

AGENCY FOR INTERNATIONAL DEVELOPMENT  
WASHINGTON, D. C. 20423  
BIBLIOGRAPHIC INPUT SHEET

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Batch 97

1. SUBJECT CLASSIFICATION  
A. PRIMARY: Food production and nutrition  
B. SECONDARY: Animal production--Domesticated birds--Yemen Arab Rep.  
AL00-6000-G788

2. TITLE AND SUBJECT  
Analysis and overview of poultry sub-sector in the Yemen Arab Rep.

3. AUTHOR(S)  
Miller, P.C.; Rogalla, John

4. DOCUMENT DATE: 1978  
5. NUMBER OF PAGES: 91p.  
6. ARC NUMBER: ARC

7. REFERENCE ORGANIZATION NAME AND ADDRESS  
Ca. Polytech.

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)

9. ABSTRACT

10. CONTROL NUMBER: PN-AAG-326  
11. PRICE OF DOCUMENT  
12. DESCRIPTORS: Poultry, Sector analysis, Yemen  
13. PROJECT NUMBER: 279013000  
14. CONTRACT NUMBER: AID/NE-C-1204  
15. TYPE OF DOCUMENT

ARDA  
PN-AAE-326

ANALYSIS AND OVERVIEW  
OF  
POULTRY SUB-SECTOR  
IN THE  
YEMEN ARAB REPUBLIC

prepared by

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Contract AID/~~ME~~-C-1204

Amendment No. 3

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### Note to the Reader

This report is presented in a prose short form. All tables and figures are included as appendices. We hope this style is convenient for your use of the material.

Dr. Paul C. Miller  
Dr. John Rogalla

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# THE POULTRY INDUSTRY OF YEMEN PAST, PRESENT AND FUTURE

## INTRODUCTION

This analysis and overview of the Poultry Sub-Sector of the Yemen Arab Republic is based upon the outline of scope of work as contained in the contract between the Agency for International Development and California Polytechnic State University, San Luis Obispo (Contract AID/NE-C-1204). The in-country analysis and review was conducted during the period of March 8 and April 7, 1978, by Professors John A. Rogalla and Paul C. Miller, members of the faculty of the School of Agriculture and Natural Resources at Cal Poly. A brief report on data sources was provided to the USAID/Mission Agriculture Development Officer on April 1 and a preliminary draft of conclusions and recommendations was provided prior to the team's departure from Sana'a. This final report completes the Scope of Work requirements as specified in the contract for this aspect of the project.

Assistance provided Professors Miller and Rogalla by personnel of the Yemen Arab Republic and by USAID personnel in the conduct of this study is gratefully acknowledged.

### Purpose of Study

To define what the poultry industry is in Yemen and the various components within the industry.

To give insights as to what USAID, the private sector, the Yemen Arab Republic Government (YARG) and others will be or should do in the future to assist the growth of the poultry industry.

### Scope of the Study

The following direct components of the poultry industry were studied: Feed, chicks, market, management, technical knowledge, medication and supplies, and housing.

The indirect factors of financing, transportation, cooperative formations, consumer preferences, role of women, customs, and imports were also studied.

### Resources

All large and medium poultry operations and several small operations were visited. When possible, the managers and/or owners were interviewed.

Published material was used to establish background information as to what the poultry industry has been in the past and what might be the trends in the future. These references are listed in Appendix A1 and will be mentioned when appropriate in the text.

Many personal communications with resource persons in Sana'a were utilized. These persons and their respective titles are listed in Appendix A2.

Yemeni storekeepers, restaurant owners, consumers, businessmen, government officials, villagers, city dwellers, those of lower economic status, and those of higher economic status were contacted, either in a formal or informal manner, in order to acquire information which was directly and indirectly related to the poultry industry. These many people are too numerous to mention.

Prices for poultry products, feed grains, and substitute products were collected for various markets in Yemen early in March, 1978, see Appendix B. Certain comparison prices from an earlier study are provided, as well.

### Specific Goals of the Study

The scope of work previously mentioned served as the basis for this study, with other suggestions and refinements given by John Young, Agricultural Development Officer. Why increase poultry production in the YAR? The several readers of this report have various reasons for increasing poultry production in Yemen. The worth of this report will depend upon the goals of these readers in relationship to the poultry industry. In order to better serve its readers, this report will explore briefly the question - Why increase poultry production in Yemen?

