for slaughter Although these animals have the highest final weight and the highest dressing percentage, they are less valued because of the consumers' preference of the "Baladi" meat produced from native cattle Large feedlots are owned by both private and public sectors It is estimated that about 260,000 steers will be imported in 1993 both as feeders and as ready-to-slaughter animals at a heavier weight

Table 4 12 Number of Buffalo Calves and Bulls Involved in the National Veal Project, 1983-1991

Year	First Stage ('000 head)	Second Stage ('000 head)
1983/84	47	36
1984/85	90	60
1985/86	119	70
1986/87	118	79
1987/88	163	129
1988/89	198	181
1989/90	275	150
1990/91	204	--

Source Unpublished Report on the National Veal Project
Animal Production Sector, MOALR, 1992

Table 4 13 Number of Buffalo Bulls Fattened in Public and Private Sector Feedlots in Final Years of the Project

Year	Public Sector		Private Sector	
	No of Farms	No of Animals	No of Farms	No of Animals
1988/89	32	125,000	165	56,000
1989/90	24	90,000	242	60,000

Source Unpublished Report on the National Veal Project
Animal Production Sector, MOALR, 1992

Poultry Production Systems

The rural poultry sector This comprises five different systems

(a) State farms which include 1000-2000 birds each and use floor housing, manual feeding and watering Native breeds are raised in this type of farm and produce both eggs and meat from the same breed

(b) Cooperatives, which are essentially the same as the state farms

(c) Specialized farms which use local breeds. The production system of these farms depends on some local breeds known for maintaining reasonable production standards under sub-optimal conditions. Open houses and manual feeding and watering are used.

(d) Private farms owned by individuals or small investors. These farms used to raise commercial crosses but have lately shifted to local breeds to produce meat and eggs. Consumer preference for these products makes these enterprises profitable in spite of the low performance standards of these breeds.

(e) The backyard system which is practiced by about one-third of the farmers in Egypt. Flocks of 20 birds or less are kept under a primitive system. Flocks may contain different varieties of poultry. Chickens are kept for egg production while ducks and geese are kept for meat.

In all systems, day-old chicks are obtained from primitive local incubators, or from commercial or government incubators when available. Feed is usually mixed on-farm from available ingredients because of the high prices of commercial feeds and also because the protein content of the ready-made feed mixes is usually higher than required for the native breeds.

Eggs and live birds are sold in neighboring rural areas and outskirts of large cities. The principal production is eggs, and meat is produced as a secondary product from extra males or females which terminates their laying period.

<u>The Commercial Poultry Sector.</u> The commercial poultry production sector comprises four different types of poultry farms, broiler and layer farms, and parent-stock and grand-parent stock farms. The sector also includes commercial slaughterhouses and hatcheries.

The poultry industry is dependant on imports of major inputs such as corn, soybean, biological products, vaccines, protein concentrates and premixes. Currently, no imports of chicken meat or non-hatchable eggs are permitted.

(a) Broiler Production Systems. About 18 to 19 thousand farms (Table 4.14) follow a production system where 5 to 6 thousand birds of commercial breeds are raised on the floor in a 50m x 10m building. Farms vary in their degree of mechanization from manual feeding and watering to chain feeders and automatic watering. Buildings are usually one-story, but can be multi-storied.

A more advanced system is followed by broiler companies where either open or closed housing is used. The capacity of a farm starts from 10,000 birds of commercial stock. A high degree of automation is used in feeding, watering and heating.

Usually there are 5 production cycles/year and broilers are marketed live at an average weight of 1.6 to 1.8 kg. Recently, smaller body weight of about 1.1 to 1.3 kg is preferred by consumers.

(b) Table-egg Production Systems. Both battery and floor systems are used in producing table-eggs in Egypt. However, only 145 farms use the battery system where each farm produces 15 million eggs annually from about 68-70 thousand layers. There are four large farms that have an annual production capacity of about 100 million eggs per farm.

Farms which keep layers in batteries usually have a high degree of automation and technology. Houses are closed and can accommodate day-old chicks until they reach the laying age of 18 weeks when they are transferred to laying houses Feeds mixes are prepared on- farm using purchased ingredients

Farms owned by individuals or belonging to the governorates are smaller farms which use floor housing These farms purchase pre-mixed feed or prepare it on-farm In all cases, the layer cycle is 18 months and can be extended to 26 months by forced molting

(c) Parent-stock Farms Broiler parent-stock farms are rather few and use closed housing as well as open housing systems Feeding, watering and heating are automatic Usually, these farms which belong to large private companies in most cases have their own hatcheries Day-old chicks are sold or raised in broiler farms owned by the same companies Layer parent-stock usually raise stock on floor in either open or closed houses Farms are owned by large companies, few of them are public sector farms

(d) Grand-parent Stock Farms There are only two private farms of this type in Egypt Both farms produce broiler stock at a total annual production capacity of about 3 million mothers Open housing is used and good sanitary measures are taken in the farms Parent stock are produced by incubators in the same farm Some farms have an integrated system where parent-stock are kept to produce hatching eggs for broiler production Slaughtering and marketing of broilers is also performed by the same companies

(e) Slaughterhouses There are five modern commercial slaughterhouses in Egypt Only one belongs to a public sector company (the United) Slaughterhouses are equipped to handle all steps of slaughtering, freezing, packing, cold storing and treatment of liquid and solid residues The total capacity of slaughterhouses range from one to six million birds annually

(f) Hatcheries Modern commercial hatcheries for parent-stock, layers and broilers exist in Egypt Hatcheries are well equipped with facilities for ventilation, heating, storing of eggs, and handling of young chicks Some hatcheries have facilities for sexing of broiler and layer parent stock.

Local primitive rural hatcheries exist in specific governorates (e g Fayoum, Sharkia and Beni Suef) Hatcheries are built of bricks and clay and produce day-old chicks for the backyard flocks of small farmers Tables 4 14 and 4 15 provide background information on the commercial poultry sector

Table 4 14 Number of Commercial Poultry Farms and their Annual Capacity in Egypt, 1991

	Total Number	Full Capacity	Production as percentage of full capacity
Broiler	18619	467804 birds	53%
Layers (egg production)	2876	6303 million eggs	44%
Broiler-parent-stock	61	647 million eggs	73%
Layer-parent-stock	148	164 million eggs	45%
Grand-parent-stock	2	3 parent	100%
Hatcheries	93	234 million chicks	62%

Source Animal Production Sector, MOALR, Unpublished data on the Poultry Industry, 1991

Table 4 15 Share of the Private and Public Sectors in the Commercial Production of Poultry in Egypt, 1991

	Type of Farm	
	% Private	% Public
Broiler	77	23
Layers (egg production)	90	10
Broiler parent-stock	57	43
Layer parent-stock	83	17
Grand-parent-stock	100	0
Hatcheries	66	34

Source Animal Production Sector, MOALR, Unpublished data on the Poultry Industry, 1991

Livestock in the New Lands Attention has been directed over the last few decades towards the newly reclaimed land in and near the Nile Delta as potential areas for livestock development Since rainfed fodder production is practically non-existent in Egypt, only irrigated agricultural lands are considered as potential areas for animal agriculture Data compiled over a 3-year period (1986-1988) from field surveys of the small farms owned by settlers in the new land made it possible to draw basic statistics which could help in characterizing the animal production system in the new land which is essentially a livestock/crop system (Table 4 16)

Small farmers in the new land areas comprise three different categories, ordinary farmers who own less than five feddans, University graduates who own 15 to 30 feddans and early retired employees whose land ownership vary between 5 and 15 feddans, according to their rank and the type of land they receive

All farmers are members of local agricultural cooperatives which provide them with services such as purchase of farm inputs and marketing Local government agencies also provide farmers with extension services, veterinary services and artificial insemination Other organizations like the Central Fund for Animal Wealth Development provide farmers with selected cattle and buffalo heifers, sheep and poultry Credit is seldom used because of the problems of insufficient collateral

Analysis of socioeconomic data showed that small farmers who own less than five feddans achieved higher income from milk yield per unit land, per unit labor and per animal This is mainly due to better utilization of their limited resources

Table 4 16 Basıc Characterıstıcs of the Crop/Lıvestock System ın the New Lands for Three Categorıes of Farmers

	Ordınary Farmers	Graduates	Retıred Employees
Sample Sıze	383	58	56
Land ownershıp (feddan)	4 2	24 5	10 9
Famıly sıze (person)	7 9	5 6	n a
Herd Sıze			
Buffalo (head)	2 6	6 6	5 2
Cows (head)	2 6	9 1	3 1
Sheep (head)	2 5	5 2	4 6
Goats (head)	3 5	6 9	4 1
Poultry (bırd)	26 0	860 0	23 0
Fodder (feddan)			
Wınter	2 4	13 9	6 5
Summer	2 6	18 3	6 7
Fodder Productıon (tons)			
Wınter	10 9	99 5	41 8
Summer	8 0	46 0	17 6

Source Central Fund for Anımal Wealth Development (CFAWD), MOALR, Caıro, 1989

Results showed that most farmers stıll keep natıve cattle and buffalo and use sımple husbandry technıques ın daıry farmıng A program was recently put ın place for the comprehensıve development of the lıvestock/crop system ın some areas (South Tahreer and Nubarıa) The program ıs operated under the supervısıon of the Anımal Productıon Department, College of Agrıculture, Caıro Unıversıty wıth the cooperatıon of NARP/Research and Technology Transfer Components, IDRC (Canada) and local agencıes ınterested ın lıvestock development

The government polıcy wıth respect to large farms ın the new land has been changed over the last few years from operatıng state farms to encouragıng prıvate commercıal daırıes and feedlots Modern prıvate commercıal farms ın the new land do not dıffer from those exıstıng ın the old lands of Egypt wıth respect to productıve and reproductıve performance of anımals and management The only exceptıon ıs that commercıal farms ın the new land own large fodder areas and sometımes feed mılls

4 2 3 Summary of Production Traits of Egyptian Livestock

A major effort was made to collect information on characteristics of Egyptian livestock and poultry under different production systems This is summarized as production characteristics for each type and system A total of nine tables were prepared and are set out in Volume II, Annex 16

4 3 Estimates of Aggregate Supply of Livestock and Poultry Products

Estimates of supply of ruminant livestock products were hampered by inadequate sources of data and questionable methods of treating inventories and outputs between census periods The last published data based on comprehensive field surveys were the 1980/81 Census of Agriculture figures Census data are used as the base figures from which subsequent figures on livestock populations are calculated by different agencies based on estimated straight-line or quadratic trends between censuses or sample surveys The population estimates thus do not adequately account for cycles and changes in trend relationships caused by numerous factors Nor can this procedure account for technical change or changes in farming structure that are not captured by the assumed trend relationship This makes accurate estimates of offtake, aggregate supply of products and livestock products balance sheets very difficult, particularly as about 90% of livestock are on small farms This makes it difficult and costly to update figures on inventories, production parameters and product supplies Therefore, the team developed the estimation procedures described later in this section

4 3 1 Data Sources

Several organizations deal with statistics on livestock populations, production and projections The procedures and assumptions differ between the organizations The primary sources of livestock data are (a) the Ministry of Agriculture and Land Reclamation (MALR) through its Undersecretariate for Agricultural Economics and Statistics (U/AES) and (b) the Central Agency for Public Mobilization and Statistics (CAPMAS) through the Department of Livestock Statistics Different procedures are used and are described below In addition, adjustments to these original data sets are routinely made by the Agricultural Attache's Office of the United States Embassy The major variables of interest are animal inventories, offtake and calving rates, carcass weights, and milk yields

The Ministry of Agriculture and CAPMAS both use the following model for estimating animal slaughter (Table 4 17) These parameters are applied to estimated livestock inventories Since U/AES and CAPMAS use different procedures to estimate animal inventories, then their estimates of supply of animal products will also differ since these parameters are applied to different levels of estimated inventories

Table 4 17 Parameters for Estimating Meat Supply by GOE Agencies

Variable and name	Cattle	Buffalo
Calving rate (>3yrs)(CR_1)	0 75	0 65
Calving rate (1-3yrs)(CR_2)	0 30	0 20
Mortality rate (>3yrs)(r_1)	0 02	0 02
Mortality rate (1-3 yrs)(r_2)	0 02	0 02
Mortality rate (<1 yrs)(r_3)	0 10	0 15
Percent females	0 50	0 50

(1) Young calves surviving
(1 1) Buffalo $(1-r_3)[CR_1(H_{1b}) + CR_2(H_{2b})]$
(1 2) Cattle $(1-r_3)[CR_1(H_{1c}) + CR_2(H_{2c})]$
where H_{1b} = female buffalo herd >3 years of age,
H_{2b} = female buffalo herd 1-3 years of age
H_{1c} = female cattle herd >3 years of age
H_{2c} = female cattle herd 1-3 years of age

(2) Numbers slaughtered (cattle and buffalo combined)
(2.1) Youngstock $[1\ 1 + 1\ 2] - \Delta[H_3]$
(2 2) 1-3 years $(1-r_2)[(H_{3(t)} + 1/2\ H_{4(t)} - H_{4(t+1)}]$
(2 3) >3 years $(1-r_1)[H_{5(t)} + 1/2\ H_{5(t)} - H_{5(t+1)}]$

where $\Delta H_3 = H_{3(t+1)}) - H_{3(t)}$ where t is time in years
H_3 = inventory of young calves (male and female, cattle and buffalo)
H_4 = inventory of cattle and buffalo, male and female 1-3 years of age
H_5 = inventory of cattle and buffalo, male and female >3 years of age

Thus projections of ruminant populations (and thus domestic milk production) are based exclusively on population estimates projected for each category of animals As explained below, supplies of red meat can also be estimated from slaughterhouse data with some adjustments for animals slaughtered outside of official slaughterhouses (off-slaughter) We now explore MALR U/AES procedures for estimating and projecting animal inventories The basic data set starts from Census of Agriculture figures For the period 1970 to 1986, basic inventory data from the 1961 Census of Agriculture, the 1968 sample survey and the 1970 (incomplete) Census of Agriculture were used to estimate an average annual growth rate of animal numbers between these periods and this growth rate coefficient was then applied each year until 1986 The growth rate coefficients from 1970 to 1986 are given in Table 4 18 below

Table 4 18 Growth Rates Used to Estımate Lıvestock Populatıons ın Egypt from 1970-1986

	Annual Growth Rate	
Type of anımal	Cattle	Buffalo
3 years		
Male	1 0	-1 2
Female	1 4	1 7
1-3 years		
Male	1 7	1 7
Female	1 4	1 7
<1 year		
Male	1 6	1 5
Female	0 9	2 2
Total		
Male	1 5	0 9
Female	1 3	1 8
Total populatıon	1 4	1 7
	Sheep	Goats
Old		
Male	3 6	1 0
Female	3 4	1 4
Young		
Male	3 6	0 8
Female	3 0	1 4
Total populatıon	3 4	1 3

Source Fıtch and Solıman (1981), p 9

In 1987, the 1980/81 Agrıcultural Census data fınally became avaılable Thus, for the perıod 1987 to the present, the growth trend ın anımal numbers between the 1970 (ıncomplete) Agrıcultural Census and the 1981 Agrıcultural Census were calculated and then applıed to the estımates from 1986 onwards usıng the 1980/81 Census populatıons as the new base

CAPMAS used a slıghtly dıfferent procedure by applyıng a quadratıc equatıon fıtted to data between several sample surveys and Census data to project the growth rates ın lıvestock numbers The parameters were estımated by fıttıng a quadratıc tıme trend model to data from the 1937 Agrıcultural Census, the 1947 Agrıcultural Census, the 1961 Census, the 1968 sample survey, the 1970 ıncomplete Census, and the 1981 Agrıcultural Census The implıcıt annual average growth rates ın anımal populatıons as provıded by the CAPMAS procedure are gıven below From 1986 onwards, CAPMAS changed back to a straıght-lıne trend procedure The CAPMAS fıgures are gıven ın Table 4 19

Table 4 19 Livestock Populations in Egypt 1960, 1970 and 1978 based on CAPMAS Estimates

	Total populations ('000 head)						
	Cattle	Buffalo	Sheep	Goats	Camels	Pigs	Donkey
1960	1,867	1,781	2,220	1,583	184	22	1,010
1970	2,115	2,009	2,066	1,155	127	15	1,362
1978	2,587	2,542	2,554	1,440	93	15	n a
	Implicit annual average growth rates						
1960-70	1 3	1 2	-0 7	-3 1	-3 6	-3 8	3 0
1970-78	2 5	3 0	2 7	2 8	-3 8	0 0	n a

Source Fitch and Ibrahim, 1981,p 12 (originally derived from CAPMAS)

The estimated populations given by the MOALR as well as the data from the 1980/81 Census of Agriculture and our estimates extrapolated from incomplete returns of the 1990/91 Census of Agriculture are set out in Volume II, Annexes 1, 2 and 7

In an attempt to estimate red meat supply from slaughtered animals, Soliman (personal communication) derived a procedure based on hide numbers procured, which was considered to be a more reliable number than offtakes based on unreliable animal population figures or on slaughterhouse data used alone The formula developed was

Sum $[N_i Q_i][1/r]$ where
N=number of animals slaughtered in official slaughterhouses by category i
Q=estimated carcass weight of category i
r= proportion of animals slaughtered in official slaughterhouses calculated as official slaughterings/total hides procured

The data on *r* was gathered by a Central Administration of Veterinary Services survey in 1970 where they estimated hide numbers from which the official slaughterings were subtracted to get off-slaughterhouse numbers as a residual For example, if category *i* was mature cattle, with 800,000 hides procured, official slaughterings of 500,000 head, then *r* = 500,000/800,000 or 0 625 If carcass weight for this category averaged 225 kg, total supply of red meat from this category would be [500,000*225][1/ 625] =180,000,000 kg or 180,000 tons The coefficient for *r* is not adjusted regularly because hide data are not collected regularly The preferred method is to use the official slaughter data and adjust it for "off-slaughterhouse" carcasses For buffalo, the same procedure is used to estimate populations, the census data is adjusted for trends to provide annual population estimates as described above Trade data from CAPMAS is then added to get a food balance sheet for red meat The categories of slaughter animals and the estimated *r* coefficient for each is given in Table 4 20

Table 4 20 Estimates of Slaughter Parameters

	Official Slaughter %	Carcass Weight
Cull cows	0 50	200
Cull buffalo	0 50	250
Feed lot bulls	0 40	165
Oxen	0 50	250
Buffalo veal	0 40	40
Sheep	0 30	20
Goats	0 20	12
Finished buffalo	0 40	180
Imported live animals		
Camels	0 50	250
Beef cattle	1 00	200
Mutton	1 00	20
Young calves	1 00	150
Imported cows	1 00	230

For both cattle and buffalo milk production estimates, CAPMAS uses inventory data to estimate domestic milk production using the coefficients in Table 4 21

Table 4 21 Milk Estimation Coefficients Used by CAPMAS

	Dairy animals as % of population	Conception rate of dairy animals (%)	Yield per lactation of milkers
Buffalo			
>3 years	100	65	1168
1-3 years	50	65	898
Cattle			
>3 years	100	75	674
1-3 years	50	65	674

These equations are then adjusted for 1% mortality, in effect reducing the original estimates by 1% Applying the coefficients in Table 4 21 to our estimates of the 1990/91 census inventories gives us the estimated milk output calculated in Table 4 22

Table 4 22 Estimated Output of Milk in Egypt in 1991 based on Estimated Animal Inventories from 1990/91 Agricultural Census, CAPMAS Coefficients

	Estimated Inventory	% Dairy Animals	Conception Rate	Yield (t)	Output
Class					
Buffalo					
> 3 years	1,262,112	x 1 00	x 0 65	x 1 168	1,234,544
1-3 years	588,877	x 0 50	x 0 65	x 0 898	171,864
CATTLE					
> 3 years	1,459,588	x 1 00	x 0 75	X 0 674	737,821
1-3 years	576,967	x 0 50	x 0 65	x 0 674	126,384
Unadjusted production					2,270,613
Less 1% mortality adjustment					22,706
Adjusted total milk production					2,247,907

This figure is consistent with estimates from the U S Agricultural Attache's Office (2,140,000 tons) and the official estimate by CAPMAS based on their earlier estimate of livestock inventories (2,231,000 tons) as well as the team estimates set out in Volume II, Annex 2

In actuality, the conception rates under village conditions may be closer to 72 to 73% As we note below, the official milk production estimates may be slightly underestimated, particularly in the latter years, when commercial dairies are supplying more milk Soliman (personal communication) indicated that more realistic yield coefficients would be 1400 kg/lactation for buffalo and 900 kg/lactation for cattle

The Agricultural Economics Research Institute of the Agricultural Research Center in Cairo undertook a major survey to explore the impact of farm-level production parameters on overall meat and milk supply to test procedures to keep track of animal protein supplies The basis was a Farm Management Survey of 2000 farms conducted in the seven most important livestock Governorates during December, 1992 The sample was split between commercial producers of over 50 head of animals (100% of farms were surveyed) and smallholders which were sampled through stratified random sampling in clusters The top 50% of livestock producing districts in each Governorate were selected and the largest four villages, in terms of livestock numbers, were selected Farmer recall was used to record information for all of 1992

The survey provides detailed information about different production systems, detailed herd structure data, quantities fed per day of various feeds, number of cows by type, milk yields, lactation periods, income from milk, sale of animals (culls and calves, by sex), animals slaughtered on farm or marketed, and mortality Data was not collected on labor use or crop production

To date, these data have been used to make estimates of milk and red meat supply in the respective Governorates (Gharbia, Sharqia, Minufiyah, Kafr el Sheikh, Giza, Minya and Suhag) Differences between published (official) data and estimates derived from this survey for populations, output and utilization were very large with some above and some below, depending on governate

The survey procedure allowed for extrapolation to the Governorate and National level The extrapolated survey figures for 1992, put the total cattle population at 2,774,000 head (our estimates based on 1990/91 partial census returns were 2,683,000 head) with a milking herd of 1,023,600 head while the extrapolated figures for buffalo were 3,288,000 head (our estimate based on 1990/91 partial census returns was 2,940,592 head) with 1,910,330 in milk. This gives a total milking herd of 2,933,930 head which is considerably higher than other estimates Nevertheless, this survey illustrates that it is possible to make reasonably accurate estimates of animal inventories based on well designed, small scale surveys Their estimates of lactation yields are -

Kilograms per Lactation for Cattle

Local	Exotic	Crossbred
854	2313	1487

As noted above, the average for buffalo was 1260 kgs/lactating animal

The same survey found these parameters for cattle and buffalo

	Female Cattle as % of total	Milking Cattle as % of females	Milking Cattle as % of total
Cattle	58 2	63 0	36 6
Buffalo	77 4	76 3	59 1

4 3.2 Study Team Estimates of Livestock and Poultry Inventories, Production, Consumption and Total Value

The database we used as the basis for this study, including the statistical estimates reported in Chapter 2, is set out in Volume II, Annex Tables 1-5 The footnotes at the bottom of these tables set out the equations used to generate these numbers Essentially, the procedure was to use the most reliable estimates that were not based on trend extrapolations and tie these together through slaughter numbers, which were also felt to be fairly reliable The initial animal inventory levels were taken from the 1981 and 1991 agricultural censuses Slaughter estimates are available from CAPMAS The principle used beginning inventory, adjusted these numbers for death loss, slaughter and estimated replacements to get ending inventories which were the beginning inventories for the start of the next year Death losses are fairly well known and are not expected to vary much between years Estimated replacements were thus adjusted so the inventories at the end of 1991 were consistent with the agricultural census figures

4 3 3 Imports of Livestock and Livestock Products

Imports and exports also contribute to the overall supply of animal products available for consumption in Egypt Official trade statistics are taken from CAPMAS These are summarized in various places in Volume II, including Annexes 1, 2, 4, 7, and 9

The major imported products contributing to supply are imports of frozen beef, live cattle, live camels and dairy products Due to EEC subsidies on exports of beef and live cattle and the low tariff rate on meat (5%) and live cattle (0%), imports are surging with an estimated 1992 import of frozen beef of 40,000 tons and estimated 1993 imports of 70,000 to 80,000 tons Using data from Soliman (1982, page 12), 1st and 2nd quality retail cuts represent 49% of live weight of Egyptian cattle Thus imports of 75,000 tons of retail cuts translates into a liveweight equivalent of Egyptian cattle of

$$\frac{75{,}000{,}000 \text{ kg}}{0\ 49} = \frac{153{,}000{,}000 \text{ kg/w}}{425 \text{ kg/animal}} = 360{,}000/\text{head}$$

This number compares with slaughter of 2,412,000 head of cattle and buffalo in 1991 and estimated 1991 meat supplied (carcass weight) of 439,000 tons from local cattle and buffalo

The nature of these subsidies and their impact on local producers' profitability is set out in Section 4 4 6 below Dairy product imports are concentrated primarily on those items requiring large amounts of fresh milk in the manufacturing process such as milk powders, butter and cheese We did not consider butter as this is typically in the fats and oils trade account Table 4 23 sets out the process of constructing a milk supply balance, for Egypt, in whole milk equivalents

By excluding the whole milk equivalent of imported butter, Egypt has a self sufficiency ratio of about 84% in dairy products Including butter is confusing because it is a co-product of skim milk powder and butter requires a large volume of milk, most of which is used for other products such as fresh skim milk, low fat milk, yogurt, or skim milk powder

Table 4 23 Estimated Supply of Milk and Milk Products in Egypt in 1991, in tons (converted into whole milk equivalents)

Products	In product form(tons)	Conversion factor to whole milk equivalents	Total supply in whole milk equivalents (tons)
Local			
Fresh milk	2,200,000	1 000	2,200,000
Imports			
Milk & cream, fresh	231	1 000	231
Full cream milk powder	2,959	7 162	21,192
Skim milk powder (2)	11,834	7 690	91,003
Evaporated milk	-	2 135	0
Sweetened condensed	46	2 297	106
Canned milk	-	1 000	0
Cream	-	5 400	0
Other milk & cream	-	1 000	0
Cheese & curd	36,143	8 700	314,444
Sub-total			2,626,977
Less Exports (in whole milk equivalents)		20,514	
Total supply			2,606,463
Population			57,000,000
Consumption (kg/capita of total supply)		46	
Consumption (kg/capita of domestic supply)		39	
% self-sufficiency			84 41%

(1) Assumes 20% of all imports of dry milk are in this category
(2) Assumes 80% of all imports of dry milk are in this category
(3) Does not include butter imports in whole milk equivalent calculations
Butter is usually treated in the fats and oils food balance sheet

Sources (1) CAPMAS 1990 The Standard International Trade Classification (revised)
(2) MOALR U/AES (Unpublished data)
(3) CAPMAS 1993 Statistical Yearbook

4 3 4 Estimates of Domestic Consumption of Animal Protein Foods

This information is available from four different sources First, the Winrock Study Team estimates of inventories and supplies was converted into estimates of per capita consumption This is reported in Volume II, Annexes 1 (red meat), 2 (whole milk equivalents) and 4 (poultry products) These estimates should be regarded as the most reliable based on the consistency of animal inventories A similar approach is used by the United States Department of Agriculture in constructing their Global Economic Data Exchange Series Their approach, like ours, is based on a logical relationship between beginning and ending inventories regulated by the apparent offtake

Three other sources were also available for cross-referencing purposes The FAO Food Balance Sheets are broadly similar to the approach followed by both the Winrock Team and the USDA but do not pay attention to the internal consistency of animal inventories that generate the supply Rather, they take official government estimates of supplies, add on trade, losses, etc and produce food balance sheets The final source is based on household expenditure surveys We were able to obtain preliminary estimates of the 1990/91 National Food Expenditure Survey data from CAPMAS This survey consisted of data from 15,000 households based on a rotating sample of 1250 households sampled each month Each household was visited 10 times during the month and during each visit, the interviewer recorded daily household expenditures The survey covered the period from September, 1990 to August, 1991 These results are summarized in Section 2 21 and in Volume II, Annex 8 and in Volume III of this report The Egypt Food Balance Sheets produced by CAPMAS are given in Volume II, Annex 9

4 4 Production Economics

4 4 1 Review of Recent Crop-Livestock Budgets

Most livestock in Egypt are produced under mixed crop-livestock systems and profitability of crops and cropping systems is an important consideration in forecasting future trends in the livestock sector In particular, berseem production costs and the relative profitability of berseem in different crop rotations are important factors influencing livestock production and productivity in Egypt This is not a straightforward analysis as the demand (and thus price) for berseem is a derived demand This derived demand is governed by the profitability of livestock which use berseem

Annex Tables 13 1 to 13 5 summarize recent budgets for long- and short-term berseem production Tables 13 1 and 13 2 are budgets derived as part of the APCP Cotton Supply Response Study while Tables 13 3 to 13 5 are budgets originally derived from the 1979/80 Winrock study with costs and prices updated to 1993 levels Net returns per feddan varied between LE 447 to LE 761 in the Cotton Supply Response Study with an average of LE 632/feddan The updated Winrock budgets found net returns of LE 535/feddan in Musha, the survey village in Assiut Governorate in Upper Egypt, and LE 574/feddan in Zaweit Ghazal - Ezeb Kabeel, the Nile Delta village in Beheira Governorate The net returns per feddan thus seemed in the range of LE 450-750/feddan with an average of approximately LE 550/feddan Of particular interest for this study is the competitiveness of crop rotations with long-season berseem and its domestic resource cost Annex Table 13 6 shows the competitiveness of major crops, including both long-season and short-season berseem The divergence between financial and economic returns is an indication of berseem's heavy use of subsidized water The same relationship is evident in Annex Table 13 7 where the maize-long berseem rotation has a financial net return of LE 1292/feddan but an economic net return of only LE 470/feddan Annex Table 13 8 shows the ratio of returns between cotton-based and other crop rotations, based on the Cotton Supply Response Study In the Extra Long Staple (ELS) areas, cotton-short berseem is as profitable as alternative cropping patterns but in the long staple cotton growing areas, the cotton-short berseem rotation, as well as other rotations with berseem (long and short-term) generally were not as profitable as other rotations This is due, in part to the low productivity of native cattle and buffalo in these areas which depresses the demand for berseem

The main reason leading to the divergence between finantial and economic returns for individual crops (Annex Table 13 6) and for crop rotations (Annex Table 13 7) is the relative amount of scarce water used As water is delivered free to farmers, the divergence can be very large for high consumptive crops such as sugarcane and much less for crops using moderate amounts of water such as wheat We anticipate that the policy reform agenda will eventually lead to some type of system for water rationing and/or pricing that will lead to more efficient use of water and thus decreased berseem production

Crop Budgets It should be noted that the budgets represents financial costs and returns and not economic costs and returns The main difference (World Bank, 1992) is in the costs of water drainage services, water costs and controlled land rent The first two costs are not borne by farmers while the rent disparity is 4 to 5 times the controlled level This is the basis for Annex Tables 13 6 and 13 7 Updating our berseem production costs and livestock production costs to take full account of the economic costs of livestock production inputs is well beyond the scope of this study Not only would we have to adjust berseem and other fodder crop costs, but we would also have to readjust input costs for crop by-products such as brans, straws, molasses, and oilseed meals as well as subsidized inputs such as animal health and AI services

In the simplest example, our estimated variable costs of long berseem ranged between LE 388 - LE 426 per feddan Adding the economic cost of drainage (LE 49 2/feddan), irrigation water (LE 114 8/feddan) and land rent (LE 379 4/feddan) would add LE 543 4 to the cost, more than doubling the cost we calculated on a financial basis The situation with short berseem is almost as drastic As noted above, this would lead to reallocation of land away from these crops and would result in substantial increases in production costs for milk, and a shift away from smallholder milk production, which is heavily dependant on berseem, towards commercial feedlot operations which can substitute imported concentrate feeds for at least some locally produced roughages

Another factor which will probably reduce the area planted of long-season berseem would be freeing up of cotton pricing and land allocation rules for cotton The APCP Cotton Supply Response Study carried out a series of policy simulations with respect to cotton production using a multi-market equilibrium model Removing cotton acreage quotas, using 1990 as a base year, resulted in increases of 72,0000 feddans of long-season berseem and 164,000 feddans of short-season berseem This is because cotton was relatively unprofitable under the former pricing system and this resulted in large increases in maize and rice which can be followed with long-season berseem Using 1990 border prices resulted in increased cotton production, a large increase in short-season berseem, which follows cotton (892,000 feddans), and a large decrease in long-season berseem (349,000 feddans) A number of related simulations found the same pattern so we expect long-term policy reforms to result in increased plantings of short-season berseem and decreased plantings of long-season berseem However, Annex Table 13 6 indicates that short berseem has a negative economic net return because of heavy use of scarce water This leads to the second major policy issue raised by the World Bank (1992) - that of water pricing in agriculture

We assume that cotton production and pricing will gradually be liberalized and short-season berseem production will increase while long-season berseem production will decrease Earlier studies have shown a strong correlation between area planted to short berseem and calf growing operations and area planted to long-season berseem and dairy (cattle and buffalo) operations (Soliman and Imam, 1987) Current policy reforms in the cotton sector seem likely to result in decreased areas of long-berseem which would decrease feed supplies to dairying Water pricing or rationing would have the same effect and would result in a major decrease in short-season berseem as well Therefore, policy reforms in the crop sector will, on balance, decrease the amounts of berseem and put economic pressure on dairying and small holder cattle and buffalo growing and fattening operations

A major dairy improvement program coupled with higher and stable farm-level prices for milk would increase local demand for long-season berseem, for green maize (darawa) fodder and maize grain and would favor the maize-long berseem rotation over the cotton-short berseem rotation This policy would also increase the supply of dairy bulls for fattening Thus increased production of milk and feeder calves will require expanded levels of long-season berseem and maize This trade-off will influence the amount of wheat and cotton land However, we were unable to model all the possible scenarios for berseem production, given time constraints and data requirements (also see Section 4 4 4 below)

4 4 2 Budgets for Livestock Production Systems

There are numerous sources of data for constructing budgets of various livestock enterprises in Egypt Most, however, are pre-reform and data on prices, farm-level cropping restrictions and the effects of input and output subsidies are out of date Another significant development is the greatly reduced amount of cattle and buffalo power used directly for on-farm uses and, consequently, the substitution of milking animals for draft power Thus, most red meat is now produced as a by-product of dairy operations These production systems are described more fully in section 4 2 2 above

Of particular importance to the economics of livestock production in Egypt is the production cost of berseem (Egyptian clover or *Trifolium alexandrium*), the major feed resource for dairy production and growing animals This is summarized above Labor requirements for berseem are set out in Annex Table 12 4 These figures do not include harvesting labor as much of the berseem is sold on a standing crop basis with the purchaser providing the harvest labor Other surveys provide estimates of harvest labor Multiplying these figures by the average agricultural wage rate of LE 5 8/day would overestimate labor costs for berseem because of the lower wages for women and children The detailed cost of production estimates which follow use these rates for berseem costs (Annex Tables 13 1 to 13 5) and livestock labor costs

Poultry from commercial producers was divided into broiler units and layer units Broiler production costs are summarized for the period 1989-1991, the period following the gradual removal of subsidies to this sub-sector and are updated to 1993 Annex Table 14 1 presents estimates of recent broiler chicken production costs

The current domestic cost would be about $ 1 47 per bird or $ 0 97/kg, liveweight farmgate basis Current U S farmgate prices are $ 0 59/kg which confirms the inefficiencies which remain in the broiler sector The estimated border price for frozen broilers, CIF Alexandria without export subsidies, was estimated as $ 1 52/kg

Productions costs for eggs were estimated from commercial broiler farms, not from traditional village egg producers Annex Table 14 2 provides several comparable estimates of egg production costs Production costs were consistently in the range of LE 1 67 to LE 1 84/dozen ($ 0 55/dozen) which is slightly higher than current U S farm-level costs of $ 0 474/dozen

Productivity levels (Annex Table 16 3) were generally slightly lower than comparable U S levels but lower labor and utility rates help keep costs in Egypt down

Beef cattle and buffalo feedlot budgets were relatively straightforward Feed costs, feed conversion efficiencies, purchase and sale prices and mortality rates were fairly uniform between the various sources of data consulted during the study Volume II, Annex Tables 14 6 and 14 7 summarize costs and returns for, respectively, buffalo feedlot fattening and dairy cattle bull feedlot fattening The budgets indicate costs per kg of feedlot fed live animal of between LE 5 65 for buffalo and LE 5 24 for cattle ($ 1 69 to $ 1 56, respectively, comparable to U S costs) Next, we constructed smallholder fattening budgets Volume II, Tables 14 8 and 14 9 provide costs and returns for buffalo and cattle, respectively Costs per kg for fattened animals were estimated as LE 4 72 for buffalo and LE 4 44 for cattle These lower costs are to be expected as it is difficult to fully account for all non-cash costs in the village situation, whereas costs for commercial operations can much more easily be accounted for

Milk production costs were also estimated for buffalo and cattle under both commercial (dairy cattle only) and conventional smallholder conditions Volume II, Annex Table 14 3 summarizes costs for commercial farms while Tables 14 4 and 14 5 summarize costs for buffalo and cattle smallholder dairying, respectively Commercial milk production costs were between LE 0 32 and LE 0 646/kg and were lower than comparable figures for smallholder cattle (LE 0 68 to 1 09/kg) Smallholder buffalo production costs were about LE 0 87/kg, adjusted to cow milk equivalents using Jane's equation Cattle milk costs were slightly higher (Annex Table 14 5) due to low yields but input quantities and costs were comparable to those of buffalo The non-milk returns still provide a positive return to the cow even though direct revenues from milk sales don't cover production costs The conventional, subsistence oriented Baladi cattle producers obtain yields of only 600 to 900 kg/annum and those animals need to be gradually replaced with crossbred animals as part of a well managed long-term breed improvement program which includes genetic conservation of the Baladi animals

4 4 3 Summary of Production Costs

As a basis for comparison, production costs for selected livestock in the U S were also compiled These do not represent border prices (discussed in Section 4 4 6) but are a useful comparison in deriving general ideas about production efficiencies where certain input costs (particularly labor) vary greatly between countries The U S costs were derived from USDA bulletins and various issues of *Feedstuffs* magazine The dates are late September-early October, 1993 The comparable figures for Egypt come from our analysis carried out above The animals are of generally comparable quality Table 4 24 summarizes the data at the farmgate level, assuming $ 1 00 U S = LE 3 35

Table 4 24 A Comparison of Farmgate Production Costs Between Egyptian and USA Producers for Comparable Commodities

Commodity	U S	Egypt	U S	Egypt
Broilers, live,per kg	$0 591	$0 97	LE 1 98	LE 3 25
Eggs, per dozen	$0 474	$0 549	LE 1 59	LE 1 84
Fed beef, liveweight, per kg	$1 76	$1 56	LE 5 90	LE 5 24
Cow milk, per kg[1]	$0 22	$0 19	LE 0 73	LE 0 636

[1] Authors own estimate, USDA does not publish milk production costs

These figures are consistent with our observations in other parts of the report Low feed conversion efficiencies and high mortality rates have increased poultry industry costs The availability of low-cost crop residues and by-products coupled with low wage rates maintains local red meat and milk production costs at competitive levels but significant expansion of local production beyond current levels will put increasing pressure on local feed supplies and will require significant modernization of the dairy industry and increased imports of concentrate feeds Charging for water would also increase industry costs significantly

4 4 4 Linear Programming Analysis of Livestock Enterprises for Egyptian Small Farms

The purpose of this exercise was to examine the response of crop and livestock activities to changes in prices and technology under a small-farm resource situation assuming short-run profit maximizing behavior An earlier study of feed resources in Egypt (Winrock International, 1980) developed representative small-farm models for upper and lower Egypt and examined the impact of introducing high-yielding varieties of Elephant grass (*Pennisetum purpureum*) into the farms in conjunction with various policy scenarios This study found that elephant grass could play a major role in reducing summer feed deficits and that farmers who could expand their feed base could support high yielding crossbred cows

In the course of this study, we tried to reproduce the 1980 farm planning models, but were only partially successful These results are reported later in this section A more recent attempt (Soliman, M., 1989) focused on farm level least cost ration formulation Models were developed for summer and winter seasons and for dairy buffalo, native cattle, crossbred cattle, and high-yielding as well as low-yielding exotic breed cows Soliman (1989) found that making berseem hay for use in summer was not economic and green maize for summer fodder is the most economic source of feed The optimal proportions of feed, on a dry matter basis, were

Feed	Winter (%)	Summer (%)
Long berseem	5 7	-
Short berseem	1 9	16 0
Concentrates	56 4	39 6
Cereal straw	36 0	44 4
Total	100 00	100 00

The linear programming (L-P) model developed for the Animal Protein Foods System study is now briefly described Due to lack of time, however, we were not able to fully develop and test the model nor were we able to develop several different farm types based upon soil conditions, water supplies, crop suitabilities, market opportunities, and the full range of cropping patterns and livestock enterprises that are possible in Egypt

Model Assumptions The small farm model is a simplified version of the original models developed by the Winrock team in 1979-80 (Winrock International, 1980) for representative farms in Upper and Lower Egypt The original models were based upon a large scale, intensive farm survey undertaken in 1979 in two areas of Egypt This model considered explicitly farm needs for animal power, subsistence food requirements, farm family energy requirements, subsistence food needs, credit restrictions, allocation of subsidized cottonseed meal, wheat bran and the "uniform ration," government mandated areas that had to be planted in wheat and cotton, and the dual prices faced by producers for feedstuffs (subsidized, rationed feedstuffs, and open market feedstuffs) As noted earlier, we were not able to reconstruct this model completely and even if we were, extensive modifications would have been necessary to reflect (a) changed costs, prices, input-output coefficients and (b) changed demand for draft power and household energy requirements We used the basic structure of the previous model, however, but with considerable simplification due to time constraints, lack of access to the original survey data and tapes with the original model runs and lack of access to a large computer with a dedicated linear programming software package Nevertheless, we were able to get started on the modelling process and to take a preliminary look at some policy issues germane to the overall study

Model Structure The original matrix representing activities, constraints, and input-output coefficients was developed in a Quattro Pro spreadsheet We were unable to run this model on the Quattro Pro optimizer routine because of size restrictions Upon return to Winrock, we transferred the spreadsheet to Lotus 1-2-3 and then imported the data in LP88 software for the runs reported here The simplified model had 98 activities and 52 constraints The activities are listed on the following pages

Animal Protein Foods System

Produce cotton	Produce wheat	Produce grain sorghum	Produce horse bean	Sell beef
Produce lentil	Produce soybean	Produce tomato	Produce long berseem	Sell wool
Produce short berseem	Make long berseem hay	Make short berseem hay	Transfer berseem forage	Sell veal
Produce elephant grass-berseem	Produce Sudan grass	Produce elephant grass	Produce alfalfa	Buy nitrogen
Produce donkey	Produce sheep	Produce goats	Produce buffalo 1 bull fatten 300-400 kg	Sell sheep meat
Produce buffalo 2 smallholder fatten	Produce buffalo 3 milkers high yield	Produce buffalo 4 calves 1-2 yrs	Produce cattle 1 bull fatten 200-300 kg	Buy phosphorus
Produce cattle 2 dairy low yield	Produce cattle 3 dairy high yield	Produce cattle 4 fatten to 480 kg	Sell seed cotton	Sell goat meat
Sell cotton stems	Sell wheat	Buy wheat	Feed summer wheat	Cattle/ buffalo manure for fertilizer
Feed winter wheat	Sell wheat bran	Buy wheat bran	Feed summer wheat bran	Sheep/ goat manure for fertilizer
Feed winter wheat bran	Sell wheat straw	Buy wheat straw	Feed summer wheat straw	Donkey manure for fertilizer
Feed winter wheat straw	Sell sorghum	Buy sorghum	Feed summer sorghum	

Animal Protein Foods System

Feed winter sorghum	Sell sorghum stover	Buy sorghum stover	Feed summer stover
Feed winter stover	Sell horse bean	Buy horse bean straw	Feed summer horse bean straw
Feed winter horsebean straw	Sell lentil	Buy lentil straw	Feed summer lentil straw
Feed winter lentil straw	Sell soybeans	Buy soybean straw	Feed summer soybean straw
Feed winter soybean straw	Sell tomato	Sell berseem straw	Buy berseem straw
Feed summer berseem straw	Feed winter berseem straw	Sell berseem forage	Buy berseem forage
Feed winter berseem forage	Sell elephant grass	Buy elephant grass	Feed summer elephant grass
Sell Sudan grass	Buy Sudan grass	Summer Sudan grass	Sell alfalfa forage
Buy alfalfa forage	Summer alfalfa forage	Buy concentrate feed	Summer concentrate feed
Feed winter concentrate feed	Buy cottonseed meal	Feed summer cottonseed meal	Feed winter cottonseed meal
Sell buffalo milk	Sell cattle milk	Sell buffalo meat	Sell cull meat

For our purposes, the main activities of interest are fodder producing activities which include long-season berseem, short berseem, elephant-grass berseem intercropped, sudan grass, elephant grass, and alfalfa Feed is also supplied by crop residues such as straws and stovers, wheat bran and buying activities which allow the farmer to purchase green fodder, straws, and concentrates Production activities are linked with selling activities and feed pools of TDN, CP, and DM are fed by the sources of feed noted above Livestock activities represent buffalo fattening, milk production, and calf fattening while cattle activities include bull calf fattening, low-yielding dairy cows, high-yielding dairy cows, and bull finishing operations

Constraints included rows to transfer production activities to selling activities as well as to allow purchases adding to the commodity balance, family labor constraints fixed initially at 150 days per 2 month period, summer cropland at 2 1 feddans, winter cropland at 2 1 feddans, rows to supply and utilize TDN, CP, and DM and rows accounting for manure produced which then added to nitrogen and phosphorus supplies The objective function coefficients for each activity were set as follows for the cost per unit of activity, e g variable costs of cotton for one feddan, variable costs of buffalo milk cows per cow The production activities generated revenue by selling activities based on the selling price per unit For example, produce buffalo Z activity is bull fattening from 300-400 kg The variable costs is LE 452, and the activity requires 30 days of labor each over the January - February period, March - April period, the May - June period, and the November - December period Basically, this implies 0 5 days for this activity over 8 months The activity requires 740 kg of winter TDN, 115 kg of winter CP, and 1054 kg of DM Sale is of 400 kg of live buffalo through the "sell buffalo meat" activity at LE 5 15/kg l w and 1300 kg of manure for use as fertilizer The perennial or long-term crops such as elephant grass require both summer and winter land Description of the complete model is beyond the scope of this study but could be provided by the authors, if needed

Preliminary Results The initial run of the model had all cropland planted to elephant grass Since this crop is a perennial, it requires both summer and winter cropland Animal activities included one unit of sheep and 4 4 units of cattle activity 1 (fatten dairy bulls from 200-300 kg) Animal feed consisted of 9,377 kg of purchased horsebean straw only All elephant grass was sold, not fed to the animals Sales included live cattle (1,332 kg l w), cull sheep meat (11 5 kg), sheep meat (8 4 kg), and wool (2 1 kg) The only other purchase was nitrogen as the animal manure did not supply enough nitrogen for the elephant grass This solution indicated that the animal nutrition requirements and feed composition were not calibrated correctly as the energy and protein supplied by horsebean straw would not be sufficient to fatten steers in the time frame specified in the model activity Total farm gross margin was LE 12,505 Adjustments were made to reduce elephant grass productivity which was found to be too high (we assumed 80 tons/feddan whereas the best estimate we had was 30 tons/feddan) Variable costs for cattle fattening were also too low as we forgot to include the cost of the calf in the gross margin calculation The activity also was adjusted to reflect the budget set out in Annex Table 14 7a, in that the fattening period was from 250-400 kg Feed inputs and costs were adjusted accordingly

The second run of the model provided a total farm gross margin of LE 6,852

Activity	Level of Activity
Produce grain sorghum (summer)	0 72 feddan
Produce lentil (winter)	1 33 feddan
Produce elephant grass (perennial)	0 76 feddan
Buffalo 1 (bull fattening)	0 28 units
Cattle 3 (high-yield dairy cows)	3 76 units
Sell grain sorghum	1,425 kg
Sell sorghum stover	1,454 kg
Buy horsebean straw	38,135 kg
Feed summer horsebean straw	11,650 kg
Feed winter horsebean straw	26,485 kg
Sell lentil grain	1,120 kg
Feed winter lentil straw	1,320 kg
Sell elephant grass	22,995 kg
Sell beef cattle	391 kg
Sell cow milk	13,311 kg
Sell buffalo milk	110 kg
Sell cull animals	282 kg
Buy nitrogen fertilizer	144 kg
Buy phosphorus fertilizer	46 kg
Produce cattle/buffalo dung	975 kg

This run again indicated that the nutrient requirements and supplies from crop residues were not properly specified as it should not be possible to maintain buffalo fattening and high-yielding dairy cows on horsebean and lentil straws Also, elephant grass and sorghum stover were sold, not fed to animals The model specifications for these straws, on an "as fed" basis were

	TDN	Crude Protein	Dry Matter
Horsebean straw	43%	6%	93%
Lentil straw	44 5%	5 3%	89%
Berseem forage	11%	3%	18%
Elephant grass	12 5%	2%	19%

These are direct from Egyptian feed tables and are considered accurate The use of the latter two feeds should be preferred because of their high production level relative to straws However, we found in the earlier run and this run that when elephant grass is produced, it is sold rather than fed Therefore, in the next run of the model we reduced the selling price for elephant grass by 25% and increased the selling prices of cattle and buffalo milk by 25% This was done to try and force berseem into the optimal farm plan

The third run produced a total gross margin of LE 11,364 and the following activities

Activity	Level of Activity
Grain sorghum (summer)	0 526 feddan
Lentils (winter)	1 214 feddan
Long season berseem (winter)	0 263 feddan
Long berseem hay production	6567 kg
Elephant grass	0 624 feddan
Cattle 3 (high-yield dairy cows)	4 units
Sell sorghum grain	1,044 kg
Sell sorghum stover	1,065 kg
Sell lentil grain	1,019 kg
Feed summer lentil straw	1,201 kg
Buy soybean straw	45,829 kg
Feed summer soybean straw	12,950 kg
Feed winter soybean straw	32,943 kg
Sell berseem straw	1,313 kg
Sell elephant grass	18,713 kg
Sell beef	419 kg
Sell cow milk	14,282 kg
Sell cull beef	302 kg
Buy nitrogen	91 kg
Buy phosphorus	42 kg
Produce cattle/buffalo dung	10,081 kg

The model now has long-season berseem and lentils as winter activities and grain sorghum as the summer crop with elephant grass using land in both seasons The model does respond to relative changes in product prices and input-output coefficients and, with further work and modification, could be expanded into a useful planning exercise This is discussed in more detail below

Summary Basically, there was not enough time or field data to continue to develop this model We decided that rather than delay submission of the final report even longer, we would finish work on the LP model to this stage only The shortcomings of the model reported above include (a) the need to construct "composite livestock activities" which would be a cow plus followers at each stage of growth, (b) the need to use integer programming so livestock activities would have to enter as whole numbers, (c) the need to account for milk loss due to calf suckling, (d) the need to account for different types of cotton, (e) the need to include labor hiring activities, (f) the need to include credit restrictions on farm cash requirements, (g) the need to model household energy requirements, (h) the need to include some concept of a "subsistence" basket of food that farmers produce for home consumption, and (i) the need to account for the riskiness of various options

In a more general sense, the overall study has identified a complex and often conflicting situation regarding trends in consumption, production, and competitiveness of dairy products This is closely linked to the production of berseem, which also faces a complex set of farm-level economic issues regarding its economic and financial competitiveness with other crops These issues were too complex and demanding of data to sort out during this study and should be considered as a separate follow-on activity We feel that the LP model we started during this study is a step in the right direction and should be one of the key elements of follow-on work on a berseem-dairy production-animal production linkages study

4 5 Prices and Price Projections for Major Livestock Products and Feedstuff Ingredients

This study focuses on markets, competition, efficiency and trade policy, thus prices play a major role in all aspects of the analysis Therefore, we have attempted to pull together prices at various levels for different commodities at the domestic and international level and make relevant comparisons with Egyptian prices This section also represents the start of a simple price outlook exercise which could easily be expanded and improved upon by the Egyptian Government, by a commercial firm, or by an industry association

The price situation and outlook data presented here is based upon several sources Current U S cash prices are taken from *Feedstuffs* magazine Internal U S market trends and production costs are taken from various issues of USDA Situation and Outlook Reports International prices are taken from USDA reports, FAO Production and Trade Yearbooks and the World Bank (1993) publication "Price Prospects for Major Primary Commodities, 1990-2005, Vol II" The latter publication also provides medium- and long-term price projections for major primary commodities including beef, corn, wheat and soybeans These are deflated by the MUV index of prices U S $ and Egyptian Pound rates are converted at LE 3 35 = $ 1 00 U S U S weights or measures (pounds, bushels, hundred weight, etc) are converted to metric units Retail price comparisons are between U S supermarkets and Cairo supermarkets We realize that most Egyptian consumers may pay somewhat less than the Cairo supermarket retail prices we have listed here The price and market analysis is carried out for the major groups of interest Where applicable, possible outcomes of GATT negotiations on agricultural trade are discussed, as well as current export subsidies arrangement for some products which are imported by Egypt

4 5 1 Red Meat

Price comparisons are somewhat imprecise due to the many forms in which beef is traded and used as well as substantial differences in quality At the retail level, the following prices were found in November, 1993 (per kg)

Product	Cairo Retail		U S Retail	
Ground beef	$ 4 20	LE 14 00	$ 3 46	LE 11 60
Round Steak	$ 4 78	LE 16 00	$ 6 38	LE 21 37

Farm level prices for fed cattle, feedlot fattened, are virtually identical between the USA and Egypt at $ 1 64/kg (LE 5 5/kg) in the U S and between LE 4 72 to 5 24/kg in Egypt for commercial units

Breakeven costs for fed steers in the U S in August, 1993 were $ 1 76/kg (LE 5 9/kg) while our budgets calculated breakeven costs for fattened cattle of $ 1 65/ kg (LE 5 52) in Egypt and slightly more ($ 1 69/kg or LE 5 65/kg) for fattened buffalo (Annex Tables 14 6 and 14 7)

As noted above, Egypt's red meat production costs for small holders are slightly less than the above figures The main product traded internationally is frozen boneless cow forequarters from Australia and New Zealand Quotes for early 1994 delivery, CIF U S East Coast ports are $ 2 42/kg (LE 8 11/kg) with the following prices (deflated basis) projected by the World Bank Year 2000 $ 2 28/kg - year 2005 $ 2 53/kg These forecasts thus call for international prices of $ 2,200-2,500/ton for medium to low quality boneless beef A comparable U S product is the wholesale price for boxed beef, cut out, select 1-3 grade Current cash prices for this product are also $ 2 42/kg (LE 8 11/kg) The Australian Meat Corporation quoted CIF prices Alexandria for frozen forequarters of $ 1 82/kg or $ 1822/ton (LE 6 11/kg) These are not yet in the form of retail cuts

Currently, Egypt is importing heavily subsidized European frozen beef, retail cuts CIF Alexandria, for only $ 1,200/ton (LE 4 02/kg) Adding handling, shipping, taxes and retail mark-up of 50% would still make these products available at the retail level at about LE 6 00/kg, well under local meat prices Importer and distributor profits thus would be in the range of LE 10 00/kg or LE 10,000/ton

The subsidy from the EEC, based on European carcass beef prices, would be in the range of $ 1300/ton There is thus a strong case for a countervailing duty to bring CIF prices up to the range of $ 2,500/ton, a close estimate of the international unsubsidized CIF price for this type of meat European live animal prices and carcass prices are similar to those listed earlier for the U S and are higher than production costs in Egypt for cattle and buffalo meat

Field visits further confirmed the extremely low prices at which subsidized European live animals and meat were entering Egypt and the negative impact this was having on the price for fattened cattle and buffalo Dairy and mixed breed steers from Europe were being supplied to slaughterhouses for LE 4 50/kg liveweight (U S $ 1 34/kg), far below the prices for comparable grades of cattle in the USA or Europe This compares to production costs in Egypt of LE 5 00 - LE 5 25 for comparable or better quality grades of live cattle These local production costs are comparable to those of the main beef exporting countries, on an unsubsidized basis

Manufacturing grade boneless beef, 11 to 13% fat, was being delivered to processing plants for costs of only U S $ 900/ton CIF Alexandria plus delivery costs of LE 500/ton for a net price delivered to the processing plants of LE 3518/ton (U S $ 1050/ton), far below the export price of unsubsidized New Zealand/Australian beef of comparable quality which is currently U S $ 2420/ton, delivered, U S East Coast or of Australian frozen forequarters, CIF Alexandria, of $ 1822/ton The imported EEC beef thus costs the processor LE 3 515/kg and is sold as retail hamburger meat for between LE 14 and LE 16/kg This is providing the local processors, importers and distributors enormous profits at the expense of local producers The same holds true for other types of imported red meat

4 5 2 Poultry and Eggs

Prıce and productıon cost comparısons for commercıal products (broılers and eggs) are straıghtforward The comparısons are not attempted for meat and eggs produced by local (Baladı) chıckens Retaıl prıce comparısons between U S and Caıro, Egypt ın November, 1993 found the followıng

Product	Caıro Retaıl	U S Retaıl
Eggs, large (dozen)	$ 0 96 LE 3 22	$ 0 90 LE 3 02
Chıcken, whole, fresh	$ 2 20 LE 7 37	$ 2 00 LE 6 70
Frozen broıler, kg	$ 1 91 LE 6 40	$ 1 56 LE 5 23

Productıon costs for eggs ın the U S ın late 1993 were $ 0 474/ dozen (LE 1 59) whıle our budgets ındıcated costs ın Egypt of about $ 0 55/dozen (LE 1 84/dozen) Productıon costs for U S broıler chıckens ın August, 1993 were $ 0 59/kg (LE 1 98) whıle our budgets ındıcated farm gate costs ın Egypt of $ 0 97/kg (LE 3 25) These dıfferentıals are consıstent wıth our earlıer observatıons that low levels of productıon effıcıency, partıcularly ın the broıler ındustry, have resulted ın hıgh productıon costs for poulty products

The U S domınates the export market for the maın type of exported product, whole frozen broılers The 1991 average FOB prıce, ın U S $/kg, was $ 1 19 Sınce then, prıces have moved up moderately but countrıes such as Egypt are able to ımport poultry meat at lower prıces due to competıtıve subsıdıes offered by the EEC and USA Thıs was one reason for the severe cost-prıce squeeze on the Egyptıan broıler producers whıch trıggered the ımport ban For purposes of thıs study, a market prıce of $ 1 25 kg for frozen broılers, FOB New York ıs used Gıven the cost pressures on the ındustry and the long-term outlook for prıces of the major feed ıngredıents (maıze and soybean meal), there wıll not be much upward pressure on thıs prıce ın the medıum-term as the border prıce calculated on thıs marker product wıll also serve as a long-range cost target for the local broıler ındustry Current ex-factory costs for frozen broılers ın Egypt ıs about LE 5 5/kg ($ 1 64/kg) or about 30% over U S FOB costs

For eggs, no comparable calculatıon was made as fresh eggs for consumptıon are not wıdely traded ınternatıonally Instead, we used U S productıon costs as the ındıcator of competıtıveness

4 5 3 Dairy Products

A large variety of products are produced, consumed, and imported into Egypt The main products, however, are fresh milk, milk powder, butter and white cheese First, a comparison of retail prices is made

Product	Cairo Retail		U S Retail	
Pasteurized milk (liter)	$ 0 60	LE 2 00	$ 0 60	LE 2 00
Butter (kg)[1]	$ 3 73	LE 12 50	$ 2 56	LE 8 58
Feta cheese (kg)	$ 2 09	LE 7 00	$ 2 42	LE 8 11
Whole cream Milk powder (kg)[2]	$ 4 48	LE 15 00	$ 3 56	LE 11 93

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[1] U S butter price takes Chicago wholesale price and adds 50% wholesale-retail mark-up

[2] U S milk powder price takes Minneapolis bulk wholesale price and adds 40% for packaging and retailing

Fresh milk is seldom sold through retail supermarkets in Egypt so a better indicator of local consumer prices is delivered cost of raw buffalo milk in major cities which is currently $ 0 45/ liter (LE 1 50) Village level prices for raw milk delivered to the household is about $ 0 36/liter (LE 1 20) for buffalo milk

Considerable variation was found in farmgate prices for cow and buffalo milk, depending on region, method of delivery and quality Commercial cattle dairies were delivering bulk chilled cow milk, 3 5% fat basis, to processors for about LE 0 80/kg (U S $ 0 24/kg) while a comparable prices for buffalo milk, 7 2% fat basis, was LE 1 14/kg (U S $ 0 42/kg) In more remote areas, smallholders selling small quantities to middlemen receive as little as LE 0 40/kg (U S $ 0 12/kg) for cows milk and LE 0 6 to 0 7/kg (U S $ 0 18 to U S $ 0 21/kg) for buffalo milk

The current average U S farmgate price in the U S for all classes of milk is $ 0 28/kg (LE 0 94) for cow milk, 3 2% butterfat These differences are a good reflection of differences in production costs between the two countries It was not possible to obtain directly U S milk production costs but the team estimated it at about $ 0 21/kg (LE 0 90) while we calculated milk production costs in Egypt for specialized Nile Delta commercial producers at $ 0 16/kg (LE 0 55) We now briefly describe the main products imported by Egypt and their price structure

4 5 4 Milk Powder

Both skim milk powder (SMP) and whole cream milk powder are used for recombining into fluid milk and milk products The U S Agricultural Attache estimates 80% of milk powder imported into Egypt is SMP, so the analysis which follows focuses on this product The export price in September, 1993 was $ 1,375/ton but the price is quite volatile, rising to $ 1,855 in September, 1992 The support price for this product in the U S is $ 2,279/ton while the current wholesale price in the U S is above the support price at $ 2,407/ton

Current import prices of SMP are about $ 1525/ton, CIF Alexandria A continued decrease to the $ 1,400-1,500/ton range is likely for the 2nd half of the decade unless GATT negotiations on agricultural products are successful, in which case prices would gradually trend upwards to the $ 1,600 to 2,000/ton range The minimum international export price set by the International Dairy Agreement under GATT is $ 1,350/ton and recent prices have been close to that floor price The market price used for border price calculations is $ 1,600/mt CIF Alexandria for 1993 rising to $ 1,800/mt CIF Alexandria for the medium-term (year 2000) Volume II, Annex Table 15 3 sets out the calculations to convert this to a farm level indicative cost of production for Egyptian producers to remain competitive with unsubsidized and subsidized imports

Subsidies are a feature of the international market for dairy products As noted above, the U S support price for SMP is $ 2,279/ton while the international export price is only $ 1,375/ton, a difference of almost $ 1,000 The U S operates a Dairy Incentive Program to make up the difference between U S market prices and export prices which obviously varies with the international price and particularly with the supplies of the major low cost exporters - New Zealand and Australia

The EEC operates a similar subsidy scheme with subsidies per ton even greater than in the U S The FAO Production Yearbook, 1992, Vol 46, quotes ex-factory prices in the Netherlands for whole milk powder of $ 3,469/ton and for SMP of $ 2,872/ton, prices even higher than current U S market prices With a CIF price in Alexandria of $ 1,600/ton, a subsidy of at least $ 1,330/ ton is provided by the EEC The World Bank (1993) does not make long-term projections for dairy products Based on current market prices and the limited impact (GATT) is expected to have on dairy surpluses, the export prices noted above are used ($ 1600 medium-term and $ 1800 long-term)

As Egypt does not have a milk powder industry, it is difficult to justify a countervailing duty on imported milk powder as the cost of locally recombined milk using powder is similar to the price of locally produced milk The cost of milk powder recombined is about $ 0 58/liter (LE 1 94) at the retail level

4 5 5 Butter

Current wholesale butter prices in Chicago are $ 1641/ton (LE 5497/ton) International prices are $ 1,275/ton (LE 4 27/kg) as of September, 1993 These export prices varied between $ 1,575 and $ 1,275 over the past year The GATT International Dairy Agreement minimum export price is pegged at $ 1,350/ton Egypt is the world's second largest butter importer with imports over the 1989-91 period averaging 46,620 tons/annum. CIF prices for butter, Alexandria, are $ 1,350 ton Substantial subsidies are involved in butter exports from the EEC The U S cash price (wholesale) is $ 1,640/ton compared to the current international price of $ 1,275/ton The FAO Production Yearbook (1992) quotes ex-factory butter prices in Holland of $ 4,055/ton Egypt CIF prices are close to the international prices quoted above Near-term price prospects are for export prices in the $ 1,400 to $ 1,560/ton range with medium-term prices (latter part of the 1990s) reviving to the $ 1,600 to $ 2,000 range Given these prices and the continuing scarcity of locally produced milk, Egypt should avoid production of butter on a large scale, given the continued strong demand for fluid milk and white cheese Butter production simply requires too much scarce fresh milk to make economic sense in Egypt where feed supplies are so limited and supplies of low cost imported butter will remain available

4 5 6 Cheese

EEC cheese exports to Egypt also receive subsidies Feta cheese from Denmark is imported CIF Alexandria for LE 4 00/kg ($ 1 19/kg) compared to local feta cheese, retail level, Cairo, of $ 2 00/kg The apparent subsidy compared to EEC wholesale prices is on the order of $ 1,400/ton based on wholesale prices of $ 2,600/ton Similar subsidies apply to other types of imported European cheese The FAO Production Yearbook (1992) quotes ex-factory prices in the Netherlands for full-fat Gouda cheese of $ 3,816/ton while current Cheddar cheese prices, wholesale, Cairo, are $ 2,880/ton The local Feta cheese and Greek-style hard cheeses will not be able to compete with such heavy subsidies if EEC exporters increase their exports to Egypt

4 5 7 Feed Ingredients

The current prices in the U S and Egypt for some feedstuffs are summarized in Annex Table Volume II, Annex Table 15 1 For the major export products, prices generally reflect the differences between U S prices and costs of transport, handling, insurance and other items between U S locations and either Alexandria or the farm level For products which are of lower value and are not commonly traded internationally, some substantial price differences are evident Prices of whole cotton seed in Egypt is about 50% of the U S price and cottonseed meal is also considerably cheaper in Egypt Most other concentrate prices are higher in Egypt, reflecting CIF costs

The specific calculations for determining border prices for some of the major feed ingredients are set out in Annex 15 The World Bank (1992) carries out commodity price projections for wheat, maize, sorghum, rice, soybean and cotton, the major commodities contributing either directly or indirectly to concentrate feed supplies in Egypt The next section summarizes the most recent World Bank forecasts for each commodity All prices are in constant 1990 values

Wheat prices are expected to decline over the medium term, rising slightly towards the end of the decade and then declining beyond the year 2000 Rice, on the other hand, is expected to rise gradually over the medium- and longer-term Prices for maize and sorghum are not expected to change significantly over current levels Prices for both soybeans and soybean meal will stay about at current levels Cotton prices will decline The price forecasts, in constant 1990 values, are

	Wheat	Rice	Sorghum	Maize	Soybeans	Soybean meal	Cotton
1995	$ 133	$ 300	91	101	234	208	140
2000	$ 142	$ 336	98	101	219	185	150
2005	$ 121	$ 374	78	82	234	210	145

In conclusion, Egyptian crop and livestock producers will face a generally stagnant situation for commodity and feedstuff prices We can expect crop production to continue a gradual trend towards higher value crops while livestock producers should be able to secure low cost concentrate feeds from the local and international markets

4 6 Border Prices for Livestock Products and Feedstuff Ingredients

Border prices are defined as the domestic equivalent of the export price for a commodity Border prices are calculated using export prices as the starting point and then performing the following adjustments

a Convert from the export price in $ cents/pound to LE/kg Since there is no open parallel market for LE, the current exchange rate of $ 1 00 U S =LE 3 35 was used
b Adjust for F O B expenses
c Adjust for processing costs, if any
d Adjust for by-product values, if any
e Adjust for transport and handling costs
f Adjust for waste or shrinkage

This provides an equivalent cost at the level of interest for analysis, viz slaughterhouse, cold store, feed mill and live animals or milk at the farm gate A border price equal to the procurement price at the relevant level in the marketing or processing chain implies that the recipient is paid the full export price, adjusted for marketing and processing cost

Calculations for border prices for the major livestock products of interest are carried out in Annex 15

4 6 1 Border Price Calculations for Beef

Soliman (1982) sets out in detail the procedures needed to adjust locally produced beef, imported carcass meat, imported boneless meat and live animals imported for slaughter, to a product-equivalent basis A large number of adjustments are necessary given the different form of the products The data on slaughterhouse carcass weight and boneless weight adjustments were derived from a series of experiments in slaughterhouses and cold stores conducted by the Ministry of Supply during 1980-81 and reflect general adjustment factors for Egypt quite well The basic carcass characteristics and dressing percentages should be in the same range in 1993 as there has been little change in the genetic composition and feeding practices of local animals during this period It was decided not to use the category "red meat" as the marker product as there is no standard for the product in international trade as various types of cuts are traded internationally

The marker product initially chosen was Australian/New Zealand frozen boneless cow meat, 60 kg cartons We assume CIF price Alexandria is the same as the CIF price for the same product, U S East Coast ports, or $ 2420/ton This will be used as a marker price by adding 3% for handling, storage and transport, for a total of $ 2493/ton Annex Table 15 2 sets out the detailed costs of producing an equivalent product in Egypt This table is indicative only as it was not possible during this study to update all costs included in Annex Table 15 2 Instead, most costs were calculated on a % of total value basis, rather than trying to adjust each cost item for cost inflation The trader margins found in our analysis are very close to those calculated by Soliman (1982) and the retail trader selling costs are those prevailing in the Cairo market By adjusting for revenues from offal, liver, etc we came up with an average price of 1st and 2nd quality beef of about LE 11 06/kg of red meat or about $ 3 30/kg This is somewhat higher than the CIF cost of Australian boneless beef which is a lower quality product A more comparable product would be U S boxed beef cutout, choice 1-3 grade which is currently priced at $

2500/ton U S Midwest and would cost about $ 2 80/kg delivered Cairo (LE 9 38/kg) Costs of both locally produced beef and beef imported from Australia or the U S are far higher than the landed costs of heavily subsidized EEC beef exports (see Section 4 4 5) We can also make a more direct comparison using live cattle prices Current costs of Australian live steers, slaughter weight, CIF Alexandria, 450 kg live weight, are $ 580/head, or $ 1 29/kg liveweight (LE 4 32) which is slightly below our estimated cost for smallholder cattle fattening of LE 4 44/kg Again, heavily subsidized Irish live cattle are entering Egypt for less than those costs (Section 4 4 5)

The local production costs under the other production systems budgeted were all higher than the smallholder cost of LE 4 44/kg (Annex Table 14 9) with costs ranging from LE 4 73/kg to LE 5 65/kg depending on the budget (Annex Tables 14 6-14 8), indicating that these costs are not competitive with import parity prices

Both of the above analyses indicate that Egyptian beef production costs are at, or slightly above, comparable border prices for beef and substantial expansion of red meat production will not be cost effective at current world market prices If frozen beef prices go to $ 2800/ton, this would bring costs of imports closer to local costs but would still not result in a comparative advantage for Egyptian producers, particularly for lower quality grass fed beef

4 6 2 Border Price Calculations for Milk

Soliman, El Zaher and Fitch (1983) carried out a similar analysis in 1993 for milk import parity costs They first derived milk production costs from various dairying systems, adjusted to 4% milk fat basis They then calculated farm-level cost of milk imported as milk powder using a free market price and EEC-subsidized price for the milk powder At 1983 cost and price levels, adjusted costs (adjusted, for feed subsidies and berseem shadow price) were (Piasters/kg, 4% fat basis)

Commercial System		Traditional System	
Foreign Breeds	Buffalo	Buffalo	Native Breeds
25 12	26 32	14 95	31 36

Our budgets (Annex 14) also found traditional native cattle milk production costs to be the highest but commercial dairy cattle systems were now producing milk at lower cost than traditional buffalo producers The costs calculated in this study were not adjusted to true economic cost by putting in a shadow price for water used to produce animal feed We compare border prices for milk powder at both open market and subsidized prices Annex Table 15 3 sets out our calculations The results indicate that producers in Egypt will have an increasingly difficult time competing against subsidized milk powder imports but Egyptian production costs are competitive with costs of milk powder imported at competitive export prices with the exception of local cattle milk production The higher producing commercial systems can produce milk at costs at equal or less than subsidized milk powder prices but charging these units a shadow price for water, particularly for those units using large amounts of aquifer water, would probably put the full economic costs of local milk between the subsidized and open market (unsubsidized) price for milk produced from reconstituted milk powder

The medium-to-long term price outlook, with milk powder price at $ 1600/ton and $ 1800/ton respectively (CIF of $ 1725 and $ 1925 respectively) indicates that current Egyptian production costs will be well within the competitive range of imported, reconstituted milk powder (Columns 2 and 3, Table 15 3) if we do not account for the economic costs of water used to produce feed

4 6 3 Border Price Calculations for Chicken Meat

The border price calculated for U S frozen broilers CIF Cairo was $ 1 52/kg (LE 5 1/kg) in Section 4 4 5 Current production costs in Egypt for frozen broilers are $ 1 64/kg (LE 5 5/kg), or slightly above CIF costs With marginal improvements in production efficiency and better utilization of economies of scale in processing, Egyptian costs should be about equal to unsubsidized cost of imported whole frozen broiler chicken meat Under the current situation of competitive subsidization of frozen broilers by the U S and the EEC (Section 4 4 5), CIF prices would be much less than local production costs With continued access to low cost supplies of imported maize and soybean meal, Egyptian broiler production costs should remain at about the border price levels as long as some increases in efficiency take place

4 6 4 Border Price Calculations for Maize

The current FOB Chicago price for No 2 yellow maize is about $ 100/ton The World Bank (1992) estimated import parity costs for maize using ocean freight-insurance cost of $ 32/ton, for a CIF price of $ 132/ton Additional costs assumed by the World Bank to get the commodity to market are estimated as port charge and transport handling (LE 40), importer charges (LE 30) and wholesaling charge (LE 65) for a total cost at the local market of LE 537 ($ 160/ton) In fact, feed mills interviewed by the team were getting maize delivered at lower costs than those used by the World Bank and we calculated total costs from port to feed mill of only LE 60/ton

Annex Table 15 4 sets out four different estimates of local production costs The three studies using financial costs all put costs for producing local white maize at $ 85-95/ton This is consistent with our findings of local maize delivered to feedlots of slightly over $ 100/ton Next, if we adjust the cost estimates of columns (1) and (4) to add the economic costs of water drainage (LE 81/feddan), irrigation water (LE 189/feddan) and the difference between controlled land rent and market land rent (332 5 - 66 5 = LE 266/feddan), economic costs would increase by $ 160/feddan This adjustment is carried out in Annex Table 15 4 Rows 10-13 set out these calculations which put the economic cost to Egypt of producing maize at between $ 145 - $ 172/ton, above the border price we calculated We have suggested earlier than it would be difficult to sort out the production cost of crops and livestock products following full-cost pricing of all agricultural inputs and that is well beyond the scope of this study We have speculated earlier in this section about the possible impact on production costs of milk and red meat of full-cost pricing of inputs We have also indicated that substantial improvement of maize yields are forecast and that the widespread adoption of hybrid yellow maize could easily lead to a doubling of yields which would bring cost down considerably Under the current costs and yields, however, Egypt does have a comparative advantage in producing maize using financial costs but not economic costs We also found freight and insurance costs of $ 20/ton for a total cost, delivered to feed mills, of only $ 138 (LE 462) which corresponded closely to our field survey findings Using the World Bank import parity figures for imported maize with the FOB maize price of $ 100 ton results in a price at the market of LE 570/ton or $ 170 This would make locally produced maize even competitive with the import parity cost based on financial costs and marginally competitive using economic costs However, our observation is that the

5 The Feed Industry

The basic information on aggregate feed supplies is presented in Section 4 2 1 of Chapter 4 of this study In this chapter, we focus specifically on the feed milling industry, support services provided to this industry by the government, and constraints and opportunities facing this sector under the transition to a market economy As indicated in Section 4 2 1, feed supply and feed requirements were approximately in balance after consideration of normal losses of crop residues for bedding, fuel, and wastage However, these calculations did not address the capacity or structure of the feed milling industry As noted later in this chapter, both the poultry feed mills, as well as livestock feed mills, have considerable excess capacity This resulted from two related factors based on the GOEs historical pattern of state ownership and subsidization State ownership of feed mills, particularly those producing ruminant feed, led to excess capacity and inefficiencies which became evident when market-based policies were put in force New entrants in the commercial animal sector, such as dairy and beef cattle feedlots and poultry units, chose to construct their own feed mills to ensure their units had adequate and reliable supplies of mixed feed meeting their feeding standards Thus, additional capacity was added to the industry Earlier subsidies, particularly for poultry and veal production, encouraged this trend When subsidies were withdrawn from 1986 onwards, the industry faced higher costs which were passed on to consumers, resulting in reduced demand This reduced the demand for formulated feed, leading to even more excess capacity Volume II, Annex Tables 11 2 and 11 3 indicate the excess capacity of the poultry feed mills in 1989 and the jump in idle production capacity of broiler chicken farms from 1988 onward Volume II, Annex Table 10 6 indicates that from 1976-1986, the average annual dry matter requirements for meat and egg production increased by 5 8 and 7 1% respectively During the period when major economic reforms were put in place (1986-1993), the respective average annual figures for meat and egg dry matter requirements were 4 7% and 0 2%

Historically, the GOE has subsidized feed and feed ingredients and enforced low prices for feed mill products This was accompanied by government control on importation of ingredients and quotas to feed mills which resulted in a black market for feed and an inefficient industry in terms of feed production and profitability At present, with the removal of subsidies and quantitative controls, the feed and feed ingredient markets are moving towards free and competitive markets It is expected that a more efficient feed industry can be developed Volume II, Annex Tables 11 4 and 11 5 illustrate the extent of these subsidies on selected feedstuffs prior to economic reforms

5 1 Domestic Feed Resources

The basic information on feed resources is given in Section 4 2 1 of Chapter 4 This section supplements the earlier discussion and provides background to the feed industry

5 1 1 Green Fodders

Green fodders represent about 64% of TDN produced for ruminants Berseem clover is the only major green fodder which is recognized as an important crop of the tripartite agricultural rotation commonly followed in Egypt Total clover yield contributes about 75% of the digestible crude protein (DCP) used in ruminant nutrition All other green fodders (alfalfa, sorghum, darawa [green maize] and others) play a limited role in animal feeding

5 1.2 Dry Roughage

Included in this section are hay and several kinds of straw The total production of all these materials and crop residues (in particular corn stalks) is estimated as 14 0 million tons However, it is thought that only 30% of this amount is available for ruminant feeding This category contributes only 18% of the TDN production for ruminants Because of the low DCP of the dry roughages, its contribution in this regard is marginal

5 1 3 Concentrates

The animal feed resources classified as concentrates account for 18% of the TDN and 24% of the DCP used in animal feeds If poultry is included, concentrates would account for 15% and 18% of the total TDN and DCP available in Egypt Annual concentrate availability is 4 7 million tons (Volume II, Annex Tables 10 32) The concentrates available in Egypt consist mainly of

Grains and seeds The use of cereals for livestock feed in Egypt is limited Grains and seeds contribute about 50% and 25% of the TDN and DCP of all concentrates, respectively

By-products The major bulk of manufactured feed used in Egypt for animal and poultry feeding is produced as by-products of the vegetable oil, cereal milling and rice polishing industries Sugarcane molasses has also been included in this group

A major contribution to by-product supply is from cottonseed cake (decorticated and undecorticated) Limited amounts of plant protein supplements such as linseed meal and soybeans meal are also utilized in feeding

5 1 4 Poultry Feed Ingredients

Most of the poultry feed ingredients are imported The bulk of it -- corn -- is imported from the U S Some other ingredients such as soybean meal, fish meal, and premixes are also imported However, all the wheat bran is produced locally from local and imported wheat About half of the soybean meal is produced locally and the other half is imported Limestone, molasses, rice bran, and limited amounts of other concentrates are also produced locally

5 1 5 Nonconventional Feedstuffs

Corn stalks, sorghum stalks, corn cobs, rice straw hulls and vegetable and fruit residues represent the most promising nonconventional livestock feeds in Egypt A feed containing rice straw, urea and molasses is now produced by some newer feed mills The production of these feed mills will aim at the utilization of dry roughages in the formulation of balanced rations for meat and milk production

5 1 6 Micro Ingredients

Limited amounts of mineral mixes of poor quality are available for livestock from domestic sources No comparable ingredients are available for poultry locally but imported products are available

Volume II provides a statistical background to the Egyptian feed industry Production of berseem is given in Annex Tables 10 13 and 10 14 Residues produced by barley, berseem, horsebean, chickpea, flax, lentils, sugar beet tops, wheat, groundnuts, maize, rice, sesame, sorghum, sugarcane, maize cobs, and soybeans are given in Annex Tables 10 15 to 10 30, respectively Estimated grains and concentrates available for animal feeding in 1992 are shown in Annex Table 10 31 while Annex Table 10 32 provides estimated availability of grains, concentrates, and crop residues for 1993 and projected to the year 2000 Annex Table 10 33 gives the proximate analysis of common Egyptian feed ingredients Annex Table 10 34 estimates the quantities of total dry matter, crude protein, and TDN from crop residues in 1990 followed by Annex Table 10 35 which provides the same estimates for green fodder produced in 1990 Annex Table 10 36 calculates the total supply, total dry matter, total crude protein for poultry and ruminants, and total TDN for poultry and ruminants Annex Table 10 37 provides a summary of these same measures grouped as crop residues, green fodder, grains (domestic plus imported) and concentrates (domestic plus imported) Imports of yellow corn and soybean meal in 1992 are summarized in Annex Table 10 39 Recent feed ingredient prices, as well as some international comparisons, are given in Annex Table 15 1

A list of feed mills in Egypt is given in Table 5 1 Of the 60 feed mills listed, 39 are for production of poultry feed Of these 39, 11 are joint investment status, 4 are public sector factories, and 24 are under private sector control. Feed ingredients used by broilers and layers are shown in Volume II, Annex Table 11 1 Annex Table 11 2 gives capacity utilization of poultry feed mills in 1989 by type of ownership

Table 5 1 Feed Mills in Egypt

Goverorate	Name	Location	Production capacity ton/hour	Type of feed
Dakahlia	Belkas feed mill (Misr for oil & soap company)	Belkas	21	Animals
	Mit Ghamr feed mill (Misr for soap & oil company)	Mit Ghamr	54	Animals
	Sherbin feed mill (Madareb Belkas & Domiat)	Sherbin	33	Animals
	Atmida feed mill	Mit Ghamr	25	Animals
	National Mit Ghamr feed mill for investments	Kafr El Mekdam	14	Animals
	Fagr El Islam feed mill	Mit Ghamr	11	Animals
	El Morshedy feed mill	Mit Ghamr	62	Animals
	Tarek feed mill for feed stuff	Mansoura	10	Animals
	Islamic center feed mill	Mit Ghamr	15	Animals
	El Nasr feed mill	Mit Ghamr	15	Animals
Domiat	Kafr Saad feed mill (Misr oil company)	Kafr Saad	25	Animals
Alexandria	Karmouz feed mill	Karmouz	20	Animals
	El Kabary feed mill	El Kabary	20	Animals
	El Kabary feed mill	El Kabary	21	Animals
	El Kabary feed mill (salt & soda company)	El Kabary	16	Animals
	Alexandria for animal production	Amerya	4	Animals
Marsa Matrouh	El Hamam feed mill	El Hamam	12	Animals
Giza	Badrashen feed mill (El Kahira for oil & soap)	Badrashen	21	Animals
	El Ayyat feed mill (El Kahira for oil & soap)	El Ayat	21	Animals
	El Kahira feed mill for agricultural dev	6th October	15	Animals
	Natco feed mill El Nile for agricultural dev	El Mansoureya	8	Animals
	Alamia feed mill for agricultural wealth	Abu Rawash	13	Animals
Kalioubia	Benha feed mill (Tanta oil company)	Benha	23	Animals
	Animal insurance fund	El Marg	10	Bedouin feed
	Gaafar feed mill	Benha	6	Animals/rabbits
	El Ahlia for safety food	Kjhanka	11 5	Animals
	Valigi Maamoun feed mill	Kalioub	25	Animals
	Saad brothers feed mill	Benha	5	Animals
Sharkia	Zakazik feed mill (Misr for oil & soap)	Zakazik	33	Animals
	Zakazik feed mill	Zakazik	33	Animals
	Misr protein feed mill	10th Ramadan	10	Animals
	Derb Negm feed mill	Derb Negm	18	Animals
	El Sharkia National feed mill	Belbeis	9	Animals
Gharbia	Tanta feed mill (Tanta for oil & soap)	Tanta	25	Animals
	El Mahalla feed mill (Tanta for oil & soap)	El Mahalla	33	Animals
	Alexandria for oil & soap	Kafr El Ziat	72	Animals
	Salt & soda	Kafr El Ziat	145	Animals
	El Gharbia for poultry Garofid	Zefta	5	Animals
	El Gharbia feed mill	El Mahalla	15	Animals
	El Santa feed mill	El Santa	7	Animals
El Menoufia	Zenara feed mill	Zenara	6 5	
Kafr El Sheikh	Kafr El Sheikh (Alexandria for oil & soap)	Kafr El Sheikh	8	Animals
	Kafr El Sheikh governorate feed mill	Kafr El Sheikh	6	Animals
	Faculty of Agriculture feed mill	Kafr El Sheikh	1	Animals
El Behera	Oil feed mill	Damanhour	54	Animals
	Rashid feed mill	Rashid	33	Animals
	Delengat feed mill	Delengat	33	Animals
	El Helbawy feed mill	Kafr El Dawar	9 5	Animals
	Alamia feed mill	Abu Homs	16	Animals
El Nobaria	El Ektessadia for food development	El Nobaria	16	Animals
	El Tal for food & poultry	El Nobaria	10	Animals
	El Sherif & partners	El Nobaria	3	Animals
El Fayoum	Gerfes feed mill	Gerfes	10	Animals
El Menya	El Nile for cotton	El Menya	25	Animals
Assiut	Beni Kazza feed mill	Beni Kezza	21	Animals
	Kayan Said feed mill	Elias Sons	5	Animals
Sohag	Sohag feed mill	Sohag	30	Animals
	Tahta feed mill	Tahta	33	
	Akhmim feed mill	Akhmim	6 5	Animals
Kena	Kena feed mill	Kena	10	Animals

Source of information. Ministry of Agriculture & Land Reclamation, and Undersecretary for Livestock Production 1993 Cairo

5 2 Feed Mills

5 2 1 Livestock

Almost all livestock feed mills are public sector mills They have no facilities for adding urea or micro-ingredients A limited range of livestock feed is produced in Egypt At present, the so called "unified feed" which was made from available ingredients to be fed for all production purposes is no longer produced

5.2.2 Poultry

The poultry feed industry reflects the growth in private sector feed production which has occurred only in the last twenty years Feed ingredients used by commercial layers and broilers are set out in Volume II, Annex Table 11 1

Poultry feed mills are relatively modern, equipped with fat adding units and premixing systems for micro ingredients with facilities to produce pellets and mash Most of the plants have computerized mixing systems

Local poultry production was accompanied by the necessary increase in feed manufacturing However, a large proportion of the ingredient are still imported All feed mills produce broiler (starter, grower and finisher) feeds and layer (starter, grower and layer) feeds Most of the poultry feeds are produced in mash form Although poultry feed mills have the equipment to produce pelletized feed, most decline to do so because of the high cost involved

5 3 Additional Features

5 3 1 Infrastructure

All existing poultry and livestock feed mills in Egypt are located in areas with good access to roads Also, all of these mills enjoy public electricity Most have stand-by power generators Very few of these feed mills have access to railroads Water is usually supplied by artesian wells, however, some feed mills have public groundwater supplies

5 3 2 Transportation

Major ports	Major Airports
Alexandria	Cairo (main airport)
Port Said	Alexandria
Suez	Luxor
Damietta	

In addition, there exist a well-developed network of rail system, roads and water ways Section 4 4 5, in the discussion of border prices for maize, discusses local transport and handling costs

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5 3 3 Labor Availability

Skilled and unskilled labor is abundant in Egypt Salaries are relatively low as compared to many other countries There are also large numbers of experienced professionals and technicians

5 3 4 Strengths and Weaknesses of the Feed Industry

Livestock Feed Industry

- Old facilities and technology
- No modernization in physical facilities has taken place
- There has been no growth in capacity since establishment in most feed mills
- Quality control is poor
- Formulas are very limited and depend on available ingredients
- Recently non-conventional feeds, new ingredients and new variable formulas have been introduced
- Market for feed concentrates, milk replacers, liquid feeds, salt blocks, minerals and vitamin are still wide open

Poultry Feed Industry

- Relatively new facilities and technology
- Modern technology is used in manufacturing
- Feed formulas are reasonable and coincide with international standards
- Quality control laws for supervising the industry are strict
- Production of layer and broiler rations is at peak capacity in relation to existing broiler and layer farms
- Improving quality is taking place
- Concentrates and premix products are still imported

Characteristic of Market	Livestock	Poultry
Intensity	unsatisfactory	adequate
Quality	poor	satisfactory
Product mix available	limited	variable but generally adequate
Ingredients		
- domestic	limited	limited
- imported	corn	corn, micro-ingredients, soybean, protein concentrates, premixes

Constraints to market expansion are now listed For livestock feed, the most important constraint is the shortage of feed ingredients Livestock feed depends largely on cottonseed cake, wheat bran and corn which are available in limited amounts However, there has recently been a trend to produce non-conventional cattle feed by treatment of fibrous crop residues Using this type of process, more farm residues can be utilized to manufacture more balanced livestock rations

For poultry feed, the most important constraint is the shortage of corn which represents 65% of the total rations This puts a ceiling on the total amount of poultry feed that can be produced

5 4 Operating Standards in the Feed Industry

5 4 1 Formulation Standards

The Central Administration for Animal Production is the authority responsible for registering feed and concentrate formulas to be either produced locally or imported for ruminants or poultry These include formulation standards for ruminants and poultry feeds, concentrates, premixes, milk replacers and any other feed mix One constraint mentioned by industry management is the need to get government permission any time the mills need to produce a new (i e unapproved) ration formulation

5 4 2 Quality Check

Quality checks are regulated by the Ministry of Agriculture according to Ministerial Decrees which include tests, standards and specifications The quality tests are performed in the Ministry labs Recently, nutrition labs at Colleges of Agriculture have been permitted to perform quality tests

5 4 3 Quality of Ingredients

The corn used in the poultry and livestock feeds in mainly imported from the U S The imported grade is mostly Yellow Dent no 2 Part of the soybean meal is produced locally Soybean meal is also imported from the U S and Europe Herring fish meal is mostly imported from Denmark. Concentrates and premixes are also imported from Europe Other feed ingredients (wheat bran, cottonseed meal, rice bran, molasses, white maize) are produced locally and their quality is not consistent

5 4 4 Handling and Transportation

Concentrates All concentrates produced for feeding cattle are sold in cube form The finished product is sold and distributed in 75 kg jute bags There is no cattle feed sold or distributed in bulk.

Roughages Baling is the most popular form for storing and distributing coarse feed, particularly hay, rice straw and wheat straw Bales normally weigh about 50 kg These bales are usually tied with twine or three wires

The major means of transportation is by truck. Most feed companies offer delivery services to their clients

5 5 Summary and Conclusions

The feed industry is one of the key components of the inputs area of the animal protein foods system Its performance is reflected in the costs, availability, and quality of feeds As feeds make up the majority of costs for all types of animals produced in this system, it can be considered one of the key sub-sectors of the system The development of a market economy is also being felt in the feed industry Traditional cattle feed factories must purchase ingredients in competition with farmers and other factories and compete with private sector firms Modern, private sector commercial feed mills that were built in response to subsidies and growing markets now find themselves with excess capacity Access to both local and imported feed ingredients has improved but supplies of imported feed face problems common to the Egyptian foreign trade sector such as poor port infrastructure, lack of bulk handling equipment and bulk transport vehicles, poor railway facilities which increases costs or requires using more expensive trucking services, inconsistent and delayed inspection services, and other factors which have been set out in more detail in studies dealing with Egypt's general trade regime

Our results indicate that continued expansion of commercial dairy, red meat, and poultry enterprises will gradually occur To provide these units with lowest cost inputs, bulk handling, and bulk transport and delivery services will be necessary Additional work would seem to be warranted to assess the in-depth requirements for such facilities and the most appropriate roles for both the public and private sectors in providing such facilities

In general, the industry has adequate capacity and many factories have relatively modern technology, particularly in the poultry sector Thus, substantial new investment in the feed industry does not seem to be required Any inputs, financial or technical, into feed milling should be demand driven, i e based on the requirements of the animal feeding system and developments in animal nutrition which can be transferred to Egyptian producers A recent example is feeding of whole cottonseed to dairy cows in the U S Specific technology transfer programs, either through technical assistance providing consultancy services, joint venture, or licensing arrangements, should concentrate first on feeding systems and animal nutrition Once the viability of improved rations ere established, assistance should then be provided to feed mills to ensure production of the improved rations Either a "fast track" approval process is needed to allow feed manufacturers to adjust rations flexibly or the requirement for approval or new formulations should be discarded and replaced with a much better system of feed quality control and testing The latter could be carried out by an industry association, a strengthened government unit, or by licensed private sector laboratories

Some specific policy issues related to the feed industry are discussed in Chapter 6

6 Policy Related to the Animal Protein Foods System

6 1 Policies to Develop a Market Economy Environment

On the whole, it appears that the Government of Egypt is gradually setting in motion policies to enable a market economy environment The GOE is deregulating, eliminating subsidies, initiating an agricultural policy for food security, putting privatization and entrepreneurship into practice, and developing and importing applicable technology As these policies have been applied to the animal protein food system, supplies have been disrupted The per capita available supplies of red meat, poultry meat, and eggs (and probably milk) have declined since 1986 when reforms were started As result, policies are discussed here that will speed the creation of a market economy environment and restructure the industry so that growth in the per capita available supplies can resume

Integration

The poultry meat industry in Egypt has had to reorganize as feed subsidies have been dropped This has eliminated a number of operators and left the entire industry with over capacity However, this does not represent complete restructuring Both horizontal and vertical integration is needed to be competitive with other international poultry businesses

Most of the poultry meat, milk, and beef feedlot industry firms have not reached a size to take advantage of the economies of scale that can reduce costs Both capital and management are not available to develop markets and expand production so that greater economies of scale can be reached Both regional and national regulations and local business attitudes prevent international investments and management from entering the industry Regulations that prevent ownership of land and ownership control of the business limit potential investment and management to local sources

Vertical integration is another part of the reorganization that will be required in attaining efficiency and lower cost animal protein food As noted in several industry publications the purpose of vertical integration is to shrink costs and create coordination between the various production and marketing stages Another important point is that it can be a means of effective technology transfer For example, a poultry company has an incentive to communicate and teach farm producers how to use modern technology and produce efficiently through contract farm production

More specifically, modern international processing companies have integrated backward through contracting and forward by developing packaging, dressed bird and piece sales, and cold storage and transportation At this point, it appears that the poultry meat industry could be reorganized to be substantially more competitive Indeed, poultry meat could even be more competitive with the preferred red meats

Similar integration of the milk industry would be helpful For example, a coordinated system of milk production, collection, processing, and distribution would support both management and technology transfer Marketing management is needed to expand the market and production management and technologies are needed to expand production in a cost efficient way

The gradual downward trend of projected per capita milk supplies is of real concern Historically, the downward trend is probably due to urbanization and the replacement of milk in the diet with other more convenient and storable foods Market promotion along with more widespread use of high producing dairy cows could shift demand and supply These factors, along with resumption of growth in per capita incomes, would help reverse this decline in per capita consumption

Competition

Growth in the domestic production of animal protein foods depends on the emergence of a commercial sector Currently a significant share of egg production is on a commercial basis Only small portions of red meat, and milk are commercially produced About one-half of poultry meat is commercially produced The commercial sector has been developed by a relatively small number of individuals The number of commercial business entities are small and each holds a large market share A single business entity in any commodity area, including egg production, can adjust production and affect price levels for the commodity This is a major condition used to define an oligopoly This condition also indicates a level of competition that does not favor the consumer

These noncompetitive conditions and firm behavior appear at nearly all levels of the animal protein food industry As discussed in the marketing section most wholesale markets are controlled by a few traders who meet the classic test for less than "pure" competition That is, they can affect price by adjusting supplies they make available to the market These noncompetitive conditions also extend to the retail market where retailers, wholesalers, and butchers collude This is expected behavior since it is profitable and acceptable under current policy

Now that the commercial sector is established, further growth would more likely occur if more competitive conditions could be promoted and further developed through policy, regulation, and regulation enforcement Generally, in the animal proteins food industry there appears to be a serious lack of regulation in the areas of price fixing, market sharing, and other anti-competitive behavior In view of the small number of firms in the inputs and processing components of the animal protein food system, the regulation regime needs to be rationalized with respect to anti-competitive behavior, quality control, development of competitive markets, and the removal of regulations that block the growth of new business

Business (Trade) Organizations

The team interviewed businesses at all levels of the animal protein food chain In most cases businesses indicated that they were not part of any business or industry organization that represented their interests with the Government of Egypt or that provided market or technical information Some business organizations as the Buffalo Producers Association indicated a strong interest in strengthening their associations and would appreciate support in training their membership in organization management and representation Most organizations indicated that they were not part of the on-going government committees that makes decisions concerning government interventions impacting upon their industry

Marketing

Market development is a key part of the animal protein food industry restructuring As discussed in the introduction, animal protein food is a supplemental source of protein Cereals and legumes are the major source of protein This special role of animal protein food in the diet indicates that market development will most likely center on developing price competitive and unique products The development of products that are price competitive is necessary because the consumer perceives a number of low cost substitutes As noted in the consumption section, the demand for most animal protein foods is elastic with respect to consumption The development of unique products will be necessary so that consumers will not perceive substitutes and will be willing to pay for added processing and service costs

Overall the meat and milk market is beginning to develop a commercial sector This sector is small but it could be developed further to more effectively service the large urban markets that are developing Migration of the rural population to the urban areas appears to be an ongoing trend

As urbanization continues markets are becoming larger and traditional practices are no longer possible For example, to reach the larger market, it will probably be necessary to distribute chilled and frozen poultry and red meat, packaged eggs, and pasteurized or UHT milk However, traditionally poultry is sold live, red meat in unchilled carcass form, and milk in a raw state In more densely populated urban areas it is difficult to slaughter live birds Warm carcass red meat and raw milk cannot be held for long periods of time or transported readily in congested areas Eggs that are traditionally packed without protection cannot be transported long distances or distributed in congested areas without costly breakage

Grading, Labelling, and Warranting

The current grading of red meat, carried out by government officials, identifies the type of animal and its age This information is stamped on the carcass Further grading is carried out by butchers Carcasses are divided into first and second grades of meat This is done to distinguish the product for retail pricing There are no standard measures for grading at this level Also, consumers appear to prefer local production and fresh meat over imported frozen meat

Poultry meat is inspected at the government slaughter plants but not graded Eggs are sometimes graded by size by retailers At the retail market level consumers appear to prefer traditional farm produced poultry meat and eggs over commercial production Traditional farm production is identified and receives a price premium Milk is sold fresh and is usually identified as buffalo, mixed, or cow milk.

The current forms of grading are traditional However, in the growing urban market, grades that reflect tastes and preferences would benefit the consumer Buyers could with a greater level of certainty purchase "what they want " Consumers appear to select meat on the basis of expected taste and texture, eggs on size, color, freshness, and when possible color of the yolk, and milk on the basis of taste, butterfat, and freshness

For most animal food products there is informal traditional grading However, this system is not uniform since there are no standard measures for grading Further, as the urban consumer market develops tastes and preferences are changing and consumers are not able to use this informal system to purchase the qualities they desire Both the consumer and the producer would benefit if a uniform grading system were developed, a system that reflected consumer tastes and preferences The consumer would receive higher levels of satisfaction and through higher prices (willingly paid by the consumer) the producer and the rest of the animal protein food system would receive greater revenues

Feed is labelled with the generic materials included in the feed but nutrient content is not clearly identified nor guaranteed Baby chicks are identified by some companies by providing genetic background, breed, and other commercial characteristics

Market Information

The lack of market and technical information is probably the current largest barrier to operation of an effective market economy in the animal protein foods sector All elements of the animal protein food sector are not able to access up-to-date market information Every business interviewed by the team indicated that market information had to be gathered directly by the business Some businesses had several individuals that gathered and analyzed market and technical production information

The team found that basic livestock and poultry information was not available The information that was available was out of date and often misleading Inventory estimates were based on projections between census points taken every ten years Other than the census data no information on inventories was estimated based on statistically significant samples Market trends and market analyses are not analyzed

Estimates of farm prices are not made from actual farm surveys Other prices of animal protein foods are made on a monthly basis but are not made available until a year later Regional prices are not reported and international market trends and forecasts are not available

To make a market economy effective, programs will be necessary for implementing a national agricultural sample survey on an annual basis, and operating an agricultural marketing information system. If government programs are not put into effect it will be necessary for business organizations to gather and process their own market information

Foreign Trade

Trade policy has traditionally played a direct as well as indirect role in Egypt's livestock economy For example, the implicit export tax on cotton has discriminated against cotton production and encouraged alternative summer crops which fit into a crop rotation using long-season berseem.

Despite planting requirements forcing farmers to grow cotton, this policy led to more berseem (and more feed resources) than would have been the case under a cotton pricing regime with producer prices closer to border prices Underpricing of wheat also encouraged the planting of

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more profitable winter crops such as berseem Increased producer prices for cotton and wheat since 1990 has corrected some of these distortions

More recently, trade liberalization in the livestock product area led to a surge of subsidized frozen broiler imports which devastated the local industry which had been operating under a variety of subsidies Subsidized exports of live cattle and beef from the EEC have also put pressure on profits of local producers The current tariff and import regulations on animals, animal products and feedstuffs are set out in Table 6 1

Of concern is the current "pocket veto" on imports of eggs and poultry meat Even though the official national ban on the imports of eggs and poultry meat has been lifted, importers report that documentation is not processed in a timely way so that imports can be made Possibly, internal ministry orders have been issued to control the imports of poultry meat and eggs Based on field interviews the industry expects the ministry to prevent imports The current tariff of 85% on imported poultry meat effectively shuts off imports as well

The decline in total egg production is reflected in per capita supplies since imports have not been used to offset the decline in local production This is unfortunate for the consumer and producer The consumer has missed the satisfaction of higher levels of consumption and eggs have lost market share Local producers will now have to develop a larger market share if they wish to produce and sell additional eggs Undoubtedly, consumers have replaced eggs with more convenient processed foods Stagnant or declining per capita income is also a factor

Secondly, poultry meat consumption has dropped precipitously since the middle 1980s and is projected to continue declining through 2003 To offset this decline, the poultry meat industry can re-organize, bring in new capital and management, and aggressively develop urban markets for dressed birds To prevent further consumer dissatisfaction and to discipline the poultry meat industry to be more competitive, imports could be allowed entry on a "fair competition" basis A number of other alternatives could be followed but with the successful conclusion of the General Agreement on Tariffs and Trade, it will probably be beneficial to participate in world poultry trade

As shown by the consumption section, imports that amount to as much as 15% of production for both eggs and poultry meat can be introduced and have only a small impact on prices

The subsidized exports of live cattle and beef from the EEC are a problem because they have a price depressing effect on domestic production Reduced prices have put pressure on profits of local producers and could in the future put some out of business Subsidized imports of beef are supported by processors and traders because of the substantial profits that can be accrued Low cost imports are converted to high priced retail cuts and processed meats Most likely, these subsidized imports will not be acceptable under GATT However, in the interim "anti-dumping" quotas and tariffs would be useful as beef growing enterprises get started

Table 6 1 Import Regulations for Animals, Animal Products, Feedstuff and other Inputs

Commodity	Tariff %	Import Ban	Approval Required
Grains			
Wheat	1		Yes
Corn	1		
Rice	20	Banned	
Sorghum/barley	5		
Grain Products			
Wheat flour	5		
Semolina	10		
Starches	50		
Bread/pasta/cookies	80	Banned	
Pulses			
Beans	1		
Lentils	1		
Peas	1		
Others	10		
Feed			
Straw/bran/premixes	10		
Hay/forage products	5		
Tapioca	5		
Molasses			
Oilseeds			
Cottonseed	1	Banned	
Sunflower	1		
Soybeans	1		
Peanut (for sowing)	5		Yes
Sesame	1		
Palm nuts/kernels	1		
Live animals			
Feeder cattle/steers	5		
Bred heifers/cows	5		
Sheep/goats/camels	5		
Live poultry	80	Banned	
Swine	80	Banned	
Day old chicks	5		
Meats			
Beef/veal	5		
Lamb/goat	5		Yes
Poultry	5		
Edible meat offals	5		Yes
Eggs			
Table eggs	80		
Dairy Products			
Dry milk	5		
Milk casein	1		
Butter (for retail)	20		
Butter (manufacturing)	5		
Butter oil/shortening)	1		
Feta Edam Gouda and Cheddar cheese for retail sale 0 5-2 0	30		
Cheddar cheese for retail sale > 2 kg	10		
Other cheese	30	Banned	
Margarine	20		

Source: Agricultural Attache's Office U.S Embassy

State Ownership of Feed Mills, Farms and Processing Units

The Government of Egypt still owns considerable feed milling capacity concentrated in the production of cattle feeds The production of poultry feed is concentrated in the private and joint venture sectors (Volume II, Annex Table 11 2) With the freeing up of feed ingredient and mixed feed prices, state owned feed processing factories have relatively little influence on the market These tend to be concentrated in the cattle feed sector, where demand is low, particularly since smallholders have lost access to heavily subsidized government feed Most trade is now from government feed mills to government owned or controlled farms with private firms dominating the supply of concentrate feeds for commercial dairies, poultry, and fattening feedlots

State ownership and control has been exercised through feed mills which received subsidized supplies of feed ingredients (primarily cottonseed meal, wheat bran, rice bran and molasses) from state-owned mills and then resold the processed feed at highly subsidized prices Volume II, Annex Table 11 5 indicates the degree of these subsidies as late as 1989 Currently, cottonseed meal seems to be the only product where private sector access to supplies still has problems and where a large difference between the international price and domestic price continues to exist (Volume II, Annex Table 15 1) In some cases, local demand has pushed tradable feedstuff prices up to, or even above, world market prices Thus the existence of state-owned feed mills does not, in itself, pose a major policy constraint at the present time although the GOE does face a problem in terms of absorbing financial losses of these enterprises and retrenchment of staff as these units are closed or privatized

The GOE has also been actively divesting itself of agricultural lands, particularly in the new lands area, with around 384,000 feddans of previously reclaimed land sold to the private sector The process of earmarking land for graduates and retrenched government employees has been criticized on grounds of both efficiency and equity with about 150,000 feddans allocated according to this process Evidence is contradictory on animal production efficiency of farms operated by graduates versus "old land" farmers, however, and we do not consider this a major policy issue In the food processing sector, excess capacity in the state-owned sector (e g Misr Co for Milk) has hampered private sector investment as total supplies of milk are inadequate to serve the processing capacity of the state-owned firms as well as new private sector processors However, our observations were that both public-and private sector firms were competing in the milk procurement and final product markets and that privatization of state-owned firms in the processing sector was moving ahead in the form of holding companies

In summary, state ownership is not a major policy issue restricting the supply of animal products as long as current trends toward open markets and divestiture move ahead

Subsidized Distribution of Food and Feedstuffs

Again, the role of state marketing cooperatives and government controls over feedstuff prices and allocation has declined to the point where these are not the major policy problems facing the sector The amount of animal protein products marketed through the government cooperatives at the retail level is now so low that it does not have much impact on overall subsector performance Our understanding is that these subsidized sales of meat, eggs and dairy products are in the process of being phased out

Nutritional Status and Policy

An appraisal of human nutrition status indicates the availability of excess energy and a deficiency in protein quality (NPU) Available estimates indicated that NPU is at about one-fourth of the recommended level A large proportion of the population, particularly the low income level strata, are expecting to face health threatening shortages of NPU

The expected positive impacts of adequate nutrition on economic development often takes generations Children are often the most vulnerable group and a whole generation must pass before the full impact of adequate or inadequate nutrition is observable In order to correct for the current shortage of NPU it may be useful to

- Develop a school lunch program to provide a meal with suitable protein sources This is especially the case for milk because it is a cheap source of animal protein and can be used with a number of staple foods such as cereals

- Provide an enriched bread program because bread is the main food item

Price Controls

The main issues are in the areas of cotton, water and land rent pricing These are discussed at greater length in the APCP Cotton Supply Response Study and the World Bank (1992) Agricultural Strategy Report Basically, underpricing of cotton and water both indirectly lead to overallocation of resources to long-berseem, and feed production which is larger than the economic optimum Underpricing of cotton leads to less than optimum production of cotton which encourages substitution for crop rotations which can incorporate long berseem as the winter crop Underpricing of water also leads to over planting of crops which are heavy users of water such as long berseem, sugarcane, and rice

Our analysis indicates that feed and animal protein product prices are, in most cases, close to their border prices and large price distortions are not present in most of the input and output markets Recent GOE policy decisions to subsidize the price of Extra Long Staple (ELS) cotton may encourage marginal shifts towards the cotton-short berseem rotation The gradual freeing up of cotton procurement prices along with declining prices in the export market has led to a situation where local prices have gone from well under border prices to slightly above border prices Analysis of the implications of this shift has not yet been carried out With the exception of cottonseed meal, which is scheduled to be freely traded by May, 1994, there do not appear to be major price controls influencing performance of the feed sector

Crop Area Allotments

The freeing up of cotton planting in 1994 will remove the last vestiges of land controls related to specific crops Thus there will be no impact on livestock supplies from these historical policies

Review of Pre-Reform and Post Reform Issues

In the teams judgement the transition to a market-oriented economy has left a gap in a major facilitating function needed in a market economy, that of an efficient and responsive information system The role of the agricultural research and extension system and other supporting systems has not been reoriented towards serving the needs of a market economy In particular, breed improvement and more specifically, artificial insemination services, have performed poorly The same is true for much of the animal health area As long as the government agencies provide AI and animal health services on a heavily subsidized basis, private sector suppliers of such services will not have an adequate profit incentive to enter these areas However, privatization of such services must be accompanied by strong marketing, publicity and credit program as well as a vastly improved product procurement system (particularly for fresh milk) which will reduce the producer risk from adoption of these higher cost technologies

The final pre-reform issue which has surfaced during this study is the National Buffalo Veal Project This project which was heavily subsidized during its previous operation from 1984-1991, will now provide producer incentives from subsidized credit only The objective of this project is to reduce local buffalo bull fattening costs enough to allow local producers to compete against subsidized imports of red meat and live cattle While we agree with the anti-dumping arguments in general, our analysis of production costs and returns indicated that credit costs alone were not a large enough component of total costs to allow local producers to compete against highly subsidized imports There is a high probability that subsidized credit will be diverted to other activities earning higher rates of return We suggest a policy of countervailing, anti-dumping duties to allow local producers to maintain local prices at (unsubsidized) about border prices with government support used to improve farmer services and encourage private sector investments in all areas A large scale buffalo fattening program based on subsidies will also divert resources away for dairying, an area where high quality feed is needed to produce low cost animal protein

6 2 Indicative Policy Agenda

Policy agendas change rapidly as new policies are adopted, as the political environment changes, and with on going events In view of the certainty of continued change the following is an indicative policy agenda that appears appropriate for the current period in developing a market economy environment for the animal protein food system The agenda summarizes policies that are consistent with the discussion above and the overall study objectives

Indicative Policy Agenda That Will Further Develop A Market Economy Environment for the Animal Protein Foods System

Indicative Policy Agenda	Illustrative Alternatives	Probable Beneficiaries
I Business Policy	**Creating a Positive Business Atmosphere for Development**	**National Economy**
1 Investment	Eliminate restrictions, and promote foreign investment to encourage integration in the poultry and milk industry	All Investors and National Economy
2 Competition	Develop competitive behavior, anti-monopoly, and fair trade practice regulation and enforcement	Animal Protein Food Business and Consumers
3 Private Sector	Provide for representation of the private sector on all government committees related to animal protein food businesses	Animal Protein Food Businesses and Government
4 Private Sector	Support livestock and poultry business organizations in becoming industry spokespersons and providers of market and technical information	Animal Protein Food Businesses and Government
5 Marketing	Provide incentives for market development of chilled and frozen poultry meat, and processed milk.	Animal Protein Food Business and Consumers
6 Marketing	Develop system for formal grading, labelling, and product warranting	Animal Protein Food Business and Consumers
7 Marketing	Develop government or private sector support market information for animal protein foods	Animal Protein Food Business and Consumers
II Trade Policy	**Creating a Positive Business Atmosphere for Trade**	**Total Economy**
1 Anti-Dumping Legislation	Eliminate imports of below world market priced products as beef and milk	Animal Protein Food System
2 Import Bans	Remove import administrative ban on poultry meat and egg imports	National Economy and consumers

To be definitive a further analysis of policy in the animal protein food area is needed to show the legislation upon which regulations have been established so that the goals of the legislation/laws can be examined in relation to the outcome of the regulations currently in practice Further interviews are probably necessary with practicing businesses to establish operating regulations Currently, government agencies are responsible for regulations which are carried out with varying rigor

An analysis of business policy will probably indicate that Egypt has a serious image problem to overcome Currently, domestic and foreign investors are frightened by the Egypt business atmosphere The American firms interviewed all had bad investment and trade experiences in Egypt These included the inability to purchase real estate, to "up stream" profits to the U S , to completely own the operation, to move funds in and out of Egypt, to raise capital by selling stock on a public stock exchange and to buy and sell freely At this point these firms have "written off" Egypt as an area of investment

This poor business reputation can be removed by opening business to all domestic and international investors This can be done by eliminating regulations and restrictions on business except for those that protect and promote competition, and define fair and orderly methods and practices of business An analysis will probably show that there are substantial benefits to all of Egypt for such policy reform. The Government of Egypt and the national agribusiness community will probably have to prove themselves through their actions to local and foreign traders and investors

The technology and research policy in the animal protein foods area can be improved by reforms that will reward and nurture the innovator and encourage the adoption of competitive technology Currently, patent rights must be established and protected Regulations need to allow the collection of royalties Research needs to be directed to current business problems and supported with government or endowment funding

6 3 Improving the Animal Protein Food System

The analysis in this report indicates several steps that can be taken to improve the animal protein food system and to make the policies discussed above effective Programs for improving the animal protein food system will need to build on the perceived potential comparative advantage, or near comparative advantage, in poultry meat, egg, and milk production Beef production is largely a by-product or complimentary product to dairy production and will continue to play a role in the sector, although at a declining level

Provide management expertise to producers using experts from international poultry and milk companies Donor sources can probably make experts available from operating companies who will provide management expertise and work directly with producers Both management and technology could be applied in a more effective, low cost way in the poultry industry In the milk industry, high producing breeds and crossbreds can be used effectively along with targeted marketing of specific products On a larger scale, operating companies, especially those who sell hatching eggs and feed inputs, are available for workshops, conferences and on site visits to train in the management area

Bring in effective investment, technology, and management by supporting domestic and international joint venture investors in completing feasibility analyses of investments in commercial poultry meat and milk production In addition, these need to assess the alternative financial instruments that can be used to finance such projects For example, can bonds or stocks be sold to raise funds for investment or can loans on a profit share basis be arranged? Can several small farmers be organized to produce on a commercial basis?