The various answers are:

1. Keep people on farms or to have them return.
2. Decrease imports.
3. Increase exports.
4. Provide improved nutrition through increased protein consumption.
5. Raise the standard of living of the lower socio-economic class.
6. Produce a lower cost source of protein.

7. Improve quality of the products.
8. Satisfy religious demands.
9. Establish self-sufficiencies as a national security measure.

Each of the above are explored in more detail below.

1. Keep People on farms or to have them return.

Data from the 1975 census indicate that migration to the cities, and especially outside the country, is occurring. This may be due to economic reasons. It has been implied that the YARG has encouraged migration to work centers outside Yemen in order to increase monies sent into Yemen. Based on the assumption that keeping people on the farm is not an objective of the poultry production, the manpower already existing must be utilized.

2. Decrease imports.

No official or unofficial documents have been secured which would indicate a desire to decrease imports. It can then be assumed that there should be little difficulty in this area in securing imported stock, feed, and other supplies. The government does obtain a large proportion (80%) of its revenue from customs, therefore, indicating some increased costs of some imported items. Red tape is, of course, always present.

3. Increase exports.

No official or unofficial documents have been secured which propose, in the near future (up to 1981 by the five-year plan), any anticipation of exporting poultry products. The present high demand of poultry eggs, combined with the low in-country production, would indicate that exports of these commodities will not be possible for at least ten years.

4. Provide improved nutrition through increased protein consumption.

The nutritional status of the populace is not well defined. A study was done in 1975-76 indicating that the average daily intake was 59 g. protein and 2,000 calories, which is 75% of recommended daily allowance. In the travel of the authors, no apparent malnutrition was seen. Yemeni interviewed indicated that the people ate well. Several USAID personnel have mentioned that infant mortality is high, due to malnutrition; not due to a lack of food, but due to ignorance in how to give food to the child or in not giving it to the child.

5. Raise the standard of living of the lower socio-economic class.

The authors have not located a distinct lower socio-economic class as is commonly defined in other developing nations. Ms. Lee Ann Ross (USAID Statistician) and several other interviewers have clearly stated that there really is no large group of "poorest of the poor" to assist. The street sweepers of Taiz and other localities and the peoples of the Northeast (i.e., Marib, Khabb) may be a small group that would fit into the category of the "poorest of the poor."

6. Produce a lower cost source of protein.

Eggs cost 1R (22¢) for a 56 g. egg, as opposed to 35R (\$7.70) for 1000 g. of beef. Eggs contain about 12% protein, and beef contains 20% protein. The cost of the egg protein is 6.7 g. per R and for beef protein it is 5.7 g. per R. In Sana'a the price is .5R/egg, therefore, 13.4 g. of egg protein would be provided per R. Non-consumable eggs are not considered here. Considering that as many as 10% of the eggs must be discarded, the quantity of egg per R decreases to 6.0 g. and 12.1 g. for the 1R/egg and .5R/egg prices, respectively. Under either condition, eggs are as good as, if not a better buy, than beef.

7. Improve quality of the products.

It is evident that not all eggs are edible after purchase. When some eggs of a group are discarded, it is obvious that the quality of the remaining eggs is, of course, very low. This deterioration of quality is due to long storage time and absence of any egg refrigeration beyond the wholesale distributors. Over 100 million eggs were imported in 1977 from many countries. These came by ship, air, and/or truck. From producer to consumer, the time is estimated to be about four weeks. Under the warm environment of YAR deterioration is rapid.

Several methods can be utilized to improve egg quality: (1) refrigerate eggs from distributor to consumer and (2) produce a local product to decrease storage time or (3) combine the two methods.

Frozen broilers are kept frozen in a very good condition until purchased by the consumer. The bird then is thawed, as few households have freezer facilities. No problem is seen in the frozen bird area.

Live birds produced in villages look healthy, but are very small and not well fleshed. The two commercial operators between Ibb and Taiz produce a poor quality product, due to poor husbandry techniques. The Omeri and Yemen-Holland project produce at this time a moderate quality live bird. Quality will improve greatly as the new feed mills begin operation.

8. Satisfy religious demands.

The Muslim religion and Yemen tradition required that many live poultry be killed and processed by the individual consumer. This demand is very evident as indicated by the price differential between the ready-to-cook imported broiler (10-13 R/kg) and the live, backyard egg layer (50 R/kg).