Joint venture investors can provide the know-how in integrating poultry operations from production through marketing They can also help develop either a privately owned or a cooperative collection network among small farmers for fresh milk, and white and cottage cheeses The Ministry of Agriculture and Land Reclamation has regional rural sociologists who can identify rural leaders that can support the development of the network necessary to gather marketable surplus for urban consumer markets and processors Solving the marketing problem will provide further incentives for expanding supply and encourage the adoption of more productive animals and management techniques

Strengthen business organizations with management and organizational support to augment their skills in being industry spokespersons and in gathering and providing market information to the industry Currently, producers are probably not organized or do not perceive their organizations as a means of communicating policy positions to the legislature In the developing market economy it will also be useful for the industry organizations to promote and carry-out national advertizing for their commodities and products

Demonstrate technologies as bulk grain handling to the feed industry to reduce losses and transport costs As the animal protein food system grows, larger amounts of feeds and feed ingredients will be required Such large volumes cannot be easily moved and stored in sacks

Organize government agencies to provide market and technical information in an open transparent way As the market economy develops national information is necessary for planning operations and investments At least an annual survey of livestock numbers and slaughter are needed to assess the supplies that are moving to market In addition, information on daily market prices at the retail, wholesale, and farm level are necessary to locate market opportunities and assess the efficiency of distribution The ministry has already started analyses and market information provision with the publication of the "Poultry and Eggs Situation and Outlook Report" by the Commodity Analysis Division of the Agricultural Economic Research Institute," and the "Red Meat Situation and Outlook Report" and "Dairy Situation and Outlook Report," through the National Agricultural Research Project Finally, regular calculations on costs and returns to meat, milk, and egg production, processing, and distribution need to be completed on a regular basis to assess the financial health of the industry

Under the market economy, a number of basic changes will likely occur For example, it is possible that the berseem area could shrink to a small portion of the current acreage Short season berseem may decline and it is possible that it will be replaced by vegetables or even fruits The area replacing long season berseem will likely be devoted to wheat, which will in turn lead to an expansion in the supply of wheat, bran, and straw

The need for grain concentrates is growing rapidly, particularly with the expected growth in poultry, eggs, fish farming and milk production It is possible that prices of grain concentrates could rise bringing in new resources for, say, corn production With new technology and input intensification a doubling of the yield of corn could occur

Continue with policy changes to develop a market-economy environment for the animal protein food system as a means of assuring continued investment, reorganization, and up-dating of management and technology Both domestic and foreign investors and managers are attracted to areas where market forces determine prices and available capital

Animal Protein Foods System

Based on the analysis of the study it is important that trade be open to allow imports of meat, eggs, and milk products that are priced at full cost world market prices This "fair competition" policy will provide discipline to the development of the animal protein food system and helps insure that the industry is sustainable as public sector subsidies are reduced It is also important in establishing output prices that are realistic for determining the value of businesses that are being de-nationalized

However, care must be taken to insure that these imports are priced at full cost of production and transport If meat, eggs, or milk products are being sold on the world market and imported into Egypt at below cost (dumping), this will unnecessarily constrain the development of animal production, input processing, and marketing firms

To insure imports are priced at full world market values will require adapting the current legislation or developing further "anti-dumping" legislation to comply with GATT The executing agency will need to act quickly and must therefore have clear protest procedures and communications on import price decisions Measures of world prices, both "fair" and subsidized can be obtained from the GATT organization It should be noted that this is not a basis for banning imports of red meat A substantial deficit of red meat exists and the market and the welfare of the consumer would be seriously disrupted without imports of red meat Further, imports are a source of less expensive meats that are purchased by the poor that are at a protein quality risk.

To further the development of the market economy and to be in line with the GATT it will be also useful to lift the "pocket veto" on imports of poultry Imports are necessary to cause a restructuring of the industry so that it is competitive at the world market levels The simulation model used in this study indicates that imports spread out over the year that are within the 10%-20% range of production will not unduly lower prices and thereby impede production Further, it leads to a higher level of final consumption that cannot otherwise be obtained

As the market economy evolves and as the commercial sector of the animal protein food system expands, tax incentives and selected de-regulation will be helpful in market development Currently, incentives are needed to encourage the development of a market for chilled and frozen poultry meat As this market develops proportionately fewer live birds will be purchased at retail and slaughtered A similar situation exists with cow milk. Buffalo milk is preferred to that from more productive, exotic, and crossbred cows Consequently, promotion efforts will be necessary to develop the less preferred product

References

Abdel El Nabi, M E and Shalaby, E A E M 1991 "Red Meat Situation and Outlook Report", Ministry of Agriculture and Land Reclamation, National Agricultural Research Project, Agricultural Policy Analysis Component, USAID Project 263-0152, Cairo, Egypt

Abdel Zaher, T 1983 "Milk Production Economics in Egypt", Ph D Thesis Faculty of Agriculture Ain Shams University, Cairo, Egypt

American Embassy March 1993 "Grain and Feed Annual Report", AGR no EG3020, Report Code 11, Cairo, Egypt

American Embassy June 1993 "Poultry Annual Report", AGR no EG3034, Report Code 53, Cairo, Egypt

American Embassy August 1993 "Livestock Annual Report", AGR no EG3047, Report Code 52, Cairo, Egypt

American Embassy October 1993 "Dairy Annual Report", AGR no EG2077, Report Code 51, Cairo, Egypt

APCP 1993 "The Response of Egyptian Farmers to Cotton Policy Interventions " Report of the Cotton Supply Response Team, prepared by Gerry O'Mara, Ibrahim Soliman and Emad El Hawari

APCP September 1993 "Current Status of Tranche 6 Policy Reform Program", Cairo, Egypt

ARE Ministry of Agriculture - University of California 1983 "Livestock Economics in Egyptian Agriculture " Economics Working Paper no 125 Agricultural Development Systems Project, Cairo, Egypt

Cattle Information Project 1993 College of Agriculture, Cairo University, Giza, Egypt

Central Agency for Public Mobilization and Statistics (CAPMAS) CAPMAS Livestock Statistics, several issues, 1980-93 CAPMAS Monthly Bulletin of Foreign Trade of ARE, several issues, 1980-93 CAPMAS Monthly Bulletin of Consumer prices, several issues 1980-93 CAPMAS Monthly Bulletin of Food Commodity Prices, several issues, 1980-93 CAPMAS Statistical Yearbook of ARE, several issues, 1988-93

De Boer, A J and Amir, P 1987 "Economic Analysis of Farm Feed Resource Development in Egypt " Agribusiness Volume 3, No 1, pages 69-82

Egyptian Organization for Standardization, different issues

Ewada, O 1987 "Impacts of Price Policies on Resource Use in Egyptian Agriculture " M Sc Thesis Faculty of Agriculture, Zagazig University, Zagazig, Egypt

El Ahram 1993 "Operation of Veal Restoration Project," translated from Arabic, October 16, 1993, page 7

FAO 1987 "Production", Yearbook, Volume 41

FAO 1987 "Trade", Yearbook, Volume 41

Fitch, J and Soliman, I 1981 "The Livestock Economy in Egypt" Economics Working Paper no 29 Agricultural Development Systems Project, ARE Ministry of Agriculture - University of California, Cairo, Egypt

Fitch, J B and Soliman, I 1982 "Livestock and Crop Production Linkages " Implications for Agricultural Policy, Economics Working Paper no 62, Agricultural Development Systems Project, ARE, Ministry of Agriculture, University of California, Cairo, Egypt

Fox, Edwin L 1989 "Feed and Livestock Industry Review " Policy and Administrative Reform Recommendations, Technological Recommendations Economic Working Paper no APAC-89-(14), Ministry of Agriculture and Land Reclamation, Undersecretary for Agricultural Economics and Statistics, Cairo, Egypt

Goueli, A , Soliman, I , and Mashhour A 1988 "Economic Efficiency of Family Farm Small Scale Enterprise for Table Eggs Production vs Large Scale Enterprise " Proceedings of the 18th World's Poultry Congress pp 1399-1401 Organized by World Poultry Science Association, Nagoya, Japan

Kementa, Jan 1986 "Elements of Econometrics", 2nd edition, MacMillan Publishing Company, New York, USA pp 269-270

Ibrahim, A 1983 "Economics Study for Broiler Production in Sharkia Governorate M.Sc Thesis Faculty of Agriculture, Zagazig University, Egypt

International Fund for Agricultural Development 1991 Livestock Production and Intensification Project, Base Line Survey

Imam, M 1988 "Marketing Efficiency of Red Meat in Egyptian Market " Ph D Thesis Faculty of Agriculture Ain Shams University, Cairo, Egypt

Ministry of Agriculture and Land Reclamation (MOALR) 1991 The Livestock Census

Ministry of Agriculture and Land Reclamation (MOALR), Animal Production Central Administration 1992 Unpublished data on the Poultry and Feed Industries

National Research Council Various years "Nutrient Requirements of Beef Cattle, Dairy Cattle, Sheep, Goats, Buffalo, Poultry, Swine " National Academy of Sciences, Washington D C

National Veal Project 1992 Unpublished Report Egypt

Negm, A , Soliman, I , Hamed, M , and Abdel Aziz, A S 1986 "Estimate of Livestock Traits and Livestock Database" 7th Conference of the Egyptian Society of Animal production, Cairo, Egypt

Nofal, M A 1992 Assessment of Storage Ability and Expiry Date of Stored Foods (Frozen Stored) Academy of Scientific Research and Technology Final Report, Cairo, Egypt, p 209

Prais, J and Houthakker, H S 1955 "The Analysis of Family Budgets" Cambridge, U K , the University Press

Preston, R. L , Mc Connen, R J , and Haynes, G 1983 "An Analysis of Red Meat Production in Egypt" International Agricultural Development Service and Ministry of Agriculture, Egypt

Shahla, S and Soliman, I , 1983 "The Role of Meat in the Egyptian Food Economy" Economics Working Paper no 119 Agricultural Development Project, ARE Ministry of Agriculture - University of California, Cairo, Egypt

Soliman, I. 1982 "Red Meat Price Policy in Egypt" Economics Working Paper no 62, Agricultural Development Systems Project, ARE Ministry of Agriculture - University of California, Cairo, Egypt

Soliman, I 1982 "Food Security in Egypt The Socio-Economics Implications of Dietary Protein-Energy Interrelationships" Economics Working Paper no 97, Agricultural Development Systems Project, ARE Ministry of Agriculture - University of California, Cairo, Egypt

Soliman, I 1983 "Livestock Working Power in Egyptian Agriculture" Economics Working Paper no 123, Agricultural Development Systems Project, ARE Ministry of Agriculture - University of California, Cairo, Egypt

Soliman, I 1984 " An Appraisal of Livestock Concentrate Feed Policy in Egypt" Proceedings of the 9th session, Res no 8 The 2nd Conference of Agri Research Center, MOALR, Giza, Egypt

Soliman, I 1985 "An Analysis of the Buffalo Milk Response Under the Conventional Egyptian Farming System" Proceedings of the 10th Congress of Statistics, Computer Sciences, Social and Demography Research, Vol 3, pp 91-106 Computer Center, Ain Shams University, Cairo, Egypt

Soliman, I 1985 "Milk Marketed Surplus of the Conventional Egyptian Farm" Proceedings of the 20th Annual Conference on Statistics, Computer Science, Operational Research and Mathematics Vol 1, no 1 Institute of Statistical Studies and Research, Cairo University, Giza, Egypt

Soliman, I 1986 "Expenditure Pattern of Farm Income from Milk Marketing with Emphasis upon Women Role" Al Azhar Journal for Agricultural Research, Vol 6

Soliman, I 1989 "Economics of Buffalo Production in Private vs State Farms"

Soliman, I 1991 Towards Livestock Development in Egypt, "Proposed Credit Package for Milk Marketing Development and Processing in Egyptian Village", Agricultural Production and Credit Project (APCP), sponsored by Chemonics/PBDAC, Cairo, Egypt

Soliman, I and Rizk, R. 1991 An Economic Study for Market System of Agricultural Land in the Egyptian Village Egyptian Journal of Agricultural Economics, Dokki, Egypt

Soliman, I. 1993 "Livestock and Poultry Planning Model for Egypt" Unpublished

Soliman, Ibrahim 1993 "Livestock and Poultry Policy Trends in Egypt", Annex II in The Response of Egyptian Farmers to Cotton Policy Interventions" Report of the Cotton Supply Response Team, prepared by Ronald D Krenz, Agricultural Production and Credit Project, Cairo, Egypt

Soliman, I and Nawar, M 1986 Feed Use Pattern for Livestock on the Egyptian Farm Proceedings of the 7th Conference on Animal Production, Department of Animal Breeding, Cairo, University, Giza, Egypt

Soliman, I and Abd El-Azim, M 1983 "An Appraisal of Livestock Concentrate Feed Policy in Egypt" Agricultural Development Systems Project Economics Working Paper no 138, ARE Ministry of Agriculture - University of California, Cairo, Egypt

Soliman, I., Abd El-Azim, M , and Habib, F 1983 "Some Observations on Livestock Policies in Egypt with Special Reference to Credit and Import Policies" Economics Working Paper no 135, ARE Ministry of Agriculture University of California, Cairo, Egypt

Soliman I and Eid, N 1992 "Impacts of Economics Liberalization on Food Demand and Dietary Adequacy" Proceedings of the First International Conference on "Towards An Arab African Strategy for Safe Food and Better Nutrition, High Institute of Natural Resources Economics, pp 1-10

Soliman, I , Fitch, J , and Abdel Aziz, N 1982 " Economics of Livestock on Traditional Farm" Research Bulletin No 679 Faculty of Agriculture, Zagazig University, Zagazig, Egypt

Soliman, I and Imam, S 1987 "Analytical Study for Some Factors Determining Egyptian Berseem Acreage" Proceedings of the 22nd Annual Conference for Statistics, Computer Sciences and Operation Research Institute of Statistics Studies & Research, Cairo University, Giza, Egypt

Soliman, I and Zaki, E Sh 1982 "Socio Economics Factors Affecting Decisions of Traditional Farmer on Investment in Livestock in Sharkia Governorate" Proceeding of 7th International Congress for Statistics, Computer Sciences, Social and Demographic Research, Computer Center Ain Shams University, Cairo, Egypt

Soliman, I Zaki, E Sh, and Rashad, T 1987 "Rural Woman's Role in Decision Making For Livestock Production Activities in an Egyptian Village" Proceedings of the 12th International Congress of Statistics, Computer Sciences, Social and Demographic Research Scientific Computing Center Ain Shams University, Cairo, Egypt

Soliman, I , Fitch, J B , and Abd El-Aziz, N 1982. "The Role of Livestock Production on the Egyptian Farm" Economics Working Paper no 85, Agricultural Development Systems Project, ARE Ministry of Agriculture - University of California, Cairo, Egypt

Soliman, I and Ibrahim, A 1983 "The Productive Efficiency of The Broiler Industry in Egypt Economics Working Paper no 122, Agricultural Development System Project, ARE Ministry of Agriculture - University of California, Cairo, Egypt

Soliman, I , Abd El-Zaher, T , and Fitch, J 1983 "Milk Production Systems in Egypt and the Impact of Government Policies" Economics Working Paper no 121, Agricultural Development Systems Project, ARE Ministry of Agriculture - University of California, Cairo, Egypt

Soliman, I and Ibrahim, A 1983 "An Appraisal of Poultry Feed Policy in Egypt" Economics Working Paper no 137, Agricultural Development Systems Project, ARE Ministry of Agriculture - University of California, Cairo, Egypt

Soliman, I and Ragab A M 1985 "Labor Use Patterns for Livestock Operations on Conventional Farms with Special Emphasis on the Women Role in Egypt" Zagazig Journal of Agricultural Research, Vol 12, No 1, pp 647-675 Faculty of Agriculture, Zagazig university, Zagazig, Egypt

Soliman, I and Shapuri Sh 1984 "The Impacts of Wheat Price policy Change on Nutrition Status in Egypt" ERS Research, Bulletin no AGES 831129, United Stated Department of Agriculture Economic Research Service, International Economic Division", Washington DC, USA

Soliman, I and Imam, S 1987 "Farm Income as an Incentive for Agricultural Graduate Farmers settled in the reclaimed Land Areas of Egypt" Conference of Agricultural Science on Food Deficiency Overcoming Through Autonomous Efforts in Egypt, Volume 5, pp 1179-1190

Soliman, I 1988 "Economics of Buffalo Production in Private U S State Farms", World II Buffalo Congress, Volume I, Part I, pages 139-144 Indian Council of Agricultural Research, New Delhi, India

Soliman, I , Mahdy, E H , and Ibrahim, A A 1992 "Milk Production Performance on Conventional Egyptian Farm" Food Sector Development Project, European Economic Community and Ministry of Agriculture, Cairo, Egypt

Soliman, I and Zaki E S 1982 "Socio-Economic Factors Affecting Decisions of Traditional Farmer on Investment in Livestock in Sharkia Governorate" Economics Working Paper no 65 Agricultural Development Systems Project, ARE Ministry of Agriculture - University of California, Cairo, Egypt

Soliman, M 1989 An Economic Study for Feed Sector in Egypt Unpublished M Sc Thesis, Department of Agricultural Economics, Faculty of Agriculture, Zagazig University, Zagazig, Egypt

Shapuri, S and Solıman, I 1985 "Egyptıan Meat Market Polıcy Issues ın Trade, Prıces and Expected Market Performance" RES Bulletın no AGS 841217 IED, ERS, USDA

Sharaf, M., Solıman, I , and Seleem, A. 1987 "Towards Development of Marketıng Systems of Lıvestock, Anımal Products & Fısh ın Egypt" Publıshed ın "Natıonal Symposıum of prıce & marketıng Polıcıes ın Egypt" Edıtor Fahmy Bıshay, S Nassar & Z Abdulla FAO TCP EGY 6652

Stıgler, G 1968 "The Theory of Prıce" Thırd Edıtıon The MacMıllan Company, New York, USA, Chapter 1

USAID/Caıro August 1990 "Corn Sub-sector Polıcy Study", Integrated Development Consultants, Caıro, Egypt

USAID/Caıro January 1992 Agrıcultural Data Base, AGR/ACE

Wınrock Internatıonal 1992 "Proposed Work Plan for Buffalo Fattenıng Project Report", prepared for US Feed Graıns Councıl, Caıro, Egypt Wınrock Internatıonal Instıtute for Agrıcultural Development, Morrılton, Arkansas, USA

Wınrock Internatıonal 1980 A Consultant Report on the Project "Improved Utılızatıon of Feed Resources for the Egyptıan Lıvestock Sector", Morrılton Arkansas, USA

Wınrock Internatıonal 1992 Proposed Work Plan for the Buffalo Fattenıng Project USA Egypt, Morrılton Arkansas, USA

Wınrock Internatıonal 1992 "Assessment of Anımal Agrıculture ın Sub-Saharan Afrıca", Morrılton AR, USA

Wınrock Internatıonal 1992 "Anımal Agrıculture ın Developıng Countrıes Technology Dımensıons", Morrılton, Arkansas, USA

World Bank. 1992 Arab Republıc of Egypt "An Agrıcultural Strategy For The 1990's" Report no 11083-EGT, Agrıculture Operatıons Dıvısıon, Country Department II, Mıddle East and North Afrıca Regıon, Washıngton, D C

World Bank. 1993 "Prıce Prospects for Major Prımary Commodıtıes, 1990-2005", Vol II Agrıcultural Products, Fertılızer and Tropıcal Tımber The World Bank, Washıngton, D C

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Supplement A

Responses and Action Taken in Regard to Comments Received Following the GOE Review of First Draft of Report

The purpose of this Supplement is to incorporate in the Final Report of the Study Team for Animal Protein Foods System, a record of issues brought to the attention of the Study Team by the Government of Egypt Review Committee following receipt of the December 23, 1993 Draft Final Report Where appropriate, changes were made in the Final Report submitted to USAID and GOE in April 1994 The format used in this Supplement, was to highlight the issue of concern to the Review Committee and follow with the response of the Study Team The numbering sequence here follows that used in the original comments from the Review Committee chair

Refer To Volume I

1 **Terminology** Term "oversight committee" changed to "review committee" in all parts of the report text where applicable

2 **Regarding report title** Title of study and report remains as that mandated under contractual agreement and was not changed to more explicitly indicate an exclusion of consideration of fish The term "animal" in most cases is not inclusive of fish and so exclusion of fish in the study and report will not be a surprise for most readers Reference to the exclusion of fish is contained at the beginning of the Executive Summary and in the first paragraph of the main report page 9 The report does include the standard information on fish as would be expected in systems approach to an agribusiness study of a commodity subsector

3 **Contradictions and irregularities** The apparent contradictions and irregularities of the first draft were resolved in this final document by a thorough editing and the commitment of Dr Walters to deal with these matters by remaining in Egypt two weeks longer than originally scheduled

4 **Fish protein** While the importance of fish protein in human nutrition and the Egyptian economy is recognized, the terms of reference given to the study team did not suggest that the role of fish protein be given targeted attention. Therefore fish were excluded from the various tables which list contributions of various sources of animal protein We realize that excluding fish may give an unduly pessimistic picture of overall protein supplies and consumption in Egypt, but believe this would not change the conclusions or policy recommendations It is our understanding that a fisheries sub-sector study is in the planning stage That study should provide the overall picture that the animal protein study perhaps did not show

5 **Regarding methodologies** Linear correlations were not used to extrapolate per capita animal protein consumption The projections were based on a recursive model as described in the section on Animal Protein Food Demand and Consumption. This is a standard econometric technique and is accepted by the economics profession as more appropriate than linear extrapolation Several scenarios are shown in that section which reflect the outcomes of the liberalization policy in Egypt

6 **Regarding comparative advantage** The team was careful to try and determine unsubsidized border prices Much of Section 4 5, Prices and Price Projections , was devoted to analyses of the various types of prices that should be taken into consideration by GOE and other interest groups The team attempted to broaden CIF prices for red meat and dairy products into the cost of production in the exporting country, CIF elements, the subsidy component, and the border price in Egypt A careful reading of Chapter 4 should provide good guidelines to GOE regarding the subsidies involved The actual subsidy payments provided to exporters are generally regarded as trade secrets, so the team had to estimate subsidies indirectly However, it is believed that the analysis of comparative advantage is generally accurate enough for use in policy analysis

7 **Concerning the implications of recent GATT deliberations and agreements** It is acknowledged that the team had inadequate time to look carefully at implications of the GATT Agreement for Egypt Further, the team did not have access to the documents and expertise needed to look at this issue in detail GOE policy-makers working on the GATT agreement should be able to use the results of the Animal Protein Report as a basis for appropriate policies that fit with the GATT provisions It is assumed that under GATT, at least in the short-term, subsidization of agricultural exports will continue under various guises and Egypt will be justified in putting a countervailing tariff on subsidized exports of poultry If this is done, the team sees little need for a 10% subsidy for Egyptian poultry producers The team suggests that the current government protected poultry meat oligarchy is negatively impacting the Egyptian consumer

8 **Concerning comparatitive analysis in short run and long run** It is true that the concept of comparative advantage is dynamic, although domestic (Egyptian) production costs fluctuate much less than do international commodity prices It would not have been appropriate to base production costs in this case, on historical data from the pre-1990 period because of subsidies and highly distorted input and output markets The 1993 situation appeared to represent a period of fairly stable local costs As noted in several places in the report, the main problem encountered by the study team in this regard were the differences between financial and economic costs caused by subsidized drainage costs, subsidized irrigation water, and controlled land rents in Egypt To carry out the comparative analysis the team undertook a fairly intensive analysis of commodity price outlook data from the World Bank and other sources (see Section 4 5) and made projections based on the Bank medium term projections based on their best estimates of what unsubsidized world prices would be The team was not aware of any studies available that adjust commodity price forecasts based on what is likely to happen because of GATT Our reading of GATT is that reforms of agricultural subsidies will be a gradual, long-term process and in the meantime, technical progress will continue to increase the production capacity of developed country producers and continue to put downward pressure on export prices

9 **Concerning application of conclusions in the face of change** While some readers might suggest otherwise, the team believes the basic conclusions of the study will remain valid even in the face of modest changes in the variables involved The conclusions seem fairly straightforward It would take major changes in the production structure of Egyptian agriculture and the world commodity markets to drastically change the report conclusions A good analyst can take the framework developed during this study and modify the estimates to consider other variables and data of interest to GOE The various models are located in the USAID library on computer disk, and can be modified to be consistent with any foreseeable change in the Egyptian and world economy

10 **Need for additional scenarios** The recursive model used for production, price, and supply projections is on computer disk and is available in the USAID library for use in creating any number of additional scenarios desired by GOE and other users In addition, each member of the team has a copy of the disk. Using the model and the computer, any organization can generate whatever scenario they prefer The projections used in the three models generated, are based on a recursive model that does include a lagged production response relation thus creating a more realistic outcome

11 **Accounting for improvements in know-how and motivation in domestic production competitive position as compared to imports** The study team did consider likely changes or lack of change in technical progress in the animal protein foods sector Results of analysis and professional judgement indicated that there would be relatively little change in the red meat sector In dairying, the team forecasted that substantially lower costs would be obtained by commercial operations and the comparative advantage analysis used the lower costs that were found for commercial producers The higher costs found for producing milk with low productivity of Baladi cattle were not used For broiler production, the team forecast that costs would decrease as the industry adjusted to the new economic environment They were also projected to decrease if appropriate policies encouraged vertical integration, foreign collaboration, foreign investment, and market promotion activities These factors were considered in the comparative advantage analysis and in the policy matrix of the study and final report

12 **The issue of self-sufficiency** Following consideration of various options, the study team cannot highlight self-sufficiency in non-redmeat sectors of animal protein sources Reference is made in the Executive Summary to the Note on the Strategy of the Livestock Sector which provides local views on self-sufficiency issues

13 **Quotations from a report not released by President's Office** The final report contains no references to an unreleased report entitled "Production and Marketing of Animal Protein"

14 **Inadequate number of solutions to issues raised** Section 4 5 sets out what the team considered to be "fair" international prices for most commodities considered The guarantees against dumping will hopefully be part of GATT and the comments made in Item 7 (above) would apply The modeling of international commodity markets is notoriously difficult, and that is why the team recommends using some reasonable medium-term commodity projection process as the basis for a "target" that Egyptian production costs should be measured against These prices could also serve as the basis for countervailing tariffs, but this would require some careful consideration and analysis Modeling of world commodity prices was beyond the scope The Study terms of reference

If there continues to be a need for a "world commodity price model", the GOE can use one of several developed by the U S Department of Agriculture, World Bank, University of Minnesota, Sparks Commodity, and others

15 **Use of 1986-1991 as base period for study of economics of home-produced milk and poultry** Production cost figures used in Annex 14 and Annex 16, were all either 1992 or 1993 Earlier data for 1990 or 1991 were updated for current prices Some questions may have come up in regard to Table 14 5 in Volume II where the team used earlier survey data on conventional farmers and then updated costs and returns to a 1993 basis The study team did not have budgets for home-produced (i e traditional) poultry production

16 **Application of constant prices for imported inputs and commodities** This issue has been addressed in earlier comments in items 6,7,8,9,11, and 14 The team could have done simulations or sensitivity analysis on the impact that price changes of imported inputs (e g maize) or imported commodities (e g milk powder) would have on Egyptian comparative advantage in animal protein foods However, such exercises lead to more and more qualifications of policy recommendations The concept of comparative advantage is long-term in nature and is based heavily upon long-term and is based heavily upon national human and physical resources Comparative advantage does not depend upon short-term price variablilty in international markets, but upon long-term trends in local production costs and international commodity prices It is for these reasons the team used the World Bank commodity price forecasts as the basis for calculation of border prices, which could then be compared to local production costs using long-term costs of production. Part of an analyst's job is thus to make the best possible judgment of constant prices and costs which can then be used in analyses The team undertook to do just that

17 **Validity of information on selected tables** In regard to wage rates, those were from a 1992 survey so should be fairly current The data were not use directly in budgets, but do seem fairly consistent with rural wage rates found in the large Chemonics/APCP survey of 1991/92 The purpose of the wage rate table (page 64) was to illustrate <u>differences</u> in wages by gender and task. Thus it is an important piece of information, although the survey covered only a small geographic area of Egypt

While the team agrees that some of the data in tables on pages 71-73 are based on relatively small samples and in the Delta only, they were used to only illustrate the text not as the basis for any judgments or policy recommendations

Table 4 9 has been corrected to reflect the "000" head intended

The team feels that Table 4 11 provides some important information related to the provision of breeding services It was the only data of this type the team was able to locate Based on the judgment of the Egyptian members of the team, it is considered to be valid information The same applies to Tables 4 14 and 4 15

18 **The issue of feed availability and rangelands** The sections on feed availability were prepared and reviewed in close collaboration with the appropriate Egyptian team member, and therefore the team believes the information to be the best estimates available Regarding rangelands, the team did not have independent estimates of rangelands in Egypt or even documentation of what types of ecosystems in Egypt would constitute rangeland The suggestion on page 71, in connection with small ruminant systems, that

natural rangelands do not exist in Egypt may not be entirely correct, but should stand unless the appropriate authorities agree to change it

19 **Intrinsic population growth rate for goats** The figures in Table 4 18 were taken directly from the reference cited Those authors apparently took their figures from U/EAS, MOA The estimates were not created by the study team although they were considered valid Part of the difference in population growth rates between goats and sheep may be in response to high prices for sheep being exported to the Middle East

20 **Issues related to comparative Egyptian and USA farmgate production costs** USA productions costs for live broilers, eggs, and finishing beef were taken directly from the October 24, 1993 Feedstuffs Magazine, which uses USDA cost of production indicators and is considered an authoritive source USDA does not directly publish composite milk production costs because of the substantial regional differences in costs which occur An aggregate number would be meaningless The estimate used in this report is based on Minnesota-Wisconsin weighted procurement prices for raw milk less a producer profit margin

The Egyptian costs come directly from the budgets generated in Volume II, Annex Table 14 The team was not satisfied with these budgets and would have preferred to use data from national cost of production surveys which are regularly updated However, such data do not exist in Egypt so the team had to make their best informed judgment

This is one of the reasons the study team strongly recommends a national statistical information-base for this sector, to allow analysts and policy-makers access to important economic data

21 **Contradictory and unrealistic poultry and eggs information** Steps were taken to correct consistency issues between information in the tables and discussions of costs in the text USA costs came directly from published sources Changes to correct consistency do not change the study conclusions

22 **Poultry and anti-dumping legislation** Poultry products have been added to the anti-dumping provisions recommended in final report

23 **Requirements versus authorization** Issue not found in text

24 **Study references too restricted** References were provided by study team members as part of their terms of reference, and through USAID-Cairo library Several other references identified from MOA, World Bank, and other sources Several of the Egyptian team members had been directly associated with the original research and so were intimately familiar with the data The concentration of references tends to reflect the particular interests of the team members An attempt was made however to collect all possible literature related to the fields of study

25 **Consideration of meat handling capacity in the face of frozen imports** The team assumed that since substantial quantities of frozen meats were already entering Egypt, that the handling segment of the trade was already in place or was being expanded by the private trade and processors, many of whom have quite good cold storage facilities The team is now advocating a major surge in imported meat, so there would not seem to be

a problem related to capacity The study team did recommend that some additional work be done on the slaughtering and meat marketing aspects That issue could certainly be addressed in a follow-on study

26 **Prices of various meats and impact on the poor** In Egypt as in a large part of the world economy, beef prices are higher than poultry prices It is also true that poultry prices are being protected by the GOE Every poultry importing company the team contacted indicated that the GOE was not processing the necessary paper work. Further there is not a significant level of competition among the importing red meat processing companies Hence prices are not under pressure to come down Profits from importing red meat are very high using even the most conservative budget estimates

27 **Per capata consumption trends** The figures on pages 25-30 were taken from household budget surveys, and as long as the same methods were used in each time period, we should assume the figures are accurate and reflect a combination of (a) rapid human population growth, and (b) heavy state controls which provided strong disincentives for agricultural production

28 **Poultry marketing system clarification** In producing schematics and figures of a marketing system, the team tried to avoid making the graphic too complicated or containing too many numbers illustrating various points of information Since the percentages of a product moving through each channel changes slowly, the analyst can take a total supply figure, e g 3,000M eggs, and easily calculate the approximate numbers of eggs in each channel This is more straightforward than trying to put numbers in each channel The numbers change annually anyway

29 **Ideal sized birds consumer versus producer** The issue of an "ideal" sized broiler is appreciated The team did not have a chance to apply a marginal costs/marginal benefits analysis to the question of ideal-size at the producer level However, it can be assumed that the interaction of demand and supply for different size live birds determines the actual mix of bird sized produced It is instructive to note that in a market economy, production is organized to service consumer tastes and preferences

30 **Capacity of table egg compounds** In the original draft text, the report listed a layer capacity of 5,000M eggs, but in Table 4 14 the report listed 6,303M eggs per year The text was changed to 6,303M eggs per year as compared to current production of 3,000M - 3,550M per year The capacity of hatcheries for integrated enterprises, is around one (1) million hatchable eggs per year per unit If there are other reliable figures for hatchery capacity of integrated egg laying operations, the team was not able to locate them

31 **Broiler market weights** On page 80, the reports reads that broilers are marketed at 1 6kg - 1 8kg, but noted that the market is adjusting towards smaller body weights of 1 3kg - 1 6kg which is consistent with the point made in comment 29, above

32 **Contents of Table 4 14 not realistic** The team agrees with this point and so in the final report the following numbers should be found

(a) Broilers In Volume II, annex table 11 3, CAPMAS estimates were used These suggested that for 1991 there were 18,986 broiler farms, production capacity of 474 million birds, and actual production of 100 million broilers Thus, the percent of

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production as full capacity in annex table 11 3 is only 21% as compared to 53% in table 4 14 The full capacity figure in table 4 14 has been corrected to be 467,804,000 birds

(b) Egg production The figures for egg production corresponds well to that for 1991 given in Volume II, annex table 4 4 The unit is correct as million eggs

(c) Broiler parent stock eggs MOA should check their figures The team agrees that the figure for broiler parent stock egg production appears to be far too high compared to total broiler production estimates in the same table Numbers in table 4 14 do not tally with those given in Volume II

(d) Commercial egg production If commercial egg production is on the order of 2,500M eggs with a laying rate of 240 eggs/year (annex, table 16 3), then about 100M layers would need to be hatched each year With a capacity of 164M eggs and production at 45% of capacity, production of hatchable eggs to produce laying hens would be only 74M, not discounting the males

33 **Unpublished data, not released** The data in Table 4 15 were provided to the team by the MOA on the understanding that they would be used in the study report only

34 **Costs and prices not realistic** In final report the production costs estimates for broilers and eggs were revised slightly so the text numbers are consistent with annex budget tables As noted earlier, USA costs are from official published sources and are generally considered quite accurate for eggs and broilers USA costs should be below production costs in Egypt because of lower feed costs, higher conversion of efficiencies, and economies of scale

35 **Information comparability in table 4 24** Table 4 24 is related to production costs, while the table on page 103 refers to retail prices They are not directly comparable

36 **Retail prices for egg flats** To make the comparisons between Cairo retail and USA retail, the team chose to use comparable retail outlets, i e stores selling clean eggs in high quality cartons under refrigerated conditions, and this implies high retail prices in fancy Cairo supermarkets The team acknowledges that the average Egyptian consumer pays less than LE3/dozen The same could be said about the other Cairo prices listed for fresh and frozen broilers, red meat, and dairy products Therefore the retail prices listed in the report for Egypt are considerably higher than those paid by the average Egyptian consumer Those retail price figures were not used in the sections dealing with competitiveness and comparative advantage, and thus are not relevant for policy conclusions

37 **Further contradictions** Corrected in final report

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38 **Tables deserving to be explained or discussed** The team tried to list the sources and assumptions to the extent possible The preface sets out the basis for each section The procedures used in Section I are noted on page i and again at the bottom of the tables

Section II has data derived directly from other sources which are cited in the tables The data figures in Section III are all keyed to tables 10 9 - 10 12 regarding estimated nutrient requirements of livestock from the National Research Council tables The remaining tables have well-documented references which are found at the end of the main report (Volume I)

39 **Assumed versus actual carcass weights** The assumed carcass weights were used in the inventory model to estimate the total meat production for Egypt This model is on computer disk and is available from the team members or the USAID library

40 **Small stock weights should be revised** In table 10 10 the assumed weights seem reasonable as do the figures in tables 16 8 and 16 9 Several of the numbers in table 10 11 do appear to be out of line Please note however that the weights used in the study estimates (last column, table 10 11) do not include the extreme values Thus we do not believe there is bias in the overall results for the feed requirement analysis

41 **Combining several types of poultry seem irregular** It is in fact common practice to add various types of poultry to get a "head" count

42 **Production level of local chickens versus broilers** Reference is made to table 4 1 which shows the poultry numbers on farms at one time, not the total number produced during the year

43 **Table 4 3 not consistent with Table 4 4** Standard techniques were used here They are consistent with international commodity accounting standards

44 **Documented estimates** Baladi birds by calculation will produce 180 eggs/year while commercial layers will produce 280 eggs/year This information was provided by a member of the review committee

45 **Question farm gate price in table 5 1** Farm gate prices were based on information from CAPMAS MOAL could not provide annual farm gate prices

46 **Units of measure for manure** The study team used animal output measures and then converted it to tons the acceptable international standard

47 **Inconsistent prices used in several tables regarding poultry** The team is concerned about this because in interviews, the MOAL claims not to have a long-term series of annual poultry prices at the farm, wholesale, and retail levels Further, there are no studies that show the different economic and market forces that separately affect retail, wholesale, and farm prices

48 **Questionable feed conversion in table 16 1** The feed conversion efficiencies will vary considerably depending on season, health of birds, quality of feed, and level of management No single figure will suffice, although the team prefers the concept of an "industry standard" as expressed by Dr Naguib Table 16 1 could be modified to include that column

49 **Breed specifications and laying percentage/technical coefficients** The technical coefficients in annex table 16 3 were provided by members of the team They are believed

to be sound Seek further advice in Egypt from members of the team

50 **Scope of work for the study and issues related to production, marketing, transport, storage, regulations** The terms of reference for the study were developed by USAID/Cairo in close consultation with the PBDAC, and emphasized policy reforms required in the animal protein foods system which would allow this sector to adjust to Egypt's macroeconomic reforms Within this general policy background, additional work on production inputs, marketing, processing, storage, bulk handling, and regulations could be examined during the stage of design of a detailed project Nonetheless the team did put considerable efforts into defining and quantifying the feed input and labor input areas, and did examine in some detail the issue of local production versus imports On the feed resources side the team did identify three actions that were considered essential (1) increased domestic feed supplies by increasing grain crop and forage crop yields, (2) increase efficiency of use of crop residues and, (3) increase animal productivity The first two issues are fairly straightforward, while the third implies that total production will increase while feed requirements per unit of product will decline

Books on Livestock and Africa
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ISBN 0-933595-10-7 .

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ISBN 0-933595-55-7.

African professional women in agriculture. An analysis of two roundtable discussions. Cheryl R. Doss 1991.
ISBN 0-933595-58-1

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Volume II

ANIMAL PROTEIN FOODS SYSTEM

Increasing Efficiency of Production Processing and Marketing

Prepared By

WINROCK INTERNATIONAL

WINROCK INTERNATIONAL INSTITUTE FOR AGRICULTURAL DEVELOPMENT

For

The Government of the Arab Republic of Egypt
and USAID/Cairo

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Volume II

Animal Protein Foods System
Increasing Efficiency of Production, Processing, and Marketing

Preface

This volume contains the data base used to develop the animal protein food systems study These annexes of data are being published as a separate volume because comprehensive data on the industry is often difficult to obtain or estimate In addition, when compiled from the various sources the result is bulky and difficult to manipulate in a single volume

This volume is divided into four sections **Section I, Livestock and Poultry Inventories, Production, and Prices** has been estimated specifically for this study Livestock inventories are estimated by government agencies as linear projections between census years For this study the researchers needed data that reflected the economic environment, especially price changes As a consequence, inventory estimates shown in this section were calculated as a function of the annual slaughter Also, assumptions for weaning rates and death losses were used Annual slaughter is based on the count of animals slaughtered in government slaughter houses It should also be noted that inventory numbers when graphed show a regular cyclical pattern of change as well as non-regular changes

Section II, Selected Livestock and Poultry Data From the GOE Agriculture Census, GOE Central Agency for Public Mobilisation and Statistics, U N Food and Agriculture Organization, and U S Department of Agriculture provides the usual sources of livestock and poultry data published by the government Data from the agriculture census were used as bench marks for the estimates shown in Section I Per Capita consumption from the 1990/91 Household Expenditure Survey was also used to guide the estimates shown in Section I However, the estimates of per capita milk consumption were not used because they differ substantial from those suggested by the 1990/91 Agriculture Census As the 1990/91 Agricultural Census is finalized the implied milk consumption may more closely coincide with the 1990/91 Household Expenditure Survey

Section III, Feed Requirements and Balances, shows information on the estimation of feed requirements and availability Details of the calculations are shown here as a basis for further estimates These calculations show the animal nutrient requirements on a per animal basis as well as estimates of the amount of manure that is expelled This section ends with estimates of the feed balance

Section IV, Livestock, Poultry, and Related Enterprise Budgets, shows cost and returns estimates for livestock and poultry related enterprises Selected tables also show input requirements and border price calculations for comparison

ANIMAL PROTEIN FOODS SYSTEM
Increasing Efficiency of Production, Processing and Marketing

Volume II
Databases Supporting the Animal Protein Foods System Study

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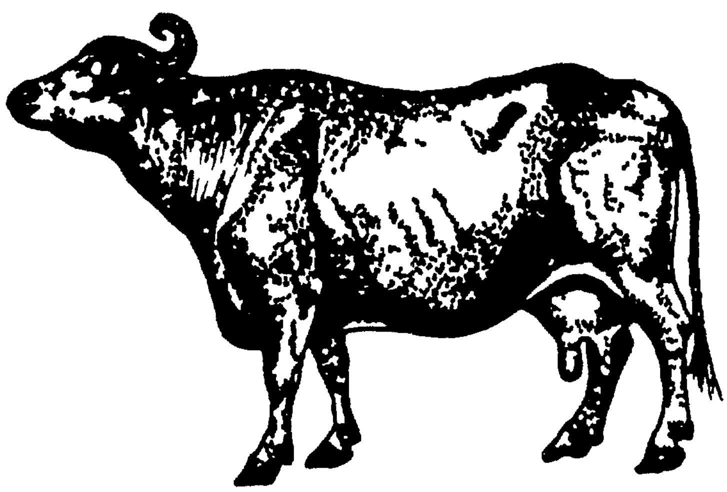
SECTION I.