9. Establish self-sufficiency.

It has been indicated by a Ministry of Agriculture official that, in the interest of national economic security, the YARG should produce many of its own products, including poultry.

It should be apparent that the poultry industry in the YARG does not necessarily have to be enlarged to satisfy all of the above nine goals. Other methods could be employed. For example, quality of poultry products (eggs and meat) could be improved by establishing a quality control agency and enforcing basic standards. There may also be less expensive means of improving human nutrition, such as through the introduction of soyabean and fish products. It should also be pointed out that several large poultry corporations would easily satisfy many of the goals stated and will probably be doing so within 20 years.

Regardless of which reason(s) the authors believe to be most valid to justify the poultry industry in the YARG, the following report will relate to how the industry has been, is at present, and how it will or could expand in the next few years.

## THE YEMENI INDIVIDUAL

The Yemeni is an economically motivated individual who will provide a service if it will provide him with income. Under this situation, the private sector may be expected to develop very rapidly when an industry is profitable. This has been true in the poultry industry over the past few years. It is true of the entire economy, as well. The Poultry Planning Project Report developed by Leo Sanloff and Larry Rathbun in August of 1974 described an entirely different scene than exists today. The broiler industry especially is developing in the private sector at a rapid pace. This is augmented by a phenomenal increase in the importation of both frozen broilers and fresh eggs. Another aspect is the development of the convenience food segment, broasted chicken. General factors have been instrumental in this development of the economy.

## THE ECONOMY

The economy of Yemen has two distinct segments. The village economy is basically regulated by custom and the Moslem religious mores. Rural villages are often comprised of closely related individuals who are by nature friendly, generous, and hospitable. They do not sell to a friend. Any needed good would be a gift. In a close society, this operates successfully, since the donor in one transaction will be the recipient in the next. However, this is not the typical commercial economy which prevails outside the rural village. The rural economy is important, since, in one study, half the villages are of 50 or fewer inhabitants and nearly two-thirds of the population live in villages of less than 250 inhabitants. Almost 73% of the population is involved in agriculture or the primary industries.

Individuals living in the larger population centers are economically motivated. The prevalence of small stores and bargaining are indications of this motivation. They comprise the second segment, or commercial economy of Yemen. Distribution of the population as enumerated in the 1975 census is graphically pictured on a population map, see Appendix C. The census enumerated 4,705,336 residents and 331,649 emigrants working outside the country in February, 1975. Present estimates approach 600,000 emigrant workers, however the Saudis estimate 1 million Yemeni work in their Kingdom. Though this is not a new phenomenon, it is increasing, and in one section east of Ibb, an individual estimated more than 60 percent of the men were working out of the country. These emigrants remit income to their families. In this area it was estimated that as much as 60% of the income was from remittance. Thus, Yemen, in a sense, is exporting labor, rather than products, which leads to another consequence, inflation.

Since no additional product is forthcoming from agriculture, production may have decreased as land has been abandoned from production when some of the farmers emigrate. Abandonment may be for one or more years until he returns. The decreased amount of goods available for sale is being sought after by people with increased purchasing power. The result is increased prices. The increase has been sufficient to draw additional products from other countries. Imports increased in value almost four-fold from 1973-74 to 1976-77. Also, 1976-77 import targets for live animals, meat, poultry, and eggs of the first Five-Year Plan were exceeded significantly by 94, 333, 560, and 390 percentages, respectively. Targets for wheat and flour were not met. Thus, the people purchased more of the luxury foods and less of the common foods. When compared to domestic production, imports are relatively large for chickens, eggs, and wheat. (See Appendix D) The rates of increase in levels of import of these, as well as beef, are significant, supporting the conclusion that this excess purchasing power is drawing luxury consumption products into the country. This illustrates the business acumen of the Yemeni in private enterprise to provide for consumer desires when it will generate profit, as well.

Inflation is evidenced by an increase in price. The index of retail price in Sana'a for foodstuffs, clothing, dwelling, and miscellaneous items based on prices in 1972 has risen over the period 1973-74 through 1976-77. The index values were 154, 203, 237, and ended with 329 in June 1977, respectively. This would appear to be nearly a 20% compound rate. Such inflation has an effect on investment, consumption, and markets, since holding money is the poorest of all choices.