Livestock and Poultry Inventories, Production and Prices



ANNEX TABLE 1 1 ESTIMATED NUMBER OF LIVESTOCK IN EGYPT 1970 1991 AND PROJECTIONS FOR 1992 1993 [1]

Cattle

Year	Bulls[2]	Cows[3]	Calves[4] < 1 year	Males+females[5] > 1 year	TOTAL CATTLE [6]
	-- -	-- - -	(000)Head	- -	- --
1976	115	1700	350	700	2865
1977	114	1740	486	686	3026
1978	114	1747	432	790	3083
1979	115	1748	315	776	2954
1980	115	1758	441	690	3003
1981	115	1765	390	732	3002
1982	115	1790	298	682	2886
1983	116	1791	398	586	2890
1984	115	1773	499	647	3034
1985	116	1781	350	743	2990
1986	117	1796	334	660	2907
1987	100	1738	408	584	2830
1988	84	1737	445	612	2878
1989	53	1747	449	667	2915
1990	38	1731	395	697	2860
1991	23	1681	325	655	2683
[P] 1992	24	1652	397	584	2658
[P] 1993	25	1606	345	597	2572
Average Annual Percent Change					
1976 86	0 2%	0 6%	0 5%	0 6%	0 1%
1986 93	19 8%	1 6%	0 5%	1 4%	1 7%

[1] Winrock International Institute for Agricultural Development

[2] Bulls=Bull numbers pervious year estimated slaughter+estimated replacements annual death loss

[3] Cows=Cow numbers previous year estimated slaughter +estimated replacements annual death loss

[4] Calves< 1 Year=(Cow numbers x calving rate) estimated calf slaughter and the death loss correction

[5] Males/Females> 1 Year= Calves < 1 year from previous year + remaining Males/Females> 1 Year from previous year slaughter and death loss

[6] Total figures are based on the relations above The assumptions in the following tables are used to set the inventory levels at those in the 1981 and 1991 Agriculture Census provided by the Ministry of Agriculture and Land Reclamation Slaughter estimates are provided the Central Agency for Public Mobilisation and Statistics

[P] Projected numbers based on government and private sector interviews and interpolation of the Global Economic Data Exchange projections and data

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ANNEX TABLE 1 1 ESTIMATED NUMBER OF LIVESTOCK IN EGYPT
1970 1991 AND PROJECTIONS FOR 1992-1993 (Continued)[1]

Buffalo

Year	Bulls[2]	Cows[3]	Calves[4] < 1 year	Males+females[5] > 1 year	TOTAL BUFFALO [6]	TOTAL CATTLE & BUFFALO
	- ---	--- --	(000)Head	--	-	- -
1976	19	1262	757	412	2450	5315
1977	21	1360	378	685	2444	5470
1978	25	1586	432	368	2411	5494
1979	24	1579	438	313	2354	5308
1980	23	1547	397	300	2267	5270
1981	23	1553	490	310	2376	5379
1982	24	1582	491	311	2408	5293
1983	24	1600	510	303	2437	5327
1984	25	1638	536	295	2494	5528
1985	25	1656	495	248	2423	5413
1986	24	1587	476	136	2222	5129
1987	21	1537	751	122	2432	5262
1988	19	1485	733	382	2619	5498
1989	18	1674	794	354	2840	5756
1990	17	1809	751	352	2930	5790
1991	15	1882	750	283	2929	5612
[P] 1992	15	1897	767	292	2971	5629
[P] 1993	15	1920	782	310	3027	5600
Average Annual Percent Change						
1976 86	2 2%	2 3%	4 5%	10 5%	1 0%	0 4%
1986 93	6 0%	2 8%	7 4%	12 5%	4 5%	1 3%

[1] Winrock International Institute for Agricultural Development
[2] Bulls=Bull numbers pervious year estimated slaughter+estimated replacements annual death loss
[3] Cows=Cow numbers previous year estimated slaughter +estimated replacements annual death loss
[4] Calves< 1 Year=(Cow numbers x calving rate) estimated calf slaughter and the death loss correction
[5] Males/Females> 1 Year= Calves < 1 year from previous year+ remaining Males/Females> 1 Year from previous year slaughter and death loss
[6] Total figures are based on the relations above The assumptions in the following tables are used to set the inventory levels at those in the 1981 and 1991 Agriculture Census provided by the Ministry of Agriculture and Land Reclamation Slaughter estimates are provided the Central Agency for Public Mobilisation and Statistics
[P] Projected numbers based on government and private sector interviews and interpolation of the Global Economic Data Exchange projections and data

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ANNEX TABLE 1 1 ESTIMATED NUMBER OF LIVESTOCK IN EGYPT 1970 1991 AND PROJECTIONS FOR 1992 1993 (Continued)[1]

	Sheep and Goats				TOTAL SHEEP AND GOATS		
	Ewes/ Doe[2]	Lambs/ Kids[3]	Others[4]	Net Imports Exports[5]	[6]	TOTAL CAM ELS[7]	TOTAL PIGS[8]
Year	-	- - --	(000)Head	- - - -	- --- - -- -	-	- - -
1976	3602	1649	438	71	5689	137	45
1977	3286	1277	952	62	5515	136	47
1978	3444	1435	698	93	5576	136	49
1979	3367	1402	827	121	5596	135	51
1980	3409	1592	912	119	5913	135	53
1981	3512	1509	1003	180	6024	134	55
1982	3669	1667	966	215	6302	134	57
1983	3767	1657	1059	5	6483	134	59
1984	3923	1649	989	37	6561	133	62
1985	3992	1722	988	58	6703	110	64
1986	4048	1827	1097	50	6972	109	67
1987	4006	1825	1211	96	7042	109	69
1988	4065	1852	1214	24	7131	109	72
1989	4113	1947	1277	84	7338	108	75
1990	4201	1997	1365	15	7564	108	78
1991	4340	1888	1295	95	7523	108	81
[P] 1992	4390	1980	1221	86	7592	108	84
[P] 1993	4370	2047	1347	105	7764	107	86
Average Annual Percent Change							
1976 86	1 2%	1 0%	9 6%	NA	2 1%	2 2%	4 0%
1986 93	1 1%	1 6%	3 0%	NA	1 5%	0 3%	3 7%

[1] Winrock International Institute for Agricultural Development

[2] Ewes/Doe=numbers of ewes/doe in the pervious year culls +estimated estimated replacements from others> 1 year annual death loss

[3] Lambs/Kids=(Weaned lamb/kid rate x number of ewes/does) estimated slaughter of lamb/kids

[4] Others= Lambs/kids from the previous year Others from previous year that have gone to the Ewe/Doe herd slaughter of others death loss

[5] Net Imports/Exports=Live imports exports Foreign Agricultural Service U S Department of Agriculture American Embassy Cairo Egypt

[6] Total figures are based on the relations above The assumpt ions in the following tables are used to set the inventory levels at those in the 1981 and 1991 Agriculture Census provided by the Ministry of Agriculture and Land Reclamation Slaughter estimates are provided the Central Agency for Public Mobilisation and Statistics

[7] Camel numbers are based on a simple annual growth rate of 2 1%

[8] Pig numbers are based on a simple growth rate of 6 2%

[P] Projected numbers based on government and private sector interviews and interpolation of the Global Economic Data Exchange projections and data

ANNEX TABLE 1 2 TECHNICAL COEFFICIENTS USED IN ESTIMATING LIVESTOCK NUMBERS

	Cattle		Buffalo		Sheep and Goats	
	Before 1986	After 1986	Before 1986	After 1986	Before 1986	After 1986
Weaned						
Calf/Lamb Rate	59 5%	66 0%	50 0%	65 0%	70 0%	70 0%
Mortalıty Rate						
Cows/Ewes	4 3%	4 3%	2 0%	2 0%	7 0%	8 0%
Calves<1 Year	1 5%	1 5%	1 5%	1 5%	NA	NA
Males/Females>1 Y	3 0%	3 0%	3 0%	3 0%	NA	NA
Bulls	2 0%	2 0%	1 5%	1 5%	NA	NA
Percent of Slaughter						
Calves<1 Year	76 3%	76 3%	NA	NA	60 0%	60 0%
Males/Females>1 Y	23 7%	23 7%	NA	NA	40 0%	40 0%
% of Remaınıng Males/ females>1yr that go to						
Ewe/Cow Herd	25 0%	25 0%	67 0%	90 0%	87 0%	87 0%
Males/Females>1 Y	NA	NA	33 0%	10 0%	NA	NA
Cullıng Rate	NA	NA	NA	NA	12 5%	16 0%
Percent of Calves Used to Replace						
Cows/Ewes	97 3%	99 5%	98 2%	99 4%	NA	NA
Bulls	2 8%	0 5%	1 8%	0 6%	NA	NA
Percent Slaughtered In Government Slaughter Houses						
Oxen/Bulls	50 0%	6 5%	NA	NA		
Cows	50 0%	25 0%	50 0%	65 0%	NA	NA
Calves/sheep	50 0%	50 0%	50 0%	65 0%	20 0%	18 4%
Veal	NA	NA	65 0%	77 0%	NA	NA
Camel Growth Rate	0 3%				100 0%	100 0%
Pıg Growth Rate	4 0%				100 0%	100 0%

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ANNEX TABLE 1 3 ESTIMATED NUMBER OF LIVESTOCK
SLAUGHTERED 1970 1991 AND
PROJECTIONS FOR 1992 1993 [1][2]

	Domestic Cattle			
	Oxen	Cows	Calves	TOTAL CATTLE
Year		(000) Head		
1970	3 3	54	629	686
1971	2 6	48	564	614
1972	2 0	46	604	652
1973	1 5	56	646	704
1974	2 0	64	633	699
1975	3 8	67	705	776
1976	3 0	51	654	708
1977	2 7	52	710	765
1978	2 5	81	787	871
1979	3 0	112	945	1060
1980	2 5	100	785	887
1981	2 0	81	857	940
1982	2 1	73	999	1074
1983	1 9	84	868	954
1984	1 3	81	719	801
1985	1 8	70	922	994
1986	1 4	85	956	1042
1987	15 4	144	960	1119
1988	15 4	68	910	993
1989	30 8	64	914	1009
1990	15 4	104	972	1091
1991	15 4	148	1022	1185
[P] 1992	2 4	114	900	1016
[P] 1993	2 8	116	930	1049
Average Annual Percent Change				
1976 86	7 4%	5 3%	3 9%	3 9%
1986 93	10 5%	4 6%	0 4%	0 1%

[1] Winrock International Institute for Agricultural Development

[2] Estimates based on numbers slaughtered in government slaughter houses as provided by the Central Agency for Public Mobilisation and Statistics

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ANNEX TABLE 1 3 ESTIMATED NUMBER OF LIVESTOCK SLAUGHTERED 1970 1991 AND PROJECTIONS FOR 1992 1993 [1][2]

(Continued)

Year	Cows	Domestic Buffalo Fed Calves	Veal	TOTAL BUFFALO	TOTAL CATTLE & BUFFALO
	- --- -	(000) Head-	-----	- -	- -
1970	157	70	306	533	1219
1971	148	124	278	550	1165
1972	143	188	272	602	1254
1973	170	243	284	697	1401
1974	177	263	303	743	1442
1975	166	205	281	652	1428
1976	164	155	280	599	1307
1977	149	187	296	631	1396
1978	196	225	354	775	1646
1979	222	231	344	798	1857
1980	211	232	370	813	1700
1981	163	176	279	618	1558
1982	145	272	293	710	1784
1983	157	281	282	721	1675
1984	131	305	275	711	1511
1985	146	378	326	849	1843
1986	203	436	310	950	1992
1987	143	363	236	743	1862
1988	134	369	221	724	1717
1989	122	406	282	810	1818
1990	148	466	413	1027	2118
1991	208	495	462	1165	2351
[P] 1992	200	477	455	1131	2148
[P] 1993	200	477	455	1131	2180
Average Annual Percent Change					
1976 86	2 2%	10 9%	1 1%	4 7%	4 3%
1986 93	0 2%	1 3%	5 6%	2 5%	1 3%

[1] Winrock International Institute for Agricultural Development

[2] Estimates based on numbers slaughtered in government slaughter houses as provided by the Central Agency for Public Mobilisation and Statistics

ANNEX TABLE 1 3 ESTIMATED NUMBER OF LIVESTOCK
SLAUGHTERED 1970 1991 AND
PROJECTIONS FOR 1992 1993 [1][2]
(Continued)

Domestic

Year	SHEEP	GOATS	CAMELS	PIGS
	-	(000) Head - - --- -		- - --
1970	1933	152	47	39
1971	1975	141	48	41
1972	1915	142	46	43
1973	1869	143	49	40
1974	1643	107	50	44
1975	1899	122	50	45
1976	1841	120	51	49
1977	1977	128	57	46
1978	2204	114	52	45
1979	2159	128	45	56
1980	2041	143	32	58
1981	2108	166	46	59
1982	2187	119	50	64
1983	2089	123	64	62
1984	2116	130	77	62
1985	2437	174	128	66
1986	2344	180	88	72
1987	2180	207	49	61
1988	2075	185	77	60
1989	2425	213	80	54
1990	2630	289	74	58
1991	2805	349	90	61
[P] 1992	3000	403	90	65
[P] 1993	3100	414	85	69
Average Annual Percent Change				
1976 86	2 4%	4 1%	5 6%	3 9%
1986 93	4 1%	12 7%	0 5%	0 6%

[1] Winrock International Institute for Agricultural Development

[2] Estimates based on numbers slaughtered in government slaughter houses as provided by the Central Agency for Public Mobilisation and Statistics

ANNEX TABLE 1 3 ESTIMATED NUMBER OF LIVESTOCK SLAUGHTERED 1970 1991 AND PROJECTIONS FOR 1992 1993 [1][2]

(Continued)

Live Imports

	Cattle				
	Oxen	Cows	Calves	Sheep	Camels
Year	- - - - ----- - (000) Head--	--- - ----		- -- - - --- -	- - - - - - -
1970	13	0	0	23	0
1971	31	0	0	12	0
1972	12	0	0	10	0
1973	17	0	0	5	0
1974	6	0	0	23	0
1975	0	0	0	0	0
1976	0	0	0	3	0
1977	0	0	0	3	0
1978	0	0	0	4	0
1979	1	0	0	0	45
1980	0	0	0	0	32
1981	0	0	46	0	46
1982	6	0	96	9	50
1983	0	0	73	0	64
1984	3	104	0	11	77
1985	17	78	0	21	129
1986	4	40	0	8	88
1987	1	7	0	35	49
1988	3	3	0	10	77
1989	2	2	0	23	80
1990	0	0	1	29	74
1991	0	0	3	3	90
[P] 1992	0	0	7	26	95
[P] 1993	0	0	12	25	98
Average Annual Percent Change					
1976 86	NA	NA	NA	10 3%	NA
1986 93	NA	NA	NA	17 7%	1 5%

[1] Winrock International Institute for Agricultural Development

[2] Estimates based on numbers slaughtered in government slaughter houses as provided by the Central Agency for Public Mobilisation and Statistics

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ANNEX TABLE 1 4 NUMBER SLAUGHTERED IN GOVERNMENT SLAUGHTER HOUSES, 1970-1991 AND ESTIMATES FOR 1992-1993 [1]

		Domestic Cattle		
	Oxen	Cows	Fed Calves	TOTAL CATTLE
Year	(000) Head			
1970	1 6	27	315	343
1971	1 3	24	282	307
1972	1 0	23	302	326
1973	0 8	28	323	352
1974	1 0	32	316	349
1975	1 9	34	352	388
1976	1 5	25	327	354
1977	1 4	26	355	382
1978	1 2	41	394	436
1979	1 5	56	472	530
1980	1 3	50	392	444
1981	1 0	41	429	470
1982	1 1	36	499	537
1983	1 0	42	434	477
1984	0 7	40	359	400
1985	0 9	35	461	497
1986	0 7	42	478	521
1987	1 0	36	480	517
1988	1 0	34	455	490
1989	2 0	32	457	491
1990	1 0	52	486	539
1991	1 0	74	511	586
[P] 1992	1 2	57	450	508
[P] 1993	1 4	58	465	520

[1] Summary data provided by the Central Agency for Public Mobilisation and Statics data in internal reports and annual issuses of the issues of the Statistical Year Book

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ANNEX TABLE 1 4 NUMBER SLAUGHTERED IN GOVERNMENT SLAUGHTER HOUSES, 1970-1991 AND ESTIMATES FOR 1992-1993 [1] (Continued)

	Domestic Buffalo				
Year	Cows	Fed Calves	Veal	TOTAL BUFFALO	TOTAL CATTLE & BUFFALO
	-------------- (000) Head --------------				
1970	79	35	199	312	627
1971	74	62	181	317	599
1972	71	94	177	342	644
1973	85	121	185	391	714
1974	89	132	197	417	733
1975	83	103	182	368	720
1976	82	77	182	341	668
1977	74	93	192	360	715
1978	98	112	230	441	834
1979	111	116	224	451	923
1980	105	116	241	462	854
1981	81	88	181	351	779
1982	73	136	190	399	898
1983	79	141	184	403	837
1984	65	153	179	397	756
1985	73	189	212	474	935
1986	102	218	202	522	1000
1987	93	236	182	511	991
1988	87	240	170	497	952
1989	79	264	217	560	1017
1990	96	303	318	717	1203
1991	135	322	356	813	1324
[P] 1992	130	310	350	790	1240
[P] 1993	130	310	350	800	1265

[1] Summary data provided by the Central Agency for Public Mobilisation and Statics data in internal reports and annual issuses of the issues of the Statistical Year Book

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ANNEX TABLE 1 4 NUMBER SLAUGHTERED IN GOVERNMENT SLAUGHTER HOUSES, 1970-1991 A ESTIMATES FOR 1992-1993 [1] (Continued)

Domestic

Year	TOTAL SHEEP	TOTAL GOATS	TOTAL CAMELS	TOTAL PIGS
	--------------	(000) Head	--------------	--------------
1970	387	28	47	39
1971	395	26	48	41
1972	383	26	46	43
1973	374	26	49	40
1974	329	20	50	44
1975	380	22	50	45
1976	368	22	51	49
1977	395	23	57	46
1978	441	21	52	45
1979	432	24	45	56
1980	408	26	32	58
1981	422	31	46	59
1982	437	22	50	64
1983	418	23	64	62
1984	423	24	77	62
1985	487	32	128	66
1986	469	33	88	72
1987	436	38	49	61
1988	415	34	77	60
1989	485	39	80	54
1990	526	53	74	58
1991	561	64	90	61
[P] 1992	600	74	90	65
[P] 1993	620	76	85	69

[1] Summary data provided by the Central Agency for Public Mobilisation and Statics data in internal reports and annual issuses of the issues of the Statistical Year Book

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ANNEX TABLE 1 4 NUMBER SLAUGHTERED IN GOVERNMENT SLAUGHTER HOUSES, 1970-1991 AND ESTIMATES FOR 1992-1993 [1] (Continued)

	Imports				
	Cattle				
	Oxen	Cows	Fed Calves	Sheep	Camels
Year	(000) Head				
1970	13	0	0	23	0
1971	31	0	0	12	0
1972	12	0	0	10	0
1973	17	0	0	5	0
1974	6	0	0	23	0
1975	0	0	0	0	0
1976	0	0	0	3	0
1977	0	0	0	3	0
1978	0	0	0	4	0
1979	1	0	0	0	45
1980	0	0	0	0	32
1981	0	0	46	0	46
1982	6	0	96	9	50
1983	0	0	73	0	64
1984	3	104	0	11	77
1985	17	78	0	21	129
1986	4	40	0	8	88
1987	1	7	0	35	49
1988	3	3	0	10	77
1989	2	2	0	23	80
1990	0	0	1	29	74
1991	0	0	3	3	90
[P] 1992	0	0	7	26	95
[P] 1993	0	0	12	25	98

[1] Summary data provided by the Central Agency for Public Mobilisation and Statics data in internal reports and annual issuses of the issues of the Statistical Year Book

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ANNEX TABLE 1 5 ESTIMATED RED MEAT SUPPLY, 1976-1
AND PROJECTIONS FOR 1992-1993[1][2]

	Domestic Production			
	Cattle			
	Oxen	Cows	Fed Calves	TOTAL CATTLE
Year	----------------	M TONS	----------------	------------------
1976	706	10922	130880	142508
1977	643	11180	141960	153783
1978	576	17501	157440	175517
1979	711	24037	188960	213708
1980	592	21500	156920	179012
1981	466	17501	171400	189367
1982	501	15609	199760	215870
1983	457	18103	173520	192080
1984	309	17372	143720	161401
1985	418	14964	184480	199862
1986	327	18232	191240	209799
1987	3615	30960	192000	226575
1988	3615	14620	182000	200235
1989	7231	13760	182800	203791
1990	3615	22360	194400	220375
1991	3615	31820	204400	239835
[P] 1992	564	24510	180000	205074
[P] 1993	658	24940	186000	211598

[1] Winrock International Institute for Agricultural Development

[2] Estimates based on carcass weight assumptions that follow and estimates of total slaughter show in earlier tables

ANNEX TABLE 1 5 ESTIMATED RED MEAT SUPPLY, 1976-1991 AND PROJECTIONS FOR 1992-1993[1][2]

(Contınuted)

Year	Domestic Production Cows	Buffalo Fed Calves	Veal	TOTAL BUFFALO	TOTAL CATTLE & BUFFALO
	-------------	M TONS	-------------	-------------	-------------
1976	40229	26316	9784	76329	218837
1977	36407	31756	10355	78518	232301
1978	47922	38182	12406	98510	274027
1979	54390	39338	12056	105784	319492
1980	51597	39440	12966	104003	283015
1981	39886	29988	9752	79626	268993
1982	35525	46274	10247	92046	307916
1983	38514	47838	9881	96233	288313
1984	31997	51918	9612	93527	254928
1985	35672	64294	11394	111360	311222
1986	49833	74154	10866	134853	344652
1987	35054	61723	8273	105050	331625
1988	32792	62769	7727	103289	303524
1989	29777	69046	9864	108687	312477
1990	36185	79246	14455	129885	350261
1991	50885	84215	16182	151282	391117
[P] 1992	49000	81077	15909	145986	351060
[P] 1993	49000	81077	15909	145986	357584

[1] Wınrock Internatıonal Instıtute for Agrıcultural Development

[2] Estımates based on carcass weıght assumptıons that follow and estımates of total slaughter show ın earlıer tables

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ANNEX TABLE 1 5 ESTIMATED RED MEAT SUPPLY, 1976-1991 AND PROJECTIONS FOR 1992-1993[1][2]
(Continuted)

	Domestic Production				
Year	TOTAL SHEEP	TOTAL GOATS	TOTAL CAMELS	TOTAL PIGS	PRODUCT-ION OF RED MEAT
			M TONS		
1976	40502	1678	11730	3920	276668
1977	43494	1785	13110	3680	294370
1978	48488	1595	11960	3600	339669
1979	47487	1793	10350	4480	383602
1980	44902	2007	7360	4640	341923
1981	46376	2327	10580	4720	332996
1982	48114	1671	11500	5120	374321
1983	45947	1724	14720	4960	355664
1984	46541	1816	17710	4960	325955
1985	53603	2441	29440	5280	401986
1986	51579	2518	20240	5760	424749
1987	47960	2899	11270	4880	398634
1988	45650	2594	17710	4800	374278
1989	53350	2975	18400	4320	391523
1990	57860	4044	17020	4640	433824
1991	61710	4883	20700	4880	483290
[P] 1992	66000	5646	20700	5200	448606
[P] 1993	68200	5798	19550	5520	456652

[1] Winrock International Institute for Agricultural Development
[2] Estimates based on carcass weight assumptions that follow and estimates of total slaughter show in earlier tables

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ANNEX TABLE 1 5 ESTIMATED RED MEAT SUPPLY, 1976-1991
AND PROJECTIONS FOR 1992-1993[1][2]
(Continuted)

Year	Live Imports Cattle Oxen	Cows	Fed Calves	Sheep	Camels	TOTAL IMPORTS OF LIVE RED MEA
	--------------	--------------	M TONS	--------------	--------------	--------------
1976	0	0	0	78	0	78
1977	0	0	0	78	0	78
1978	0	0	0	104	0	104
1979	265	0	0	0	10350	10615
1980	0	0	0	0	7360	7360
1981	0	0	10120	0	10580	20700
1982	1590	0	21120	234	11500	34444
1983	0	0	16060	0	14720	30780
1984	795	23920	0	286	17710	42711
1985	4505	17940	0	546	29670	52661
1986	1060	9200	0	208	20240	30708
1987	265	1610	0	910	11270	14055
1988	795	690	0	260	17710	19455
1989	530	460	0	598	18400	19988
1990	0	0	220	754	17020	17994
1991	0	0	660	78	20700	21438
[P] 1992	0	0	1540	676	21850	24066
[P] 1993	0	0	2640	650	22540	25830

[1] Winrock International Institute for Agricultural Development

[2] Estimates based on carcass weight assumptions that follow and estimates of total slaughter show in earlier tables

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ANNEX TABLE 1 5 ESTIMATED RED MEAT SUPPLY 1976-1991 AND PROJECTIONS FOR 1992-1993[1][

(Contınuted)

Year	Frozen Imports Beef	Mutton	IMPORTS OF FROZEN RED MEAT	TOTAL IMPORTS OF RED MEAT
	--------------	M TONS	--------------	--------------
1976	116	35559	35675	35753
1977	5990	33755	39745	39823
1978	46550	47	46597	46701
1979	31938	2230	34168	44783
1980	65152	8647	73799	81159
1981	108849	7872	116721	137421
1982	97047	3168	100215	134659
1983	77583	1741	79324	110104
1984	90000	20000	110000	152711
1985	138272	32008	170280	222941
1986	115523	3745	119268	149976
1987	142897	2418	145315	159370
1988	120000	3000	123000	142455
1989	117812	4836	122648	142636
1990	154198	152	154350	172344
1991	85000	0	85000	106438
[P] 1992	108000	0	108000	132066
[P] 1993	130000	0	130000	155830

[1] Wınrock Internatıonal Instıtute for Agrıcultural Development

[2] Estımates based on carcass weıght assumptıons that follow and estımates of total slaughter show ın earlıer tables

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ANNEX TABLE 1 6 ESTIMATED PER CAPITA RED MEAT SUPPLY 1976 1991
WITH PROJECTION FOR 1992 1993 [1][2]

Year	Population (000)	Total Red Meat Supply M Tons	Per Capita Red Meat Supply Kilo	Domestic Red Meat Production Total M Tons	Domestic Red Meat Production Per Capita Kilo	Imported Red Meat Available Total M Tons	Imported Red Meat Available Per Capita Kilo
1976	38198	312421	8 2	276668	7 2	35753	0 9
1977	38794	334193	8 6	294370	7 6	39823	1 0
1978	39767	386370	9 7	339669	8 5	46701	1 2
1979	40889	428385	10 5	383602	9 4	44783	1 1
1980	42126	423082	10 0	341923	8 1	81159	1 9
1981	43322	470417	10 9	332996	7 7	137421	3 2
1982	44506	508980	11 4	374321	8 4	134659	3 0
1983	45721	465768	10 2	355664	7 8	110104	2 4
1984	46990	478666	10 2	325955	6 9	152711	3 2
1985	48349	624927	12 9	401986	8 3	222941	4 6
1986	49863	574725	11 5	424749	8 5	149976	3 0
1987	51349	558004	10 9	398634	7 8	159370	3 1
1988	52827	516733	9 8	374278	7 1	142455	2 7
1989	54210	534159	9 9	391523	7 2	142636	2 6
1990	55543	606168	10 9	433824	7 8	172344	3 1
1991	56898	589728	10 4	483290	8 5	106438	1 9
[P] 1992	58286	580672	10 0	448606	7 7	132066	2 3
[P] 1993	60027	612482	10 2	456652	7 6	155830	2 6
Average Annual Percent Change							
1976 86	2 7%	6 3%	3 5%	4 4%	1 6%	15 4%	12 4%
1986 93	2 7%	0 9%	1 7%	1 0%	1 6%	0 5%	2 1%

[1] Winrock International Institute for Agricultural Development

[2] Estimates based on earlier tables of numbers slaughtered and the carcass weights below

ANNEX TABLE 1 7 THE ASSUMED CARCASS WEIGHTS ARE AS FOLLOWS

Type	Kilos Per Head	Type	Kilos Per Head
CATTLE		BUFFALO	
Oxen		Cows	245
Domestic	235	Fed Calves	170
Imported	265	Veal	35
Cows		SHEEP	
Domestic	215	Domestic	22
Imported	230	Imported	26
Fed Calves		GOATS	14
Domestic	200	CAMELS	230
Imported	220	PIGS	80

ANNEX TABLE 2 1 ESTIMATED MILK PRODUCTION AND SUPPLY 1976-1991, WITH PROJECTIONS FOR 1992-1993[1][2]

	Cattle		Buffalo	
	Cows On Farms	Cows Producing Milk	Cows On Farms	Cows Producing Milk
	--------------	(000)Head	----------------	----------------
1976	1,700 0	1,062 5	1,262 0	668 9
1977	1,740 0	1,087 5	1,359 7	720 6
1978	1,746 8	1,091 7	1,586 3	840 7
1979	1,748 4	1,092 7	1,578 8	836 8
1980	1,758 1	1,098 8	1,546 5	819 7
1981	1,765 1	1,103 2	1,552 8	823 0
1982	1,790 1	1,118 8	1,582 3	838 6
1983	1 791 1	1,119 5	1,600 0	848 0
1984	1,773 1	1,108 2	1,637 7	868 0
1985	1,780 8	1,113 0	1,655 5	877 4
1986	1,795 9	1,122 4	1,586 8	841 0
1987	1,738 1	1,147 1	1,536 9	1,029 7
1988	1,737 2	1,146 5	1,484 9	994 9
1989	1,746 8	1,152 9	1,673 7	1,121 4
1990	1,730 9	1,142 4	1,809 1	1,212 1
1991	1,680 8	1,109 3	1,882 4	1,261 2
[P] 1992	1,651 8	1,090 2	1,897 4	1,271 2
[P] 1993	1,605 7	1,059 8	1,920 3	1,286 6
Average Annual Percent Change				
1976-86	0 6%	0 6%	2 3%	2 3%
1986-93	-1 6%	-0 8%	2 8%	6 3%

[1] Winrock International Institute for Agricultural Development

[2] Estimates based on the estimated number of cows in milk and assumed production per cow

MILK PRODUCTION ASSUMPTIONS

	Before 1986	After 1986
	----(Metric Ton)---------	
Cattle/Cows	0 600	0 607
Buffalo/Cows	1 200	1 200

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ANNEX TABLE 2 1 ESTIMATED MILK PRODUCTION AND SUPPLY 1976-1991 WITH PROJECTIONS FOR 1992-1993[1][2] (Continued)

Year	Cattle Milk Production	Buffalo Milk Productio	TOTAL MILK PROD-UCTION	Milk Imports[3	Total Milk Supply	Pop-ulation	Per Capit Con-sumption
	---------------	--------------	(000) Metric Tons-----		---------------	(000)-------	--------------
1976	638	803	1,440	720	2,160	38,198	57
1977	653	865	1,517	525	2,042	38,794	53
1978	655	1,009	1,664	914	2,578	39,767	65
1979	656	1,004	1,660	767	2,427	40,889	59
1980	659	984	1,643	1,138	2,781	42,126	66
1981	662	988	1,649	1,200	2,849	43,322	66
1982	671	1 006	1,678	833	2,511	44,506	56
1983	672	1,018	1,689	1,117	2,806	45,721	61
1984	665	1,042	1,707	248	1,955	46,990	42
1985	668	1,053	1,721	230	1,951	48,349	40
1986	673	1,009	1,683	320	2,003	49,863	40
1987	696	1,236	1,932	350	2,282	51,349	44
1988	696	1,194	1,890	550	2,440	52,827	46
1989	700	1,346	2,045	600	2,645	54,210	49
1990	693	1,454	2,148	747	2,895	55,543	52
1991	673	1,513	2,187	611	2,798	56,898	49
[P] 1992	662	1,525	2,187	605	2,792	58,286	48
[P] 1993	643	1,544	2,187	639	2,826	60,027	47
Average Annual Percent Change							
1976-86	0 6%	2 3%	1 6%	-7 8%	-0 8%	2 7%	-3 4%
1986-93	-0 7%	6 3%	3 8%	10 4%	5 0%	2 7%	2 3%

[1] Winrock International Institute for Agricultural Development

[2] Estimates based on the estimated number of cows in milk and assumed production per cow

[3] Imports based on U N Food and Agriculture Agency estimates and Foreign Agricultural Service, U S Department of Agriculture projections

MILK PRODUCTION ASSUMPTIONS

	Before 1986	After 1986
	----(Metric Ton)---------	
Cattle/Cows	0 600	0 607
Buffalo/Cows	1 200	1 200

ANNEX TABLE 3 1 ESTIMATED FARM VALUE OF LIVESTOCK PRODUCTS 1976 1991 WITH PROJECTIONS FOR 1992 1993[1][2]

	Year	Cattle and Buffalo Meat Prod uction M Tons	Farm Beef and Buffalo Meat Price[3] Pt /Kilo	Total Farm Value of Beef and Buffalo Meat (000) L E	Mutton and Other Meat Prod uction M Tons	Farm Mutton Price[4] Pt /Kilo	Total Farm Value of Mutton (000) L E	TOTAL VALUE OF MEAT (000) L E
	1976	218,837	59	129,114	57 830	83	47,999	177 113
	1977	232,301	73	169,580	62 069	92	57,104	226 684
	1978	274 027	69	189 079	65 643	94	61 704	250 783
	1979	319 492	85	271 568	64 110	102	65 392	336 961
	1980	283 015	160	452 824	58 909	147	86 596	539 419
	1981	268 993	172	462 668	64 003	149	95 364	558 032
	1982	307 916	181	557 328	66 405	175	116 208	673 536
	1983	288 313	194	559 326	67 351	240	161 643	720 969
	1984	254 928	212	540 447	71 027	275	195 324	735 771
	1985	311 222	222	690 912	90 764	278	252 325	943 237
	1986	344 652	254	875 417	80 097	342	273 931	1 149 348
	1987	331 625	324	1 074 465	67 009	380	254 635	1 329 100
	1988	303 524	391	1 186 780	70 754	473	334 666	1 521 446
	1989	312 477	455	1 421 773	79 045	547	432 379	1 854 151
	1990	350 261	462	1 618 204	83 564	570	476 313	2 094 517
	1991	391 117	461	1 803 050	92 173	570	525 385	2 328 435
[P]	1992	351 060	487	1 709 662	97 546	599	584 299	2 293 961
[P]	1993	357 584	518	1 852 285	99 068	635	629 084	2 481 369
Average Annual Percent Change								
1976 86		4 6%	15 7%	21 1%	3 3%	15 2%	19 0%	20 6%
1986 93		0 5%	10 7%	11 3%	3 1%	9 2%	12 6%	11 6%

[1] Winrock International Institute for Agricultural Development

[2] Based on production estimates from earlier tables

[3] Dr Soliman I and Imam S 1987 'Farm Income as an Incentive for Agricultural Graduate Farmers Settled in the Relcaimed Land Areas of Egypt Conference of Agricultural science on Food Deficiency Problems Solved Through Autonomous Efforts in Egypt volume 5 pp 1179 1190

[4] Estimated from retail and wholesale prices provided by the Central Agency for Public Mobilisation and Statistics

[5] Based on selected issues of the Monthly Consumer Prices Report and Quarterly Wholesale and Farmgate Prices provided by the Central Agency for Public Mobilisation and Statistics

[6] Based on selected issues of the Monthly Consumer Prices Report Quarterly Wholesale and Farmgate Prices and farm surveys reports provided by the Central Agency for Public Mobilisation and Statistics

[7] Based on value statistics shown in Livestock Statistics Central Agency for Public Mobilisation and Statistics

[8] Estimates from the Production Economics Division Agricultural Economics Research Institute Agricultural Research Center

ANNEX TABLE 3 2 ESTIMATED FARM VALUE OF LIVESTOCK PROD
1976-1991 WITH PROJECTIONS FOR 1992-1993[1][2]

	Total Farm Value				
Year	Meat	Milk	Manure	Wool & Hair	ALL PRODUCT
	----------------	---------(000)L E	----------	----------------	
1976	177,113	116,908	18,609	1,964	314,595
1977	226,684	140,359	27,005	2,962	397,010
1978	250,783	188,905	30,694	3,014	473,396
1979	336,961	213,605	32,363	3,907	586,835
1980	539,419	282,084	40,554	4,109	866,167
1981	558,032	336,956	45,327	4,095	944,411
1982	673,536	341,200	52,880	4,835	1,072,451
1983	720,969	427,852	63,754	4 987	1,217,562
1984	735,771	517,469	73,600	6,171	1,333,011
1985	943,237	595,488	73,580	7,235	1,619,540
1986	1,149,348	623,182	76,737	8,294	1,857,561
1987	1,329,100	824,557	80,510	9,643	2,243,810
1988	1,521,446	909,170	92,657	12,280	2,535,553
1989	1,854,151	1,103,627	115,915	12,797	3,086,490
1990	2,094,517	1,357,337	121,335	15,812	3,589,000
1991	2,328,435	1,492,734	122,129	26,382	3,969,681
[P] 1992	2 293,961	1,598,605	125,348	28,756	4,046,671
[P] 1993	2,481,369	1,844,863	128,828	31,056	4,486,117
Average Annual Percent Change					
1976 86	20 6%	18 2%	15 2%	15 5%	19 4%
1986-93	11 6%	16 8%	7 7%	20 8%	13 4%

[1] Winrock International Institute for Agricultural Development
[2] Based on production estimates from earlier tables

ANNEX TABLE 3 3 ESTIMATED MANURE PRODUCTION BY LIVEST
1970-1991 AND PROJECTIONS FOR 1992-1993 [1][2]

	Domestic				
	Cattle				
Year	Bulls	Cows	Calves < 1 year	Males/ females > 1 year	TOTAL CATTLE
	-------------	---------------	(000) Metric	Tons------	---------------
1976	232	2,513	218	701	3,665
1977	231	2,572	304	687	3,794
1978	231	2,582	270	791	3,873
1979	232	2,585	196	778	3,790
1980	232	2,599	275	691	3,797
1981	232	2,609	244	733	3,818
1982	233	2,646	186	683	3,748
1983	233	2,648	248	587	3,716
1984	233	2,621	312	648	3,813
1985	234	2,632	219	744	3,829
1986	236	2,655	208	662	3,761
1987	203	2,569	255	585	3,612
1988	170	2,568	278	613	3,628
1989	107	2,582	280	668	3,637
1990	76	2,559	246	698	3,579
1991	46	2,485	203	656	3,389
[P] 1992	49	2,442	248	585	3,324
[P] 1993	50	2,374	215	598	3,237

[1] Winrock International Institute for Agricultural Development
[2] Based on the proportion of dry matter expelled

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ANNEX TABLE 3 3 ESTIMATED MANURE PRODUCTION BY LIVESTOCK 1970-1991 AND PROJECTIONS FOR 1992-1993 (Continued) [1][2]

		Buffalo				
				Males/		TOTAL
			Calves	Females	TOTAL	CATTLE
	Bulls	Cows	< 1 year	> 1 year	BUFFALO	BUFFALO
Year	--------------	--------------	(000) Metric Tons------		----------------	--------------
1976	38	2,218	510	423	3,189	6,854
1977	41	2,390	255	703	3,389	7,183
1978	49	2,788	291	378	3,506	7,380
1979	48	2,775	295	321	3,439	7,230
1980	47	2,718	267	308	3,340	7,137
1981	47	2,729	330	318	3,424	7,242
1982	48	2 781	331	319	3,478	7,227
1983	48	2,812	344	311	3,515	7,231
1984	49	2,879	361	303	3,592	7,406
1985	50	2,910	333	254	3,547	7,377
1986	47	2,789	320	140	3,296	7,057
1987	42	2,701	506	126	3,375	6,987
1988	38	2,610	494	392	3,534	7,162
1989	36	2,942	535	364	3,877	7,514
1990	34	3,180	506	362	4,081	7,661
1991	29	3,309	505	290	4,133	7,521
[P] 1992	30	3,335	517	300	4,181	7,505
[P] 1993	31	3,375	527	318	4,250	7,488

[1] Winrock International Institute for Agricultural Development
[2] Based on the proportion of dry matter expelled

ANNEX TABLE 3 3 ESTIMATED MANURE PRODUCTION BY LIVESTOCK
1970 1991 AND PROJECTIONS FOR 1992-1993 (Continued) [1][2]

	Sheep							
Year	Ewes/ Does	Lambs/ Kids	Others	TOTAL SHEEP & GOATS	TOTAL CAMELS	TOTAL DONKEY	TOTAL HORSES & MULES	MANURE PROD UCTION FROM AL LIVE-STOCK
			(000) Metric Tons					
1976	947	190	101	1,237	237	1,674	64	8,091
1977	863	147	219	1,230	236	1,674	64	10,387
1978	905	165	160	1,231	235	1,674	64	10,584
1979	885	162	190	1,237	234	1,674	64	10 440
1980	896	183	210	1,289	234	1,674	64	10,398
1981	923	174	231	1,327	233	1,674	64	10,541
1982	964	192	222	1,378	232	1,674	64	10 576
1983	990	191	244	1,424	232	1,674	64	10 626
1984	1,031	190	227	1,448	231	1,674	64	10,824
1985	1,049	198	227	1,475	190	1,674	64	10,821
1986	1,064	210	252	1,527	190	1,674	64	10,512
1987	1,053	210	278	1,541	189	1,674	64	10 456
1988	1,068	213	279	1,561	189	1 674	64	10 650
1989	1,081	224	294	1,599	188	1,674	64	11,040
1990	1,104	230	314	1,648	188	1,674	64	11,235
1991	1,140	217	298	1,656	187	1,674	64	11,103
[P] 1992	1,154	228	281	1,663	186	1,674	64	11,093
[P] 1993	1,149	236	310	1 694	186	1,674	64	11,106

[1] Winrock International Institute for Agricultural Development
[2] Based on the proportion of dry matter expelled

ANNEX TABLE 4 1 POULTRY NUMBERS ON FARMS 1976-1991
AND PRELIMINARY 1992-1993[1]

Balady

Year	Chickens	Ducks	Geese --(000)---	Pigeons	Rabbits	Turkeys	BALADY TOTAL[2]
1976	26,375	3,294	5,221	10,080	5,994	705	51,669
1977	26,680	3,343	5,269	9,275	5,961	715	51,243
1978	26,986	3,392	5,316	8,449	5,926	724	50,793
1979	27,292	3,440	5,395	7,588	5,903	733	50,351
1980	27,597	3 489	5,411	7,749	5,850	742	50,838
1981	27 903	3,538	5,460	7,882	5,818	751	51,352
1982	28,208	3,589	5,508	8,071	5,768	761	51,905
1983	28,514	3,634	5,555	8,260	5,723	770	52,456
1984	28,820	3,684	5,603	8,456	5,674	779	53,016
1985	29,125	3,732	5,650	8,659	5,941	788	53,895
1986	32,735	6,973	5,706	8,976	5,885	1,267	61,542
1987	33,125	7,090	5,800	9,245	6,056	1,287	62,603
1988	33,515	7,205	5,895	9,520	6,231	2,614	64,980
1989	33,905	7,321	5,989	9,801	6,409	3,901	67,326
1990	34,295	7 437	6,084	10,088	6,591	5,188	69,683
1991	35,465	7,553	6 180	10,380	6,777	5,100	71,455
[P]1992	35 855	7,668	6 275	10,679	6,966	5,100	72,543
[P]1993	36 249	7 600	6,300	10,800	7,160	5,100	73,209
Average Annual Percent Change							
1976 86	2 2%	7 8%	0 9%	1 2%	-0 2%	6 0%	1 8%
1986 93	1 5%	1 2%	1 4%	2 7%	2 8%	22 0%	2 5%

[1] Winrock International Institute For Agricultural Development

[2] Based on estimates from annual issues of the Statistical Year Book Arab Republic of Egypt Central Agency for Public Mobilisation and Statistics Adjustments have been made for the levels shown in the 1981 Agricultural Census

[P] Preliminary

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ANNEX TABLE 4 1 POULTRY NUMBERS ON FARMS 1976-1991 AND PRELIMINARY 1992-1993[1](Continued)

Year	Commercial Layers	Broilers	COMMER-CIAL TOTAL[2]
	--------------	----Mil --- -	--------------
1976	4	41	44 7
1977	4	42	45 9
1978	4	45	49 2
1979	4	46	50 4
1980	5	53	57 6
1981	4	65	69 8
1982	5	89	94 3
1983	6	82	88 0
1984	7	104	110 8
1985	8	98	105 3
1986	7	93	100 3
1987	9	91	99 9
1988	10	64	73 1
1989	11	44	55 1
1990	10	46	55 0
1991	9	43	51 9
[P]1992	8	43	50 5
[P]1993	8	47	54 5
Average Annual Percent Change			
1976-86	7 2%	8 5%	8 4%
1986 93	0 2%	-9 3%	-8 3%

[1] Winrock International Institute For Agricultural Development

[2] Estimates from the Central Agency for Public Mobilisation and Statistics Interpolations from from hatchings were made for individual years Layers estimated from egg numbers produced

[P] Preliminary

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ANNEX TABLE 4 2 POULTRY MEAT PRODUCTION 1976-1992
AND PRELIMINARY 1993[1]

Balady

Year	Chickens	Ducks	Geese	Pigeons	Rabbits	Turkeys	BALADY TOTAL[2]
	--------------	--------------	------(000)	M Tons-----	--------------	--------------	--------------
1976	123 7	11 1	9 4	24 0	21 0	2 7	191 8
1977	125 1	11 2	9 5	22 1	20 9	2 7	191 5
1978	126 6	11 4	9 6	20 1	20 7	2 8	191 1
1979	128 0	11 6	9 7	18 1	20 7	2 8	190 8
1980	129 4	11 7	9 7	18 4	20 5	2 8	192 6
1981	130 9	11 9	9 8	18 8	20 4	2 9	194 6
1982	132 3	12 1	9 9	19 2	20 2	2 9	196 6
1983	133 7	18 6	10 0	19 7	20 0	2 9	204 9
1984	117 9	22 6	12 3	20 9	21 3	3 0	198 0
1985	146 5	23 3	12 6	21 6	22 0	3 0	229 0
1986	153 4	23 4	12 8	22 2	22 6	4 8	239 2
1987	176 6	23 8	13 0	22 9	23 3	4 9	264 5
1988	152 2	24 2	13 2	23 5	23 9	9 9	246 9
1989	153 9	23 0	13 4	24 2	24 6	14 8	254 0
1990	155 7	23 0	13 6	24 9	25 3	19 7	262 3
1991	161 0	24 0	13 8	25 6	26 0	19 4	269 9
[P]1992	162 8	24 0	14 1	26 4	26 7	19 4	273 3
[P]1993	164 6	24 0	14 1	26 7	27 5	19 4	276 2
Average Annual Percent Change							
1976 86	2 2%	7 7%	3 1%	-0 8%	0 7%	6 0%	2 2%
1986 93	1 0%	0 4%	1 4%	2 7%	2 8%	22 0%	2 1%

[1] Winrock International Institutue For Agricultural Development

[2] Estimates based on Livestock Statistics Report 1988
Central Agency for Public Mobilisation and Statistics

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ANNEX TABLE 4 2 POULTRY MEAT PRODUCTION 1976-1992 AND PRELIMINARY 1993[1](Continued)

Year	Commercial Spent Layers	Broilers	COM-MERCIAL TOTAL[2]
	------(000) M Tons-----		--------------
1976	3	106	109
1977	3	109	112
1978	3	116	120
1979	3	119	122
1980	3	137	141
1981	3	169	173
1982	4	230	234
1983	5	211	216
1984	5	214	219
1985	6	217	223
1986	6	219	225
1987	7	221	228
1988	7	224	232
1989	8	156	164
1990	7	161	168
1991	7	152	159
[P]1992	6	152	158
[P]1993	6	166	172
Average Annual Percent Change			
1976 86	7 2%	7 5%	7 5%
1986 93	0 2%	3 9%	-3 8%

[1] Winrock International Institutue For Agricultural Development

[2] Estimates based on Livestock Statistics Report 1988, Central Agency For Public Mobilisation and Statistics

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ANNEX TABLE 4 3 POULTRY MEAT AVAILABILITY 1976-1992
AND PRELIMINARY 1993[1][2]

Year	Balady	Com-mercial	Imports	TOTAL AVAIL-ABILITY	Pop-ulation	Per Capit Avail-ability
	--------------	(000) M Tons-----------		--------------	Mil	Kilo
1976	191 8	108 9	5 0	305 7	38,198	8 0
1977	191 5	111 6	6 0	309 1	38,494	8 0
1978	191 1	119 6	5 0	315 8	39,767	7 9
1979	190 8	122 4	0 0	313 2	40,889	7 7
1980	192 6	140 6	50 0	383 2	42,126	9 1
1981	194 6	172 6	110 0	477 2	43,322	11 0
1982	196 6	234 4	39 0	470 0	44,506	10 6
1983	204 9	216 2	51 0	472 2	45,721	10 3
1984	198 0	219 2	100 0	517 1	46,990	11 0
1985	229 0	222 7	86 0	537 7	48,349	11 1
1986	239 2	224 6	65 0	528 8	49,863	10 6
1987	264 5	227 8	65 0	557 3	51,349	10 9
1988	246 9	231 6	25 0	503 5	52,827	9 5
1989	254 0	164 1	20 0	438 1	54,210	8 1
1990	262 3	167 9	2 0	432 2	55,543	7 8
1991	269 9	158 9	15 0	443 8	56,898	7 8
[P]1992	273 3	157 6	2 0	432 9	58,286	7 4
[P]1993	276 2	171 7	5 0	453 0	60,027	7 5
Average Annua' Percent Change						
1976 86	2 2%	7 5%	29 2%	5 6%	2 7%	2 9%
1986 93	2 1%	-3 8%	-30 7%	-2 2%	2 7%	-4 7%

[1] Winrock International Institutue For Agricultural Development
[2] Central Agency for Public Mobilisation and Statistics

ANNEX TABLE 4 4 EGG PRODUCTION AND AVAILABILITY 1976 1992 AND PRELIMINARY 1993[1][2]

	Production								
	Balady Layers	Commercial Layers	Balady Eggs	Commercial Eggs	TOTAL	Imports	TOTAL AVAIL-ABILITY	Population	Per Capita Availability
Year	-- -- -- -	-------- -- --	----Mil -- -	------ ----- -	----- -- -----	--- ---- --- -	---- -- -----	--(000)	
1976	2 5	3 8	452	1,054	1,505	0	1,505	38 198	39
1977	2 6	3 9	470	1,096	1,566	0	1,566	38,794	40
1978	2 8	4 2	500	1,166	1,666	0	1,666	39,767	42
1979	3 0	4 4	533	1 245	1 778	6	1,784	40 889	44
1980	3 0	4 6	548	1 278	1 825	38	1 863	42 126	44
1981	2 9	4 4	523	1,220	1,743	246	1,989	43,322	46
1982	3 5	5 3	635	1 481	2,115	126	2,241	44 506	50
1983	4 2	6 3	756	1,764	2 520	171	2,691	45 721	59
1984	4 6	6 9	832	1 942	2 774	90	2 864	46 990	61
1985	5 1	7 7	919	2,143	3 062	138	3 200	48 349	66
1986	4 9	7 4	883	2,059	2 942	140	3,082	49 863	62
1987	6 1	9 1	1 097	2,559	3 656	135	3 791	51 349	74
1988	6 4	9 6	1,148	2 679	3 827	69	3 896	52 827	74
1989	7 3	11 0	1 322	3,084	4 406	0	4 406	54 210	81
1990	6 3	9 5	1 140	2,661	3 801	0	3 801	55 543	68
1991	5 9	8 8	1,061	2 475	3 536	0	3,536	56 898	62
[P]1992	5 0	7 5	897	2 093	2 990	0	2 990	58 286	51
[P]1993	5 0	7 5	900	2 100	3 000	0	3 000	60 027	50
Average Annual Percent Change									
1976 86	6 9%	6 9%	6 9%	6 9%	6 9%	NA	7 4%	2 7%	4 6%
1986 93	0 3%	0 3%	0 3%	0 3%	0 3%	NA	0 4%	2 7%	3 0%

[1] Winrock International Institutue For Agricultural Development

[2] Central Agency for Public Mobilisation and Statistics

ANNEX TABLE 5 1 FARM VALUE OF POULTRY MEAT AND EGG PRODUCTION 1976 1991 AND PRELIMINARY 1992 1993[1][2]

	Balady Chickens			Commercial Broilers			Ducks		
	Prod uction	Farm Price	Farm Value	Prod uction	Farm Price	Farm Value	Prod uction	Farm Price	Farm Value
Year	000M Ton	Pt /Kilo	Mil L E	000M Ton	Pt /Kilo	Mil L E	000M Ton	Pt /Kilo	Mil L E
1976	123 7	77	95 2	108 9	66	71 9	11 1	57	6 3
1977	125 1	79	98 9	111 6	73	81 5	11 2	65	7 3
1978	126 6	82	103 8	119 6	82	98 1	11 4	72	8 2
1979	128 0	92	117 8	122 4	94	115 0	11 6	80	9 3
1980	129 4	119	154 0	140 6	117	164 5	11 7	107	12 5
1981	130 9	161	210 7	172 6	139	239 9	11 9	147	17 5
1982	132 3	174	230 2	234 4	162	379 6	12 1	161	19 5
1983	133 7	182	243 4	216 2	194	419 4	18 6	171	31 8
1984	117 9	206	242 9	219 2	222	486 6	22 6	195	44 1
1985	146 5	214	313 5	222 7	225	501 1	23 3	212	49 4
1986	153 4	229	351 3	224 6	230	516 5	23 4	225	52 7
1987	176 6	253	446 8	227 8	254	578 7	23 8	252	60 0
1988	152 2	306	465 6	231 6	287	664 7	24 2	317	76 7
1989	153 9	348	535 7	164 1	302	495 6	23 0	366	84 2
1990	155 7	390	607 2	167 9	333	559 2	23 0	397	91 3
1991	161 0	403	648 9	158 9	324	514 9	24 0	413	99 1
[P]1992	162 8	408	664 1	157 6	329	518 5	24 0	423	101 5
[P]1993	164 6	468	770 2	171 7	342	587 3	24 0	468	112 3
Average Annual Percent Change									
1976 86	2 2%	11 5%	13 9%	7 5%	13 3%	21 8%	7 7%	14 7%	23 6%
1986 93	1 0%	10 8%	11 9%	3 8%	5 8%	1 9%	0 4%	11 0%	11 4%

[1] Winrock International Institutue For Agricultural Development

[2] Central Agency for Public Mobilisation and Statistics

ANNEX TABLE 5 1 FARM VALUE OF POULTRY MEAT AND EGG PRODUCTION 1976 1991 AND PRELIMINARY 1992 1993[1][2](Continued)

Year	Geese Prod uction 000M Ton	Farm Price Pt /Kilo	Farm Value Mil L E	Pigeons Prod uction 000M Ton	Farm Price Pt /Kilo	Farm Value Mil L E	Rabbits Prod uction 000M Ton	Farm Price Pt /Kilo	Farm Value Mil L E
1976	9 4	53	5 0	24 0	52	12 5	21 0	52	10 9
1977	9 5	62	5 9	22 1	60	13 2	20 9	61	12 7
1978	9 6	68	6 5	20 1	66	13 3	20 7	68	14 1
1979	9 7	72	7 0	18 1	75	13 5	20 7	78	16 1
1980	9 7	98	9 5	18 4	107	19 7	20 5	106	21 7
1981	9 8	140	13 7	18 8	135	25 3	20 4	145	29 5
1982	9 9	145	14 4	19 2	142	27 3	20 2	160	32 3
1983	10 0	157	15 7	19 7	155	30 5	20 0	162	32 4
1984	12 3	177	21 8	20 9	177	37 0	21 3	188	40 0
1985	12 6	193	24 3	21 6	188	40 6	22 0	206	45 3
1986	12 8	208	26 6	22 2	207	46 0	22 6	216	48 8
1987	13 0	236	30 7	22 9	237	54 3	23 3	242	56 4
1988	13 2	282	37 2	23 5	278	65 4	23 9	302	72 3
1989	13 4	332	44 5	24 2	329	79 6	24 6	344	84 7
1990	13 6	371	50 6	24 9	362	90 2	25 3	373	94 4
1991	13 8	378	52 3	25 6	369	94 6	26 0	380	98 9
[P]1992	14 1	400	56 2	26 4	399	105 2	26 7	407	108 9
[P]1993	14 1	438	61 8	26 7	438	116 8	27 5	446	122 6
Average Annual Percent Change									
1976 86	3 1%	14 7%	18 2%	0 8%	14 8%	13 9%	0 7%	15 3%	16 2%
1986 93	1 4%	11 2%	12 8%	2 7%	11 3%	14 3%	2 8%	10 9%	14 1%

[1] Winrock International Institutue For Agricultural Development

[2] Central Agency for Public Mobilisation and Statistics

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ANNEX TABLE 5 1 FARM VALUE OF POULTRY MEAT AND EGG PRODUC
1976-1991 AND PRELIMINARY 1992-1993[1][2](Continued)

Year	Turkeys Prod uction 000M Ton	Farm Price Pt /Kilo	Farm Value Mil L E	FARM VALUE OF TOTAL MEAT Mil L E
1976	2 7	75	2 0	204
1977	2 7	88	2 4	222
1978	2 8	96	2 6	247
1979	2 8	107	3 0	282
1980	2 8	137	3 9	386
1981	2 9	182	5 2	542
1982	2 9	189	5 5	709
1983	2 9	218	6 4	780
1984	3 0	251	7 4	880
1985	3 0	281	8 4	983
1986	4 8	309	14 9	1057
1987	4 9	369	18 0	1245
1988	9 9	423	42 0	1424
1989	14 8	477	70 7	1395
1990	19 7	534	105 3	1598
1991	19 4	550	106 6	1615
[P]1992	19 4	570	110 5	1665
[P]1993	19 4	576	111 6	1883
Average Annual Percent Change				
1976 86	6 0%	15 2%	22 2%	17 9%
1986-93	22 0%	9 3%	33 4%	8 6%

[1] Winrock International Institutue For Agricultural Development
[2] Central Agency for Public Mobilisation and Statistics

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ANNEX TABLE 5 1 FARM VALUE OF POULTRY MEAT AND EGG PRODUCTION 1976-1991 AND PRELIMINARY 1992-1993[1][2](Continued)

Year	Balady Eggs Prod-uction Mil Eggs	Farm Price Pt /Egg	Farm Value Mil L E	Commercial Eggs Prod-uction Mil Eggs	Farm Price Pt /Egg	Farm Value Mil L E	TOTAL FARM VALUE O EGGS Mil L E
1976	451 5	2 6	12	1053 5	2 3	24	36
1977	469 8	3 0	14	1096 2	2 7	30	44
1978	499 8	3 0	15	1166 2	2 7	31	46
1979	533 4	4 2	22	1244 6	3 6	45	67
1980	547 5	5 9	32	1277 5	5 2	66	99
1981	522 9	6 8	36	1220 1	6 0	73	109
1982	634 5	6 7	43	1480 5	5 9	87	130
1983	756 0	7 4	56	1764 0	6 5	115	171
1984	832 2	7 5	62	1941 8	6 6	128	191
1985	918 6	7 1	65	2143 4	6 2	133	198
1986	882 6	7 5	66	2059 4	6 6	136	202
1987	1096 8	8 2	90	2559 2	7 2	184	274
1988	1148 1	9 5	109	2678 9	8 3	222	331
1989	1321 8	12 6	167	3084 2	11 0	339	506
1990	1140 3	13 3	152	2660 7	11 6	309	460
1991	1060 8	15 0	159	2475 2	13 2	327	486
[P]1992	897 0	15 4	138	2093 0	13 4	280	419
[P]1993	900 0	16 8	151	2100 0	14 7	309	460
Average Annual Percent Change							
1976 86	6 9%	11 2%	18 9%	6 9%	11 1%	18 8%	18 8%
1986 93	0 3%	12 2%	12 5%	0 3%	12 1%	12 4%	12 5%

[1] Winrock International Institutue For Agricultural Development
[2] Central Agency for Public Mobilisation and Statistics

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ANNEX TABLE 5 1 FARM VALUE OF POULTRY MEAT AND EGG PRODUC
1976-1991 AND PRELIMINARY 1992-1993[1][2](Continued)

Year	Manure from Egg Prod-uction 000M Ton	Farm Price of Manure L E /Ton	Manure Value Mil L E	Manure from meat Prod-uction 000M Ton	Farm Price of Manure L E /Ton	Manure value Mil L E
1976	48 8	2 3	0	201 0	2 3	0
1977	51 2	2 6	0	202 7	2 6	1
1978	54 9	2 9	0	209 6	2 9	1
1979	57 9	3 1	0	211 1	3 1	1
1980	60 1	3 9	0	230 5	3 9	1
1981	57 5	4 3	0	264 8	4 3	1
1982	69 4	5 0	0	327 7	5 0	2
1983	82 6	6 0	0	308 0	6 0	2
1984	90 6	6 8	1	367 5	6 8	2
1985	99 9	6 8	1	351 7	6 8	2
1986	96 8	7 3	1	353 5	7 3	3
1987	119 5	7 7	1	347 7	7 7	3
1988	125 7	8 7	1	278 7	8 7	2
1989	144 4	10 5	2	229 5	10 5	2
1990	124 6	10 8	1	239 5	10 8	3
1991	115 6	11 0	1	237 2	11 0	3
[P]1992	98 2	11 3	1	240 7	11 3	3
[P]1993	98 3	11 6	1	252 5	11 6	3
Average Annual Percent Change						
1976 86	ERR	12 2%	20 2%	5 8%	12 2%	18 8%
1986 93	0 2%	6 8%	7 1%	-4 7%	6 8%	1 8%

[1] Winrock International Institutue For Agricultural Development
[2] Central Agency for Public Mobilisation and Statistics

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ANNEX TABLRE 5 2 SUMMARY FARM VALUE OF POULTRY MEAT EGGS AND MANURE PRODUCTION FOR 1976 1991AND PRELIMINARY 1992 1993[1][2]

Year	Meat Value Balady	Commercial	TOTAL Mil L E	Egg Value Balady	Commercial	TOTAL Mil L E	Manure Value	ALL PRODUCT TOTAL Mil L E
1976	18	72	204	12	24	36	1	240
1977	20	81	222	14	30	44	1	266
1978	22	98	247	15	31	46	1	294
1979	26	115	282	22	45	67	1	350
1980	35	165	386	32	66	99	1	486
1981	50	240	542	36	73	109	1	652
1982	56	380	709	43	87	130	2	841
1983	61	419	780	56	115	171	2	953
1984	37	487	880	62	128	191	3	1073
1985	100	501	983	65	133	198	3	1184
1986	122	516	1057	66	136	202	3	1262
1987	194	579	1245	90	184	274	4	1523
1988	160	665	1424	109	222	331	4	1759
1989	188	496	1395	167	339	506	4	1905
1990	217	559	1598	152	309	460	4	2062
1991	246	515	1615	159	327	486	4	2105
[P]1992	256	518	1665	138	280	419	4	2087
[P]1993	302	587	1883	151	309	460	4	2347
Average Annual Percent Change								
1976 86	21 0%	21 8%	17 9%	18 9%	18 8%	18 8%	19 1%	18 0%
1986 93	13 8%	1 9%	8 6%	12 5%	12 4%	12 5%	3 1%	9 3%

[1] Winrock International Institutue For Agricultural Development

[2] Central Agency for Public Mobilisation and Statistics

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ANNEX TABLE 5 3 POULTRY MANURE PRODUCTION 1976-1991 AND PRELIMINARY 1992-1993

	From Meat Production			From Egg Production			TOTAL FROM MEAT AND EGG PROD-UCTION
	Balady	Com-mercial	TOTAL	Balady	Com-mercial	TOTAL	
Year	---- ---------	(000) M Tons-----------		--------------	(000) M Tons-----------		--------------
1976	91 6	109 4	201 0	18 2	30 6	48 8	249 8
1977	90 6	112 1	202 7	18 9	32 3	51 2	253 9
1978	89 5	120 1	209 6	20 1	34 8	54 9	264 5
1979	88 3	122 8	211 1	21 5	36 4	57 9	269 0
1980	89 0	141 5	230 5	22 0	38 1	60 1	290 7
1981	90 3	174 6	264 8	21 1	36 4	57 5	322 3
1982	90 1	237 6	327 7	25 5	43 9	69 4	397 1
1983	89 9	218 1	308 0	30 4	52 2	82 6	390 6
1984	90 2	277 4	367 5	33 5	57 1	90 6	458 2
1985	90 9	260 8	351 7	37 0	62 9	99 9	451 6
1986	105 5	248 0	353 5	35 5	61 3	96 8	450 3
1987	105 3	242 4	347 7	44 2	75 3	119 5	467 2
1988	109 2	169 5	278 7	46 2	79 5	125 7	404 4
1989	111 7	117 7	229 5	53 2	91 2	144 4	373 9
1990	118 0	121 5	239 5	45 9	78 7	124 6	364 0
1991	122 1	115 1	237 2	42 7	72 9	115 6	352 8
1992	125 9	114 8	240 7	36 1	62 1	98 2	338 9
1993	127 1	125 5	252 5	36 2	62 1	98 3	350 9

ANNEX TABLE 10 5 ASSUMPTIONS USED TO ESTIMATE POULTRY FEED REQUIREMENTS AND MANURE PRODUCTION

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ANNEX TABLE 6 1 BUFFALO VEAL PRICES RETAIL LEVEL (Pt /Kg)

	Jan	Feb	March	Apr l	May	June	July	Aug	Sept	Oct	Nov	Dec	Average
1976	131	136	140	138	144	146	149	151	155	152	158	158 1	146 4
1977	159	158	159	162	165	166	169	170	169	170	171	171 9	165 7
1978	170	166	168	170	168	171	169	169	169	169	169	169 8	168 8
1979	169	172	173	176	181	185	188	192	204	207	209	209 7	188 8
1980	238	253	268	296	269	289	322	341	243	225	224	225 8	266 2
1981	227	242	246	236	323	236	240	241	245	262	258	257 1	251 1
1982	273	264	257	259	261	254	248	262	271	271	277	305 8	266 8
1983	320	322	344	370	389	398	403	421	432	434	432	432 4	391 5
1984	441	430	445	450	448	453	455	453	453	453	451	453 1	448 7
1985	455	459	456	459	460	467	469	471	478	476	477	482 6	467 5
1986	479	480	493	498	496	507	517	537	532	538	539	539 3	512 9
1987	554	570	598	614	626	637	655	664	669	677	684	677 4	635 5
1988	685	709	533	760	771	772	775	780	810	861	862	883 8	766 9
1989	872	770	878	891	896	901	915	913	916	919	916	916 3	891 9
1990	920	721	912	913	918	925	923	939	929	924	924	924 1	905 9
1991	870	871	880	885	900	914	910	917	923	921	923	924 1	903 2
1992	972	971	982	964	743	952	964	970	993	983	985	990 2	955 7
P1993													

Source Monthly Bulletin and Consumer prices for food group Centeral agency for puplic mobilization and statistics (CAPMAS) through the period 1976 1992

ANNEX TABLE 6 2 BEEF AND BUFFALO PRICES, RETAIL LEVEL (Pt /Kg)

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Average
1976	121	125	131	134	134	153	135	138	140	141	143	142	136
1977	144	146	148	149	151	149	150	151	150	153	155	156	150
1978	153	152	15	154	153	151	152	152	152	152	154	154	141
1979	151	154	156	158	159	160	176	167	183	186	187	192	169
1980	220	235	253	262	240	262	269	282	262	243	226	237	249
1981	235	249	254	256	257	275	276	277	271	277	281	270	265
1982	268	275	281	293	297	300	305	320	320	320	336	324	303
1983	338	341	368	390	444	417	422	442	449	458	458	458	415
1984	457	446	445	448	449	454	456	456	457	457	458	456	453
1985	460	462	461	462	462	461	461	464	473	468	471	474	465
1986	470	501	488	488	491	500	511	527	519	524	477	541	503
1987	554	573	588	607	610	623	653	665	671	675	683	677	632
1988	689	705	737	770	770	772	775	776	801	875	875	884	786
1989	874	872	869	871	876	880	914	920	921	923	921	916	896
1990	917	923	923	923	929	939	933	938	933	933	934	935	930
1991	917	918	919	921	933	938	938	943	957	958	959	960	938
1992	952	950	951	927	985	986	988	1002	1012	1017	1017	1018	984
P1993													1047

Source Monthly Bulletin and Consumer prices for food group Centeral agency for puplic mobilization and statistics (CAPMAS) through the period 1976 1992

ANNEX TABLE 6 3 MUTTON PRICES, RETAIL LEVEL (Pt /Kg)

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Average
1976	125	130	134	139	141	142	141	141	140	142	143	144	138
1977	147	148	151	152	153	153	154	155	155	156	159	160	153
1978	157	158	158	158	158	156	156	156	156	157	157	158	157
1979	157	159	159	159	160	161	164	170	183	187	189	193	170
1980	220	238	252	257	238	265	270	276	249	223	225	222	244
1981	225	229	233	235	241	243	245	247	266	271	271	270	248
1982	248	271	275	271	266	282	290	304	313	296	339	345	292
1983	328	334	355	381	388	405	414	424	432	445	445	448	400
1984	447	446	448	461	467	465	474	458	457	457	460	459	458
1985	463	463	455	462	463	465	465	465	465	465	465	466	464
1986	485	531	537	529	519	552	567	613	595	579	662	675	570
1987	571	573	593	601		630	653	664	671	676	673	668	634
1988	682	701	735	756						882	882	883	789
1989	874	827	889	890	905	903	925	942	941	942	946	957	912
1990	962	962	964	962	961	943	943	948	938	938	940	940	950
1991	920	920	923	924	946	966	961	966	970	970	970	970	951
1992	952	953	952	971	984	982	989	993	1058	1050	1051	1052	999
P1993													1059

Source Monthly Bulletin and Consumer prices for food group Centeral agency for puplic mobilization and statistics (CAPMAS) through the period 1976 1992

ANNEX TABLE 6 4 MILK PRICES, RETAIL LEVEL (Pt /Kg)

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Average
1976	15	15	15	15	15	16	15	15	16	17	18	17	16
1977	17	17	17	17	17	17	18	18	19	19	20	20	18
1978	22	21	21	21	23	21	21	21	21	22	22	22	22
1979	23	22	22	22	22	22	22	23	29	29	29	29	24
1980	30	30	31	32	32	33	33	34	34	34	35	37	33
1981	37	36	38	38	38	38	39	40	41	40	41	42	39
1982	37	37	37	37	37	38	38	39	40	40	40	44	39
1983	45	45	47	47	48	48	49	49	49	50	52	53	48
1984	54	55	57	57	57	57	57	58	58	59	61	61	58
1985	62	64	63	64	65	65	66	66	68	69	69	70	66
1986	71	70	70	69	70	70	71	71	70	72	71	73	71
1987	71	76	76	76	78	79	83	83	83	84	85	86	80
1988	87	88	88	89	89	90	90	91	92	92	94	96	90
1989	96	97	98	99	98	99	101	100	101	103	106	107	100
1990	111	113	113	114	115	114	115	120	120	121	121	121	116
1991	124	123	124	123	125	126	126	127	126	127	128	128	126
1992	136	136	136	132	133	132	131	132	132	133	134	134	133
P1993													150

Source Monthly Bulletin and Consumer prices for food group Centeral agency for puplic mobilization and statistics (CAPMAS) through the period 1976 1992

ANNEX TABLE 6 5 PRICES FOR COMMERCIAL LIVE BROILERS RETAIL LEVEL (Pt /Kg)

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Average
1983	126	127	134	140	142	140	140	139	136	140	139	138	137
1984	141	154	155	137	136	146	149	162	162	159	149	148	150
1985	156	158	155	148	150	152	167	182	185	179	175	177	165
1986	163	166	167	167	167	172	186	203	211	213	202	210	185
1987	192	201	214	212	217	223	227	233	239	240	242	239	223
1988	227	238	260	260	261	266	280	296	310	328	325	327	281
1989	286	290	342	331	325	326	340	340	339	371	371	347	334
1990	348	343	350	351	355	345	336	341	370	371	371	376	355
1991	340	340	344	352	368	366	364	377	381	394	393	395	368
1992	370	371	379	385	384	383	396	401	407	381	381	390	386

Source Monthly Bulletin and Consumer prices for food group Centeral agency for puplic mobilization and statistics (CAPMAS) through the period 1976 - 1992

ANNEX TABLE 6 6 PRICES FOR LIVE CHECKENS RETAIL LEVEL (Pt /Kg)

Year	Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec	Average
1976													
1977													
1978	112	111	114	113	112	113	112	114	115	116	118	119	114
1979	120	121	121	124	123	121	125	127	130	134	139	142	127
1980	141	144	149	149	150	151	158	166	180	193	194	206	165
1981	214	207	205	220	230	226	225	228	225	236	230	229	223
1982	233	235	238	233	236	239	233	246	249	249	260	245	241
1983	235	230	234	243	252	253	254	257	264	271	270	276	253
1984	276	282	279	282	281	280	295	294	293	293	293	293	287
1985	295	300	290	293	298	294	291	298	301	300	303	305	297
1986	304	309	311	313	319	317	313	322	324	333	332	327	319
1987	335	335	336	339	343	315	363	356	362	371	377	380	351
1988	387	390	392	394	401	412	428	444	454	463	463	468	425
1989	458	463	466	464	485	480	485	492	477	500	501	527	483
1990	539	525	521	541	541	545	543	549	546	553	552	551	542
1991	547	546	549	550	560	566	569	569	569	565	564	562	560
1992	562	569	561	568	572	561	571						566
P1993													650

Source Monthly Bulletin and Consumer prices for food group Centeral agency for puplic mobilization and statistics (CAPMAS) through the period 1976 1992

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ANNEX TABLE 6 7 LIVE MALE TURKEY PRICES RETAIL LEVEL (Pt /Kg)

Year	Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec	Average
1976	96	100	102		108	104	103	104	104		107	110	104
1977		112	113				119	121	124	126	129	131	122
1978	129	129	133	130	128	128	133	134	135	137	142	142	133
1979	141	147	145	146	145	143	144	148	153	157	160	160	149
1980	157	162	170	173	176	177	183	188	236	215	220	234	191
1981	235	231	251	248	246	265	261	256	256	263	264	259	253
1982	260	263	259	259	256	258	252	266	271	271	268	274	263
1983	274	273	279	289	299	301	303	305	311	318	329	355	303
1984	333	336	329	349	353	348	348	355	358	358	360	359	349
1985	365	368	364	368	381	379	386	407	419	412	414	422	390
1986	411	417	421	425	425	432	431	431	433	439	444	442	429
1987	443	449	458	468	470	487	498	506	510	816	520	530	513
1988	556	556	557	557	569	580	591	612	615	618	618	617	587
1989	611	623	638	657	675	671	679	591	696	696	701	710	662
1990	715	725	705	726	726	739	737	744	750	772	775	780	741
1991	750	742	746	760	764	754	750	754	785	785	788	790	764
1992	790	781	787	800	805	783	793		800	789			792
P1993													800

Source Monthly Bulletin and Consumer prices for food group Centeral agency for puplic mobilization and statistics (CAPMAS) through the period 1976 1992

ANNEX TABLE 6 8 PRICES FOR LIVE DUCKS RETAIL LEVEL (Pt /Kg)

Year	Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec	Average
1976	74	75	77	78	79	78	77	80	80	80	84	85	79
1977	85	86	88	89	89	87	88	92	93	95	98	98	91
1978	99	100	100	99	99	99	97	99	101	103	105	105	100
1979	106	107	107	107	105	105	108	109	114	119	123	125	111
1980	129	132	137	138	138	136	142	145	177	179	151	184	149
1981	195	195	188	208	204	201	214	212	210	214	208	207	205
1982	205	213	227	214	218	224	230	234	234	225	230	227	223
1983	223	221	226	231	234	239	237	243	247	249	249	250	237
1984	253	263	258	260	267	270	273	277	280	282	286	287	271
1985	288	298	295	295	305	292	286	294	302	293	293	292	294
1986	293	297	310	320	313	314	313	310	317	317	320	320	312
1987	323	325	328	331	344	353	355	366	360	368	373	375	350
1988	382	391	401	413	424	441	454	465	475	479	482	484	441
1989	470	487	486	491	503	503	514	514	523	526	532	548	508
1990	555	549	556	557	557	551	552	552	549	546	546	547	551
1991		534	539	550	570	582	594	590	579	583			569
1992			582	580					602	609			593
1993													650

Source Monthly Bulletin and Consumer prices for food group Centeral agency for puplic mobilization and statistics (CAPMAS) through the period 1976 1992

ANNEX TABLE 6 9 PRICES FOR LIVE GEESE RETAIL LEVEL (Pt /Kg)

Year	Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec	Average
1976	69	72	73	74	74	74	72	73	73	74	76	80	74
1977	80	81	84	85	85	82	83	86	88	90	92	93	86
1978	96	93	94	92	92	91	90	99	95	98	98	98	95
1979	99	99	99	99	101	98	98	100	105	108			101
1980	125	129	132	138	138	138	142	145					136
1981	195	195	188	189	190	192	201	197	189	197		207	194
1982	190	197	193	199	200	204	207	208	209	207			201
1983	219	221	204	212	215	219	218				227	229	218
1984	228	235	238	245	247	250	259	250			254	257	246
1985	264	266	259	264	271	266	264	270	274	270	274	276	268
1986	273		272	287	284	286	283	295	296	302	296	301	288
1987	302	286	296	308	319	328	331	341	347	353	360	356	327
1988	366	369	371	391	401				389		402	448	392
1989	444	447	444			453	465	446		482		512	461
1990	512	508	515		518	516	519	520	519	516			516
1991		534	539	519	519	521	527	525	523	525			526
1992	540		558	546	541			561	561	577			555
1993													608

Source Monthly Bulletin and Consumer prices for food group Centeral agency for puplic mobilization and statistics (CAPMAS) through the period 1976 1992

ANNEX TABLE 6 10 PRICES FOR LIVE RABBITS RETAIL LEVEL (Pt /Kg)

Year	Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec	Average
1976	68	70	71	72	72	73	71	72	74	75	77	79	73
1977	79	80	81	83	84	80	81	85	87	91	93	93	85
1978	93	94	94	94	93	92	90	93	96	99	100	101	95
1979	102	103	101	103	102	98	101	106	113	118	122	125	108
1980	139	139	130	141	131	142	141	148	177			188	148
1981	201	228	193	207	203	199	189	193	200	199		209	202
1982	215	219	224	212	218	223	221	229	223	231	241	209	222
1983	215	217	218	225	225	225	223				241	243	226
1984	245	252	259	259	262	264	269	264			267	271	261
1985	278	283	286	283	280	280	279	285	283	293	298	304	286
1986	300		312	299	293	291	296	300	299	306	302	302	300
1987	312	308	323	326	333	334	343	350	357	346	326	374	336
1988	384	396	399	403	470				417		423	462	419
1989	466	459	461			475	477	478		498		511	478
1990	522	519	519		518	516	516	518	515	520			518
1991		512	532	524	529	527	532	532	531	536			528

ANNEX TABLE 6 11 PRICES FOR LIVE PIGEON RETAIL LEVEL (Pt /PAIR)

Year	Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec	AVERAGE
1976	67	70	70	72	71	71	70	72	74	77	78	77	72
1977	77	79	81	82	83	80	81	82	86	89	91	91	83
1978	90	92	94	91	89	89	88	90	92	95	95	99	92
1979	100	99	98	99	97	98	99	102	110	113	119	121	105
1980	131	136	137	144	135	142	144	147	198			177	149
1981	176	190	189	181	176	188	184	202	188	190		198	187
1982	188	197	198	186	179	195	199	210	207	212	201	200	198
1983	200	203	206	209	211	215	217				233	239	215
1984	237	238	238	242	243	247	251	252			254	258	246
1985	257	259	254	257	259	260	259	263	265	263	268	270	261
1986	287		277	277	280	277	276	281	293	301	306	304	287
1987	314	296	312	313	322	324	320	328	350	349	367	358	329
1988	361	366	373	375	383						416	429	386
1989	421	430	445			449	459	471		483		503	457
1990	502	505	506		501	503	496	508	499	502			503
1991		429	507	506	517	533	532	532	536	526			513
1992	541	540	546	539				570	570	575			555
1993													608

Source Monthly Bulletin and Consumer prices for food group Centeral agency for puplic mobilization and statistics (CAPMAS) through the period 1976 1992

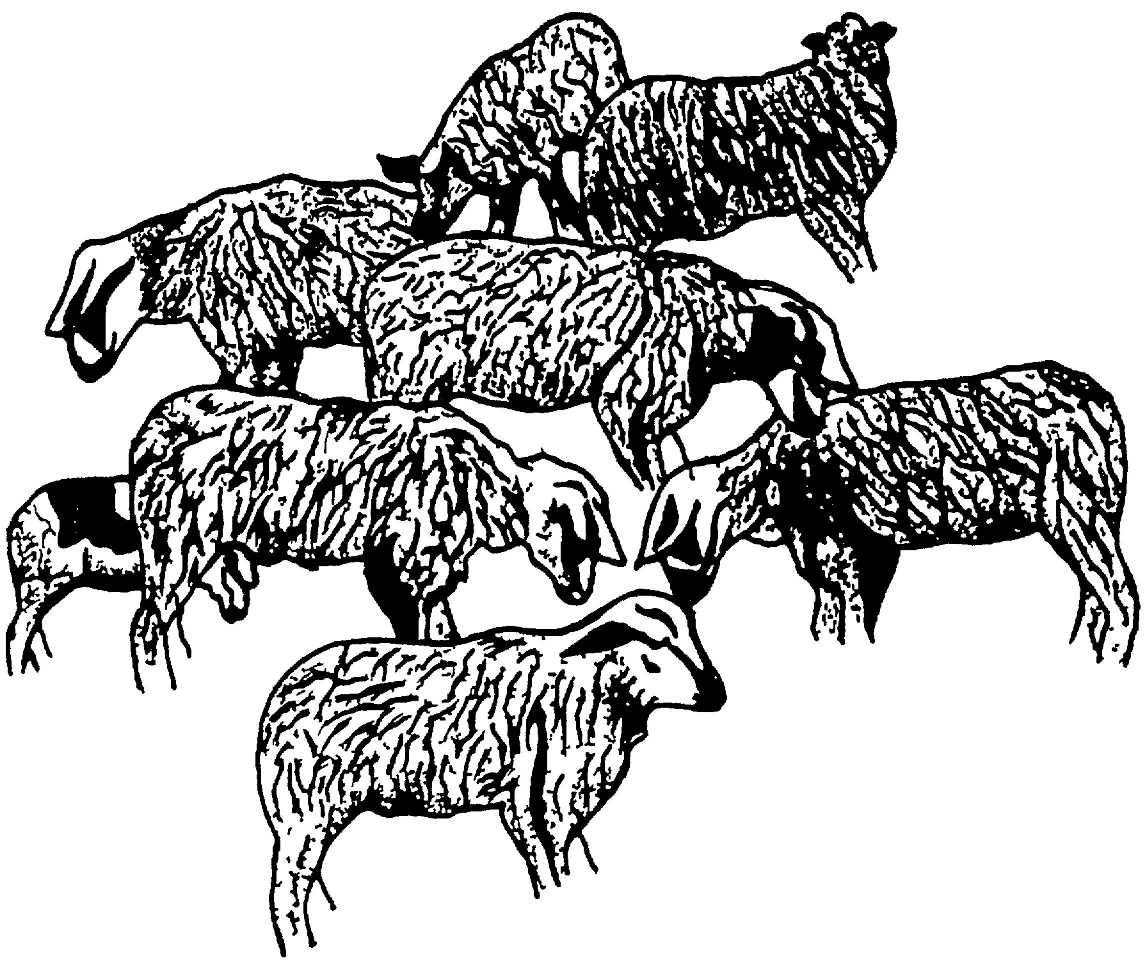
ANNEX TABLE 6 12 EGG PRICES RETAIL LEVEL (Pt /Eacn)

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Average
1976	3 2	3 3	3 2	3 2	3 1	3 1	3 1	3 1	3 4	3 5	3 7	3 7	3 3
1977	3 7	3 8	3 7	3 7	3 5	3 5	3 5	3 7	3 7	4 0	4 2	4 3	3 8
1978	3 3	3 2	3 7	3 5	3 6	3 6	3 5	3 9	3 9	4 1	4 7	4 7	3 8
1979	4 5	3 4	4 8	4 5	4 4	4 5	4 6	5 1	6 2	6 5	6 6	6 7	5 2
1980	6 8	6 8	9 6	6 8	6 7	6 6	6 7	6 8	7 4	7 9	8 2	8 3	7 4
1981	8 5	8 5	8 4	8 4	8 2	8 1	8 3	8 4	8 5	8 6	8 7	8 9	8 5
1982	8 2	8 3	8 4	8 3	8 4	8 5	8 3	8 4	8 4	8 3	8 4	8 5	8 4
1983	8 6	8 7	8 7	8 9	9 0	8 9	9 0	9 6	9 7	9 8	10 0	10 1	9 3
1984	10 3	10 1	9 8	9 7	9 6	9 2	9 0	8 6	9 1	9 3	9 3	9 3	9 4
1985	9 3	9 1	8 9	8 6	8 4	8 5	8 1	8 1	9 0	9 4	9 4	9 7	8 9
1986	9 6	9 6	9 7	9 4	9 0	9 3	8 7	9 3	9 3	9 6	9 6	9 7	9 4
1987	9 7	9 7	9 7	9 7	9 7	9 6	9 8	10 4	10 5	11 4	12 0	11 1	10 3
1988	10 9	11 3	11 2	11 0	10 7	10 8	10 9	11 2	12 4	14 3	14 3	14 2	11 9
1989	14 6	14 7	14 9	14 7	14 9	15 0	15 0	16 4	16 0	17 4	17 2	17 1	15 7
1990	17 7	17 7	17 7	17 6	16 0	15 4	15 1	15 7	16 3	16 7	16 8	16 8	16 6
1991	17 9	18 1	17 6	17 9	17 6	18 2	18 1	18 3	20 0	20 6	20 6	20 7	18 8
1992	18 2	18 7	19 8	18 2	18 2	18 6	18 7	19 1	20 1	20 3	20 2	20 3	19 2
P1993													21 0

Source Monthly Bulletin and Consumer prices for food group Centeral agency for puplic mobilization and statistics (CAPMAS) through the period 1976 1992

SECTION II

Livestock Data From the Agricultural Census, UN Food and Agriculture Organization and the US Department of Agriculture



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ANNEX TABLE 7 1 SUMMARY OF LIVESTOCK INVENTORIES FROM 1980 1981 AGRICULTURAL CENSUS

Cattle	Local (Baladi)	Exotic	Crossbred	Total all classes
Females				
<1 year	184 895	6 435	10 088	201 418
1 2 years	363 511	18 055	14 782	396 348
2 8 years				
Dry	281 832	6 059	9 811	297 702
In milk	1 079 887	36 603	37 948	1 154 438
Total	1 361 719	42 662	47 759	1 452 140
>8 years				
Dry	57 951	519	675	59 145
In milk	221 266	3 200	4 885	229 351
Total	279 217	3 719	5 560	288 496
Total females	2 189 342	70 871	78 189	2 338 402
Males				
<1 year	149 862	2 284	5 159	157 305
1 2 years	283 665	3 436	9 431	296 532
2 8 years	98 245	3 508	3 312	105 065
>8 years	7918	437	548	8 903
Total males	539 690	9 665	18 450	567 805
Total all cattle	2 729 032	80 536	96 639	2 906 207

Buffalo	Local
Females	
<1 year	153 272
1 2 5 years	328 644
2 5 9 years	
Dry	231 235
In milk	1 186 400
Total	1 417 635
>9 years	
Dry	41 150
In milk	222 448
Total	263 598
Total females	2 163 149
Males	
<1 year	89 053
1 2 5 years	101 369
2 5 9 years	22 765
>9 years	2 225
Total males	215 412
Total all buffalo	2 378 561

	Female		Male	
	<1 year	>1 year	>1 year	Total
Goats	814 701	1 432 005	214 883	2 461 589
Sheep	832 809	1 931 991	295 121	3 059 921
Camels				134 514

ANNEX TABLE 7 2 SUMMARY OF LIVESTOCK INVENTORIES FROM 1980-1981 AND 1991 AGRICULTURAL CENSUS

Class	1981	1991
Cattle		
Cows	1,740,636	1,459,588
Calves < 1 year	358,723	625,048
Calves > 1 year	692,880	576,967
Bulls	113,968	21,464
Total	2,906,207	2,683,067
Buffaloes		
Cows	1,681,233	1,626,112
Calves < 1 year	242,325	740,837
Calves > 1 year	430,013	558,877
Bulls	24,990	14,703
Total	2,378,561	2,940,529
Sheep and Goats		
Ewes/Doe	3,874,000	3,688,995
Lambs/Kids	1,773,122	3,011,425
Others	471,288	828,237
Total	6,118,410	7,528,657
Camels	134,514	108,131

Source Based on proportion in each class in the governrates that have been completed Dec 1993

ANNEX TABLE 8 1 PER CAPITA CONSUMPTION OF ANIMAL PROTEIN FOOD [1]

Annual Expenditure Class	Proportion of Population	Red Meat			Milk					
		Fresh	Frozen	Total	Fluid Milk	White Cheese	Cottage Cheese	Total Milk Equivalent	Poultry Meat	Eggs
(L E)	%	-----K G ---	-----K G ---	-----K G ---	-----K G ---	-----K G ---	-----K G ---	-----K G ---	-----K G ---	-----No -----
<1000	0 69%	2 42	0 10	2 52	1 27	0 23	1 81	11 24	0 97	23
1000-1200	0 40%	3 80	0 39	4 19	2 94	0 45	2 57	17 59	2 90	35
1200-1600	1 38%	3 60	0 45	4 05	2 51	0 44	2 51	16 82	2 79	35
1600-2400	6 41%	4 05	0 47	4 52	3 94	0 61	2 46	18 68	3 78	38
2400-3200	12 16%	4 95	0 54	5 49	6 34	0 76	2 87	23 73	5 00	45
3200-4000	15 45%	5 66	0 54	6 20	8 00	1 19	2 91	27 31	6 26	52
4000-4800	15 65%	6 43	0 59	7 02	10 21	1 32	3 00	30 49	7 41	59
4800-5600	12 24%	7 40	0 45	7 85	11 99	1 72	3 08	34 27	9 02	63
5600-6800	12 73%	7 96	0 59	8 55	15 08	2 15	3 13	39 33	9 91	65
6800-8000	8 47%	9 68	0 41	10 09	16 78	2 42	2 15	37 21	11 72	70
8000-10000	6 92%	10 80	0 63	11 43	20 94	2 79	3 31	48 65	14 47	76
10000-12000	3 21%	12 58	0 40	12 98	24 57	3 22	3 12	53 05	15 86	79
12000-14000	1 54%	15 32	0 57	15 89	28 78	3 57	4 05	63 31	17 84	78
>14000	2 75%	16 60	0 61	17 21	33 11	4 67	3 62	69 89	22 80	84
All	Average	7 41	0 53	7 93	12 31	1 70	2 93	33 77	8 80	59
<1600	Average	3 84	0 43	4 28	3 47	0 55	2 42	17 76	3 37	37

[1] Estimates from the 1990/91 Household Expenditures Survey

Annex table 9 1 Commodity Balance Red Meat (1000 Metric Ton)[1]

Year	Pro-duction	Net Inventor Change	Export	Import	Inventory	Industry	Loss	Total Supply	Pop [2] (1,000)	Per Capita Kg
1976	310	0	3	47	354	0	0	354	38,198	9 3
1977	315	0	2	43	356	0	0	356	38,794	9 2
1978	321	0	2	50	369	0	0	369	39,767	9 3
1979	329	0	2	37	364	0	0	364	40,889	8 9
1980	336	0	5	81	412	0	0	412	42,126	9 8
1981	342	0	0	149	491	0	0	491	43,322	11 3
1982	347	0	0	138	485	0	0	485	44,506	10 9
1983	355	0	0	126	481	0	0	481	45,721	10 5
1984	366	0	0	138	504	0	0	504	46,990	10 7
1985	359	0	1	271	629	0	0	629	48,349	13
1986	366	0	0	239	605	0	0	605	49,863	12 1
1987	530	-4	0	113	643	0	0	643	51,349	12 5
1988	539	-1	0	117	656	0	0	656	52 827	12 4
1989	548	-2	0	149	697	0	0	697	54,210	12 9
1990[3]	548	0	0	174	722	0	0	722	55,543	13
1991[3]	564	0	0	108	672	0	0	672	56,898	11 8

Source [1] Food balance sheet Centeral Administration for Agriculture Economics Statistics (MOA)
[2] Centeral Agency for puplic mobilization and Statistics (CAPMAS) Statistical Year Book
[3] Calculated from CAPMAS Livestock Statistics and Forigen Trade Bulliten

Annex table 9 2 Commodity Balance Poultry (1000 Metric Ton)[1]

Year	Pro-duction	Net Inventor Change	Export	Import	Inventory	Industry	Loss	Total Supply	Pop [2] (1 000)	Per Capita Kg
1976	115	0	0	0	115	0	0	115	38 198	3 0
1977	121	0	0	7	128	0	0	128	38 794	3 3
1978	115	0	0	9	124	0	0	124	39 767	3 1
1979	119	0	0	20	139	0	0	139	40 889	3 4
1980	136	0	0	56	192	0	0	192	42,126	4 6
1981	140	0	0	86	226	0	0	226	43,322	5 2
1982	144	0	0	0	144	0	0	144	44,506	3 2
1983	150	0	0	69	219	0	0	219	45 721	4 8
1984	230	0	0	46	276	0	0	276	46 990	5 9
1985	381	0	0	5	386	0	0	386	48,349	8 0
1986	363	0	0	39	402	0	0	402	49 863	8 1
1987	303	0	0	56	359	0	0	359	51 349	7 0
1988	281	0	0	31	312	0	0	312	52,827	5 9
1989	222	0	0	11	233	0	0	233	54 210	4 3
1990	229	0	0	25	254	0	0	254	55 543	4 6
1991	229	0	0	20	249	0	0	249	56 898	4 4

Source [1] Food balance sheet Centeral Administration for Agriculture Economics Statistics (MOA)
[2] Centeral Agency for puplic mobilization and Statistics (CAPMAS) Statistical Year Book

Annex table 9 3 Commodity Balance Eggs (1 000 eggs)[1]

Year	Pro-duction	Net Inventor Change	Export	Import	Inventory	Industry	Loss	Total Supply	Pop [2] (1,000)	Per Capita Eggs
1976	1,260,000	0	0	0	1,260,000	180,000	20,000	1,060,000	38,198	27 8
1977	1,400,000	0	0	0	1,400,000	180,000	20,000	1,200 000	38,794	30 9
1978	1,500,000	0	0	0	1,500,000	180,000	40 000	1 280,000	39,767	32 2
1979	1,520,000	0	0	20,000	1,540,000	180,000	40,000	1,320 000	40,889	32 3
1980	1,600,000	0	0	40,000	1,640,000	200,000	40,000	1,400,000	42,126	33 2
1981	1,700,000	0	0	40,000	1,740,000	220,000	40,000	1,480,000	43,322	34 2
1982	2,020,000	0	0	140,000	2,160,000	280 000	60,000	1 820 000	44 506	40 9
1983	2,220,000	0	0	20,000	2,240,000	300,000	60,000	1,880 000	45,721	41 1
1984	2,440,000	0	0	0	2,440,000	260,000	60,000	2,120,000	46 990	45 1
1985	3,400,000	0	0	120,000	3 520,000	300,000	120 000	3 100 000	48 349	64 1
1986	3,980,000	0	0	100,000	4 080,000	360 000	100 000	3 620 000	49,863	72 6
1987	4,406,000	0	580	46,286	4,451,706	838,224	155,915	3,457,567	51,349	67 3
1988	3,801,000	0	467	40,729	3,841,262	756,278	134 444	2,950,540	52 827	55 9
1989	3,536,000	0	487	3,909	3,539,422	260 240	123 760	3 155 422	54 210	58 2
1990	3,536,000	0	0	0	3,536,000	260,240	123 760	3,152 000	55,543	56 7
1991	2,990,000	0	0	0	2,990,000	0	0	2,990,000	56 898	52 6

Source [1] Food balance sheet Centeral Administration for Agriculture Economics Statistics (MOA)
[2] Centeral Agency for puplic mobilization and Statistics (CAPMAS) Statistical Year Book

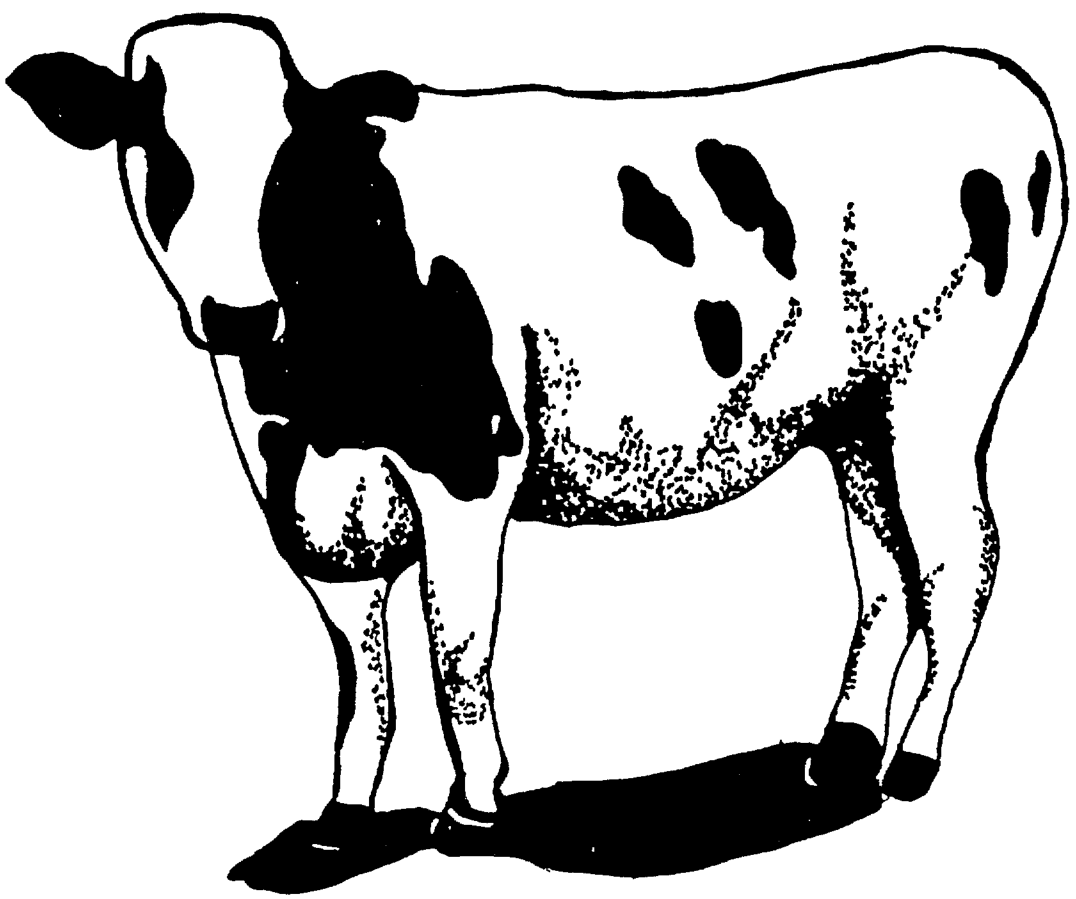
Annex table 9 4 Commodity Balance Milk (1000 Metric Ton)[1]

Year	Pro-duction	Net Inventor Change	Export	Import	Inventory	Industry	Loss	Total Supply	Pop [2] (1,000)	Per Capita Kg
1976	1,749	0	0	720	2,469	0	0	2,469	38 198	64 6
1977	1,773	0	0	525	2,298	0	0	2,298	38 794	59 2
1978	1,801	0	0	914	2,715	0	0	2,715	39 767	68 3
1979	1,830	0	0	767	2,597	0	0	2,597	40,889	63 5
1980	1,865	0	0	1,138	3,003	0	0	3,003	42 126	71 3
1981	1,900	0	0	1,200	3,100	0	0	3 100	43 322	71 6
1982	1,935	0	0	833	2,768	0	0	2 768	44,506	62 2
1983	1,971	0	0	1,117	3,088	0	0	3,088	45 721	67 5
1984	2,005	0	0	248	2,253	0	0	2 253	46 990	47 9
1985	2,014	0	0	169	2,183	0	0	2,183	48 349	45 2
1986	2,081	0	0	157	2,238	0	0	2 238	49,863	44 9
1987	2,169	0	0	528	2,697	0	0	2 697	51,349	52 5
1988	2,178	0	0	0	2,178	0	0	2 178	52 827	41 2
1989	2,204	0	0	461	2,665	0	0	2 665	54,210	49 2
1990[3]	2,200	0	0	420	2,620	0	0	2 620	55,543	47 2
1991[3]	2,231	0	0	405	2,636	0	0	2,636	56 898	46 3

Source [1] Food balance sheet Centeral Administration for Agriculture Economics Statistics (MOA)
[2] Centeral Agency for puplic mobilization and Statistics (CAPMAS) Statistical Year Book
[3] Calculated from CAPMAS Livestock Statistics and Forigen Trade Bulliten

SECTION III

Feed Requrements and Feed Industry Related Data



ANNEX TABL1 10 1 ASSUMPTIONS USED TO ESTIMATE TOTAL FEED REQUIREMENTS AND MANURE PRODUCTION BY LIVESTOCK

Species	Requirements per Head per Year Dry Matter	Crude Protein	Total Digestible Nutrients	Percent Manure Produced
Cattle				
Bulls	4489	330	2446	45%
Cows	3285	294	1825	45%
Calves< 1 Year	1387	157	803	45%
Males/Females> 1 Year	2226	226	1424	45%
Buffalo				
Cows	4416	292	2409	45%
Bulls	3906	375	2153	45%
Calves< 1 Year	1497	177	1059	45%
Males/Females> 1 Year	2281	249	1588	45%
Sheep/Goats				
Ewes/Does	584	49	329	45%
Lambs/Kids	256	24	146	45%
Males/Females> 1 Year	511	47	301	45%
Camels	3467	390	1788	50%
Donkeys	NA	NA	NA	50%
Horses & Mules	NA	NA	NA	45%

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ANNEX TABLE 10 2 ESTIMATED FEED REQUIREMENTS (DM) BY LIVESTOCK 1970-1991 AND PROJECTIONS FOR 1992-1993 [1][2]

Cattle

Year	Bulls	Cows	Calves < 1 year	Males/ females > 1 year	TOTAL CATTLE
			(000) Metric Tons		
1976	516	5,585	485	1,558	8,144
1977	514	5,716	675	1,526	8,430
1978	512	5,738	599	1,757	8,607
1979	515	5,743	436	1,728	8,423
1980	515	5,775	611	1,535	8,437
1981	514	5,798	541	1,630	8,484
1982	518	5,880	414	1,518	8,329
1983	518	5,884	552	1,304	8,258
1984	517	5,825	692	1,440	8,474
1985	521	5,850	486	1,653	8,510
1986	525	5,899	463	1,470	8,358
1987	450	5,710	566	1,299	8,026
1988	377	5,707	618	1,361	8,063
1989	237	5,738	622	1,484	8 082
1990	169	5,686	548	1,551	7,954
1991	101	5,521	450	1,458	7,531
[P] 1992	109	5,426	551	1,301	7,387
[P] 1993	112	5,275	478	1,329	7,194

[1] Winrock International Institute for Agricultural Development

[2] Based on dry matter requirements shown at the end of the feed requirement tables

ANNEX TABLE 10 2 ESTIMATED FEED REQUIREMENTS (DM) BY LIVESTOCK 1970-1991 AND PROJECTIONS FOR 1992-1993 [1][2] (Continued)

	Buffalo					
Year	Bulls	Cows	Calves < 1 year	Males/ Females > 1 year	TOTAL BUFFALO	TOTAL CATTLE BUFFALO
			(000) Metric Tons			
1976	84	4,929	1,133	940	7 086	15,231
1977	91	5,311	566	1,562	7,531	15,961
1978	109	6,196	647	840	7,792	16,399
1979	107	6,167	656	713	7,643	16,066
1980	104	6,041	594	685	7,423	15,860
1981	104	6,065	734	707	7,610	16,094
1982	106	6,180	735	709	7,730	16,059
1983	107	6,250	763	690	7,810	16,069
1984	110	6,397	803	674	7,983	16,457
1985	111	6,467	741	565	7,883	16,393
1986	105	6,198	712	310	7,325	15,682
1987	94	6,003	1,124	279	7,501	15,526
1988	84	5,800	1,098	872	7,853	15,916
1989	81	6,537	1,189	808	8,615	16,698
1990	75	7,066	1,125	804	9,070	17,024
1991	64	7,352	1,122	645	9,184	16,714
[P] 1992	66	7,411	1,148	666	9,291	16,678
[P] 1993	68	7,501	1,170	707	9,445	16,639

[1] Winrock International Institute for Agricultural Development

[2] Based on dry matter requirements shown at the end of the feed requirement tables

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ANNEX TABLE 10 2 ESTIMATED FEED REQUIREMENTS (DM) BY LIVESTOCK 1970-1991 AND PROJECTIONS FOR 1992-1993 [1][2] (Continued)

& Year	Sheep and Goats Ewes/ Does	Lambs/ Kids	Others	TOTAL SHEEP & GOATS	TOTAL CAMELS	TOTAL DONKEYS	TOTAL HORSES & MULES	DRY MATTER FEED REQUIREMENTS FOR ALL LIVE STOCK
	(000) Metric Tons							
1976	2,104	422	224	2,750	473	3,348	142	21 943
1977	1,919	327	487	2,732	472	3,348	142	22 655
1978	2,011	367	356	2,735	470	3 348	142	23,095
1979	1,966	359	423	2,748	469	3 348	142	22,773
1980	1,991	408	466	2,864	468	3,348	142	22,682
1981	2,051	386	512	2,950	466	3,348	142	23 000
1982	2,143	427	494	3,063	465	3,348	142	23 077
1983	2,200	424	541	3,165	463	3 348	142	23,187
1984	2,291	422	505	3,218	462	3 348	142	23,627
1985	2,331	441	505	3,277	381	3,348	142	23,541
1986	2,364	468	560	3,392	380	3,348	142	22,944
1987	2,340	467	619	3,426	378	3,348	142	22,820
1988	2,374	474	620	3,469	377	3,348	142	23 252
1989	2,402	498	653	3,553	376	3 348	142	24 117
1990	2,454	511	698	3 662	375	3,348	142	24,551
1991	2,534	483	662	3 679	374	3,348	142	24 258
[P] 1992	2,564	507	624	3,695	373	3 348	142	24 236
[P] 1993	2,552	524	688	3,764	372	3,348	142	24,265

[1] Winrock International Institute for Agricultural Development
[2] Based on dry matter requirements shown at the end of the feed requirement tables

ANNEX 10 3 ESTIMATED FEED REQUIREMENTS (CP) BY LIVESTOCK 1970-1991 AND PROJECTIONS FOR 1992-1993 [1][2]

	Cattle				
				Males/	
			Calves	females	TOTAL
	Bulls	Cows	< 1 year	> 1 year	CATTLE
Year	--------------	----------------	(000) Metric	Tons------	----------------
1976	38	500	55	158	751
1977	38	512	76	155	781
1978	38	514	68	178	797
1979	38	514	49	175	777
1980	38	517	69	156	780
1981	38	519	61	165	784
1982	38	526	47	154	765
1983	38	527	62	132	760
1984	38	521	78	146	784
1985	38	524	55	168	785
1986	39	528	52	149	768
1987	33	511	64	132	740
1988	28	511	70	138	747
1989	17	514	70	151	752
1990	12	509	62	158	741
1991	7	494	51	148	701
[P] 1992	8	486	62	132	688
[P] 1993	8	472	54	135	669

[1] Winrock International Institute for Agricultural Development
[2] Based on crude protein requirements shown at the end of feed requirement tables

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ANNEX 10 3 ESTIMATED FEED REQUIREMENTS CP) BY LIVESTOCK 1970-1991 AND PROJECTIONS FOR 1992-1993 [1][2] Continued)

	Buffalo					
Year	Bulls	Cows	Calves < 1 year	Males/ Females > 1 year	TOTAL BUFFALO	TOTAL CATTLE BUFFALO
			000) Metric Tons			
1976	6	473	134	103	715	1466
1977	6	510	67	171	753	1534
1978	7	595	76	92	770	1568
1979	7	592	78	78	755	1531
1980	7	580	70	75	732	1512
1981	7	582	87	77	753	1537
1982	7	593	87	77	765	1530
1983	7	600	90	75	773	1532
1984	7	614	95	74	790	1574
1985	7	621	88	62	777	1562
1986	7	595	84	34	720	1488
1987	6	576	133	30	746	1486
1988	6	557	130	95	787	1534
1989	5	628	141	88	862	1614
1990	5	678	133	88	904	1645
1991	4	706	133	70	913	1614
[P] 1992	4	712	136	73	924	1612
[P] 1993	4	720	138	77	940	1609

[1] Winrock International Institute for Agricultural Development

[2] Based on crude protein requirements shown at the end of feed requirement tables

ANNEX 10 3 ESTIMATED FEED REQUIREMENTS (CP) BY LIVESTOCK 1970-1991 AND PROJECTIONS FOR 1992-1993 [1][2] (Continued)

& Year	Sheep and Goats Ewes/ Does	Lambs/ Kids	Others	TOTAL SHEEP & GOATS	TOTAL CAMELS	TOTAL DONKEYS	TOTAL HORSES & MULES	PROTEIN FEED REQUIREMENTS FOR ALL LIVE STOCK
	(000) Metric Tons							
1976	176	40	21	237	53	419	15	2,190
1977	161	31	45	236	53	419	15	2,258
1978	169	34	33	236	53	419	15	2,291
1979	165	34	39	238	53	419	15	2,256
1980	167	38	43	248	53	419	15	2,246
1981	172	36	47	255	52	419	15	2,278
1982	180	40	45	265	52	419	15	2 281
1983	185	40	50	274	52	419	15	2,293
1984	192	40	46	278	52	419	15	2,338
1985	196	41	46	283	43	419	15	2,322
1986	198	44	52	294	43	419	15	2 259
1987	196	44	57	297	43	419	15	2 260
1988	199	44	57	301	42	419	15	2,311
1989	202	47	60	308	42	419	15	2,399
1990	206	48	64	318	42	419	15	2 439
1991	213	45	61	319	42	419	15	2,409
[P] 1992	215	48	57	320	42	419	15	2,408
[P] 1993	214	49	63	327	42	419	15	2,412

[2] Based on dry matter requirements shown at the end of the feed requirement tables

Cattle

Year	Bulls	Cows	Calves < 1 year	Males/ females > 1 year	TOTAL CATTLE
	--------------	----------------	(000) Metric	Tons------	----------------
1976	281	3,103	281	997	4,662
1977	280	3,176	391	976	4,822
1978	279	3,188	347	1,124	4,938
1979	281	3,191	253	1,106	4,830
1980	281	3,209	354	982	4,825
1981	280	3,221	313	1,043	4,858
1982	282	3 267	240	971	4,759
1983	283	3,269	319	834	4,705
1984	282	3,236	401	921	4,840
1985	284	3,250	281	1,058	4,873
1986	286	3,277	268	940	4,772
1987	245	3,172	328	831	4,576
1988	205	3,170	358	871	4,604
1989	129	3,188	360	950	4,627
1990	92	3,159	317	992	4,560
1991	55	3,067	261	933	4,316
[P] 1992	59	3 015	319	832	4,225
[P] 1993	61	2,930	277	850	4,118

[1] Winrock International Institute for Agricultural Development
[2] Based on the total digestible nutrient requirements shown at the end of the feed requirement tables

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ANNEX TABLE 10 4 ESTIMATED FEED REQUIREMENTS (TDN) BY LIVESTOCK 1970-1991 AND PROJECTIONS FOR 1992-1993 [1][2] (Continued)

	Buffalo					
	Bulls	Cows	Calves < 1 year	Males/ Females > 1 year	TOTAL BUFFALO	TOTAL CATTLE BUFFALO
Year	--------------	--------------	(000) Metric Tons------		----------------	--------------
1976	46	2,717	802	654	4,219	8,880
1977	50	2,927	401	1,088	4,466	9,288
1978	59	3,415	458	585	4,517	9,455
1979	59	3,399	464	496	4,418	9,248
1980	57	3,330	420	477	4,283	9,108
1981	57	3,343	519	492	4,411	9,269
1982	58	3,407	520	493	4,478	9,237
1983	58	3,445	540	481	4,524	9,229
1984	60	3,526	568	469	4,623	9 462
1985	61	3,564	524	393	4,542	9,415
1986	57	3,416	504	216	4,193	8,965
1987	51	3 309	795	194	4,350	8,926
1988	46	3,197	777	607	4,626	9,231
1989	44	3 603	841	563	5,051	9,678
1990	41	3,895	796	560	5,291	9,851
1991	35	4 053	794	449	5,330	9,646
[P] 1992	36	4,085	812	464	5,397	9,622
[P] 1993	37	4,134	828	492	5,491	9,610

[1] Winrock International Institute for Agricultural Development
[2] Based on the total digestible nutrient requirements shown at the end of the feed requirement tables

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ANNEX TABLE 10 4 ESTIMATED FEED REQUIREMENTS (TDN) BY LIVESTOCK 1970 1991 AND PROJECTIONS FOR 1992-1993 [1][2] (Continued)

Sheep & Year	Ewes/ Does	Lambs/ Kids	Others	TOTAL SHEEP & GOATS	TOTAL CAMELS	TOTAL DONKEYS	TOTAL HORSES & MULES	TOTAL DI ESTABLE NUTRIEN REQUIRE MENTS ALL LIVE STOCK
			(000) Metric Tons					
1976	1,185	241	132	1,558	244	1,759	76	10 438
1977	1,081	186	287	1,554	243	1,759	76	12 921
1978	1,133	209	210	1 553	243	1,759	76	13,086
1979	1,108	205	249	1,561	242	1,759	76	12,887
1980	1,122	232	274	1,629	241	1 759	76	12 814
1981	1,155	220	302	1,678	240	1,759	76	13,022
1982	1,207	243	291	1 741	240	1,759	76	13,054
1983	1,239	242	319	1,800	239	1,759	76	13 104
1984	1,291	241	298	1,829	238	1,759	76	13 365
1985	1,313	251	298	1,862	196	1,759	76	13 350
1986	1,332	267	330	1,929	196	1 759	76	12 925
1987	1,318	266	364	1 949	195	1 759	76	12 906
1988	1,337	270	365	1,973	195	1 759	76	13,234
1989	1,353	284	385	2,022	194	1,759	76	13 730
1990	1,382	292	411	2,085	193	1,759	76	13 965
1991	1,428	276	390	2,093	193	1 759	76	13 768
[P] 1992	1,444	289	368	2 101	192	1,759	76	13 751
[P] 1993	1,438	299	405	2,142	192	1 759	76	13 779