Investments will be made to store wealth, even if they fail to generate sufficient income to cover all costs. So long as the items of production inflate in value at the same rate in the general economy, the investors will be satisfied covering variable costs.

Consumers are prone to spend what they have to in order to obtain things at higher prices than yesterday, since they expect the price to be higher tomorrow. Their given purchasing power will never be greater than it is at present. This prevents meaningful evaluation of elasticities of demand and income, unless data can be adjusted to constant Rials. The current index of prices would not be a good mechanism, since it is currently under revision due to changes in the relative proportions of income spent for food, clothes, dwelling, and miscellaneous items. The entire economy is not inflating at the same rate. Thus, meaningful elasticities cannot be calculated.

The impact of inflation and high purchasing power in rural areas has had an influence on the marketing system. This has been accentuated by development of improved transportation systems. The typical market structure of Production on the Farm sold to buying agents in villages for wholesale marketing in town and eventual retail sales in the city has been altered. Under the traditional system the farm producer can buy only after he has sold. That additional buying power has accelerated the reversal of the general flow of goods. The market has responded, and imported eggs and frozen broilers are available in the village markets where domestically produced products would be expected.

## PAST AND PRESENT POULTRY PRODUCTION

Prior to 1977, there were no commercial egg or broiler operations in Yemen. As of August, 1977, (Appendix E) only two firms (Sallah & Sons and Yemen Poultry Farms) were functioning as commercial broiler production units with a combined annual capacity of 150,000. The only commercial egg layer flock of 4,000 was with Sallah & Sons.

About 3,200 non-commercial layers were at the USAID training center. Two private and two quasi-government poultry operations were planned.

As of February, 1978, there were five broiler operations with a combined annual capacity of about 1.3 million broilers. No appreciable expansion of the egg industry had occurred. Only Sallah & Sons and the USAID project, with a total of 7,200 layers, had flocks of over moderate sizes (Appendix E). Small flocks in several parts of Yemen (Appendix F), ranging in size from 15 to 200 females, had been created with USAID assistance.

There are presently six broiler production units in Yemen (see Appendix E3) with a combined annual capacity of about 1.4 million birds. Egg production is still centered with Sallah & Sons, the U.S. Aid project, and the several small flocks created with USAID assistance.

Several broiler and egg production units are planned. The Amran Government poultry project is designed for 945,000 broilers per year and 170,000 cage layers. The project is six months behind schedule, due to a land title problem. Once land is obtained, construction will begin. The Middle East Project to be located near Sana'a will have a broiler capacity of 3 million per year and a cage layer capacity of 576,000. The Yihia Brothers near Ibb are expanding from their present 4,000 broilers per brood capacity to 21,000 broiler per brood capacity. Sallah & Sons plan to terminate the egg production strain and bring in broiler breeders. The Dutch plan to bring in broiler breeders, also. No egg production breeders are expected to enter Yemen within the year.

## HUSBANDRY KNOWLEDGE

After visiting all of the poultry operations mentioned above, it is very apparent that basic husbandry knowledge is lacking in half the farms. Common problems were: a lack of ventilation; crowded conditions; shortage of feeders, too small of feeders; too few brooders; unsanitary conditions; and poor quality feed. Only those operations with imported technicians have satisfactory to excellent management. There is no doubt that the need for technical assistance is great.

## INPUTS OF POULTRY PRODUCTION

### Feed

There is no independent commercial type feed mill in Yemen as is commonly found in Europe or North America. Feed that is produced comes from Omeri, Sallah & Sons, or the USAID training center, all in Sana'a. These feeds are composed of a concentrate, containing a high concentration of vitamins, minerals, protein and other nutrients, and grains, such as sorghum, corn or wheat, which are the basic sources of energy for the birds. The ratio of concentrate to grain is normally 30:70 in the case of broiler diets and 25:75 in the case of layer diets.

Until very recently, Omeri, Sallah & Sons, and the Yemen-Holland Project used complete diets (no further mixing) from Kenya, France or Italy, Holland, and the United Kingdom. The last of this nine-month-old feed, in some cases, is now being consumed. The use of the concentrate plus grain method has now begun.

In the near future, the Yemen-Holland Project will mix broiler diets, using the basic ingredients of wheat, sorghum, corn, sesame cake, dried fish, and vitamin-mineral-protein premix. The starter diet, used from one day to four weeks, will consist of 30, 22.5, 22.5, 5, 10 and 10% respectively, for the ingredients listed above. The finisher diet will consist of 30, 25, 25, 5, 5, and 10% respectively for the ingredients listed above.

Central Soya has expressed an interest in supplying mixed feeds within YAR, but no details or time schedules are available.

The USAID poultry project personnel have explored the possibility of mixing diets from locally available ingredients. These diets have not been tried, but will probably do fairly well for egg production type chicks. The starter diets, used from one day to eight weeks, would consist of 59.6% sorghum, 10.0% dried fish, 10.0% beans or pea, 10.0% sesame seed cake, 10.0% alfalfa meal, sun dried, and 0.4% salt. The growth rate would be less than on the higher quality "Acceptable" standard diets of North America, but this would be acceptable, due to the fact that light weight birds have been found to perform better than the heavier ones.

The authors suggest that a grow diet from eight weeks to twenty weeks consist of 80% grain, 10% dried fish, 10% beans or peas, 0.2% salt, and 0.8% vitamin-mineral premix. The layer diet could consist of the grow diet, plus free choice limestone chips from the Amran Valley. With local ingredients, plus the imported premix, the diets would cost about 2 R. per Kg.

## Ingredients

Poultry can perform well on all vegetable diets, but efficiency and economics of production normally require that feed ingredients of an animal source, such as fish or meat meal, be utilized.

The dried fish available in the Hodeidah area was analyzed by Elias B. Muus Odense on May 13, 1977, at Tuskegee University, U.S.A., and found to contain 71.3% protein, 1.9% fat, 2.9% calcium, and 2.0% p. The calculated metabolizable energy content was 2984 k calories per kilogram. The quality of the fish appears to be excellent. It has been suggested by other advisors to the YARG that the fish industry be encouraged. Based on the projected growth of the poultry industry, 3,000 tons of fish meal could be used yearly by 1981.

Sesame oil cake available in the Tihamas is another excellent source of nutrients. The analysis by Odense found 41.9% protein, 13.0% fat, 2.5% calcium, and 1.2% phosphorous. The calculated metabolizable energy content was 2542 k calories per kg. The high fat content may lead to rancidity, therefore, some testing should be done feeding the broilers. Also, improved presses could be utilized to reduce the fat level to about 3%.

The grains, for all practical purposes, can be interchanged, depending upon economics, availability, or other factors. Commonly imported grains are less expensive than locally produced grains. The five-year plan indicates that grain production will increase greatly by the year 1981 (Appendix D2). This will definitely assist the poultry industry of Yemen to compete with the imported poultry products.

Soyabean oil meal would be an excellent source of nutrients for poultry. Based on climate studies, personal communications with Robert Voigt, and the Wadi Rima Report, it seems very likely that soya could be cultivated with little problem in the YAR. Other crops, such as sunflower and rapeseed meal, could also be used for poultry. Agronomists should be consulted as to the possibility for these crops in the YAR.

## Chicks

There are no broiler breeders in the YAR, therefore, all 1.4 million broilers per year must be imported. Originally, Sallah & Sons imported these, but now that Omeri has begun full operation with excellent management, Omeri has chartered a flight every three weeks to bring in 112,000 day-old chicks from Holland. These chicks arrive in Sana'a at a cost of 2.5 to 3 R each and are then sold by Omeri to Sallah & Sons, the Yemen-Dutch Project, IBB Poultry Farm, and the Yemen Poultry Farm. The Yihia Brothers have received their chicks from Sallah & Sons. The USAID project receives 1,000 egg production chicks through Omeri's chartered flights at various times.

The only egg production breeders are at the USAID Project in Sana'a. The chicks produced have been used to establish some backyard-village flocks, but as yet have not been utilized to the maximum extent (600 female chicks per week), due to the problem with Marek's disease.

A primary breeder representative has visited the YAR, but the intentions are not known. In all likelihood the industry will need to develop for five more years before a franchise hatchery could be justified.

The 5 to 8 million backyard poultry in Yemen propagate themselves the natural way - broody hens. The indigenous "breeds" cannot be used to improve the poultry industry, because of poor egg and meat production.