[1] Winrock International Institute for Agricultural Development

[2] Based on the total digestible nutrient requirements shown at the end of the feed requirement tables

ANNEX TABLE 10 5 ASSUMPTIONS USED TO ESTIMATE POUL FEED REQUIREMENTS AND MANURE PRODUCTION

Annual Requirement

Kind	Dry Matter	Crude Protein	Total Digestible Nutrients	Manure Production DM %
	-------Kilograms Per Year----------			
Commercial Broilers	3 744	0 749	3 239	23%
Balady Chickens	8 100	1 620	7 006	23%
Commercial Layers	36 000	7 205	31 136	23%
Balady Layers	31 508	6 305	27 254	23%

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ANNEX TABLE 10 6 TOTAL FEED REQUIREMENS (DRY MATTER) FOR MEAT AND E PRODUCTION 1976-1991 AND PRELIMINARY 1992-1993[1][2]

	For Meat Production			For Egg Production		
	Balady	Com-mercial	TOTAL	Balady	Com-mercial	TOTAL
Year	--------------	(000) M Tons-----------		--------------	(000) M Tons-----------	
1976	398 2	475 9	874 1	79 0	133 2	212 2
1977	393 9	487 5	881 4	82 2	140 4	222 6
1978	388 9	522 3	911 2	87 5	151 2	238 7
1979	383 8	533 9	917 7	93 4	158 4	251 8
1980	387 2	615 1	1002 3	95 8	165 6	261 4
1981	392 4	759 1	1151 5	91 5	158 4	249 9
1982	391 9	1033 0	1424 8	111 1	190 8	301 9
1983	390 9	948 2	1339 1	132 3	226 8	359 1
1984	392 0	1205 9	1597 9	145 7	248 4	394 1
1985	395 2	1133 9	1529 2	160 8	273 6	434 4
1986	458 8	1078 2	1537 0	154 5	266 4	420 9
1987	457 7	1053 9	1511 6	192 0	327 6	519 6
1988	474 7	737 0	1211 7	201 0	345 6	546 6
1989	485 9	511 8	997 7	231 4	396 4	627 7
1990	513 1	528 1	1041 2	199 6	342 0	541 6
1991	531 0	500 2	1031 3	185 7	316 8	502 5
[P]1992	547 2	499 1	1046 3	157 0	270 0	427 0
[P]1993	552 5	545 5	1098 0	157 5	270 0	427 5
Average Annual Percent Change						
1976-86	1 4%	8 5%	5 8%	6 9%	7 2%	7 1%
1986-93	2 7%	-9 3%	-4 7%	0 3%	0 2%	0 2%

[1] Winrock International Institutue For Agricultural Development
[2] Central Agency for Public Mobilisation and Statistics

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ANNEX TABLE 10 7 POULTRY FEED (CP) REQUIREMENTS 1976-1991 AND PRELIMINARY 1992

Year	For Meat Production Balady	For Meat Production Com-mercial	For Meat Production TOTAL	For Egg Production Balady	For Egg Production Com-mercial	For Egg Production TOTAL	TOTAL FOR MEA AND EGG PROD-UCTION
	--------------	(000) M Tons	-----------	--------------	(000) M Tons	-----------	--------------
1976	79 6	95 2	174 8	15 8	26 7	42 5	217 3
1977	78 8	97 5	176 3	16 5	28 1	44 6	220 9
1978	77 8	104 5	182 3	17 5	30 3	47 8	230 0
1979	76 8	106 8	183 6	18 7	31 7	50 4	234 0
1980	77 4	123 1	200 5	19 2	33 1	52 3	252 8
1981	78 5	151 9	230 3	18 3	31 7	50 0	280 4
1982	78 4	206 6	285 0	22 2	38 2	60 4	345 4
1983	78 2	189 7	267 9	26 5	45 4	71 9	339 7
1984	78 4	241 2	319 6	29 2	49 7	78 9	398 5
1985	79 0	226 8	305 9	32 2	54 8	86 9	392 8
1986	91 8	215 7	307 5	30 9	53 3	84 2	391 7
1987	91 5	210 8	302 4	38 4	65 6	104 0	406 4
1988	94 9	147 4	242 4	40 2	69 2	109 4	351 8
1989	97 2	102 4	199 6	46 3	79 3	125 6	325 2
1990	102 6	105 6	208 3	39 9	68 4	108 4	316 7
1991	106 2	100 1	206 3	37 2	63 4	100 6	306 8
1992	109 4	99 8	209 3	31 4	54 0	85 5	294 7
1993	110 5	109 1	219 6	31 5	54 0	85 6	305 2

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ANNEX TABLE 10 8 POULTRY FEED (TDN) REQUIREMENTS 1976-1991 AND PRELIMINARY 1992-1993

	For Meat Production			For Egg Production			TOTAL FOR MEAT AND EGG PRODUCTION
Year	Balady	Commercial	TOTAL	Balady	Com-mercial	TOTAL	
	---------------	(000) M Tons	-----------	---------------	(000) M Tons	-----------	---------------
1976	344 4	411 7	756 1	68 4	115 2	183 6	939 7
1977	340 7	421 7	762 4	71 1	121 4	192 6	955 0
1978	336 4	451 8	788 2	75 7	130 8	206 4	994 7
1979	332 0	461 9	793 9	80 8	137 0	217 8	1 011 6
1980	334 9	532 2	867 0	82 9	143 2	226 1	1,093 2
1981	339 4	656 7	996 1	79 2	137 0	216 2	1,212 3
1982	339 0	893 6	1,232 6	96 1	165 0	261 1	1 493 7
1983	338 1	820 3	1 158 4	114 5	196 2	310 6	1 469 0
1984	339 0	1,043 2	1,382 3	126 0	214 8	340 8	1,723 1
1985	341 8	981 0	1,322 8	139 1	236 6	375 7	1 698 6
1986	396 8	932 8	1 329 6	133 6	230 4	364 0	1 693 7
1987	395 9	911 7	1 307 6	166 1	283 3	449 4	1 757 0
1988	410 6	637 6	1 048 2	173 8	298 9	472 7	1 520 9
1989	420 2	442 8	863 0	200 1	342 8	542 9	1 406 0
1990	443 8	456 9	900 7	172 7	295 8	468 4	1 369 1
1991	459 3	432 8	892 1	160 6	274 0	434 6	1 326 7
1992	473 3	431 8	905 1	135 8	233 5	369 3	1 274 4
1993	477 9	471 9	949 8	136 3	233 5	369 8	1 319 6

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ANNEX TABLE 10 9 ESTIMATION OF NUTRIENT REQUIREMENTS OF LIVESTOCK 1991

SPECIES	NUMBER ANIMALS '000	REQUIREMENTS/head/year kg DM	CP	TDN	TOTAL REQUIREMENTS, tons '000 DM	CP	TDN
CATTLE							
Bulls	20 3	4489	330	2446	91	7	49
Cows	1590 8	3285	294	1825	5225	467	2903
Calves < 1 year	274	1387	157	803	380	43	220
Males/females> 1 year	797 1	2226	226	1424	1774	180	1135
SUB-TOTAL	2682 1				7470	697	4307
BUFFALO							
Bulls	14 5	4416	292	2409	64	4	35
Cows	1861 2	3906	375	2153	7269	698	4007
Calves< 1 year	749 2	1497	177	1059	1121	132	793
Males/females> 1 year	304 6	2281	249	1588	695	75	484
SUB-TOTAL	2929 5				9149	909	5319
SHEEP/GOATS							
Ewes/does	4545 7	584	49	329	2655	222	1495
Lambs/kids	1682 6	256	24	146	430	40	245
Males/females> 1 year	1351 3	511	47	301	690	63	406
SUB-TOTAL	7579 6				3775	325	2146
DONKEYS	2293 5*	1460	183	766	3348	419	1756
HORSES & MULES	52 0*	2737	306	1460	142	15	76
CAMELS	108 8	3467	390	1788	377	42	194
TOTAL					24261	2407	13798

* Numbers recorded in the 1982 Agricultural census

Source of Information on Nutrient Requirements National Research Council
Nutrient Requirements of Beef Cattle Dairy Cattle Sheep Goats Poultry Buffalo
National Academy of Sciences Washington D C

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ANNEX TABLE 10 10 CALCULATION OF NUTRIENT REQUIREMENTS/HEAD

	DM (Kg)		CP (Kg)		TDN (Kg)	
	Day	Year	Day	Year	Day	Year
CATTLE						
Bulls 650 kg	12 3	4489	0 904	330	6 7	2446
Breeding cows & replacements 450kg	9 0	3285	0 807	294	5 0	1825
Calves < 1 year 140 kg	3 8	1387	0 430	157	2 2	803
Heifers 1 2 years 240 kg	5 4	1971	0 505	184	3 3	1205
Males 1 2 years,275 kg	6 8	2482	0 732	267	4 5	1643
Dairy cows improved 10kg milk/day, 550kg*	15 5	5658	1 697	619	8 2	2993
BUFFALO						
Bulls 700kg	12 1	4416	0 801	292	6 6	2409
Breeding cows & replacements 550kg 4kg milk	10 7	3906	1 028	375	5 9	2153
Calves < 1 year 150kg	4 1	1497	0 486	177	2 9	1059
Heifers 1 2 years 240kg	5 9	2153	0 650	237	4 0	1460
Males 1 2 years 280kg	6 6	240o	0 712	260	4 7	1715
SHEEP						
Rams 60kg	2 3	840	0 219	80	1 4	511
Ewes & replacements 50kg	1 7	621	0 158	58	1 0	365
Weaned lambs 30kg (1/2)	0 7	256	0 065	24	0 4	146
Yearling females 40kg	1 6	584	0 158	58	1 0	365
Yearling males 40kg	1 4	511	0 13	47	0 8	292
GOATS						
Bucks 50kg	1 7	621	0 128	47	0 9	329
Does & replacements 40kg	1 5	548	0 108	39	0 8	292
Weaned Kids 30kg (1/2)	0 7	256	0 065	24	0 4	146
Yearling females 30kg	1 4	511	0 13	47	0 8	292
Yearling males 30kg	1 2	438	0 1	36	0 7	255
DONKEYS						
200kg LW	4 0	1460	0 5	183	2 1	766
HORSES & MULES						
375kg LW	7 5	2737	0 84	306	4 0	1460
CAMELS						
475kg LW	9 5	3467	1 07	390	4 9	1788

Sources of Nutrient Requirements National Research Council Nutrient Requirements of Beef Cattle Dairy Cattle Sheep Goats Poultry Buffalo National Academy of Sciences Washington,DC

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ANNEX TABLE 10 11 SPECIES PROFILES/INVENTORIES

	ESTIMATES OF AVERAGE WEIGHT, KG Soliman	APRI	Aziz	Study Estimate
CATTLE				
Bulls	500	650	700	650
Breeding cows & replacements	450	450	450	450
Calves < 1 year	125	160	160	140
Heifers 1-2 years	175	245	240	240
Males 1-2 years	175	285	285	275
Dairy cows (improved)*			575	550
BUFFALO				
Bulls	600	500	800	700
Breeding cows & replacements	550	350	600	550
Calves weaned < 1 year	100	180	170	150
Heifers 1-2 years	150	290	255	240
Males 1-2 years	150	350	300	280
SHEEP				
Rams	110	65	60	60
Ewes and replacements	100	45	50	50
Lambs < 1 year	25	35	30	(1/2 of) 30
Females 1-2 years	30	46	50	40
Males 1-2 years	35	40	50	40
GOATS				
Bucks	110	45	45	50
Does & replacements	100	35	30	40
Kids < 1 year	25	30	25	(1/2 of) 30
Females 1 2 years	30	30	25	30
Males 1 2 years	35	30	35	30
DONKEYS	200			200
HORSES & MULES	375			375
CAMELS	475			475
POULTRY				
Broilers	1 5		1 7	1 6
Layer (eggs/layer)	240		Comm 280	280
			Farm 200	175
PIGS				40
RABBITS				1

* Average weight of Friesan (650) and Crossbred (500)

ANNEX TABLE 10 12 ESTIMATED FEED REQUIREMENTS FOR POULTRY 1991

	NUMBER 000	KG FEED/ kg, gain	MKT wt kg	TOTAL FEED/ BROILER, kg	TOTAL FEED tons 000	DM tons 000	CP tons 000	TDN tons 000	ME Mcal 000'000
BROILERS/MEAT									
Commercial	133,300	2 6	1 6	4 16	554 5	499 1	99 8	431 7	1733
Small holders	58,778	3 0	3 0	9 00	529 0	476 1	95 2	411 8	1653
SUB TOTAL	192 078				1 083 5	975 2	195 0	843 5	3386
		KG FEED/ 100 Eggs	EGGS/Layer	TOTAL FEED/ Layer kg					
LAYERS									
Commercial	8 800	14 3	280	40	352 0	316 8	63 4	274 0	1100
Small holders	5,900	20 0	175	35	206 5	185 9	37 2	160 8	645
SUB TOTAL	14,700				558 5	502 7	100 6	434 8	1745
GRAND TOTAL					1 642 0	1 477 9	295 6	1 278 3	5131
Estimated Nutrient composition per kg of feed, DM basis*									
	Ingredient	Kg	CP kg	TDN kg	ME Mcal				
	Maize	0 65	0 064	0 585	2 504				
	Soybean Oil Meal	0 25	0 123	0 210	0 626				
	Concentrates	0 10	0 013	0 070	0 343				
	TOTAL	1 00	0 200	0 865	3 473				

* Source of nutrient composition National Research Council Nutrient Requirements of Poultry National Academy of Sciences

ANNEX TABLE 10 13   SHORT BERSEEM PRODUCTION, 1976-90

Short Berseem Year	Crop Area Feddan	Fresh Forage /Fed , t	Farm Price Forage /ton	Total Value of Forage , L E	Total Forage Tons	Total DM in Forage, t	Total CP in Forage, t	Total TDN in Forage, t
1976	1,045,804	10 1	7 4	77,807,818	10,562,620	1,901,272	323,216	1,235,827
1977	1,157,605	10 1	9 4	109,740,954	11,691,811	2,104,526	357,769	1,367,942
1978	993,308	10 1	16 1	161,710,542	10,032,411	1,805,834	306,992	1,173,792
1979	1,031,126	10 1	11 9	123,735,120	10,414,373	1,874,587	318,680	1,218,482
1980	989,792	10 1	11 9	118,775,040	9,996,899	1,799,442	305,905	1,169,637
1981	1,022,015	10 1	14 5	149,622,996	10,322,352	1,858,023	315,864	1,207,715
1982	914,479	10 1	17 5	161,387,254	9,236,238	1,662,523	282,629	1,080,640
1983	870,258	10 1	20 7	181,709,870	8,789,606	1,582,129	268,962	1,028 384
1984	834,971	10 1	21 3	180,019,748	8,433,207	1,517,977	258,056	986,685
1985	917,815	10 1	24 2	224,681,112	9,269,932	1,668,588	283,660	1,084,582
1986	870,281	10 1	26 6	233,583,420	8,789,838	1,582,171	268,969	1,028,411
1987	814,366	10 1	41 8	343,662,452	8,225,097	1,480,517	251,688	962,336
1988	789,782	10 1	37 6	300,117,160	7,976,798	1,435,824	244,090	933 285
1989	801,664	10 1	38 5	311,686,963	8,096,806	1,457,425	247,762	947,326
1990	796,209	10 1	47 9	385,365,156	8,041,711	1,447,508	246,076	940,880
C76-86	-0 18	0	1 28	1 1	-0 18	-0 18	-0 18	-0 18
C87-90	-0 02	0	0 14	0 11	-0 02	-0 02	-0 02	-0 02

ANNEX TABLE 10 14 LONG BERSEEM PRODUCTION, 1976-90

Long Berseem Year	Crop Area Feddan	Fresh Forage /Fed , t	Farm Price Forage /ton	Total Value of Forage , L E	Total Forage Tons	Total DM in Forage, t	Total CP in Forage, t	Total TDN in Forage, t
1976	1,710,750	26 5	4 9	222,739,650	45,334,875	8,160,278	1,387,247	5,793,797
1977	1,696,760	26 5	6 3	281,492,484	44,964,140	8,093,545	1,375,903	5,746,417
1978	1,789,151	26 5	10 8	509,729,120	47,412,502	8,534,250	1,450,823	6,059,318
1979	1,745,953	26 5	7 9	366,650,130	46,267,755	8,328,196	1,415,793	5,913,019
1980	1,721,655	26 5	7 9	361,547,550	45,623,858	8,212,294	1,396,090	5,830,729
1981	1,756,343	26 5	9 7	449,975,077	46,543,090	8,377,756	1,424,219	5,948,207
1982	1,790,631	26 5	11 7	553,018,478	47,451,722	8,541,310	1,452,023	6,064,330
1983	1,866,461	26 5	13 8	682,004,849	49,461,217	8,903,019	1,513,513	6,321,143
1984	1,971,967	26 5	14 2	744,023,149	52,257,126	9,406,283	1,599,068	6,678,461
1985	1,922,634	26 5	16 2	823,656,406	50,949,801	9,170,964	1,559,064	6,511,385
1986	1,865,692	26 5	17 7	876,315,532	49,440,838	8,899,351	1,512,890	6,318,539
1987	1,707,255	26 5	27 9	1,260,807,818	45,242,258	8,143,606	1,384,413	5,781,961
1988	1,614,393	26 5	25 1	1,073,571,345	42,781,415	7,700,655	1,309,111	5,467,465
1989	1,685,438	26 5	25 7	1,146,772,015	44,664,107	8,039,539	1,366,722	5,708,073
1990	1,660,333	26 5	32 0	1,406,302,051	43,998,825	7,919,788	1,346,364	5,623,050
C76-86	0 09	0	1 28	1 37	0 09	0 09	0 09	0 09
C87-90	-0 03	0	0 14	0 11	-0 03	-0 03	-0 03	-0 03

Source of Information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

ANNEX TABLE 10 15 BARLEY RESIDUE PRODUCTION, 1976-90

Barley

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	103,774	1 2	1 6	11 0	1,846,970	167,906	151,116	3,778	63,469
1977	95,208	1 2	1 6	18 4	2,799,420	152,142	136,928	3,423	57,510
1978	113,823	1 2	1 6	28 0	4,949,479	176,767	159,090	3,977	66,818
1979	106,755	1 1	1 5	24 0	3,817,559	159,065	143,158	3,579	60,127
1980	95,528	1 1	1 5	30 7	4,431,276	144,247	129,823	3,246	54,525
1981	91,214	1 1	1 6	52 0	7,755,014	149,135	134,221	3,356	56,373
1982	108,328	1 1	1 5	53 5	8,684,976	162,275	146,048	3,651	61,340
1983	120,989	1 1	1 5	59 2	10,736,564	181,484	163,335	4,083	68,601
1984	126,359	1 1	1 6	69 5	14,055,164	202,174	181,957	4,549	76,422
1985	124,599	1 2	1 6	88 9	17,696,826	199,109	179,198	4,480	75,263
1986	130,109	1 2	1 8	97 2	22,321,240	229,642	206,678	5,167	86,805
1987	112,249	1 2	1 9	85 6	18,256,177	213,273	191,946	4,799	80,617
1988	88,703	1 2	2 1	67 4	12,562,474	186,276	167,649	4,191	70,412
1989	118,237	1 3	1 9	68 0	14,914,415	219,330	197,397	4,935	82,907
1990	127,180	1 3	2 2	72 0	19,870,603	275,981	248,383	6,210	104,321
C76-86	0 23	-0 0	0 1	2 2	2 49	0 31	0 31	0 31	0 31
C87-90	0 12	0 1	0 1	-0 2	0 08	0 26	0 26	0 26	0 26

Source of Information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Heml= 0 25 Ardab 0 12

ANNEX TABLE 10 16 BERSEEM RESIDUE PRODUCTION 1976-90

Berseem

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	1,710,750	0 3	0 9	5 4	8,234,319	1,536,254	1,382,628	82 958	553,051
1977	1,696,760	0 3	0 9	9 1	13,372,912	1,472,788	1,325,509	79,531	530,204
1978	1,789,151	0 3	0 9	13 6	20,987,457	1,538,670	1,384,803	83,088	553,921
1979	1,745,953	0 3	0 8	13 6	19,589,593	1,440,411	1,296,370	77,782	518,548
1980	1,721,655	0 3	1 0	12 9	23,017,563	1,787,078	1,608,370	96,502	643,348
1981	1,756,343	0 3	1 0	28 4	50,029,782	1,761,612	1,585,451	95,127	634,180
1982	1,790,631	0 3	1 0	32 0	58,159,695	1,817,490	1,635,741	98,144	654,297
1983	1,866,461	0 3	1 0	30 6	57,474,307	1,875,793	1,688,214	101,293	675,286
1984	1,971,967	0 3	1 0	35 4	70,715,131	1,997,603	1,797,842	107,871	719,137
1985	1,922,634	0 3	1 0	49 0	96,297,200	1,966,855	1,770,169	106 210	708,068
1986	1,865,692	0 3	0 9	52 8	90,627,855	1,716,437	1,544,793	92,688	617,917
1987	1,707,255	0 3	1 0	44 4	75,733,832	1,707,255	1,536,530	92,192	614,612
1988	1,614,393	0 3	1 0	45 4	71,398,145	1,574 033	1,416,630	84,998	566,652
1989	1,685,438	0 3	1 0	42 4	68,818,456	1,623,077	1,460,769	87,646	584,308
1990	1,660,333	0 3	1 0	45 1	77,317 789	1,715,124	1,543,612	92,617	617,445
C76-86	0 09	0 05	0 02	2 29	2 4	0 11	0 11	0 11	0 11
C87-90	-0 03	-0 02	0 03	0 02	0 02	0	0	0	0

Source of Information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Heml= 0 25 Ardab 0 175

ANNEX TABLE 10 17 HORSEBEANS RESIDUE PRODUCTION, 1976-90

Horsebeans

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	259,638	1 0	1 3	7 5	2,505,029	333,116	299,804	19,787	173,886
1977	291,790	0 9	1 4	13 6	5,484,461	402,087	361,878	23,884	209,889
1978	238,954	1 0	1 2	21 8	6,198,945	284,355	255,920	16,891	148,433
1979	249,509	0 9	1 2	17 2	5,098,367	296,417	266,775	17,607	154,730
1980	244,746	0 9	1 2	19 6	5,876,351	299,814	269,832	17,809	156,503
1981	237,731	0 9	1 3	35 0	11,037,109	315,707	284,136	18,753	164,799
1982	274,091	0 9	1 4	37 0	13,726,697	371,393	334,254	22,061	193,867
1983	289,530	1 0	1 4	39 1	15,290,658	390,866	351,779	23,217	204,032
1984	270,857	1 0	1 3	59 3	21,176,619	356,990	321,291	21,205	186,349
1985	284,712	1 1	1 4	56 9	22,348,298	392,903	353,612	23,338	205,095
1986	270,205	1 0	1 4	56 2	21,988,634	391,257	352,131	23,241	204,236
1987	286,308	1 1	1 6	56 0	24,851,534	443,777	399,400	26,360	231,652
1988	362,825	1 0	1 6	53 7	30,698,260	571,449	514,304	33,944	298,297
1989	329,164	1 2	1 6	52 0	26,616,201	511,850	460,665	30,404	267,186
1990	302,890	1 2	1 6	54 0	26,401,867	488,562	439,705	29,021	255,029
C76-86	0 04	0 06	0 12	2 01	2 17	0 16	0 16	0 16	0 16
C87-90	0 06	0 09	0 04	-0 04	0 06	0 1	0 1	0 1	0 1

Source of information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Horsebeen Heml 0 25 Ardab= 0 155

ANNEX TABLE 10 18   CHICKPEA RESIDUE PRODUCTION, 1976-90

Chickpea

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	8,481	0 7	0 9	10 0	75,481	7,548	6,793	360	3,397
1977	13,688	0 7	0 9	15 4	187,038	12,114	10,902	578	5,451
1978	13,898	0 7	0 9	28 2	349,307	12,369	11,132	590	5,566
1979	14,958	0 6	0 9	13 6	178,000	13,088	11,779	624	5,890
1980	17,374	0 6	1 0	17 6	312,715	17,808	16,028	849	8,014
1981	19,116	0 7	0 7	28 8	401,337	13,955	12,559	666	6,280
1982	24,427	0 7	0 8	30 2	598,325	19,786	17,807	944	8,904
1983	16,091	0 6	0 9	24 0	357,220	14,884	13,396	710	6,698
1984	18,893	0 6	1 1	26 7	532,586	19,932	17,939	951	8,969
1985	18,689	0 7	1 1	34 5	722,562	20,932	18,839	998	9,419
1986	24,517	0 7	1 2	39 9	1,169,569	29,298	26,368	1,398	13,184
1987	17,862	0 7	1 0	36 4	680,181	18,666	16,799	890	8,400
1988	16,512	0 7	1 2	35 6	686,582	19,286	17,357	920	8,679
1989	16,845	0 7	1 1	36 0	660,998	18,361	16,525	876	8,262
1990	13,264	0 8	1 3	36 0	613,593	17,044	15,340	813	7,670
C76-86	1 06	0	0 29	1 38	2 74	1 36	1 36	1 36	1 36
C87-90	-0 3	0 09	0 21	-0 01	-0 1	-0 09	-0 09	-0 09	-0 09

Source of information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Chickp   Heml=   0 25   Ardab   0 15

ANNEX TABLE 10 19   FLAX RESIDUE PRODUCTION, 1976-90

Flax

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	47,490	0 5	2 6	19 3	2,402,358	124,281	111,853	3,356	34,674
1977	58,573	0 5	2 7	22 4	3,496,246	155,804	140,224	4,207	43,469
1978	59,918	0 5	2 7	33 6	5,433,312	161,898	145,709	4,371	45,170
1979	68,525	0 5	2 6	29 8	5,399,625	181,317	163,185	4,896	50,587
1980	67,633	0 5	2 6	31 3	5,580,516	178,348	160,513	4,815	49,759
1981	52,142	0 5	2 8	31 6	4,589,583	145,424	130,882	3,926	40,573
1982	37,369	0 5	2 8	34 7	3,663,909	105,680	95,112	2,853	29,485
1983	38,523	0 5	2 8	38 2	4,138,773	108,288	97,459	2,924	30,212
1984	32,365	0 5	2 8	60 7	5,566,762	91,755	82,579	2,477	25,600
1985	39,273	0 5	2 9	75 3	8,446,332	112,124	100,912	3,027	31,283
1986	42,953	0 5	2 7	79 5	9,323,477	117,262	105,536	3,166	32,716
1987	34,602	0 5	2 8	87 7	8,440,172	96,228	86,605	2,598	26,848
1988	41,274	0 6	2 8	108 7	12,612,511	116,062	104,456	3,134	32,381
1989	40,628	0 5	2 8	119 6	13,561,773	113,393	102,053	3,062	31,637
1990	30,725	0 5	2 8	121 0	10,391,041	85,876	77,289	2,319	23,960
C76-86	-0 1	0 06	0 04	1 41	1 36	-0 06	-0 06	-0 06	-0 06
C87-90	-0 12	0 01	0 01	0 32	0 21	-0 11	-0 11	-0 11	-0 11

Source of information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Flax   Heml=   0 25   Ardab=   0 122

ANNEX TABLE 10 20 LENTILS RESIDUE PRODUCTION, 1976-90

Lentils

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	63,584	0 6	1 1	16 0	1,073,298	67,081	60,373	3,622	30,187
1977	48,309	0 5	1 0	30 0	1,417,386	47,246	42,522	2,551	21,261
1978	35,504	0 5	0 8	34 0	946,299	27,800	25,020	1,501	12,510
1979	22,277	0 4	0 9	50 0	961,253	19,225	17,303	1,038	8,651
1980	15,215	0 4	1 0	40 3	594,474	14,759	13,283	797	6,641
1981	11,598	0 4	1 0	64 0	744,499	11,633	10,470	628	5,235
1982	12,261	0 5	1 0	68 9	857,704	12,445	11,200	672	5,600
1983	14,585	0 5	0 9	67 8	845,478	12,470	11,223	673	5,612
1984	17,741	0 6	1 0	64 6	1,145,359	17,741	15,967	958	7,983
1985	19,923	0 7	1 0	48 8	986,017	20,222	18,200	1,092	9,100
1986	20,974	0 7	1 0	70 3	1,474,053	20,974	18,877	1,133	9,438
1987	24,221	0 8	1 0	70 6	1,709,034	24,221	21,799	1,308	10 899
1988	19,034	0 8	1 1	53 6	1,122,245	20,937	18,844	1,131	9,422
1989	17,014	0 8	1 0	48 0	843,622	17,575	15,818	949	7,909
1990	14,009	0 9	1 1	52 6	811,177	15,410	13,869	832	6,934
C76-86	-1 11	0 13	-0 05	1 48	0 32	-1 16	-1 16	-1 16	-1 16
C87-90	-0 55	0 11	0 1	-0 29	-0 75	-0 45	-0 45	-0 45	-0 45

Source of information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Lentils Heml 0 25 Ardab= 0 166

ANNEX TABLE 10 21 SUGAR BEET TOPS RESIDUE PRODUCTION, 1976-90

Sugar Beet Tops

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	0	0	0 0	3 1	0	0	0	0	0
1977	0	0	0 0	5 8	0	0	0	0	0
1978	0	0	0 0	5 8	0	0	0	0	0
1979	0	0	0 0	6 6	0	0	0	0	0
1980	0	0	0 0	8 3	0	0	0	0	0
1981	0	0	0 0	10 8	0	0	0	0	0
1982	15,684	12 614	0 3	11 8	58,362	4,946	1,385	152	630
1983	17,862	13 783	0 3	17 2	105,616	6,155	1,723	190	784
1984	35,420	15 151	0 4	18 4	246,858	13,416	3,757	413	1,709
1985	40,622	14 226	0 4	21 4	309,170	14,447	4,045	445	1,841
1986	37,469	16 199	0 4	24 9	377,529	15,174	4,249	467	1,933
1987	41,921	17 274	0 4	26 4	477,935	18,104	5,069	558	2,306
1988	41,616	17 436	0 4	26 4	478,907	18,140	5,079	559	2,311
1989	39,705	17 245	0 4	24 9	425,891	17,118	4,793	527	2,181
1990	34,088	16 861	0 4	24 5	351,752	14,369	4,023	443	1,831
C76-86				2 09					
C87-90	-0 21	-0 02	-0 02	-0 08	-0 31	-0 23	-0 23	-0 23	-0 23

Source of information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Sugar Beet Heml 0 25 Ardab= 0 15

ANNEX TABLE 10 22 WHEAT RESIDUE PRODUCTION, 1976-90

Wheat

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	1,395,588	1 4	2 1	12 0	35,805,206	2,983,767	2,685,390	67,135	1,074,156
1977	1,207,151	1 4	2 1	24 2	60,850,792	2,514,496	2,263,046	56,576	905,218
1978	1,380,612	1 4	2 1	37 2	105,542,265	2,837,158	2,553,442	63,836	1,021,377
1979	1,391,324	1 3	2 0	30 0	85,149,029	2,838,301	2,554,471	63,862	1,021,788
1980	1,326,179	1 4	2 2	44 0	126,040,052	2,864,547	2,578,092	64,452	1,031,237
1981	1,399,595	1 4	2 1	68 7	204,552,265	2,978,338	2,680,504	67,013	1,072,202
1982	1,373,613	1 5	2 2	69 8	209,901,693	3,005,465	2,704,919	67,623	1,081,967
1983	1,320,045	1 5	2 3	74 3	222,209,511	2,989,902	2,690,912	67,273	1,076,365
1984	1,178,372	1 5	2 3	89 6	242,099,827	2,702,007	2,431,806	60,795	972,723
1985	1,185,923	1 6	2 3	107 8	296,704,652	2,751,341	2,476,207	61,905	990,483
1986	1,206,346	1 6	2 4	112 0	319,942,261	2,856,627	2,570,965	64,274	1,028,386
1987	1,373,009	2 0	2 5	96 0	333,212,808	3,470,967	3,123,870	78,097	1,249,548
1988	1,421,719	2 0	2 6	93 2	337,885,738	3,625,383	3,262,845	81,571	1,305,138
1989	1,532,534	2 1	2 5	104 0	401,327,744	3,858,921	3,473,029	86,826	1,389,211
1990	1,954,696	2 2	2 9	90 2	512,065,300	5,674,482	5,107,034	127,676	2,042,814
C76-86	-0 15	0 13	0 1	2 23	2 19	-0 04	-0 04	-0 04	-0 04
C87-90	0 35	0 1	0 14	-0 06	0 43	0 49	0 49	0 49	0 49

Source of information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Wheat Heml= 0 25 Ardab 0 15

ANNEX TABLE 10 23 GROUNDNUTS RESIDUE PRODUCTION, 1976-90

Groundnuts

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	32,083	0 9	1 2	2 9	114,761	39,302	35,372	2,335	20,515
1977	36,406	0 8	1 3	4 0	182,758	45,690	41,121	2,714	23,850
1978	30,915	0 8	1 3	4 0	156,183	39,046	35,141	2,319	20,382
1979	31,005	0 9	1 3	8 0	310,050	38,756	34,881	2,302	20,231
1980	28,451	0 9	1 2	10 0	334,299	33,430	30,087	1,986	17,450
1981	28,355	0 9	1 1	10 0	321,829	32,183	28,965	1,912	16,799
1982	29,028	0 8	1 1	10 4	320,005	30,770	27,693	1,828	16,062
1983	27,065	0 7	1 3	12 0	417,342	34,779	31,301	2,066	18,154
1984	24,026	0 9	1 2	16 0	473,985	29,624	26,662	1,760	15,464
1985	28,152	0 8	1 2	16 0	529,258	33,079	29,771	1,965	17,267
1986	22,691	0 8	1 1	19 4	486,742	25,142	22,627	1,493	13,124
1987	25,148	0 8	1 2	19 2	562,510	29,297	26,368	1,740	15,293
1988	29,588	0 9	1 2	20 0	697,093	34,855	31,369	2,070	18,194
1989	32,054	0 9	1 2	22 1	847,887	38,401	34,561	2,281	20,045
1990	29,309	0 9	1 2	21 9	797,112	36,431	32,788	2,164	19,017
C76-86	-0 35	-0 13	-0 1	1 89	1 44	-0 45	-0 45	-0 45	-0 45
C87-90	0 15	0 15	0 06	0 13	0 35	0 22	0 22	0 22	0 22

Source of information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Groundnut Heml 0 25 Ardab= 0 075

ANNEX TABLE 10 24 MAIZE RESIDUE PRODUCTION, 1976-90

Maize

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	1,890,927	1 6	1 8	4 0	13,236,489	3,309,122	2,978,210	89,346	1,727,362
1977	1,764,945	1 5	1 8	7 0	22,794,265	3,256,324	2,930,691	87,921	1,699,801
1978	1,898,103	1 6	1 9	7 6	26,827,788	3,511,491	3,160,341	94,810	1,832 998
1979	1,884,652	1 6	1 9	9 7	33,750,348	3,486,606	3,137,946	94,138	1,820,008
1980	1,905,809	1 7	1 9	10 2	36,789,737	3,621,037	3,258,933	97,768	1,890,181
1981	1,923,831	1 7	1 9	12 0	44,740,614	3,728,384	3,355,546	100,666	1,946,217
1982	1,935,314	1 7	2 0	15 0	57,623,974	3,841,598	3,457,438	103,723	2,005,314
1983	1,952,107	1 8	2 0	19 2	76,113,823	3,972,538	3,575,284	107,259	2,073,665
1984	1,974,967	1 9	2 2	19 6	84,308,971	4,301,478	3,871,330	116,140	2,245,372
1985	1,914,433	1 9	2 1	24 3	100,008,755	4,112,202	3,700,982	111,029	2,146,569
1986	1,483,238	1 9	2 1	29 2	90,092,291	3,089,585	2,780,626	83,419	1,612,763
1987	1,810,267	2 0	2 2	26 0	102,135,264	3,928,279	3,535,451	106,064	2,050,562
1988	1,959,941	2 1	2 0	32 1	127,321,687	3,968,881	3,571,992	107,160	2,071,756
1989	2,004,067	2 3	2 0	32 0	129,093,980	4,034,187	3,630,768	108,923	2,105 846
1990	1,975,815	2 4	2 2	32 5	139,451,126	4,293,446	3,864,101	115,923	2,241,179
C76-86	-0 24	0 16	0 17	1 99	1 92	-0 07	-0 07	-0 07	-0 07
C87-90	0 09	0 19	0	0 22	0 31	0 09	0 09	0 09	0 09

Source of Information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

ANNEX TABLE 10 25 RICE RESIDUE PRODUCTION, 1976-90

Rice

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	1,078,437	2 1	5 9	3 1	19,597,357	6,362,778	5,726,500	171,795	2,347,865
1977	1,039,647	2 2	6 1	5 8	36,854,239	6,310,657	5,679,592	170,388	2,328,633
1978	1,030,572	2 3	6 4	5 8	37,991,006	6,595,661	5,936,095	178,083	2,433,799
1979	1,040,094	2 4	6 8	6 6	46,679,419	7,072,639	6,365,375	190,961	2,609,804
1980	972,318	2 5	6 5	8 3	52,582,957	6,320,067	5,688,060	170,642	2,332,105
1981	956,392	2 3	6 4	10 8	66,518,976	6,159,164	5,543,248	166,297	2,272,732
1982	1,025,616	2 4	6 4	11 8	76,849,407	6,512,662	5,861,395	175,842	2,403,172
1983	1,013,680	2 4	7 1	17 2	123,328,769	7,186,991	6,468,292	194,049	2,652,000
1984	984,839	2 3	7 3	18 4	131,377,523	7,140,083	6,426,074	192,782	2,634,691
1985	924,922	2 5	6 9	21 4	135,980,183	6,354,214	5,718,793	171,564	2,344,705
1986	1,008,707	2 4	6 9	24 9	173,417,714	6,970,165	6,273,149	188,194	2,571,991
1987	982,659	2 4	6 9	26 4	179,001,163	6,780,347	6,102,312	183,069	2,501,948
1988	838,073	2 5	6 6	26 4	145,583,337	5,514,520	4,963,068	148,892	2,034,858
1989	983,573	2 7	6 6	24 9	161,510,555	6,491,582	5,842,424	175,273	2,395,394
1990	1,037,461	3 1	6 8	24 5	172,699,908	7,054,735	6,349,261	190,478	2,603,197
C76-86	-0 07	0 13	0 16	2 09	2 18	0 09	0 09	0 09	0 09
C87-90	0 05	0 22	-0 01	-0 08	-0 04	0 04	0 04	0 04	0 04

Source of Information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Rice Heml 0 25 Ardab= 0 14

ANNEX TABLE 10 26 SESAME RESIDUE PRODUCTION, 1976-90 249

Sesame

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	30,799	0 4	1 2	2 5	89,748	36,189	32,570	977	13,028
1977	40,011	0 4	1 3	3 2	164,378	50,734	45,661	1,370	18,264
1978	23,348	0 4	1 3	5 0	151,564	30,072	27,065	812	10,826
1979	37,120	0 3	1 3	5 6	261,696	46,400	41,760	1,253	16,704
1980	38,635	0 4	1 0	7 0	271,990	38,635	34,772	1,043	13,909
1981	40,228	0 4	1 4	9 2	504,443	54,831	49,348	1,480	19,739
1982	46,651	0 4	1 3	9 6	574,737	59,620	53,658	1,610	21,463
1983	25,893	0 4	1 3	11 2	379,412	33,998	30,598	918	12,239
1984	26,062	0 4	1 3	14 0	454,782	32,578	29,320	880	11,728
1985	21,617	0 4	1 4	16 4	488,527	29,788	26,809	804	10,724
1986	21,996	0 4	1 3	18 6	527,772	28,375	25,537	766	10,215
1987	29,136	0 5	1 3	20 6	748,795	36,420	32,778	983	13,111
1988	28,783	0 5	1 2	20 1	721,297	35,921	32,329	970	12,932
1989	24,795	0 5	1 3	19 9	629,743	31,614	28,452	854	11,381
1990	42,189	0 5	1 3	20 1	1,103,495	54,846	49,361	1,481	19,744
C76-86	-0 34	0 04	0 09	2 01	1 77	-0 24	-0 24	-0 24	-0 24
C87-90	0 37	0 08	0 04	-0 02	0 39	0 41	0 41	0 41	0 41

Source of information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Sesame Heml 0 25 Ardab= 0 12

ANNEX TABLE 10 27 SORGHUM RESIDUE PRODUCTION, 1976-90

Sorghum

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	474,643	1 6	2 1	4 0	4,042,212	1,000,547	900,493	36,020	360,197
1977	408,525	1 6	2 2	9 8	8,791,785	900,798	810,718	32,429	324,287
1978	433,596	1 6	2 2	11 1	10,366,413	932,231	839,008	33,560	335,603
1979	406,727	1 6	2 2	11 0	9,807,001	894,799	805,319	32,213	322,128
1980	410,082	1 6	2 3	12 4	11,441,288	922,685	830,416	33,217	332,166
1981	412,800	1 6	2 1	16 0	13,737,984	858,624	772,762	30,910	309,105
1982	382,888	1 6	2 1	16 6	13,398,323	807,128	726,415	29,057	290,566
1983	393,318	1 6	2 2	22 6	19,166,229	849,567	764,610	30,584	305,844
1984	365,135	1 5	2 2	20 4	16,429,468	806,948	726,254	29,050	290,501
1985	339,904	1 6	2 3	24 3	19,377,737	798,095	718,285	28,731	287,314
1986	371,088	1 6	2 3	26 4	22,512,870	852,760	767,484	30,699	306,994
1987	316,797	1 7	2 4	27 4	20,572,164	750,809	675,728	27,029	270,291
1988	314,275	1 9	2 2	27 6	18,649,079	675,691	608,122	24,325	243,249
1989	305,984	1 9	2 2	27 5	18,525,495	673,165	605,848	24,234	242,339
1990	319,379	2 0	2 3	27 4	19,718,459	718,603	646,742	25,870	258,697
C76-86	-0 25	0 02	0 09	1 88	1 72	-0 16	-0 16	-0 16	-0 16
C87-90	0 01	0 12	-0 05	0	-0 04	-0 04	-0 04	-0 04	-0 04

Source of Information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Sorghum Heml 0 25 Ardab= 0 14

ANNEX TABLE 10 28 SUGAR CANE RESIDUE PRODUCTION

Sugar Cane

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	242,482	34 83	0 9	3 1	650,315	211,141	59,120	2,424	31,333
1977	249,305	33 608	0 8	5 8	1,223,282	209,466	58,650	2,405	31,085
1978	247,592	33 508	0 8	5 8	1,194,669	207,408	58,074	2,381	30,779
1979	248,650	35 353	0 9	6 6	1,450,436	219,763	61,534	2,523	32,613
1980	252,481	34 135	0 9	8 3	1,792,635	215,461	60,329	2,473	31,974
1981	250,936	35 088	0 9	10 8	2,377,307	220,121	61,634	2,527	32,666
1982	253,968	34 416	0 9	11 8	2,578,466	218,514	61,184	2,509	32,427
1983	249,007	33 717	0 8	17 2	3,601,785	209,894	58,770	2,410	31,148
1984	244,384	37 408	0 9	18 4	4,205,282	228,548	63,993	2,624	33,917
1985	250,004	38 735	1 0	21 4	5,180,889	242,098	67,787	2,779	35,927
1986	261,657	41 398	1 0	24 9	6,737,552	270,802	75,825	3,109	40,187
1987	267,691	40 326	1 0	26 4	7,124,639	269,873	75,564	3,098	40,049
1988	275,251	40 737	1 0	26 4	7,400,514	280,322	78,490	3,218	41,600
1989	274,431	40 608	1 0	24 9	6,931,626	278,602	78,009	3,198	41,345
1990	263,190	42 157	1 1	24 5	6,790,324	277,383	77,667	3,184	41,164
C76-86	0 08	0 17	0 17	2 09	2 34	0 25	0 25	0 25	0 25
C87-90	-0 02	0 04	0 04	-0 08	-0 05	0 03	0 03	0 03	0 03

Source of Information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Sugar Can Heml 0 25 Ardab= 0 1755

ANNEX TABLE 10 29   MAIZE COBS RESIDUE PRODUCTION, 1976-90

Maize Cobs

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	1,890,927	1 6	0 4	4 0	3,046,283	761,571	685,414	20,562	342,707
1977	1,764,945	1 5	0 4	7 0	4,765,793	680,828	612,745	18,382	306,372
1978	1,898,103	1 6	0 4	7 6	5,952,869	779,171	701,254	21,038	350,627
1979	1,884,652	1 6	0 4	9 7	7,110,377	734,543	661,089	19,833	330,544
1980	1,905,809	1 7	0 4	10 2	8,205,079	807,587	726,828	21,805	363,414
1981	1,923,831	1 7	0 4	12 0	9,921,196	826,766	744,090	22,323	372,045
1982	1,935,314	1 7	0 4	15 0	12,555,350	837,023	753,321	22,600	376,660
1983	1,952,107	1 8	0 4	19 2	16,812,365	877,472	789,725	23,692	394,862
1984	1,974,967	1 9	0 5	19 6	18,115,977	924,285	831,856	24,956	415,928
1985	1,914,433	1 9	0 5	24 3	22,418,164	921,799	829,620	24,889	414,810
1986	1,483,238	1 9	0 5	29 2	20,468,640	701,942	631,748	18,952	315,874
1987	1,810,267	2 0	0 5	26 0	23,521,704	904,681	814,213	24,426	407,106
1988	1,959,941	2 1	0 5	32 1	32,789,264	1,022,109	919,898	27,597	459,949
1989	2,004,067	2 3	0 6	32 0	36,233,531	1,132,298	1,019,068	30,572	509,534
1990	1,975,815	2 4	0 6	32 5	38,969,948	1,199,814	1,079,832	32,395	539,916
C76-86	-0 24	0 16	0 16	1 99	1 9	-0 08	-0 08	-0 08	-0 08
C87-90	0 09	0 19	0 19	0 22	0 5	0 28	0 28	0 28	0 28

Source of information USAID/Cairo, January 1992, Agricultural Data Base AGR/ACE

Maize Heml= 0 25 Ardab 0 14

ANNEX TABLE 10 30 SOYBEANS RESIDUE PRODUCTION, 1976-90

Soybeans

Year	Crop Area Feddan	Grain Yield /Fed , t	Crop Residu /Fed t	Farm Price of Residue /t L E	Total Value of Res , L E	Total Crop Res , t	Total DM in Res , t	Total CP in Res , t	Total TDN in Res , t
1976	16,959	0 1	1 0	16 0	271,344	16,959	15,263	611	6,105
1977	33,128	0 1	1 0	30 0	993,840	33,128	29,815	1,193	11,926
1978	81,713	0 2	1 0	34 0	2,781,511	81,713	73,542	2,942	29,417
1979	100,421	0 2	1 0	50 0	5,021,050	100,421	90,379	3,615	36,152
1980	82,767	0 2	1 0	40 3	3,333,855	82,767	74,490	2,980	29,796
1981	109,420	0 2	1 0	64 0	7,002,880	109,420	98,478	3,939	39,391
1982	144,355	0 2	1 0	68 9	9,948,947	144,355	129,920	5,197	51,968
1983	147,155	0 2	1 0	67 8	9,977,109	147,155	132,440	5,298	52,976
1984	124,535	0 2	1 0	64 6	8,039,980	124,535	112,082	4,483	44,833
1985	119,048	0 2	1 0	48 8	5,804,780	119,048	107,143	4,286	42,857
1986	109,705	0 2	1 0	70 3	7,710,067	109,705	98,735	3,949	39,494
1987	113,241	0 2	1 0	70 6	7,990,285	113,241	101,917	4,077	40,767
1988	117,397	0 2	1 0	53 6	6,292,479	117,397	105,657	4,226	42,263
1989	92,319	0 2	1 0	48 0	4,431,312	92,319	83,087	3,323	33,235
1990	98,523	0 2	1 0	52 6	5,186,251	98,523	88,671	3,547	35,468
C76-86	1 87	0 6	0	1 48	3 35	1 87	1 87	1 87	1 87
C87-90	-0 14	-0 09	0	-0 29	-0 43	-0 14	-0 14	-0 14	-0 14

Source of information USAID/Cairo,, January 1992, AAgricultural Data Base AGR/ACE

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ANNEX TABLE 10 31 ESTIMATES OF GRAINS AND CONCENTRATES FOR ANIMAL FEEDING, 1992, '000 tons

	PRODUCTION	IMPORTS	TOTAL SUPPLY
GRAINS, CONCENTRATES			
Maize grain			
White	3,000 0	0	3000
Yellow	0	1444	1444
Sorghum grain	615	0	615
CONCENTRATES			
Cottonseed cake	363	0	363
Linseed cake	13	0	0
Soybean meal	92	280	372

Source of Information American Embassy, 1993 Grain and Feed Annual Report, Oilseeds and Products Annual Report

ANNEX TABLE 10 32 ESTIMATES OF GRAINS, CONCENTRATES AND CROP RESIDUES, 1993

	AVAILABLE QUANTITIES '000 tons	ESTIMATED QUANTITIES FOR THE YEAR 2000 '000 tons
GRAINS, CONCENTRATES		
Cotton seed cake	600	370
Linseed meal	18	12
Coarse wheat bran	1400	1700
Rice bran	65	65
Faba beans	45	45
Barley	98	100
White corn	145	500
Sorghum	30	30
Yellow corn (imported)	1600	2000
Molasses	40	40
Coarse rice bran	400	600
Broken rice	110	190
Rice hulls	180	200
TOTAL	4,731	5 852
CROP RESIDUES		
Wheat barley straw	2 0	4 0
Rice straw	2 3	2 1
Rice hulls	0 5	0 4
Corn stalks	2 0	1 1
By-product of sugar cane	3 0	3 8
Residues of vegetables crops	3 0	3 2
Residues of fruit crops	1 0	1 6
TOTAL	13 8	16 2

Source of Information Ministry of Agriculture & Land Reclamation, 1993

ANNEX TABLE 10 33 ANALYSIS OF FEED INGREDIENTS

INGREDIENT	CRUDE PROTEIN %	FAT %	FIBER %	ASH %	MOISTURE %	TOTAL DIG NUT (TDN)
Wheat straw	2 5	0 5	35 0	13 0	7 0	40 0
Barley straw	2 5	0 8	35 0	14 0	7 0	42 0
Horsebean straw	5 0	0 8	35 0	12 0	8 0	45 0
Clover straw	6 0	0 8	39 0	11 0	8 0	40 0
Soybean straw	4 0	1 0	40 0	7 0	8 0	38 0
Lentil straw	6 0	0 5	37 0	10 0	8 0	38 0
Rice straw	3 0	0 5	35 0	18 0	7 0	36 0
Corn stover	3 0	0 5	35 0	9 0	7 0	40 0
Corn cobs	3 0	0 5	36 0	3 0	12 0	45 0
Bagasse	2 0	0 5	44 0	4 0	9 0	35 0
Rice hulls	2.0	0 5	44 0	22 0	7 0	15 0
Cotton seed hulls	4 0	1 5	45 0	3 0	10 0	43 0
Peanut hulls	6 0	1 0	55 0	5 0	10 0	25 0
Lentil hulls	10 0	0 3	27 0	7 0	10 0	48 0
Horsebean hulls	16 0	0 3	37 0	5 0	10 0	45 0
Linseed hulls	7 0	1 0	40 0	8 0	12 0	45 0
	2 0	0 5	65 0	2 0	12 0	20 0
Sugarbeet tops	11 0	1 0	13 0	30 0	12 0	45 0
Corn grain & cops	7 0	3 0	9 0	2 0	10 0	73 0
Wheat grain hulls	6 0	2 0	18 0	4 0	12 0	50 0
Date seed	7 0	8 0	36 0	3 0	6 0	55 0
Sesame straw	3 0	2 0	48 0	6 0	8 0	40 0
Olive cake	12 0	2.0	34 0	13 0	9 0	40 0
Olives	4 0	13 0	38 0	7 0	8 0	60 0
Clover hay	13 0	2 5	27 0	14 0	9 0	50 0
Sugarbeet pulp	9 0	0 5	20 0	5 0	7 0	65 0
Soymeal (44%)	44 0	0 5	7 5	6 0	12 0	76 0
Soymeal (48%)	48 0	0 5	4 0	6 0	12 0	78 0
Cotton seed cake (undecorticated)	23 0	6 0	23 0	6 0	12 0	62 0
Cotton seed cake (decorticated)	40 0	5 0	12 0	6 0	12 0	73 0
Linseed cake	28 0	8 0	10 0	6 0	12 0	68 0
Sesame cake	40 0	10 0	13 0	7 0	12 0	77 0
Peanut cake	40 0	8 0	12 0	6 0	12 0	70 0
Wheat bran	14 0	3 0	11 0	6 0	10 0	63 0
White corn grain	9 0	4 0	2 0	1 5	12 0	83 0
Yellow corn grain	9 0	3 5	2 5	2 0	12 0	80 0
Sorghum grain	9 5	2 5	3 0	2 0	11 0	74 0
Wheat grain	10 0	1 5	2 5	1 5	11 0	78 0
Barley grain	10 0	2 0	6 5	3 0	11 0	75 0
Cassava	2 5	0 5	3 0	2 0	13 0	73 0
Sunflower cake (undecorticated hydraulic press)	38 0	8 0	13 0	7 0	12 0	65 0
Sunflower cake (decorticated solvent extracted)	40 0	3 0	17 0	7 0	12 0	60 0
Sunflower cake (undecorticated solvent extracted)	1 0	7 0	40 0	6 0	12 0	50 0
Corn gluten (6%)	60 0	3 0	2 0	2 0	10 0	83 0
Corn gluten (40%)	40 0	3 0	3 0	3 0	10 0	76 0
Gluten feed	18 0	3 0	8 0	6 0	10 0	74 0
Corn germ meal extract	22 0	8 0	11 0	3 0	10 0	79 0
Rice germ meal	20 0	1 5	7 0	11 0	10 0	71 0
Rice germ	18 0	14 0	7 0	10 0	12 0	81 0
Rice bran extract	15 0	4 0	12 0	13 0	10 0	56 0
Rice bran	13 0	14 0	12 0	12 0	10 0	70 0
Rice feed	7 0	5 0	18 0	20 0	12 0	46 0
Alfalfa hay	15 0	1 5	29 0	9 0	10 0	55 0
Horsebean grain	23 0	1 5	7 0	4 0	12 0	75 0
Cane molasses	4 0	0 0	0 0	10 0	25 0	55 0
Beet molasses	7 0	0 0	0 0	9 0	25 0	55 0
Vinasse	2 0	0 0	0 0	10 0	40 0	40 0
Molasses by products	94 0			19 6	35 0	