Several firms plan to import broiler breeders within the next 3 to 12 months. When this occurs, broiler chicks will be available from Yemen Poultry Producers & Marketing Co., Yemen Poultry Farm, Sallah & Sons, and the Yemen-Holland Poultry Project. Only the Yemen-Holland Project expects excess chicks but excess chicks will also come from the other hatcheries due to the technical inability to even out broiler egg production.

Either the Amran Government Project or the Middle East Project could have egg production breeders but these are not presently planned. Their broiler breeders will only take care of their planned needs.

#### Water

As with most animals, birds require large quantities of clean water to function most properly. A large poultry operation must put in their own well or wells depending on the size of the operation and the back-up systems desired. The German Project Leader quoted 6,000 R per meter for a well with a capacity of 1,000 liters per second. Such a large pumping rate would not be necessary for most poultry but the cost indicates the large investment needed.

The village flocks of 100 to 400 birds would probably rely on existing water supplies while the medium producers with several thousand birds will have to examine closely their particular situations. Hopefully, back-up systems would be established.

Chlorination of water could be done in areas where high contamination is present. A possible system for YAR poultry operations is not known.

#### Medicants

Vaccines, antibiotics, coccidiostats, Mitecides, etc. are now flown in from Holland and other Western European countries by Sallah & Sons, the Yemen-Holland Project, Omeri, and USAID. The British veterinary team brings in vaccines and also medications. The other poultry producers purchase vaccines from Sallah & Sons and the British veterinary team.

No store or agency handles any supplies at the present and no such supplies will be produced in Yemen for many years. But several distributors may come into existence fairly soon. Sallah & Sons plans to supply medicants within the next several months because they plan to hire a veterinarian to work with their livestock and with other livestock producers. An Eli Lilly representative has contacted a pharmaceutical firm which would hopefully distribute poultry supplies in Sana'a, Taiz and Hodeidah. Day-old imported egg production stock are vaccinated for Mareks, but broiler chicks are not. Broilers are vaccinated for Newcastle at 7 days and the egg production stock are vaccinated for Newcastle at three different ages prior to egg production. No other vaccinations are done.

### Labor

With an emigration rate of 6.5% the male to female ration is .91 to 1. Therefore, there is a distinct shortage of laborers, especially technically trained. The most qualified are out of the country.

Due to tradition and necessity, women and children do a great deal of village work: care of animals, crops, etc. But when it comes to a business, the men are the entrepreneurs. Based on conversations and observations, the authors believe that women will be utilized in the care of flocks of up to several thousand. All the management will be done by the men. Women probably will not be used in the larger commercial flocks.

A female manager is not foreseeable in the near future due to the fact that men do not show much respect for women. It is not conceivable that a woman would tell a group of men what to do.

Following on with this thought, extension service agents should be men because they can communicate with the laborer -- men and women -- and the managers -- men. Women extension agents may very well be limited to communicating and influencing the women who are not the decision makers and will probably not have influence upon the expansion of the poultry industry.

### Technical Assistance

Technical assistance can come by many sources -- trade magazines, radio, television, seminars, one-on-one encounters with extension agents, other farms, books, and scientific publications. Poultry literature of any kind in Arabic has not been seen. The USAID poultry project has begun translating some basic poultry management pamphlets. Other literature could be sought, but it should be remembered that the ability of a great number of Yemini to read is limited. Understanding may be a greater problem. The electronic media system is developed in YAR to the extent that it could be utilized. There is some communication between the various poultry firms, but sometimes the blind are leading the blind.

The extension agent is the only feasible source of information on how to get started in poultry and how to maintain that operation. There is no formal poultry extension service in the YAR, but the USAID project personnel have begun to function as extension agents and have encouraged their counterparts and trainees to do the same. This should be encouraged.

Poultrymen may also obtain information by attending the training sessions put on by USAID. The first was in late 1977, with about five trainees and a second session was in March, 1978, with three trainees. Another session is planned for June, 1978. These should be encouraged also.

One of the purposes of the Yemen-Holland Poultry Project is to train poultrymen. It is not known when this will begin.

The British veterinary team includes in its six-month training program various aspects of poultry production and emphasis on the several most prominent poultry diseases. The team also assists poultrymen in vaccination procedures and health care. This is excellent technical assistance.

#### Management

The good operations have non-Yemeni managers. Other managers are self-taught by trial and error. All of these untrained managers overlook or are not aware of basic husbandry. When a mortality rate of 30-50% is considered "acceptable," as one manager said, it is obvious that little incentive (interest, etc.) is present to encourage improved management. The managers may assume that they are making a profit even with the high mortality, but, in fact, they probably do not know. One of the great challenges of technical service will be to convince managers to maintain usable records.