Source of Information Egyptian Animal Feed Tables 1993 Prepared by Committee appointed by the Ministry of Agriculture & Land Reclamation In publication

ANNEX TABLE 10 34 FEED SUPPLY CROP RESIDUES 1990 000, tons

CROP RESIDUE	AS FED	TOTAL DM***	AVAILABLE FOR FEEDING		
			DM**	CP	TDN
		(%)	(%)***	(%)***	(%)***
Barley straw	275	(90) 248	(60) 148	(2 5) 3 7	(42) 62
Berseem straw	1715	(90) 1543	(75) 1157	(6 0) 69 4	(40) 463
Chickpea straw	17	(90) 15	(75) 11	(5 3) 0 6	(50) 6
Flax straw	85	(90) 77	(50) 39	(3 0) 1 2	(31) 12
Fruit residues	1000	(15) 150	(25) 38	(10 0) 3 8	(60) 23
Groundnut stalks	36	(90) 32	(75) 24	(6 6) 1 6	(58) 14
Horsebean straw	488	(90) 439	(75) 329	(5 0) 16 5	(45) 148
Lentil straw	15	(90) 13	(75) 10	(6 0) 0 6	(50) 5
Maize cobs	1199	(90) 1079	(60) 647	(3 00) 19 4	(50) 324
Maize stover	4293	(90) 3864	(60) 2318	(3 0) 69 5	(50) 1159
Rice hulls	500	(90) 450	(25) 113	(2 0) 2 3	(12) 14
Rice straw	3000	(90) 2700	(60) 1620	(3 0) 48 6	(41) 664
Sesame stalks	54	(90) 49	(75) 37	(3 0) 1 1	(40) 15
Sorghum stover	718	(90) 646	(60) 388	(3 0) 11 6	(50) 194
Soybean straw	98	(90) 88	(75) 66	(4 0) 2 6	(40) 26
Sugarbeet tops	14	(28) 4	(60) 2	(11 0) 0 2	(45) 1
Sugar cane tops	277	(28) 77	(50) 39	(4 1) 1 6	(53) 21
Vegetable residues	3000	(15) 450	(25) 113	(10 0) 11 3	(60) 68
Wheat straw	5674	(90) 5107	(60) 3064	(2 5) 76 6	(40) 1226
TOTAL	22458	17031	10163	342	4445

* Refers to the dry matter percentage and the total quantities produced in the field Amount that would be fed to livestock would vary depending upon time location and need for each crop residue
All estimates made by USAID/Cairo AGR/ACE Agricultural Data Base, January 1992 by MOALR except for fruit residues maize cobs rice hulls, soybean straw sugarbeet tops, sugar cane tops vegetable residues

** Estimates the (%) and tonnage of crop residues that would actually be available for feeding

*** Sources of Feed Composition Egyptian Animal Feed Tables, 1993 In publication National Research Council Nutrient Requirements of Beef Cattle, Dairy Cattle, Sheep Goats National Academy of Sciences Washington D C

ANNEX TABLE 10 35 FEED SUPPLY, GREEN FODDER, 1990,'000, tons

	AS FED	DM (%)*	CP (%)*	TDN (%)*
GREEN FORAGE				
Alfalfa	3200	(21) 672	(18) 121	(63) 423
Berseem				
Long season	43945	(18) 7,910	(17) 1,344	(71) 5616
Short season	8036	(18) 1,446	(17) 246	(65) 940
Elephant grass	2000**	(21) 420	(9) 38	(55) 231
Maize, green	3600	(26) 936	(8) 75	(70) 655
Sorghum, green	2000**	(22) 440	(8) 35	(54) 238
TOTAL	62,781	11,824	1,859	8,103

* Sources of Feed Composition Egyptian Animal Feed Tables, 1993 In publication National Research Council Nutrient Requirements of Beef Cattle, Goats National Academy of Sciences, Washington D C

** Estimates made by Study Team

Source of Information USAID/Cairo AGR/ACE, I Soliman

ANNEX TABLE 10 36 FEED SUPPLY GRAINS & CONCENTRATES 1992 000 tons

INGREDIENT	PRODUCTION	IMPORTS	TOTAL SUPPLY	TOTAL DM	CP TOTAL (%)	CP POULTRY	CP RUMINANTS	TDN TOTAL (%)	TDN POULTRY	TDN RUMINANTS
GRAINS*										
Maize										
White**	3000	0	3000	2700	(9) 243	49	194	(83) 2241	448	1793
Yellow	0	1444	1444	1299	(10) 130	117	13	(89) 1156	1040	116
Sorghum	615	0	615	554	(9) 50	0	50	(74) 410	0	410
SUB-TOTAL	3615	1444	5059	4553	423	166	257	3807	1488	2319
CONCENTRATES										
Corngluten feed	0	0	0	0	(18) 0	0	0	(74) 0	0	0
Cotton seed cake	363	0	363	327	(23) 75	0	75	(62) 203	0	203
Linseed cake	13	0	13	12	(28) 3	0	3	(68) 8	0	8
Rice bran	70	0	70	63	(13) 8	0	8	(70) 44	0	44
Rice germ meal	20	0	20	18	(18) 3	0	3	(81) 15	0	15
Sesame meal	0	0	0	0	(40) 0	0	0	(77) 0	0	0
Soybean meal	92	280	372	335	(48) 161	145	16	(78) 261	235	26
Sunflower meal	3	0	3	3	(38) 1	0	1	(65) 2	0	2
Wheat bran***	1400	0	1400	1260	14) 176	18	158	(63) 794	79	715
Molasses cane	50	0	50	38	(4) 2	0	2	(72) 27	0	27
Molasses by products	0	0	0	0	0	0	0	0	0	0
SUB-TOTAL	2011	280	2291	2056	429	163	266	1354	314	1040
GRAND TOTAL	5626	1724	7350	6609****	852	329	523	5161	1802	3359

* Grains used for feed
** Consumed on farm estimated 20% for poultry and 80% for ruminants and other uses
*** Includes wheat bran from imported wheat
**** Dry matter ruminants 4472 tons poultry 2137 tons total 6609 tons

Sources of Production and Import Data
1 American Embassy 1993 Grain and Feed Annual Report and Oilseeds and Products Annual Report
2 Ministry of Agriculture and Land Reclamation 1993
3 APRI 1993

Sources of Feed Composition Data
1 Egyptian Animal Feed Tables 1993 In publication
2 National Research Council Nutrient Requirements of Beef Cattle Dairy Cattle Sheep Goats Poultry National Academy of Sciences Washington D C

ANNEX TABLE 10 37 FEED SUPPLY, SUMMARY, 1992, '000, tons

	AS FED	DM	CP	TDN
CROP RESIDUES	22458	10163*	342	4445
GREEN FODDER	62781	11824	1859	8103
GRAINS				
Domestic	3615	3254	293	2651
Imported	1444	1299	130	1156
SUB-TOTAL	5059	4553	423	3807
CONCENTRATES				
Domestic	2011	1804	308	1157
Imported	280	252	121	197
SUB-TOTAL	2291	2056	429	1354
TOTAL	92,589	28,596	3,053	17,709

* Amount estimated to be available for feeding in 1990
Total amount is estimated to be 17031 tons (See Annex Table 10 34)

ANNEX TABLE 10 38 SUMMARY FEED BALANCE, 1992, '000, tons

	REQUIREMENTS	SUPPLY	BALANCE
DRY MATTER			
Ruminants	24261	26459	2198
Poultry	1477	2137	660
SUB-TOTAL	25738	28596	2858
CRUDE PROTEIN			
Ruminants	2407	2,724	317
Poultry	295	329	34
SUB-TOTAL	2702	3,053	351
TOTAL DIGESTIBLE NUTRIENTS			
Ruminants	13798	15907	2109
Poultry	1278	1802	524
SUB-TOTAL	15076	17,709	2633

ANNEX TABLE 10 39 IMPORTS OF YELLOW CORN AND SOYBEAN MEAL, 1992, '000, tons

FEED		DRY MATTER	CRUDE PROTEIN	TOT DIG NUT (TDN)
Yellow corn		1299	130	1156
Soybean meal		252	121	197
	TOTAL	1551	251	1353
Share of total feed supply for livestock and polutry, %		5 4	8 2	7 6

ANNEX TABLE 10 40 WORKSHEET PRELIMINARY ESTIMATE OF ANNUAL MANURE PRODUCTION 1991

SPECIES/CLASS	NUMBER OF ANIMALS	ESTIMATED AVERAGE WEIGHT/ Head, kg*	AVERAGE DM CONSUMPTION/ Head, kg**		FEED USE, %		MANURE **		MANURE AVAILABLE
			Day	Year****	Digested	Excreted	Kg/Head	Total,t	t (%)of total
	000							000	000
CATTLE	2,682	362	7 24	2643	55	45	1189	3189	2232 (70)
BUFFALO	2 929	418	8 36	3051	55	45	1373	4022	2815 (70)
SHEEP/GOATS	7 579	37	1 33	485	55	45	218	1652	826 (60)
POULTRY									
Commercial									
Broilers	133 300	1 00	0 081	4 5	80	20	0 90	120	96 (80)
Layers	8 800	2.00	0 106	38 7	80	20	7 74	68	54 (80)
Farm Balady									
Meat	58 778	1 50	0 080	9 6	75	25	2.40	141	113 (80)
Layers	5 900	2.00	0 106	38 7	75	25	9 68	57	46 (80)
PIGS	110	40	2.00	730 0	70	30	219	24	12 (50)
DONKEYS	2 293	200	4 00	1 460 0	50	50	730 00	1673	836 (50)
RABBITS	6 777	1 00	0 030	11 0	60	40	4 40	30	21 (70)
CAMELS	110	475	9 50	3467	50	50	1734	190	95 (50)
HORSES & MULES	52	375	7 50	2 738 0	55	45	1232	64	32 (50)
TOTAL								11230	7178

* See Table 2 for calculation of estimated average weight

** Average Dry Matter (DM) consumption as percent of body weight (BW)

Cattle Buffalo	Grazing high roughage	2.00
	Feedlot	2 00
Sheep Goats	Grazing high roughage	3 60
Poultry	Broilers commercial	8 10
	Layers commercial	5 30
	Farm meat	5 30
Pigs		5 00
Donkeys		2 00
Rabbits		3 00
Camels		2 00
Horses & Mules		2 00

** Total excreta, does not account for losses after excretion Manure available estimates the amount that is actually applied as fertilizer

* Commercial broiler cycle 56 days farm meat cycle 120 days

SOURCES OF INFORMATION

Livestock Numbers Egypt, Census 1991 Census 1981 for Donkeys and Horses & Mules

CAPMAS June 1992 Statistical Yearbook. Arab Republic of Egypt (Numbers of Rabbits Pigs)

Feed Consumption National Research Council Various years Nutrient Requirements of Beef Cattle Dairy Cattle Sheep Goats Swine Poultry National Academy of Sciences USA.

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ANNEX TABLE 10 41 CALCULATION OF AVERAGE WEIGHTS OF LIVESTOCK INVENTO USED IN ESTIMATING ANNUAL PRODUCTION OF MANURE AS BASED ON DM CONSUMPTION AS % OF BW

SPECIES/TYPE	AVERAGE wt kg*	NUMBER '000**	TOTAL wt tons
CATTLE			
Bulls	650	20 3	13 195
Cows	450	1590 8	715 860
Calves < 1 year	140	274 0	38 360
Males/Females > 1 year	255	797	203 260
TOTAL		2682 1	970 675
	Average wt = 362 kg		
BUFFALO			
Bulls	700	14 5	10 150
Cows	550	1861 2	1,023,660
Calves < 1 year	150	749 2	112,380
Males/females > 1 year	260	304 6	79 196
TOTAL		2929 5	122 386
	Average wt = 418 kg		
SHEEP/GOATS			
Ewes/does	45	4545 7	204 556
Lambs/kids	15	1682 6	25 239
Males/females > 1 year	35	1351 3	47 295
TOTAL		7579 6	277 090
	Average wt = 37 kg		
POULTRY			
Broilers	1 6		
	Average wt = 1 6 kg		
Layers	2 0		
	Average wt = 2 0 kg		
PIGS	40	110 9	
	Average wt = 40 kg		
DONKEYS	200	2293 5	
	Average wt = 200 kg		
RABBITS	1	6 777 0	
	Average wt = 1 kg		
CAMELS	475	108 8	
	Average wt = 475 kg		
HORSES & MULES	375	52 0	
	Average wt = 375 kg		

* Weight at middle of year/feeding period

** Cattle Buffalo Sheep//Goats Pigs from Census 1991
Other species from CAPMAS June 1993 and other sources

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ANNEX TABLE 10 42 ESTIMATED MANURE PRODUCTION AS BASED ON DM CONSUMMPTION/REQUIREMENTS, MANURE DM/year

SPECIES	NUMBER '000	DM CONSUMPTIOON '000, tons	% EXCRETED	DM MANURE* '000, tons
Cattle	2682	7470	45	3362
Buffalo	2929	9149	45	4117
Sheep/Goats	7579	3775	45	1699
Poultry	206778	1478	23	340
Pigs	110	80**	30	24
Donkeys	2293	3348	50	1674
Rabbits	6777	75**	40	30
Camels	110	377	50	189
Horses & Mules	52	142	45	64
TOTAL				11499

* Total excreta, does not account for losses after excretion

** Estimated DM consumption based on percent of body weight (pigs 5 0%, rabbits 3 0%)

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ANNEX TABLE 10 43 WORKSHEET, PRELIMINARY ESTIMATE OF ANNUAL DRY MATTER CONSUMPTION, 1991 AS BASED ON DM CONSUMPTION AS % OF BW

SPECIES	NUMBER '000	DM CONSUMPTION head/year, kg	TOTAL DM CONSUMPTION '000, tons
Cattle	2682	2643	7088
Buffalo	2929	3051	8936
Sheep/Goats	7579	485	3675
Poultry	206778	8 4	1732
Pigs	110	730	80
Donkeys	2293	1460	3347
Rabbits	6777	11	75
Camels	110	3467	381
Hosres & Mules	52	2738	142
TOTAL (DM consumption as % of BW)			25466

Note TOTAL DM consumption as based on nutrient requirements 25738

ANNEX TABLE 11 1 FEED INGREDENTS USED BY BROILER AND LAYERS, 1980-1990

	Total feed produced	Domestic Ingredients			Imported ingredients				
		Maize	Sorghum	Wheat	Soybean meal	Meat meal	Fish meal	Other conc	Yellow corn
Year	'000 t	'000 t	'000 t	'000 t	tons	tons	tons	tons	'000 t
1980	700	498	182	84	11429	2821	53444	175	596
1981	800	462	185	102	157771	3123	59170	193	1289
1982	931	502	268	101	164745	1800	33785	109	1296
1983	1247	526	268	100	144526	7400	35180	1196	1397
1984	1558	555	280	91	348428	4453	41135	732	1311
1985	1800	553	246	94	480349	4640	24400	1240	1364
1986	1900	436	273	96	273331	12750	26640	940	1303
1987	1900	163	248	136	280757	n a	13844	2610	1551
1988	1900	184	263	142	216550	2414	12200	3899	1651
1989	1630	288	302	159	257519	n a	3990	5372	1131
1990	1122	462	362	203	179694	2800	4500	7000	1297

Source (1) Ministry of Agriculture, Central Administration of Animal Production Public Administration of Feed Unpublished data
(2) CAPMAS, International Trade Statistics, various years

ANNEX TABLE 11 2 CAPACITY UTILIZATION OF POULTRY FEED MILLS, 1989

Sector	Total feed produced	Mill capacity	% capacity utili-zation	Total corn used	Corn used as % feed produced
Public	1,669	10,080	16 56%	1,100	65 91%
Joint venture	606,840	1,172,700	51 75%	395,000	65 09%
Private	341,950	1,345,320	25 42%	223,600	65 39%
Total	950,459	2,528,100	37 60%	619,700	65 20%

Source Ministy of Agriculture, Central Administartion of Animal Production, Public Adimistration of Feed and Food, Unpublished data, 1989

ANNEX TABLE 11 3 BROILER PRODUCTION, NUMBER OF BROILER FARMS AND PRODUCTION CAPACITIES, 1980-1991 and 1993(est)

	Number of broiler farms			Avail prod capacity	Actual produ-ction	Idle prod capacity	Idle production capacity as % of total capacity
	Total	In prod-uction	Idle				
Units\	nos	nos	nos	million broilers	million broilers	million broilers	capacity
Year							
1980	3035						
1981	7158	6373	785	228	203	25	10 96%
1982	12760	11040	1720	319	276	43	13 48%
1983	13607	10125	3482	340	253	87	25 59%
1984	14495	12773	1722	362	319	43	11 88%
1985	16366	12124	4242	409	303	106	25 92%
1986	17129	11526	5603	428	288	140	32 71%
1987	17897	11250	6647	447	281	166	37 14%
1988	16868	12565	4303	421	197	224	53 21%
1989	18125	7960	10165	453	124	329	72 63%
1990	18844	8235	10609	471	129	342	72 61%
1991	18986	6340	12646	474	100	374	78 90%
1993 (est)				450	275	175	38 89%

Sources

(1) Ministry of Agriculture, Central Administration of Agricultural Economics, unpublished data

(2) Ministry of Planning Department of Agriculture Planning, unpublished data

(3) A A Ibrahim "Economic Study of Poultry In Sharkia Governate Unpublished M Sc thesis, Zagazig University, Department of Agricultural Economics, 1983

(4)A A Ibrahim,"An Analytical Economics Study of Broiler in Egypt and Substitutes" Unpublished Ph D Thesis Zagazig university, Deptartment of Agr Economics, 1992

ANNEX TABLE 11 4 VALUE OF SUBSIDY PER TON OF YELLOW CORN USED FOR BROILER AND LAYER FEEDS, 1976-1988/1989

Year	Cost (LE/ ton)	Subsidized price (LE/ ton)	Subsidy (LE/ ton)	Subsidy as % of cost (%)
1976	51	27	24	47 06
1977	94	28	66	70 21
1978	111	32	79	71 17
1979	129	58	71	55 04
1980/81	165	58	107	64 85
1981/82	175	58	117	66 86
1982/83	196	61	135	68 88
1983/84	241	62	179	74 27
1984/85	201	62	139	69 15
1985/86	229	62	167	72 93
1986/87	236	120	116	49 15
1987/88	329	220	109	33 13
1988/89	378	300	78	20 63

Source Ministry of Supply, Public Agency of Commodities, Unpublished data

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ANNEX TABLE 11 5 FEED INGREDIENT PRICES BEFORE AND AFTER ECONOMIC LIBERALIZATIO

Sales price in 1989 to	Ingredient	Actual Price	Inflated Price in 1993	Local Price 1993	Approximate International Price 1993
Government feed mills	Wheat bran	30	36 90	250	268
Nontraditional manufacturer		90	110 70	250	268
Government mills for feed in excess of quota		100	123 00	250	268
Private sector		200	246 00	250	268
Government feed mills	Cottonseed cake	125	153 75	650	703
Nontraditional manufacturer		n a		650	703
Government mills for feed in excess of quota		600	738 00	650	703
Private sector		n a			
Government feed mills	Unified feed	180	221 40	430	402
Nontraditional manuf		n a			
Government mills for feed in excess of quota		400	492 00	430	402
Private sector		n a			
Government feed mills	Molasses	20	24 60	240	208
Nontraditional manuf		n a			
Government mills for feed in excess of quota		100	123 00	240	208
Private sector		180	221 40	240	208
Government feed mills	Rice bran	75	92 25	300	188
Nontraditional manuf		n a			
Government mills for feed in excess of quota		150	184 50	300	188
Private sector		200	246 00	300	188

Source Fox 1989

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ANNEX TABLE 11 6 FEED INPUTS FOR TRADITIONAL LIVESTOCK FARMS BASED ON 1977 FARM MANAGEMENT SURVEY (AVERAGE FEED INPUTS PER ANIMAL UNIT)

	Farm Size					Weighte
	0-1	1 3	3-5	5-10	>10	average
Total starch equivalent (kg/AU)	1308	2190	2119	2792	1989	1911
% derived from						
Berseem	31	35	42	44	47	37
Conc mix	4	3	6	5	6	4
Bran	2	3	3	1	0	2
Grains & legumes	7	8	8	2	9	7
Straw	30	22	19	12	19	22
Hay	11	8	8	20	9	10
Maize fodder	14	21	14	16	11	18
Total digestible protein (kg/AU)	221	407	419	610	398	358
% derived from						
Berseem	50	52	58	56	65	54
Conc mix	6	4	7	5	7	5
Bran	3	4	4	1	0	3
Grains & legumes	6	6	6	1	6	5
Straw	3	2	2	1	2	2
Hay	16	11	10	22	11	13
Maize fodder	16	22	13	14	10	18

Source Fitch and Soliman (1982), p 14

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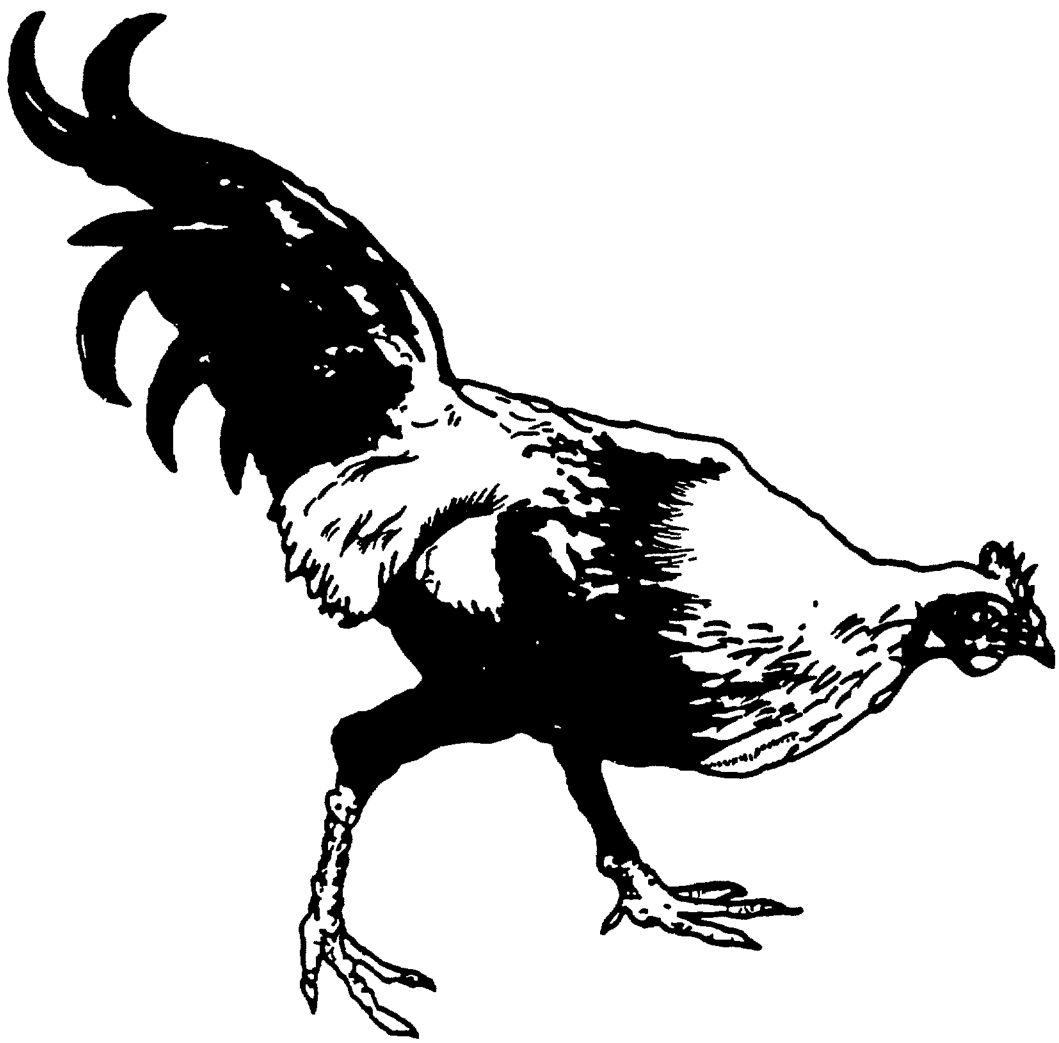
SECTION IV

Livestock, Poultry and Related Enterprises Budget



ANNEX TABLE 12 1 TOTAL DEMAND FOR AGRICULTURAL LABOR IN MAJOR COTTON GROWING AREA
(MILLIONS OF DAYS)

	Crop labor			Livestock labor			Total labor		
Month	Men	Women	Child	Men	Women	Child	Men	Women	Child
Dec	26 80	6 30	8 00	18 9	18 90	8 00	45 70	25 20	9 70
Jan	29 20	5 00	6 00	23 2	21 50	1 70	52 40	26 50	7 70
Feb	26 90	4 40	6 00	29 2	22 30	3 40	56 10	26 70	9 40
March	33 20	5 60	7 20	28 3	21 50	3 40	61 50	27 10	10 60
April	25 00	3 80	4 00	30 1	23 20	3 40	55 10	27 00	7 40
May	46 40	4 00	4 20	29 2	22 30	3 40	75 70	26 30	7 90
June	61 60	4 20	13 70	26 6	22 30	3 40	88 20	26 50	17 10
July	52 80	14 60	36 00	20 6	18 90	1 70	73 40	33 50	37 70
Aug	25 90	16 00	16 20	20 6	18 00	1 70	46 50	34 00	17 90
Sept	25 60	5 00	4 00	20 6	15 50	1 70	46 20	20 50	5 70
Oct	26 70	20 30	22 00	16 3	13 70	1 70	43 00	34 00	23 70
Nov	40 60	5 70	6 00	16 3	13 70	1 70	56 90	19 40	7 70
Total	420 70	94 90	133 30	279 90	231 80	35 20	700 70	326 70	162 50
% by crop or livestock	60	29	79	40	71	21			

Source APCP 1993 (derived from CAPMAS & U/AES

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ANNEX TABLE 12 2 SUMMARY OF RURAL WAGE RATES IN 1991 FOR FIVE VILLAGES IN GHARBIA AND SHARKIA GOVERNRATES

		Average wage rate (LE/day)				
Governate	Village	Winter	Summer	Overall	Maximum	Minimum
Men						
Gharbia	Tag Elage	5 70	7 60	6 63	11 00	2 50
Sharkia	El Birom	4 50	6 20	5 33	7 00	4 00
Sharkia	Ibrash	2 75	5 00	3 88	6 60	4 00
	Average	5 50	5 80	5 67	6 60	4 00
Women						
Sharkia	El Santa	6 20	5 60	5 88	8 00	2 50
Sharkia	El Birom	4 20	5 50	4 83	6 00	4 00
Sharkia	Mashtool	2 75	5 00	3 88	6 60	4 00
	Average	4 45	4 82	4 62	5 30	3 20
Children						
Sharkia	El Santa	2 50	2 40	2 45	3 00	2 00
Sharkia	El Birom	3 50	4 10	3 79	5 00	3 00
Sharkia	Mashtool	2 50	2 70	2 58	3 50	2 00
	Average	2 80	2 90	2 85	3 30	2 50

Source Soliman, Mahdy and Ibrahim (1992), page 7

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ANNEX TABLE 12 3 LABOR USE ON LIVESTOCK ACTIVITIES IN TRADITIONAL EGYPTIAN FARMS
(hours/animal unit)

Farm size	Feeding	Watering	Cleaning	Milking	Milk processing	Total
<3 FD (1 03 AU)						
Men	269 50	100 60	194 00	1 60	0 60	566 3
Women	53 60	79 50	7 40	91 30	66 20	298 00
Children	13 20	7 40	36 60	0 20	0 40	57 80
Total family labor	336 30	187 50	238 00	93 10	67 20	922 10
Hired labor *						12 90
Total all labor						935 00
3 5 FD (2 02 AU)						
Men	254 20	95 10	182 90	1 70	0 60	534 50
Women	51 00	80 00	7 50	66 10	64 40	269 00
Children	12 50	7 00	36 40	0 20	0 40	56 50
Total family labor	317 70	182 10	226 80	68 00	65 40	860 00
Hired labor *						60 20
Total all labor						920 20
5 10 FD (1 26 AU)						
Men	246 00	92 00	177 00	1 60	0 60	517 20
Women	49 00	72 50	6 60	83 30	62 30	273 70
Children	12 10	6 60	35 20	0 20	0 40	54 50
Total family labor	307 10	171 10	218 80	85 10	63 30	845 40
Hired labor *						84 50
Total all labor						929 90
>10 FD (2 97 AU)						
Men	166 70	62 30	120 00	1 10	0 50	350 60
Women	33 20	49 20	4 50	56 50	42 20	185 60
Children	8 20	4 20	23 90	0 10	0 30	36 70
Total family labor	208 10	115 70	148 40	57 70	43 00	572 90
Hired labor *						223 40
Total all labor						796 30
Ave all farms (1 17 AU)						
Men	267 60	100 20	192 60	1 80	0 60	562 80
Women	53 30	79 00	7 40	90 60	67 60	297 90
Children	13 10	7 40	38 30	0 20	0 40	59 40
Total family labor	334 00	186 60	238 30	92 60	68 60	920 10
Hired labor *						55 20
Total all labor						975 30

* Hired labor assumed to be all male labor at the % per farm size as estimated in study
Source Adapted from Soliman Mahdy and Ibrahim (1992) pp 9-12

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ANNEX TABLE 12 4 LABOR USED PER FEDDAN FOR BERSEEM BY MONTH (1991/1992)

Crop	Nov	Dec	Jan	Feb	March	April	May	June	Total
	Months and requirements								
	Man-days								
Long season berseem	3	2	3	3	3	3	4	5	26
Short season berseem	3	3	3	3	0	0	0	0	12
	Woman days								
Long season berseem	2	2	2	2	3	2	5	5	23
Short season berseem	3	3	4	4	0	0	0	0	14
	Child-days								
Long season berseem	1	1	1	2	2	1	2	2	12
Short season berseem	1	2	2	1	0	0		0	6
	Total								
Long season berseem	6	5	6	7	8	6	11	12	61
Short season berseem	7	9	10	9	0	0	0	0	35

Source APCP (1993) originally derived from U/AES data

ANNEX TABLE 12 5 LABOR USE FOR CROP AND LIVESTOCK BASED ON 1977 FARM MANAGEMENT SURVEY

	Farm Size(feddans)					
	0 1	1 3	3 5	5 10	>10	Weighted average
Total labor/farm (days)	394	524	840	1074	2768	554
Crops	108	315	570	915	2346	308
Livestock	286	209	270	159	422	246
Animal units	1 26	1 42	2 59	1 70	3 80	1 54
Labor/animal unit (days)	226 98	147 18	104 25	93 53	111 05	159 74
Source of livestock labor			% of total livestock labor			
Hired	0	2	7	10	39	2
Family						
Men	46	30	37	50	37	40
Women	40	41	42	25	17	40
Children	0	1	1	1	0	0
Elders	13	27	13	16	7	18

Source Fitch and Ibrahim 1982 p 10

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ANNEX TABLE 12 6 SUMMARY OF LABOR REQUIREMENTS FOR LIVESTOCK PRODUCTION

Enterprise	Year	Production system	Cost/kg (Piasters)	Cost/head year (LE)	Labor/head/ year (hrs)
Milk cattle(1)	1991	Smallholder	197 53	1380 7	699
Milk buffalo(1)	1991	Smallholder	76 35	774 9	1015
Commercial milk(2)	1986/87	Public sector		106 1	
Commercial milk(2)	1986/87	Private		83 5	
All livestock(3)	1991	Smallholders		833 0	952
All livestock(4)	1977	Smallholders			160 0
Buffalo fattening(5)	1992	Commercial		55 0	88 0

Sources

1 Soliman et al 1992 Milk Production Performance on Conventional Egyptian Farms Food Sector Development Project

2 Soliman I 1988

3 APCP (1993) Cotton Supply Response Study

4 Fitch and Ibrahim 1982

5 Winrock International 1992

ANNEX TABLE 13 1 ESTIMATED PRODUCTION COSTS FOR LONG SEASON BERSSEM IN MAJOR COTTON GROWING GOVERNATES 1991/1992 WINTER SEASON

	Areas stratified by type of cotton grown			
	ELS	LS varieties		All
	varieties	Giza 75	Other	varieties
Sample size	85	128	87	300
Feddan per farm	1 76	1 30	1 10	1 37
Seed				
Kala/FD	2 02	2 05	2 43	2 12
LE/Kala	28 56	31 03	33 83	30 93
LE/FD	57 69	63 61	82 21	65 57
Manure LE/FD	1 67	3 15	17 04	5 85
Nitrogen				
KG/FD	17 42	16 78	21 27	18 05
LE/FD	17 68	19 09	22 80	19 44
Phosphurus				
KG/FD	22 81	27 13	30 88	26 44
LE/FD	29 76	35 21	40 80	34 53
Potassium				
KG/FD	0 32	0 29		0 23
LE/FD	0 24	0 24		0 18
Herbicide LE/FD		0 21	1 03	0 33
Insecticide LE/FD		2 32	2 51	1 52
Machinery costs				
Land preparation	18 15	16 76	24 17	18 99
Transport	9 89	4 27	2 19	5 83
Irrigation	22 41	45 62	84 17	46 17
Other	8 29	1 05	3 18	4 17
Total	58 74	67 70	113 71	75 16
Animal costs				
Land preparation	0 20	0 94		0 45
Transport	7 41	23 24	40 69	21 56
Irrigation	5 22	0 73		2 19
Other	1 39	0 11	0 37	0 63
Total	14 22	25 02	41 06	24 83
Labor costs		(LE/FD)		
Man days equivalent	33 48	34 71	38 67	35 19
Ave wage rate	4 23	4 95	4 44	4 57
Costs for				
Apply fertilizer	5 23	6 94	5 98	6 10
Land preparation	3 27	6 28	10 66	6 21
Planting	4 61	5 45	4 22	4 86
Cutting	89 42	97 58	108 76	97 22
Transport	16 38	35 48	16 42	24 11
Irrigation	16 58	19 88	21 36	19 02
Other	6 14	0 29	4 28	3 34
Total	141 63	[illegible]1 90	171 68	160 86

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ANNEX TABLE 13 1 ESTIMATED PRODUCTION COSTS FOR LONG SEASON BERSSEM IN MAJOR COTTON GROWING GOVERNATES, 1991/1992 WINTER SEASON
(Continued)

	Areas stratified by type of cotton grown			
	ELS	LS varieties		All
	varieties	Giza 75	Other	varieties
Summary of Costs and Returns				
Costs				
Seed	57 69	63 61	82 21	65 57
Manure	1 67	3 15	17 04	5 85
Nitrogen	17 68	19 09	22 80	19 44
Phosphurus	29 76	35 21	40 80	34 53
Potassium	0 24	0 24	-	0 18
Herbicide	-	0 21	1 03	0 33
Insecticide	-	2 32	2 51	1 52
Machinery	58 74	67 70	113 71	75 16
Animal	14 22	25 02	41 06	24 83
Labor	141 63	171 90	171 68	160 86
Total costs	321 63	388 45	492 84	388 27
Returns				
Berseem				
Ave no cuts	3 61	4 08	3 71	3 82
LE/cut	226 44	272 36	253 38	252 33
LE/FD	817 45	1111 23	940 04	963 90
Berseem seed				
Ardeb/FD	0 44	0 15	0 10	0 24
LE/Ardeb	214 46	257 48	301 11	233 06
LE/FD	94 36	38 62	30 11	55 93
Total	911 81	1149 85	970 15	1019 84
Net returns to land, capital and management				
LE/FD	590 18	761 40	477 31	631 56

ELS are extra long staple varieties
LS are long staple varieties

Source Cotton Supply Response Study pp 67-68

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ANNEX Table 13 2 Estimated Production Costs for Short Season Berseem in Major Cotton Growing Governates 1991/1992 Winter Season

	Areas stratified by type of cotton grown			
	ELS	LS varieties		All
	varieties	Giza 75	Other	varieties
Sample size	85	128	87	300
Feddan per farm	2 05	0 98	1 14	1 33
Seed				
Kala/FD	1 97	2 02	2 40	2 09
LE/Kala	29 49	34 99	35 05	32 75
LE/FD	58 10	70 68	84 12	68 45
Manure LE/FD	1 80	0 12	8 64	2 97
Nitrogen				
KG/FD	4 34	7 89	15 51	8 23
LE/FD	4 73	8 61	16 59	8 99
Phosphurus				
KG/FD	17 77	19 56	26 43	20 48
LE/FD	23 09	26 31	34 64	26 97
Potassium				
KG/FD		0 19	0 73	0 24
LE/FD		0 14	0 61	0 20
Herbicide LE/FD	0 11		0 09	0 07
Insecticide LE/FD	0 34	1 64	3 74	1 59
Machinery costs				
Land preparation	7 46	13 23	26 81	14 07
Transport	1 68	3 19	1 56	2 13
Irrigation	6 85	26 86	42 74	22 05
Total	15 99	43 28	71 11	38 25
Animal costs				
Transport	7 15	8 28	26 10	12 21
Other	0 15	0 36		0 18
Total	7 30	8 64	26 10	12 39
Labor costs		(LE/FD)		
Man days equivalent	33 48	34 71	38 67	35 19
Ave wage rate	4 23	4 95	4 44	4 57
Costs for				
Apply fertilizer	3 92	5 78	5 15	4 81
Land preparation	3 75	8 34	9 82	6 70
Planting	4 69	5 03	5 53	5 01
Cutting	37 83	41 81	62 05	45 09
Transport	4 26	15 29	12 96	9 88
Irrigation	0 45	9 42	9 44	5 50
Other	0 83		0 52	0 49
Total	55 73	85 67	105 47	77 48

ANNEX Table 13 2 Estimated Production Costs for Short Season Berseem in Major Cotton Growing Governates, 1991/1992 Winter Season (Continued)

	Areas stratified by type of cotton grown			
	ELS	LS varieties		All
	varieties	Giza 75	Other	varieties
Summary of Costs and Returns				
Costs				
Seed	58 10	70 68	84 12	68 45
Manure	1 80	0 12	8 64	2 97
Nitrogen	4 73	8 61	16 59	8 99
Phosphurus	23 09	26 31	34 64	26 97
Potassium	-	0 14	0 61	0 20
Herbicide	0 11	-	0 09	0 07
Insecticide	0 34	1 64	3 74	1 59
Machinery	15 99	43 28	71 11	38 25
Animal	7 30	8 64	26 10	12 39
Labor	55 73	85 67	105 47	77 48
Total costs	167 19	245 09	351 11	237 36
Returns				
Berseem				
Ave no cuts	2 02	1 69	2 05	1 92
LE/cut	190 04	231 41	278 26	224 73
LE/FD	383 88	391 08	570 43	431 48
Net returns to land, capital and management				
LE/FD	216 70	145 99	219 32	194 12

ELS are extra long staple varieties
LS are long staple varieties

Source Cotton Supply Response Study, p 69

ANNEX Table 13 3 Long berseem budget Musha village
(1979 data adjusted for 1991/1992 prices)

Variable costs		Revenue from berseem	
Seed		Cuttings/FD	3 00
KALA/FD	3 00	LE/cutting	250 00
LE/KALA	31 00	LE/FD	750 00
LE/FD	93 00	Seed	
Machinery cost/FD		Ardeb/FD	1 00
Plowing	19 00	LE/Ardeb	233 00
Irrigation	45 00	LE/FD	233 00
Total	64 00	Straw	
Phosphurus/FD		Hemel/FD	3 70
KG/FD	46 50	LE/hemel	24 00
LE/KG	1 30	LE/FD	88 80
LE/FD	60 45	Total	1071 80
Animal costs/FD			
Transport forage			
Units	120 00		
LE/unit	0 24		
Total	28 80		
Transport straw			
Units	10 00		
LE/unit	0 24		
Total	2 40		
Transport seed			
Units	3 00		
LE/unit	2 40		
Total	7 20		
Total animal costs	38 40		
Labor cost/FD			
Non harvest			
Man days/FD	14 00		
LE/man day	4 60		
LE/FD	64 40		
Harvest			
Man days/FD	47 00		
LE/man day	4 60		
LE/FD	216 20		
Total labor cost/FD	280 60		
Total variable cost/FD	536 45		
Net receipts to land capital and management			
LE/FD	535 35		

Notes Prices for forage and seed land preparation irrigation fertilizer and labor taken from averages in cotton supply response study Prices for manure and draft power adjusted for 1991 prices

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ANNEX Table 13 4 Long Season Berseem Budget for Zaweit Ghazal Ezeb Kabeel Village (1979 survey data adjusted for 1991/1992 prices)

Variable costs		Revenue	
Seed		Berseem	
KALA/FD	3 00	Cuttings/FD	4 00
LE/KALA	31 00	LE/cutting	250 00
LE/FD	93 00	LE/FD	1000 00
Manure			
Donkey loads/FD	200 00		
LE/donkey load	0 24		
LE/FD	48 00		
Machinery cost/FD			
Plowing	19 00		
Irrigation	58 00		
Total	77 00		
Phosphurus/FD			
KG/FD	15 50		
LE/KG	1 30		
LE/FD	20 15		
Animal costs/FD			
Transport forage			
Donkey loads	130 00		
LE/unit	0 24		
Total	31 20		
Total animal costs	31 20		
Labor cost/FD			
Non harvest			
Man days/FD	12 00		
LE/man day	4 60		
LE/FD	55 20		
Harvest			
Man days/FD	22 00		
LE/man day	4 60		
LE/FD	101 20		
Total labor cost/FD	156 40		
Total variable cost/FD	425 75		
Net receipts to land capital and management			
LE/FD	574 25		

Notes Prices for berseem forage and seed land preparation irrigation preparation irrigation fertilizer and labor taken from averages for long season berseem from cotton supply response study Prices for manure and draft power adjusted by inflation factor 1979 1991

Source Winrock International 1980 p 136

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ANNEX Table 13 5 Short season Berseem Budget Zaweit Ghazal Ezeb Kabeel Village (1979 survey data adjusted for 1991/1992 prices)

Variable costs		Revenue	
Seed		Berseem	
KALA/FD	3 00	Cuttings/FD	1 00
LE/KALA	31 00	LE/cutting	250 00
LE/FD	93 00	LE/FD	250 00
Manure			
Donkey loads/FD	200 00		
LE/donkey load	0 24		
LE/FD	48 00		
Machinery cost/FD			
Plowing	19 00		
Irrigation	21 75		
Total	40 75		
Phosphurus/FD			
KG/FD	15 50		
LE/KG	1 30		
LE/FD	20 15		
Animal costs/FD			
Transport forage			
Donkey loads	40 00		
LE/unit	0 24		
Total	9 60		
Total animal costs	31 20		
Labor cost/FD			
Non harvest			
Man days/FD	7 00		
LE/man day	4 60		
LE/FD	32 20		
Harvest			
Man days/FD	7 00		
LE/man-day	4 60		
LE/FD	32 20		
Total labor cost/FD	64 40		
Total variable cost/FD	297 50		
Net receipts to land capital and management			
LE/FD	47 50		

Notes Prices for berseem forage and seed land preparation irrigation fertilizer and labor taken from averages for long season berseem from cotton supply response study Prices for manure and draft power adjusted for 1991 prices

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ANNEX Table 13 6 Competitiveness of Major Crops

Crop	Financial Net Return	Economic Net Return	Value Added	Domestic Resource Cost	Nominal Rate of Protection	Effective Rate of Protection
Wheat	684 1	525 6	1289 0	0 6	-0 2	-0 2
Long berseem	802 8	181 5	777 2	0 8	0 1	0 3
Short berseem	292 5	-47 5	294 9	1 2	0 1	0 4
Beans	628 1	134 2	903 0	0 9	0 0	0 1
Maize	489 6	216 2	1033 5	0 8	-0 2	0 2
Rice	609 4	35 1	1362 9	1 0	-0 3	0 2
Cotton	737 0	740 0	2073 0	0 6	-0 4	0 3
Potatoes	923 7	361 7	1177 2	0 7	0 0	0 1
Sugar Cane	1836 4	-636 2	1552 0	1 4	0 2	0 6
Sugar beet	230 0	137 9	953 5	0 9	-0 3	0 3
Tomatoes	2140 7	1480 2	2665 2	0 4	0 0	0 1
Oranges	1237 3	604 9	1433 3	0 6	0 0	0 1
Sunflowers	616 3	198 7	830 9	0 8	0 0	0 1

Note Net returns and value added expressed in LE per feddan

Source World Bank, 1992, p 38

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ANNEX Table 13 7 Competitiveness of Major Rotations

Rotations	Financial Net Return	Economic Net Return	Value Added	Domestic Resource Cost
Short berseem	292 5	-11 5	330 9	1 2
Cotton	737 0	740 0	2073 0	0 6
Total	1029 5	728 5	2403 9	0 7
Wheat	684 1	525 6	1289 0	0 6
Maize	489 6	216 2	1033 5	0 8
Total	1173 7	741 7	2322 5	0 7
Wheat	684 1	525 6	1289 0	0 6
Rice	609 4	35 1	1362 9	1 0
Total	1293 5	560 6	2651 9	0 8
Long berseem	802 8	253 5	849 2	0 8
Maize	489 6	216 2	1033 5	0 8
Total	1292 4	469 7	1882 7	0 8
Sugar	1836 4	-636 2	1552 0	1 4

Net returns and value added expressed in LE
Source World Bank, 1992, p 38

ANNEX Table 13 8 Returns to Crop Rotations in Major Cotton Growing Areas 1991

ELS Cotton Areas		RETURN RATIO
RETURNS TO ROTATION	LE/feddan	(% of cotton-short berseem ratio)
Cotton-short berseem	1599	100
Cotton-Fava beans	1646	103
Rice-Wheat	1109	69
Maize-Wheat	1230	77
Rice-Long berseem	997	62
Miaze-Long berseem	1118	70
Maize-Fava beans	866	54
Giza-75 Areas		RETURN RATIO
RETURNS TO ROTATION	LE/feddan	(% of cotton-short berseem ratio)
Cotton short berseem	1031	100
Cotton Fava beans	1140	111
Rice-Wheat	1062	103
Maize-Wheat	1320	128
Rice-Long berseem	991	96
Miaze-Long berseem	1249	121
Maize-Fava beans	887	86
Other LS Areas		RETURN RATIO
RETURNS TO ROTATION	LE/feddan	(% of cotton-short berseem ratio)
Cotton-short berseem	917	100
Cotton-Fava beans	1125	123
Maize-Wheat	1124	133
Maize-long berseem	892	97
Maize-Fava beans	867	94

Source The Response of Egyptian Farmers to Cotton Policy Interventions Report of thr Cotton Supply Response Team Agricultural Production and Credit Project, Cairo Egypt page 89

Annex Table 14 1 Average Production Costs per 5000 Bird lots Of Broiler Chickens (Average of 5 lots/year)

Item Year	1989(1)	1990(1)	1991(1)	1993(2)	1993(3)
Variable costs					
Feed costs	12915	15120	15561	14085	15175
Labor cost	536	616	708	1115	600
Medicine	600	800	1120	900	650
Veterinary	200	200	230	60	310
Others (4)	240	295	700	1720 45	1023
Sub total	14491	17031	18319	17880 45	17758
Fixed costs					
Day old chicks	3275	3530	4015	4750	4600
Depreciation	300	300	300		
Maintenance	100	100	120	75	
Taxes & fees	320	370	420		
Others (5)	184	204	225	1000	
Imputed interest				402	400
Sub total all fixed costs	4179	4504	5080	6227	5000
Total costs	18670	21535	23399	24108	22758
Less revenue from					
Manure	625	688	750	500	500
Feed bag sales	168	189	210	126	140
Net cost of production	17877	20658	22439	23482	22118
Mortality rate	5 1%	5 1%	5 1%	4 9%	6%
No birds marketed	4745	4745	4745	4849	4700
Average livewight/kg	1 63	1 63	1 63	1 60	1 60
Liveweight marketed	7734	7734	7734	7739	7520
Net cost/bird marketed	3 768	4 354	4 729	4 843	4 706
Net cost/kg marketed (liveweight)	2 31	2 67	2 90	3 03	2 94
Farmgate price/kg	2 51	2 84	2 96	3 41	3 50
Broiler revenue	19412	21965	22893	26390	26320
Profit per kg liveweight	0 20	0 17	0 06	0 38	0 56

Assumptions For references (1) feed costs include feed and transportation costs

(2) Feed conversion rate ranged from 2 26 to 2 462 kg

Sources

(1) El syed A and Samah H S Economic Analysis for Poultry Production and Marketing in Egypt Egyptian Journal of Agricultural Economics Vol 2 No 2

(2) MILARCGYPT Chairman office Unpublished data

(3)Based on team field survey

(4) Ali Ahmed Ibrahim An Economic Study for Poultry In SharkiaGovernorate Zagazig University Department of Agricultural Economics Unpublished Ms C Thesis 1983

(5) Ali Ahmed Ibrahim An Analytical Economic Study for broiler In Egypt and Substitutes Zagazig University Department of Agricultural Economics Unpublished Ms C Thesis 1992

Table 14 2 Budget for Commercial Layer Chickens
(per 1000 eggs produced in 1990/91 and 1993)

Items	Reference Year	(1 2) 1990/91	(3) 1992(1)	(4) 1993
Variable Costs				
Feed		118 20	101 34	112 00
Chicks		4 00	6 48	6 48
Veterinary		0 77	Na	Na
Medicine		3 80	2 35	3 99
Layer & egg loss		5 00	9 33	10 38
Seasonal labor		0 53	Na	Na
Heating & lighting		1 00	4 19	3 95
Others(1)		0 16	9 05	2 66
Sub total		133 46	132 74	139 45
Fixed costs				
Management		2 94	Na	0 15
Permanent labor		10 56	2 62	2 71
Depreciation		5 15	5 70	6 81
Maintenance		0 54	2 92	Na
Interest		2 49	2 60	6 48
Others(2)		1 03	0 69	Na
Sub total		22 71	14 53	16 15
Total cost /1000 eggs		156 17	147 27	155 60
Less Revenue from				
Net change in inventory		14 30	15 74	15 74
Manure		1 18	0 52	0 52
Used feed bags		1 74	3 04	3 04
Net cost of production/1000 eggs		138 95	147 27	136 30
Net cost of production/dozen eggs		1 67	1 77	1 64
Egg revenue/1000 eggs		144 90	153 00	163 00
Profit per 1000 eggs		5 95	5 73	26 70

(1) Includes watering transport and miscellaneous
(2) Includes insurance taxes fees stationary
published material and phone bill
(3) Average farm gate prices of day old chick layer manure and unused feed bags are 1 75 3 14 20 and 0 5 L E respectively
Sources
(1) A F Mashhour Economics of Egg Production In Sharkia Governate Unpublished M Sc Thesis Zagazig University Department of Agricultural Economics 1987
(2) Ministry of Agriculture Agricultural Research Centre
Agricultural Economics Research Institute
Current and Future Situation of Broilers and Eggs 1993
(3) U S Agricultural Attache Poultry Annual Report 1993
(4) Team field visits November 1993

ANNEX Table 14 3 Costs and Returns for Commercial Dairy Enterprises 1991 92 Prices
in LE per cow and per kg of milk

	Exotic cattle						Cross bred Cattle		Pure Holsteir (4)
	High Productivity		Meduim Productivity		Low productivity				
Item	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	1993 Pric
Cash Costs/Cow									
Feed									
Berseem	501 00		419 00		389 00				
Darawa		83 00		75 00		73 50			
Concentrate feed mix	858 00	606 00	515 00	344 00	420 00	331 00			
Brans	82 00	57 00	57 00	38 00	60 90	33 00			
Others(1)			15 80	10 50					
Sub total feed	1441 00	746 00	1006 80	467 50	869 90	437 50	756 00	324 00	5748
Hired labor	26 00	11 00	48 00	21 00	11 00	6 20	14 20	6 10	220
Medicine & Veterinary serv	54 00	54 00	54 00	54 00	54 00	54 00	15 40	6 60	220
Others(2)	401 00	401 00	284 00	284 00	164 00	164 00	8 70	8 70	137
Sub total all Cash costs	1922 00	1212 00	1392 80	826 50	1098 90	661 70	794 30	345 40	6326
Noncash Costs/Cow									
Imputed costs of capital	245 00	245 00	205 00	205 00	180 00	180 00	247 00	106 00	0
Others(3)	10 00	10 00	10 00	10 00	10 00	10 00	8 00	8 00	717
Sub total Noncash costs	255 00	255 00	215 00	215 00	190 00	190 00	255 00	114 00	717
Total costs/cow	2177 00	1467 00	1607 80	1041 50	1288 90	851 70	1049 30	459 40	7044
Less revenue from									
Calf sales	193 00	83 00	137 00	59 00	179 00	77 00	129 30	98 30	1158
Net change in inventory	185 00	185 00	89 00	89 00	195 00	195 00	122 20	52 40	858
Manure	61 00	26 00	26 00	10 00	41 00	18 00	71 20	30 50	683
Sub total	439 00	294 00	252 00	158 00	415 00	290 00	322 70	181 20	2700
Net total costs/cow	1738 00	1173 00	1355 80	883 50	873 90	561 70	726 60	278 20	4344
Milking yield/head (kg)	3304 00	1945 00	2132 00	1410 00	1630 00	897 00	2019 00	865 00	7930
Net total costs/kg	0 53	0 60	0 64	0 63	0 54	0 63	0 36	0 32	0
Average milk price/kg	0 70	0 75	0 70	0 75	0 70	0 75	0 70	0 75	0
Profit or loss/kg	0 17	0 15	0 06	0 12	0 16	0 12	0 34	0 43	0 2

(1) Includes flour wheat straw and dried bread
(2) Includes mortality loss
(3) Includes depreciation and bedding
(4) Based on Team trip milk productivity is 26 kg/head/day lactation period is 305days cow value is $ 2000 calf value is L E 1000

Sources (1) Soliman & Abdel Zaher The Impact of Governorat Polices Efficiency of Milk Production System in Egypt Ninth International Congrss for Statistics Social and Demographic Research Ain Shams Univ Press 31 March 10 April
(2) Soliman & Fitch Economics of livestock on Traditional Farm Zagazig Univ Faculty of Agriculture Bulletin No 679 June 1982
(3) Field Study Sample Survey 199
(4) Soliman Mahdy & Ali Milk Production Performance on Conventional Egyptian Farm Eurapian Economic Community & Ministry of Agriculture Food Sector Development Project Workshop July 1992

ANNEX Table 14 4 Commercial Buffalo Dairy Budget, 1993 prices

I Returns	Units	Quantity	Price/unit	Total
A Milk Value	kgs	1565	1 10	1721 50
B Manure value (10 donkey loads=1 cubic meter)	cubic mtr	15 00	5 00	75 00
C Calf Sales	kgs	70 00	6 50	455 00
D Inventory change	L.E			60 66
	Total returns			2312 16
Cash Costs	Units	Quantity	Price/unit	Total
A Feed costs				
Straw	kgs	320 00	0 04	12 80
Hay	kgs	390	0 22	85 80
Berseem	kgs	4500 00	0 04	180 00
Dharawa(green maize)	kgs	3000 00	0 08	240 00
Concentrate(non traditional)	kgs	1669 00	0 40	667 60
B Veterinary services	L E			20 00
C Mortality loss	%	0 01	2312 16	23 12
		Sub total		1229 32
Less revenue from				
Calf Sales				19 02
Net Chang in inventory				41 66
Manure		15	5	75
Sub total				135 68
Net Cash Costs				1093 642
III Return less Net Cash Costs				1218 518
III Non-cash costs				
Family labor	man/day	30 00	5 00	150 00
Interest on equity	L E	1206 20	0 18	217 12
Transportation	L E			20 00
Animal work	days	15 00	2 00	30 00
Bedding	cubic mtr	7 50	4 00	30 00
		Sub total		447 12
IV Total Costs				1540 76
V Profitability measures				
A Cost/kg milk produced	LE/kg	1565 00	1540 76	0 98
B Adjusted cost/kg(1)	LE/kg	2621 38	1540 76	0 59
C Net profit/head	LE/head			771 40
D Net profit/kg milk	LE/kg	1565 00	771 40	0 49

Sources
(1) Field trip November 1993
(2) Ministry of Agriculture and Land Reclamation National Agricultural Research Project Agricultural Policy Analysis Component. Dairy Situation and Outlook Report March 1991
(3)European Economic Community & Ministry of Agriculture Food Sector Development Project Milk Production Performance on Conventional Egyptian Farm July 1992
Notes
(1) Buffalo milk yield adjusted upwards via Jane s equation to make it comparable to cow s milk at 4% butterfat and buffalo milk at 7 2% fat

ANNEX Table 14 5 Farm Budget for Dairy Production on conventional farms
1991 92 prices

Item	Buffalo Winter	Buffalo Summer	Cow Winter	Cow Summer
Return				
Milking head/holding (1)	0 85	0 85	1 30	1 30
Milking yield/head (Kg)(2)	837 31	358 85	528 00	230 00
Average milk price	0 90	0 95	0 70	0 75
Total return	753 58	340 91	369 60	172 50
Cash costs				
Feed	99 15	63 44	97 54	65 35
Hired labor	14 28	7 02	16 64	10 64
Veterinary service	5 98	2 29	2 70	6 22
Mortality loss	2 74	0 77	2 46	3 87
Sub total	122 15	73 52	119 34	86 08
Less revenue from				
Calf sales	9 14	9 88	18 50	18 50
Net change in inventory	20 05	21 61	30 95	30 95
Manure	1 48	1 75	2 99	2 99
Sub total	30 67	33 24	52 44	52 44
Net Cash Costs	91 48	40 28	66 90	33 64
Return Less Net Cash Costs	662 10	300 63	302 70	138 86
Noncash Costs				
Interest on equity	38 22	38 22	27 30	27 30
Family Labor	159 00	136 00	265 00	190 00
Sub total	197 22	174 22	292 30	217 30
Net Total Costs	288 70	214 50	359 20	250 94
Profitability Measures				
Net Total Costs/kg	0 34	0 60	0 68	1 09
Adjusted milk produced	1276 90	547 25	583 44	254 15
Adjusted Costs/kg	0 23	0 39	0 62	0 99
Profit or loss per kg	0 56	0 35	0 02	0 34

(1) Milking head/holding is weighted by herd structure in different farm size
(2) Milk yield per head is weighted by milking head/holding in each farm size
Sources (1) Soliman & Abdel Zaher The Impact of Governorat Polices Efficiency of Milk Production System in Egypt Ninth International Congrss for Statistics Social and Demographic Research Ain Shams Univ Press 31 March 10 April 1984
(2) Soliman & Fitch Economics of livestock on Traditional Farm Zagazig Univ Faculty of Agriculture Bulletin No 679 June 1982
(3) Field Study Sample Survey 199
(4) Ibrahim Soliman S Mahdy & Ali Ibrahim Milk Production Performance on Conventional Egyptian Farm Eurapian Economic Community & Ministry of Agriculture Food Sector Development Project Workshop July 1992

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ANNEX Table 14 6a Buffalo Feedlot Finishing Budgets (2000 head unit)

I Returns	Units	Quantity	Price	Total
A Manure sales	Ton	15 00	5 00	75 00
B Sale of fat animal	kgs	400 00	5 15	2060 00

Total returns				2135 00
II Costs	Units	Quantity	Price	Total
A Purchase calf	kgs	200 00	7 00	1400 00
B Feed costs				
Berseem	kgs	1510 00	0 04	61 91
Straw		990	0 04	39 60
Hay		300	0 22	66 00
Conc (non-traditional)	kgs	1770 00	0 42	743 40

Sub-total, feed costs				910 91
C Other cash costs				
Hired labor		7 60	5 00	38 00
Interest	year	1400 00	18 00%	210 00
Mortality loss	%	2 00%	1400 00	28 00
Drugs				37 50
Machinery				25 00
Utilities				15 00

Sub-total, other cash cost				353 50
F Total costs				2664 41
Profit/head				-529 41
G Cost/kg meat		(kg)		
Feedlotting cost	LE/kg	200 00	1264 41	6 32
Liveweight	LE/kg	400 00	2664 41	6 66
Carcass weight(60 lw)	LE/kg	216 00	2664 41	12 34

Source

Adapted from Winrock International, Proposed Workplan for Buffalo Fattening Project, September, 1992

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ANNEX TABLE 14 6b Buffalo Feedlot Fattening Budget 2

Stage 1 Weaning to 150 kgs	Units	Quantity	Cost/unit	Total Cost
Total gain (kgs)		70		
Average daily gain (kgs)		0 65		
Days in stage		108		
Cost of calf	Animal	80	7 5	600 00
Straw cost	kgs	216	0 02	4 32
Berseem cost	kgs	324	0 04	12 96
Concentrate cost	kgs	216	0 45	97 20
			Sub-total	714 48
Stage 2 Growing 150 250kgs	**Units**	**Quantity**	**Cost/unit**	**Total Cost**
Total gain (kgs)		100		
Average daily gain (kgs)		0 8		
Days in stage		125		
Straw cost	kgs	375	0 02	7 50
Berseem cost	kgs	1250	0 04	50 00
Concentrate cost	kgs	500	0 45	225 00
			Sub total	282 50
Stage 3 Growing 250-300kgs	**Units**	**Quantity**	**Cost/unit**	**Total Cost**
Total gain		50		
Average daily gain		0 70		
Days in stage		71		
Straw cost	kgs	213	0 02	4 26
Berseem	kgs	355	0 04	14 20
Concentrate	kgs	420	0 43	180 60
Sub total			Sub total	199 06
Stage 4 Finishing 300-400 kgs	**Units**	**Quantity**	**Cost/unit**	**Total Cost**
Total gain		100		
Average daily gain		1 00		
Days in stage		100		
Straw cost		450	0 02	9 00
Berseem		0	0 04	0 00
Concentrate		800	0 43	344 00
			Sub total	353 00
		Total variable costs		1549 04
Fixed cost	**Units**	**Quantity**	**Cost/unit**	**Total Cost**
Total days of feeding	days	404		
Labor	days	96 00	5 00	480 00
Interest	%	1074 52	0 18	193 41
Depreciation	%	1000 00	0.067	67 00
Utilities				25 00
Mortality				
weaning to 200 kg	%	855 73	0 06	51 34
200 gk to 400 kg	%	1956 0	0 0075	14 67
		Total fixed costs		831 43
Total cost				2380 47
	Unit	**Quantity**	**Cost/unit**	**Total Cost**
Cost/kg of gain	LE/kg	320 00	1780 47	5 56
Total cost/kg	LE/kg	400 00	2380 47	5 95
Cost/kg carcass (54 dressing)	LE/kg	216 00	2380 47	11 02
Revenues	**Unit**	**Quantity**	**Revenue/unit**	**Total Revenue**
Sales	Animal	400 00	5 15	2060 00
Manure sales	tons	15 00	5 00	75 00
Total revenue				2135 00
		Profit/ head		245 47

Assumption 1 Based on field visits and current prices
2 The quantity (cost of dead animal) for mortality cost calculations
were 100% of calf value and 50% of all other costs
3 Feeding rates can be calculated by dividing total feed used by days in stage
4 Interest costs were calculated as 100% of calf costs and 50% of other
variable costs weighted by years in total cycle (total days on feed/365)
5 Depreciation based on investment of LE 1000/animal and 15 year depreciation

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ANNEX Table 14 7a Dairy Bull Cattle Feedlot Fattening Budget

Returns	Units	Quantity	Price/unit	Total
A Manure value (10 donkey loads=1 cubic meter)	cubic mtr	7 50	5 00	37 50
B Value of fattened animal	kgs	400 00	5 50	2200 00
Total returns				2237 50
Costs	Units	Quantity	Price/unit	Total
A Purchase feeder calf	kgs	250 00	6 50	1625 00
B Feed costs				
Straw	kgs	592 00	0 04	23 68
Berseem	kgs	350 00	0 04	14 00
Concentrate(non-traditional)	kgs	1860 00	0 42	781 20
Sub-total, feed costs				818 88
Other cash costs				
Mortality loss	%	2 00%	1625 00	32 50
Veterinary expenses				10 00
Interest on capital	%	0 18%	1625 00	146 25
Hired labor		11	5	55 00
Total costs				2687 63
Profit/head				-450 13
Cost/kg meat produced				
Liveweight	LE/kg	420 00	2687 63	6 40
Carcass weight(0 60 lw)	LE/kg	235 20	2687 63	11 43

Source Team field visits

Assumptions

1 Fatttening period of 6 months

2 Starting weight 250 kgs

3 Ending weight of 400 kgs

4 Average daily gain is 0 833/day

Table 14 7b Cattle Feedlot Fattening Budget 2

Stage 1 Weaning to 150 kgs	Units	Quantity	Cost/unit	Total Cost
Total gain (kgs)		70		
Average daily gain (kgs)		0 7		
Days in stage		100		
Cost of calf	Animal	80	7 5	600 00
Straw cost	kgs	200	0 02	4 00
Berseem cost	kgs	300	0 04	12 00
Concentrate cost	kgs	210	0 45	94 50
			Sub total	710 50
Stage 2 Growing 150-250kgs	**Units**	**Quantity**	**Cost/unit**	**Total Cost**
Total gain (kgs)		100		
Average daily gain (kgs)		0 8		
Days in stage		125		
Straw cost	kgs	375	0 02	7 50
Berseem cost	kgs	1125	0 04	45 00
Concentrate cost	kgs	500	0 45	225 00
Sub total			Sub total	277 50
Stage 3 Growing 250 300kgs	**Units**	**Quantity**	**Cost/unit**	**Total Cost**
Total gain		50		
Average daily gain		0 80		
Days in stage		63		
Straw cost	kgs	188	0 02	3 75
Berseem	kgs	344	0 04	13 75
Concentrate	kgs	406	0 43	174 69
Sub total			Sub total	192 19
Stage 4 Finishing 300-400 kgs	**Units**	**Quantity**	**Cost/unit**	**Total Cost**
Total gain		80		
Average daily gain		0 90		
Days in stage		89		
Straw cost		356	0 02	7 11
Berseem		0	0 04	0 00
Concentrate		711	0 43	305 78
Sub total			Sub total	312 89
		Total variable costs		1493 08
Fixed cost	**Units**	**Quantity**	**Cost/unit**	**Total Cost**
Total days of feeding	days	376		
Labor	days	96 00	5 00	480 00
Interest	%	1200 00	0 18	216 00
Depreciation	%	1000 00	0 07	67 00
Utilities				25 00
Mortality	%	1455 09	0 02	29 10
		Total fixed costs		817 10
Total cost				2310 18

	Unit	Quantity	Cost/unit	Total Cost
Cost/kg of gain	LE/kg	300 00	1710 18	5 70
Total cost/kg	LE/kg	380 00	2310 18	6 08
Cost/kg carcass (56 dressing)	LE/kg	212 80	2310 18	10 86

Revenues	Unit	Quantity	Revenue/un	Total Reven
Sales	Animal	400 00	5 15	2060 00
Manure sales	tons	17 00	5 00	85 00
Total revenue				2145 00
		Profit/ head		165 18

Assumptions 1 Based on field visits and current prices
2 The quantity (cost of dead animal) for mortality cost calculations were 100% of calf value and 50% of all other costs
3 Feeding rates can be calculated by dividing total feed used by days in stage
4 Interest costs were calculated as 100% of calf costs and 50% of other variable costs weighted by years in total cycle (total days on feed/365)
5 Labor inputs and costs summarized from various sources Depreciation based on on investment of LE 1000/animal and 15 year depreciation
6 Starting weight is 80 kgs and final weight is 380 kgs

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Table 14 8 Buffalo Fattening Budget for Smallholder 1993 prices

I Returns	Units	Quantity	Price/unit	Total
A Manure value (10 donkey loads=1 cubic meter)	cubic mtr	15 00	5 00	75 00
B Value of fattened animal	kgs	400 00	6 12	2600 00
	Total returns			2675 00
II Cash costs	Units	Quantity	Price/unit	Total
Purchase feeder calf	kgs	180 00	7 00	1260 00
Straw	kgs	600 00	0 04	24 00
Berseem	kgs	2250 00	0 04	90 00
Concentrate(non traditional)	kgs	1950 00	0 42	819 00
Veterinary services				20
Mortality loss	%	0 01	2213	22 13
Sub total cash costs				2235 13
V Returns less cash costs				439 87
III Non cash costs				
Family labor	man/day	96 00	5 00	480 00
Interest family capital	L E	2213 00	0 18	331 95
Transportation	L E			20 00
Animal work	days	15 00	2 00	30 00
Bedding	cubic mtr	15 00	4 00	60 00
		Sub total		921 95
IV Total Costs				3157 08
V Profit/head				-482 08
H Cost/kg meat produced				
Liveweight	LE/kg	400 00	3157 08	7 89
Carcass weight(0 54 lw)	LE/kg	216 00	3157 08	14 62

Sources (1) Field trip Novemper 1993

(2) Ministry of Agriculture and land Reclamation National Agricultural Research Project Agricultural Policy Analysis Component Red Meat Situation And Outlook Report Feb 1991

(3) Esmat Shalaby Economic Study of Sheep and Goat Production In Egypt Egyptian Journal of Agricultural Economics Vol 3 No 1 March 1993

* Cost of buffalo calf and sale price of fattened buffalo are slightly higher than for cattle in the villages This is opposite of feedlot situation

Assumptions

1 Fattening period is 10 months

2 Average daily gain is 0 816 gks/day

3 Starting weight is 180 kgs

4 Total gain is 245 kgs

ANNEX Table 14 9 Native Cattle Smallholder Fattening Budget, 1993 prices

Returns	Units	Quantity	Price/unit	Total
Manure value (10 donkey loads=1 cubic meter)	cubic mtr	15 00	5 00	75 00
Value of fattened animal	kgs	380 00	6 00	2280 00
Total returns				2355 00
Cash Costs	**Units**	**Quantity**	**Price/unit**	**Total**
A Purchase feeder calf	kgs	160 00	6 90	1104 00
B Feed costs				
Straw	kgs	450 00	0 04	18 00
Berseem	kgs	1800 00	0 04	72 00
Concentrate(non-traditional)	kgs	1650 00	0 40	660 00
Veterinary services				20 00
Mortality losses	%	0 01	1874 00	18 74
Sub-total, cash costs				1892 74
Net Farm Income				462 26
Non-cash costs				
Family labor	man-day	96 00	5 00	480 00
Interest on own capital	L E	1892 74	0 18	283 80
Transport	L E			20 00
Animal work	days	15 00	2 00	30 00
Bedding	cubic mtr	15 00	4 00	60 00
Sub-total, non-cash costs				873 80
Total costs				2766 54
Profit				-411 537436
Total cost/kg meat produced				
Liveweight	LE/kg	400 00	2766 54	6 92
Carcass weight(0 60 lw)	LE/kg	224 00	2766 54	12 35

Sources

1 Team field visits

2 Ministry of Agriculture and Land Reclamation, National Agriculture Research Project, Policy Analysis Component, Red Meat Situation and Outlook Report 1991

3 Shalaby, E Economic Study of Sheep and Goat Production, Egyptian Journal of Agricultural Economics March, 1993

Approximate assumptions

1 Fattening period is 10 months

2 Average daily gain is 0 8 kg/day

3 Starting weight is 160 kgs

300

ANNEX Table 15 1 Feed Ingredient Prices and Price Comparisons

	U S prices		Egyptian prices		
Ingredient	Basis	$/ton	Basis	LE/ton	$/ton
Concentrates					
Yellow corn	Chicago No 2	100 00	Current price delivered	510	152 24
			C I F Alexandria		113 00
			previous contracts		117 00
White corn			Delivered Ismalia	340	101 49
Grain sorghum	Kansas City	88 00		450	134 33
Millet				450	134 33
Sunflower meal	Minneapolis 28%	90 00	Pioneer-Egypt 29%	455	135 82
Broad bean				500	149 25
Tapioca meal				330	98 51
Soybeans	Chicago	222 00		900	268 66
Soybean meal	Decatur 44%	209 00		980	292 54
	Decatur 48%	202 00	Farmgate Delta	1250	373 13
Whole cottonseed	Ft Worth	160 00		270	80 60
Cottonseed meal	Solvent 41%	200 00			
Cottonseed meal	Expeller	210 00	Undecorticated, 24%	230	68 66
Corn gluten meal	Kansas City	310 00	Ex factory, Cairo	1000	298 51
Wheat bran	Kansas City	80 00	Ex flour mills	250	74 63
Rice bran	Memphis	56 00		300	89 55
Linseed meal	Minneapolis	145 00		500	149 25
Feed barley	Kansas City	89 00		510	152 24
Feed wheat	Kansas City	121 00		550	164 18
Peanut meal	Atlanta	276 00	Not available		
Cane molasses	New Orleans	62 00		240	71 64
Sugarbeet molasses				300	89 55
Fish meal	Atlanta	365 00	Imported Danish 72% CP	2900	865 67
			Local 55% CP	1100	328 36
Sugarbeet pulp	Kansas City	132 00			
Cattle concentrate 13%			Delivered Delta	430	128 36
Cattle concentrate 15%			Delivered Delta	450	134 33
Dairy concentrate			Delivered,Delta	500	149 25
Broiler starter medicated			Ex plant Ismalia	840	250 75
Broiler finisher medicated			Ex plant Ismalia	770	229 85
Broiler starter regular			Ex-plant Ismalia	810	241 79
Broiler finisher, regular			Ex-plant Ismalia	740	220 90
Roughages					
Berseem 1 3 cuts				41	12 24
Berseem 4th cut				30	8 96
Alfalfa			Wilted delivered	98	29 25
Green maize			Delta fall crop	30	8 96
Sudangrass				75	22 39
Forage sorghum				45	13 43
Millet grass				55	16 42

ANNEX Table 15 1 Feed Ingredient Prices and Price Comparisons
(Continued)

Bermuda grass			100	29 85
Rhodes grass			120	35 82
Ryegrass			140	41 79
Chickpea			60	17 91
Broad bean			55	16 42
Sugarcane leaves			40	11 94
Sugarcane tops			25	7 46
Sugarbeet leaves			40	11 94
Sugarbeet with leaves			100	29 85
Cotton browse			120	35 82
Banana leaves			25	7 46
Hay				
Berseem hay			230	68 66
Berseem straw			190	56 72
Berseem/ryegrass			200	59 70
Alfalfa hay	Nebraska	130 00	200	59 70
Alfalfa straw			190	56 72
Lentil hay/straw			200	59 70
Silage				
Berseem			60	17 91
Alfalfa			55	16 42
Maize			80	23 88
Sorghum			60	17 91
Sugarbeet leaves			30	8 96
Straw				
Wheat			160	47 76
Wheat (with NaOH)			170	50 75
Rice			30-42	9 12 50
Rice(with ammonia)			75	22 39
Barley			110	32 84
Lentil			50	14 93
Sesame			35	10 45
Cotton stem			20	5 97
Maize stalks			22	6 57
Maize cobs			35	10 45
Peanut			200	59 70
Broadbeen			120	35 82
Processing residues				
Sugarcane bagasse			30	8 96
Poultry manure			45	13 43
Others				
Urea	Atlanta	235 00	377	112 54
Bonemeal	Memphis	223 00	400	119 40
NaCl	Atlanta	50 00	30	8 96
CaCO3			100	29 85

U S prices based on November quotes from Feedstuffs magazine

Egyptian prices from winter 1992 and current prices from Animal Production Research Institute Agricultural Research Center Cairo plus team field visits

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Annex Table 15 2 Border Pnce Calculatons for Red Meat and Cattle

Item	Unit	Quantity	Cost	Smallholder cattle fattening
1 Fed animal	kg	425	4 44	1887 00
2 Marketing cost	%	0 03	1887	56 61
3 Cost to slaughterhouse				1943 61
4 Trader revenue				
Hide offal,fat etc	%	0 167	1944	324 58
Carcass at 58%	kg	246 5	9 00	2218 50
Trader margin	%	2317	0 114	264 14
5 Retailer margin				
Costs				
Carcass	kg	246 5	9 00	2218 50
Transport, labor, power, rent	%	0 01	2218 5	22 19
		Total cost		2240 69
Revenue				
Liver, kidney & kidney fats, bones	kg	21	9 00	193 40
1st quality meat(37 4% carcass wt)	kg	92 19	13 50	1244 58
2nd quality meat(44 3% carcass wt)	kg	109 20	9 00	982 80
Total revenue				2420 77
Butcher margin	%	0 08		
6 Average cost of red meat comparable to marker product	LE/kg	201 39	2227 37	11 06
7 Average cost of red meat comparable to marker product	$/kg	201 39	664 89	3 30

Source

Adapted from Tables 3,4,5, and 6 from Soliman (1982)

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Annex Table 15 3 Border Price Calculations for Fresh Milk
(L E per ton, November 1993 prices, LE 3 35=$1 00)

Situation Cost Item	(1) Milk powder, subsidized (current situation)	(2) Milk powder, int'l price medium-term projection	(3) Milk powder, int'l price long-term projection
1 CIF price $	$1,525	$1,725	$1,925
2 CIF price LE	5108 75	5778 75	6448 75
3 Banking, handling, storage, transport & misc costs	204 35	231 15	257 95
4 Total cost/ton	5108 75	5778 75	6448 75
5 Reconstitution cost	528 76	598 10	667 45
6 Cost of reconstituted milk (LE/ton)	5637 51	6376 85	7116 20
7 Cost/ton (4% fat, fresh milk basis)	713 61	807 20	900 78
7 Cost/kg (fresh milk basis)	0 71	0 81	0 90

1 See section 5 4 of main report for details FOB to CIF costs are $125/ton
Columns 2 & 3 based on price projections developed in Section5 4 6
2 Converted at LE 3 35/$1 00
3 From Soliman, El Zaher and Fitch (1983) adjusted for 1993 costs
These were 4% of CIF cost
5 From Soliman, El Zaher and Fitch (1983) adjusted for 1993 costs
These were 10 35% of total cost
7 Conversion from powder to fluid basis @7 9 1 00

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Annex Table 15 4 Production Cost Summary for Maize

Item	(1) APCP Survey 1991 (Financial values)	(2) World Bank Study 1991 (Financial values)	(3) World Bank Study 1991 (Economic values)	(4) USAID Crop database 1990 (Economic values)
1 Variable cost (LE/feddan)	465	683	999	467
2 Fixed costs (LE/feddan)	77	66	333	66
3 Total cost (LE/feddan)	542	749	1332	533
4 Yield (kg/feddan)	1974	2590	2590	2617
5 Cost/ton (LE)	275	289	514	204
6 Transport, handling, storage	25	25	25	25
7 Financial cost at market	300	314	539	229
8 Exchange rate (LE/$1 00)	3 29	3 29	3 29	2 72
9 Cost at market ($)	$91	$95	$164	$84
10 Add economic costs/fd($)	$160			$160
11 Add economic costs/ton($)	$81			$61
12 Economic cost at market($)	$172		$164	$145
13 Economic cost at market(LE)	577		549	486

Sources
1 APCP Cotton Supply Response Study Table 6 9
2 World Bank(1992) page 95
3 World Bank(1992) page 95
4 Agricultural Database USAID/Cairo AGR/ACE January 1992
The current price for local white maize delivered Ismalia feedlots is LE340/ton or slightly over $100/ton

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Annex Table 16 1 Parameters for Commercial Broiler Systems

Character	Units	1993 field trip Parameters	Abdul Azi estimates	Source 1,2,3 Parameters
Days to market	days	48 0	45	56 37
Weight at marketing	kg	1 6	1 725	1 630
Feed consumed during grow out	kg	3 2	4 2	4 2
Feed conversion	kg/kg	2 5	2 4	2 69
Mortality	%	5-8%	8 5	5 1
Dressing %	%	75 0	70 0	75 0

Soures
(1) A A Ibrahim, An Analytical Economic Study
for Broiler and Substitutes in Egypt
Dept of Agr Econ , Zagazig University, 1992
(2) El-Sayed A & Samah H , Economic Analysis
for Poultry Production and Marketing in Egypt
Egyptian Journal of Agricultural Economics,Vol 2, No 2, Sept 1992
(3) Field Study Sample Survey, 1987/86

Annex Table 16 2 Parameters for Traditional Chicken Production Systems

Production systems	Breed / Units	Local / Dual purpos meat egg(1)	Dokki-4 / Dual purpose meat egg(1)	Local / Dual purpos meat egg(2)	Local / Specialized egg breed(1)	Montazah / Specialized egg breed(1)
Average daily feed consumption (gms)	grams	n a	n a	45	65	n a
Average egg production (%)	%	40 6	47 9		36 4	56 2
Feed per 100 eggs	kgs	n a	n a		20	n a
Average weight of eggs (gms)	grams	40	48		45	55
Age at sexual maturity (days)	days	180	210		126	200
Body weight at sexual maturity						
Males	kgs	1 362	1 816	1 300	1 110	1 498
Females	kgs	1 135	1 589	1 300	0 950	1 226
Mortality	%	n a	n a	20	20 27	n a
Dressing %	%	65	70	70	70	65

Source

(1)Kamal Yamani 1989 Lecture Notes on Poultry Production and Feeding Department of Animal Production Zagazig University

(2) Dr A Abdul Aziz personal communication

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Annex Table 16 3 Parameters for Commercial Layer Systems

		1986 Survey (References 1 3)				Average weight	Hi-Line 1993	Ref 4 All
	Breed	L S L	Isa Brow	Hisex	Shaver	4 breeds	visit	breeds
Character	Units							
Age at first lay	weeks	20 00	21 40	22 00	20 00		20 00	18 00
Laying % at peak	%	75 70	74 00	74 00	75 50		74 00	93 00
Number days laying/ hen	days	329 00	329 00	329 00	329 00	329 00	364 00	360 00
Eggs produced/yr	eggs	240 00	234 00	229 00	235 00	237 00	270 00	280 00
Average egg size	grams	60 00	60 00	60 00	60 00	60 00	60 00	62 00
Feed consumed/hen/ production cycle	kgs	43 10	39 00	38 50	38 10	38 50	49 36	
Feed per 100 eggs	kgs	17 958	16 67	16 81	16 21	17 38	18 28	14 30
Mortality	%	14 00	13 00	12 00	12 00	13 00		
Rearing							4-5	7 50
Production							8-12	15 00
Average wt of cull hens	kgs	1 80	2 00	2 10	1 70	1 90	1 75	1 68
Culling rate	%	9 00	1 00	1 00	1 00	6 00	n a	
Dressing % cull hens	%	70 00	70 00	70 00	70 00	70 00	70 00	70 00

Sources

(1) A F Mashhour Economics of Egg Production In Sharkia Governate M Sc thesis Department of Agricultural Economics Zagazig University, 1987

(2) S Alaam Poultry Breeding & Feeding (7th ed)Egyptian Anglo Books, Cairo 1987

(3) Kamal Yamani, Lectures on Poultry Feeding, 1989

(4) Dr A Abdul Aziz, personal communications

Annex Table 16 4a Parameters for Dairy Cattle Production Systems

		Breed					
Character	Units	Native(1)	Improved(1)	Native (2)	Native (3)	Native (2)	Native (3)
Production systems		National average	National average	Small holders	Small holders	State farms	Commercial
Calving rate		49	80				
First lactation							
Total milk yield	kgs			570	600	400	600
Days in milk	days				180	90	200
Milk per day	kgs				3 5	4 4	3 0
Mature lactation							
Total milk yield	kgs	750	3975	640	800		800
Days in milk	days	180	280	130	180		180250
Milk per day	kgs	4 16	14 2	4 9	4 5		
Lactations/cow						3	6
Fat %	%				5 0	5 2	4 5
Kg conc /kg milk	Ratio				1 4 2	0 55 1	
Mature bodyweight							
Cows	kg				300	450	400
Bulls	kg				400	700	600
Birthweight	kg				20	25	22
Age at first calving	month	30 36	24 30		36	36	40
Calving interval (mature cows)	month	14 15	12 13	12 7	15 1	13 8	18 0
Weaning age	months				3 5	4	5
Weaning weight (males)	kg				65	100	65
Marketing age (males)	months				36	18	
Marketing wght (males)	kg				350	375	250
Mortality							
Cows	%				2	1	2
Calves>1 year	%	5	5		6	8	10
Calves	%	20	15				

(1) U S Agricultural Attache Report 1993
(2) Dr A Abdul Aziz personal communication
(3) Animal Production Research Institute personal communication

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Annex Table 16 4b Parameters for Dairy Cattle Production Systems(continued)

Milking cattle		Breed		
Character	Units	Crossbred (1)	Crossbred (2)	Crossbred (2)
Location				
Production systems (1)		State farms	Small holder	Commercial
Calving rate				
First lactation				
Total milk yield	kgs	1910	1400	1200
Days in milk	days	322	250	250
Milk per day	kgs	5 9	5 6	4 6
Mature lactation				
Total milk yield	kgs	2500	1600	2100
Days in milk	days	315	250	300
Milk per day	kgs	7 9	6 5	4 9
Lactations/cow		3	6	6
Fat %	%	4 4	3 0	4 0
Kg conc /kg milk	Ratio	1 2	1 25 2	0 75
Mature bodyweight				
Cows	kg	500	350	450
Bulls	kg	650	450	650
Birthweight	kg	27	25	28
Age at first calving	months	32	34	35
Calving interval (mature cows)	months	17 0	13 5	18 0
Weaning age	months	4 0	3 5	4 0
Weaning weight (males)	kg	105	85	70
Marketing age (males)	months	18	30	
Marketing weight (males)	kg	425	350	300
Mortality				
Cows	%	1 2	1 5	2 0
Calves>1 year	%	10 0	4 0	10 0

(1) Dr A Abdul Aziz personal communication

(2) Animal Production Research Institute personal communication

Annex Table 16 4c Parameters for Dairy Cattle Production Systems (continued)

Milking cattle		Breed			
Character	Units	Improved/purebred Friesan			
Location					
Production systems		State farms	Commercial	Commercial	Commercial
Reference		(1)	(2)	(3)	(4)
Calving rate					
First lactation					
Total milk yield	kgs	2330	2500	4400	3000
Days in milk	days	315	305	325	300
Milk per day	kgs	7 4	8 2	13 5	10
Mature lactation					
Total milk yield	kgs	2750	3000	5750	4000
Days in milk	days	340	305	400	300
Milk per day	kgs	8 1	10 0	14 5	
Lactations/cow		3		6	4 5
Fat %	%	3 9	2 8	3 6	3 5
Kg conc /kg milk	Ratio	5 1	1 2	5 1 0	1 0 1 0
Mature bodyweight					
Cows	kg	650	450		500
Bulls	kg	800	600		800
Birthweight	kg	35	30 0	26 5	35
Age at first calving	months	34 4	30 0	15 9	27
Calving interval (mature cows)	months	14 5	14 1		15 0
Weaning age	months	4 0	3 5		2 5
Weaning weight (males)	kg	115	100		80
Marketing age (males)	months	18	24		
Marketing weight (male	kg	400	400		350
Mortality					
Cows	%	2 0	1 0		2 0
Calves>1 year	%	10 0	3 0		10 0

(1) Dr A Abdul Aziz personal communication

(2) Animal Production Research Institute personal communication

Annex Table 16 5 Parameters for Dairy Buffalo Production Systems

	Reference	(1)	(1)	(2)	(3)	(2)	(4)	(1)
	Breed	Native	Native	Native	Native	Improved	Native	Improve
Location		Delta	Sharkia	National averages	National averages	Lower Egypt	National averages	Ismalia
Production systems Character	Units	Smallholder	Smallholder	Smallholder	Smallholder	State and Res farms	Smallholder	Feedlot
First lactation								
Total milk yield	kgs	1050		1025	648	1000		1600
Days in milk	days	200		184	137	190		240
Milk per day	kgs	5 25		5 7	4 7	5 3		6 7
Mature lactation								
Total milk yield	kgs	1200	1360	1250	1476	1380	1200	2000
Days in milk	days	240	200	173	235	247	200	260
Milk per day	kgs	5	6 8	7 2	6 3	5 6	6	7 7
Lactations/cow	number	6	6			3 5		5
Fat %	%	8	8		7 5	6 5 7 0	8	7 8
Kg conc /kg milk	ratio	1 1	1			75 1 0		1 3
Mature bodyweight								
Cows	kg	450	425		351	600		500
Bulls	kg	500	475		500	800		550
Birthweight	kg	37			33	32		40
Age at first calving	months	32			43	35	30-42	30
Calving interval (mature cows)	months	15	14	13 6	13 4	13 8	15	14
Weaning age	months	1 5	1 5		3	4		1 5
Weaning weight (males)	kg	80	75		86	105		80
Marketing age (males)	months	1 5	1 5			18		1 5
Marketing wght (males)	kg	80	75			365		80
Mortality								
Cows	%	1				1 2	5	1
Calves	%	8 12			9	10	20	7 8

Sources
(1) Field observations 1993
(2) Dr A Abdul Aziz personal communications
(3) Animal Production Research Institute personal communications
(4) U S Agricultural Attache Report 1993

Annex Table 16 6 Parameters for Buffalo Beef Production Systems

Location		Ismalia(1)	National(2)	National(3)
Production systems	Units	Commercial feedlot	Smallholders	Smallholders
Character				
Mature bodyweight				
Cows	kg		600	350
Bulls	kg	400	800	500
Birthweight	kg	40	32	33
Age at first calving			35	43
Calving interval (mature cows)	months	14 4	13 7	13 4
Weaning age	months	1 5	4	3
Weaning weight (males)	kg	80	105	86
Veal production				
A D G weaning to sale	kgs		0 65	0 5
Age at sale	Months		1 5	2 67
Weight at sale	kgs		60	100
Feed conversion	kg/kg			7 1
Dressing %	%		52	43 5
Feeders				
A D G purchase to sale	kgs	0 83	0 55	0 8
Age at sale	Months	6	12	12
Weight at sale	kgs	250	235	275
Feed conversion	kg/kg	0 8	7 1	6 1
Dressing %	%	55	45	50
Finishing				
A D G purchase to sale	kgs	1 1	0 7	1 0
Age at sale	Months	13	18	1 8
Weight at sale	kgs	400	365	425
Feed conversion	kg/kg	1 2	5 5 1 0	6 1
Dressing %	%	55	50	55
Mortality				
Mature animals	%	1	1	2
Feeders	%	1	2	5
Calves < 1 month	%	5 7	10	11

Note Feed conversion coefficients based on starch equivalents

Annex Table 16 7 Parameters for Beef Cattle Production Systems

Character	Breed	Native	Native	Freisan	Crossbred	Crossbred	Exotic
Source		(1)	(2)	(3)	(4)	(5)	(5)
Production systems	Units	Smallholder	Smallholder	Feedlot	Feedlot	Feedlot	Commercial bulls
Mature bodyweight							
Cows	kgs	450		650	500		
Bulls	kgs	700		800	650		450
Birthweight	kgs	25		35	27		30
Age at 1st calving	months	36		30	32		
Calving interval	months	13		15	17		
Weaning weight	kgs	100		115	105		
Weaning age	months	4		4	4		
Feeders							
A D G purchase to sale	kgs	0 55	0 5	0 6	0 6	0 75	0 9
Age at sale	months	12	15	10	10	15	6
Weight at sale	kgs	200	225	220	210	275	250
Feed conversion	kg/kg	6 5 1	12 1	6 1	8 1	10 1	0 8
Dressing %	%	55	50	50	50	45	58
Finishing							
A D G purchase to sale	kgs	0 7	0 75	0 75	0 8	1 0	1 3
Age at sale	months	18	21	18	18	18	9
Weight at sale	kgs	350	350	400	410	475	450
Feed conversion	kg/kg	5 1	10 1	4 5 1	4 5 1	8 1	1 3
Dressing %	%	58	55	53	55	60	60
Mortality							
Mature animals	%	1	5	1	1	6	1
Feeders	%	2	5	2	2	6	1
Calves < 1 month	%	8	5	10	10	6	5

Feed conversion ratios are based on starch equivalents

Sources

(1) Dr A Abdul Aziz personal communication

(2) Animal Production Research Institute personal communications

(3) Dr A Abdul Aziz personal communication

(4) Dr A Abdul Aziz personal communication

(5) Animal Production Research Institute personal communications

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Annex Table 16 8 Parameters for Sheep Production Systems

	Reference	(1)	(2)	(1)	(2)	(1)	(1)
	Breed	Ossimi	Ossimi	Barki	Barki	Rahmani	Imported Merino
Location		Nile Valley/Delta		Northwest Coast	Northwest Coast	Nile Valley/Delta	
Production systems		Crop livestock systems small flocks		Crop-livestock systems larger flocks		Crop livestock systems small flocks	
Character	Units						
Mature bodyweight							
Males	kg	60	70	55	50	65	88
Females	kg	48	50	43	40	50	65
Birthweight	kg	3 7	4	3	3	4	
Age at first lambing	months	17	21	17	24	17	24
No lambings/year	number	1	1 2	1 0	1 1	1 0	1 0
% of lambings by litter size							
Single	%	75	83	80	95	70	90
Twins	%	25	15	20	5	30	10
Triplets	%		2				
OR							
Average litter size	number	1 25	1 2	1 2	1 1	1 3	1 1
Lambing percentage	%	120	80	105	80	128	128
Lambs weaned/litter	number	0 8	1 1	0 8	0 9	0 9	0 7
Marketing weight	kgs	29 1	40	25	30	28 7	26 0
Marketing age	months	6	10	6	7	6	
Dressing %	%	44	48	44	45	44	40
Mortality							
Lambs	%	28	11	28	15	28	28
Adults	%	8	5	8	7	8	8

Sources

(1) Dr A Abdul Aziz personal communications

(2) Animal Production Research Institute personal communications

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Annex Table 16 9 Parameters for Goat Production Systems

	Breed	Zaraibi(1) (Egyptian Nubian)	Baladi(1)	Baladi(2)	Imported Anglo Nubian(1)	Imported Anglo Nubian(2)
Location		Nile valley Delta	Nile valley Delta	Nile valley Delta	Nile valley Delta	Nile valley Delta
Production systems		Crop livestock Small flocks	Crop livestock Small flocks	Crop livestock Small flocks	Crop livestock Small flocks	Crop livestock Small flocks
Character	Units					
Mature bodyweight						
Males	kg	40	35	42	60	48
Females	kg	30	25	29	38	37
Birthweight	kg	2 1	1 7	1 8	4 0	2 1
Age at first kidding	months	18	18	9	18	10
No kiddings/year	number	1 0	1 0	1 3	1 0	1 3
% of kiddings by litter size						
Single	%	25	30	30	25	35
Twins	%	40	50	60	40	57
Triplets	%	35	50	10	35	8
OR						
Average litter size	number	1 9	1 5	2 1	1 9	1 9
Kidding percentage	%	150	190	162	200	146
Kids weaned/litter	number	1 3	1 0	1 7	1 5	1 9
Marketing weight	kgs	25	20	24	28	32
Marketing age	months	12	12	7	12	7
Dressing %	%	50	49	48	50	49
Mortality						
Kids	%	35	33 7	12 0	9 3	15 0
Adults	%	7 5	7 5	4 0	4 0	5 0

Source
(1) Dr A Abdul Aziz personal communications
(2) Animal Production Research Institute personal communications

ANNEX TABLE 17 1 THE NUMBER OF INDUSTRIAL ORGANIZATIONS FOR MEAT AND POULTRY PROCESSING IN PUBLIC AND PRIVATE SECTORS IN EGYPT FROM 1980/81 1989/90

	Public Sector		Private Sector		Total	
	No	%	No	%	No	%
1980/81	4	36	7	64	11	100
1981/82	4	44	5	56	9	100
1982/83	4	50	4	50	8	100
1983/84	4	40	6	60	10	100
1984/85	7	50	7	50	14	100
1985/86	5	31	11	69	16	100
1986/87	5	42	7	58	12	100
1987/88	7	32	15	68	22	100
1988/89	7	28	18	72	25	100
1989/90	13	39	20	61	33	100
Average	6	38	10	63	16	100

Source Annual Industrial Production Bulletin for the period 1980-1990 CAPMAS

TABLE 17 2 THE NUMBER OF INDU TRIAL ORGANIZATIONS [illegible]
PRODUCTS IN PUBLIC AND PRIVATE SECTORS IN EGYPT FROM 1980/81 1989/90

	Public Sector		Private Sector		Total	
	No	%	No	%	No	%
1980/81	9	45	11	55	20	100
1981/82	9	43	12	57	21	100
1982/83	9	47	10	53	19	100
1983/84	11	52	1	48	21	100
1984/85	12	63	7	37	19	100
1985/86	12	48	13	52	25	100
1986/87	11	46	13	54	24	100
1987/88	10	33	20	67	30	100
1988/89	12	41	17	57	29	100
1989/90	11	32	23	68	34	100
Average	11	44	14	56	25	100

Source Annual Industrial Production Bulletin for the period 1980 1990 - CAPMAS

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TABLE 17 3 THE TOTAL VALUE OF INDUSTRIAL PRODUCTION FOR FOOD IN PUBLIC AND PRIVATE SECTOR IN EGYPT FROM 1980 1990

	Public Sector		Private Sector		Total	
	No	%	No	%	No	%
1980/81	1140	85	210	16	1351	100
1981/82	1057	78	292	22	1349	100
1982/83	1461	79	387	21	1848	100
1983/84	1131	72	447	28	1578	100
1984/85	1805	75	598	25	2403	100
1985/86	2120	57	1632	44	3751	100
1986/87	2598	80	662	20	3260	100
1987/88	3015	61	1901	39	4916	100
1988/89	3827	73	1385	27	5212	100
1989/90	4589	67	2218	33	6807	100
Average	2274	70	973	30	3247	100

Source Annual Industrial Production Bulletin for the period 1980-1990 CAPMAS

TABLE 17 4 WHOLESALE AND CONSUMER PRICES FOR MEAT PROCESSING IN EGYPT ACCORDING TO DIFFERENT RETAIL PACKAGE SIZE AND QUALITY IN NOV'93

Type	Wholesale Pr	Consumer Pri	Wholesale S	% Share of Wholesale in Consumer Price
	LE	LE	LE	
GRINDING				
Family grinding (1kg)	8 15	9 00	0 85	9
Grinding (450gm)	8 12	9 18	1 06	12
Grinding (350gm)	8 71	10 00	1 29	13
Grinding fry flow (500 gm)	15 80	17 60	1 80	10
Grinding beef home (250gm)	4 80	5 80	1 00	17
Grinding beef home soft (450gm)	4 69	5 56	0 87	12
Grinding beef home smooth (450gm)	5 56	6 33	0 78	12
BURGER				
Burger (500gm)	13 00	15 00	2 00	13
Burger cans (400gm)	8 13	9 38	1 25	13
Burger cans (800gm)	7 81	9 06	1 25	14
Burger beef home (500gm)	11 60	13 60	2 00	15
Burger cafetena beef home (1kg)	5 50	6 25	0 75	12
Burger/Mexican (500gm)	13 00	15 00	2 00	13
Burger/Indian (500gm)	13 00	15 00	2 00	13
Burger cans/Mexican (400gm)	8 13	9 38	1 25	13
Burger cans/Indian (400gm)	8 13	9 38	1 25	13
SAUSAGES				
Sausage /Sharki (400gm)	7 13	8 00	0 88	11
Sausage cans (Sharki) (400gm)	8 00	9 25	1 25	14
Sausage cans/mixed (Shark) (400gm)	8 00	9 25	1 25	14
Sausage cans (oriental) (400gm)	8 00	9 25	1 25	14
Sausage beef home (400gm)	6 13	7 13	1 00	14
Sausage(Markizy) (400gm)	7 75	8 75	1 00	11
Sausage cans (Markisy) (400gm)	9 00	10 00	1 00	10
Sausage (Sharki/Mexican) (400gm)	7 13	8 00	0 88	11
Sausage (Sharki/Indian) (400gm)	7 13	8 00	0 88	11
MINCED				
Minced (400gm)	6 13	6 83	0 70	10
Minced with rice (400gm)	5 50	6 25	0 75	12
Minced mixed cans (450gm)	7 22	8 33	1 11	13
Minced mouton cans (400gm)	8 13	9 38	1 25	13
Minced mouton (400gm)	6 75	7 50	0 75	10
Minced beef home (400gm)	5 75	6 25	0 50	8
CUBIC				
Cubic (400gm)	10 63	11 88	1 25	11
Cubic beef home (400gm)	6 75	7 50	0 75	10
SLICES				
Slices (400gm)	11 13	12 50	1 38	11
Slices beef home (1 kg)	6 75	7 15	0 38	5
LIVER				
Liver beef home (400gm)	6 38	7 50	1 13	15
Liver beef home (1kg)	2 50	3 00	0 50	16
BASATERMA				
Basterma small weight (1kg)	11 00	14 00	3 00	21
Basterma large weight (1kg)	13 00	16 00	3 00	19
SAUSAGE				
Smoked (500gm)	17 60	20 00	2 40	12
Smoked cocktail (1kg)	8 70	10 00	1 30	13
Smoked kromat (330gm)	9 39	10 30	0 91	9
Hot dogs (1kg)	8 80	10 00	1 20	12
HOT DOGS				
Hot Dogs Facuum (600gm)	9 50	10 42	0 92	9
Hot Dogs (500gm)	16 00	20 00	4 00	20
Hot Dogs Facuum (500gm)	6 60	8 50	1 90	22
Hot Dogs Kromat (400gm)	9 38	10 63	1 25	12
LANSHOUN				
Slices (250gm)	9 80	11 00	1 20	11
Slices with pepper (250 gm)	12 80	14 00	1 20	9
Slices with olive (250gm)	12 80	14 00	1 20	9
Slices with old meat (250gm)	12 80	14 00	1 20	9
TONGUE				
Cooked (100gm)	35 00	40 00	5 00	13
Smoked (250gm)	40 00	48 00	8 00	16

Source Collected and calculated from a sample a company in Ismailia, Nov 93

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TABLE 17 5 WHOLESALE AND CONSUMER PRICES FOR MILK PRODUCTS IN EGYPT ACCORDING TO DIFFERENT RETAIL PACKAGE SIZE AND QUALITY IN NOV 93

Type	Wholesale Price	Retail Price	Consumer Price	Wholesale	Retail Share	% Share of Who in Consumer	% Share of Retail in Consumer Price
MILK							
Pasteurized milk, 3% fat (400gm)	1 04	1 08	1 25	0 21	0 18	17	14
Milk, 3% fat (400gm)	1 25	1 33	1 50	0 25	0 18	17	123
Milk 3% fat (250gm)	1 44	1 56	1 80	0 36	0 24	20	13
YOGHURT							
Cow yoghurt, 3% fat (120gm)	2 42	2 50	2 92	0 50	0 42	17	14
Labna (225gm)	6 67	7 33	8 89				
WHITE CHEESE							
Fresh white cheese cans (1 kg)	4 25	4 40	5 25	1 00	0 85	19	16
Preserved white cheese cans (1kg)	5 25	5 40	6 00	0 75	0 60	13	10
Fresh cheese plastic package (700	4 86	5 00	5 57	0 71	0 57	13	10
Preserved cheese plastic package	6 07	6 21	7 00	0 93	0 79	13	11
KARISH CHEESE	4 00	4 40	5 00	1 00	0 60	20	12
ROMY CHEESE							
Romy cheese large size (1kg)	10 50	10 50	11 25	0 75	0 75	7	7
Romy cheese pacvkages (400gm)	11 25	11 38	11 88	0 50	0 50	4	4
Romy cheese (200gm)	11 50	11 75	12.50	1 00	0 75	8	6
CHEDDAR CHEESE							
Slices (1kg)	10 50	10 75	12 00	1 50	1 25	13	10
Slices (500gm)	10 50	10 80	12 00	1 50	1 20	13	10
Cheddar cheese (250gm)	11 00	11 40	13 00	2 00	1 60	15	14
BLUE CHEESE							
Blue cheese large (1kg)	13 00	13 60	14 00	1 00	0 40	7	3
Blue cheese pieces (70gm)	16 79	17 86	21 43	4 64	3 57	21	17
Blue cheese piece (100gm)	20 00	21 50	25 00	5 00	3 50	20	14
GHEE							
Ghee can (16 5kg)	6 97	7 27	7 58	0 61	0 30	8	4
Ghee can (8 5kg)	7 13	7 50	8 13	1 00	0 63	12	8
Ghee jar (900gm)	7 78	8 06	8 61	8 33	0 56	10	6
Ghee (ElMabrouka) (1kg)	7 25	7 60	8 00	0 75	0 40	9	5
Ghee (El Mabrouka) (2kg)	7 30	7 60	8 25	0 95	0 65	12	8
BUTTER							
ButterBlocat (10kg)	5 70	6 00	6 30	0 60	0 30	10	5
Butter Blocat (1kg)	6 00	6 15	6 50	0 50	0 35	8	5
Butter Blocat (250 gm)	6 50	6 80	7 50	1 00	0 70	13	9
Butter Blocat (500 gm)	6 60	6 80	8 00	1 40	1 20	18	15
CREAM							
Cream 40% can (150gm)	6 00	6 00	7 00	1 00	1 00	14	14
Cream 40% can (400gm)	5 13	5 13	5 63	0 50	0 50	9	9
Cream f40% can (1kg)	4 25	4 35	5 00	0 75	0 65	15	13
COOKED CHEESE							
Cooked cheese (8 pieces)	9 11	9 64	11 43	2 23	1 79	20	16
Cooked cheese (8 pieces)(Sabah El	8 29	8 93	10 71	2 42	1 79	23	17
Cooked cheese (6 pieces)(El Game	8 75	9 17	10 42	1 67	1 25	16	12
Cooked cheese (6 pieces)(Karima)	10 42	10 83	12 50	2 08	1 67	17	13
w/olive & basterma (6 pieces)	11 25	12 08	14 58	3 33	250 00	23	17
Block (500gm)	6 80	7 00	8 00	1 20	1 00	15	13
Block (Block (2kg)	6 00	6 25	6 75	0 75	0 50	11	7
MORTA							
plastic package (1kg)	4 00	4 15	4 60	0 60	0 45	13	10
Plastic packagee (500gm)	4 50	4 70	4 50	1 00	0 80	18	15
MESH							
Large cans (20kg)	2 00	2 10	2 20	0 20	0 10	9	5
Package (1kg)	2 00	2 05	2 25	0 25	0 20	11	9
Package (500gm)	2 20	2 30	2 50	0 30	0 20	12	8
Jar (1kg)	2 80	2 90	3 25	0 45	0 35	14	11
Jar (500gm)	2 50	2 60	3 00	0 50	0 40	17	13

Source Collected and calculated from a sample a company in Ismailia, Nov 93

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TABLE 17 6 WHOLESALE AND CONSUMER PRICES FOR MILK PRODUCTS IN EGYPT

Type	Wholesale Pr	Consumer Pr	Wholesale S	% Share of Wholesale in Consumer Price
Pasteurized milk 3% fat (400gm)	0 42	0 50	0 09	17
Cow yoghurt 3% fat (120gm)	0 29	0 35	0 60	17
Labna (225gm)	1 50	2 00	0 50	25
White fresh cheese (1kg)	4 25	5 25	1 00	19
White preserved cheese (1kg)	5 25	6 00	0 75	13
Karish cheese (500gm)	2 00	2 50	0 50	20
Romy cheese (1kg)	10 50	13 40	2 90	22
Cheddar cheese (1 kg)	10 50	12 00	1 50	13
Blue cheese (1kg)	13 00	14 60	1 60	11
Ghee (1kg)	6 70	7 57	0 87	11
Butter (1kg) (150gm)	5 70	6 30	0 60	10
Cream (40%)	0 90	1 05	0 15	14
Morta (1kg)	4 00	4 60	0 60	13
Mesh (1kg)	2 00	2 20	0 20	9
Processed cheese (pack of 8 pieces)	1 28	1 60	0 33	20

Source Collected and calculated from a sample a company in Abu Rawash Nov 93

TABLE 17 7 WHOLESALE AND CONSUMER PRICES FOR MILK PRODUCTS IN EGYPT

Type	Wholesale Pr	Consumer Pr	Wholesale S	% Share of Wholesale in Consumer Price
Pasteurized milk (500gm)	0 43	0 45	0 02	4
Pasteurized milk (400gm)	0 38	0 40	0 02	5
Yoghurt (150gm)	0 32	0 34	0 02	6
Yoghurt (120gm)	0 28	0 30	0 03	8
Milk	1 75	1 90	0 15	8
Fresh cheese (800gm)	4 40	4 50	0 10	2
Preserved cheese (600gm)	4 40	4 50	0 10	2
Local ghee (1kg)	7 75	7 90	0 15	2
Vegetarian ghee (1kg)	3 40	3 45	0 05	1
Mesh (1kg)	1 40	1 45	0 05	3
Cream	1 35	1 40	0 05	4
Karish cheese	1 95	2 05	0 10	5
Labna	0 80	0 85	0 05	6
Falahi cream	1 05	1 15	0 10	9

Source Collected and calculated from a sample a company in Ismailia Nov 93

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