#### Land

In all poultry operations, the land was already owned by the farmer or the YAR contributed the land to the operation. A non-land-owning person interested in setting up an operation is at a large disadvantage, because of high land costs and the general policy of the agriculture credit bank not to loan to non-land owners.

Renting land, even through relatively inexpensive avenues, has disadvantages, because long-term leases are uncommon and, in many cases, breaking a lease agreement is not difficult. It is a possibility, when contemplating the renting of land, to build poultry houses that can be put up and taken down in a pre-fab fashion or construct the buildings so that they can be transported in some other fashion.

### Equipment

Sophisticated equipment, such as automatic feeders, must always be imported. Less sophisticated equipment, such as wooden feeders and nests can be constructed, but the wood must be imported. Generally, it can be assumed that the basic equipment -- waterers, feeders, and brooders will have to be imported.

To the present, the equipment had to be imported directly by the poultryman, but there has been interest shown by Sallah & Sons and Al-Wataary General Trading and Ag. Development Co., Sana'a, to order equipment for interested persons. After a demand is created, these firms will probably stock the various items.

### Buildings

The poultry building materials are various materials: converted stone, simple open fencing, mud brick, solid concrete block, hollow concrete block, and sheet metal. The cost is, of course, variable; and the quality generally improves as the size of the operation increases.

For small operations, it has been suggested that cement coated burlap serve as walls. In the Tihama, reed walls and roofs will do. Any type of structure is satisfactory, as long as protection from the environment is provided.

Concrete flooring is common in the medium size and larger operations. Sanitation is improved with such facilities.

### Transportation

Since 1962, many roads have been constructed. Several large roads are being constructed at this time, and the five-year plan indicates an emphasis in this area. Friendly nations have assisted with road building and local development boards at the village level are doing a great deal to get roads into the mountain villages.

The present and future large road building projects are given in Appendix G. This information will assist in deciding where the poultry industry will expand and where demonstration flocks should be situated.

Generally, wherever there is a road, this means that the village served with it will have a vast amount of imported items, including frozen broilers and eggs. This also means that the various inputs necessary for poultry development are available. The cost of transportation is another matter.

### Markets

The poultry operations are centered near population centers -- Taiz, Ibb, Yarim, and Sana'a. The population census of 1975 (see Appendix C2) indicates other population areas. No doubt the poultry industry of the near future will saturate these areas before moving out into the less densely populated mountainous areas.

### Financing

Various sources of monies have been utilized -- private individual, agriculture credit bank, non-Yemen governments, and YARG. For individuals needing financial assistance, only two sources of funds are known -- the Agriculture Credit Bank (ACB) and the commercial banks. The Central Bank of Yemen has charged 12% for commercial loans in the years 1974-75, 1975-76, 1976-77, 1977-78, and in the first quarter of 1978-79. Mortgage and personal loans were 14% during these same periods. The ACB loans at the rate of 9% for short-term (about three months) and at 8% for intermediate-term loans (five years). Seven poultry loans have been made by the ACB ranging from 90,000R to 3.7 million R. These were for six poultry farms and one feed mill. In most cases, the borrower must put up 33% of the investment and the land.

The credit policy extended by Sallah & Sons and Omeri to chick buyers is not known. The Yemen-Holland Poultry Project will extend credit to chick and feed buyers. Interest charged was not specified, but the loan would be payable prior to a repurchase of products.

### Fuel

Many fuels could be used -- dung, wood, straw, gas, solar, kerosene, electric -- but the most common are butagas, electric, and kerosene. The other methods are generally impractical, although there has been some discussion about the use of fuels readily available at the village level. Butagas and electricity are used to produce infrared heat in the largest operation. Hot air has been used by Sallah & Sons. Kerosene is used by Yihia Brothers, but with less than desirable results. They will probably go to infrared bulbs.

### Electricity

Most villages have inconsistent supplies, therefore, no poultry operation should rely upon external electrical supplies. This is really no problem, because neither the broilers nor egg layers absolutely need supplemental light. The operations with feed mills and water pumps may purchase generators.

## Litter

Chopped straw from sorghum or wheat is most common. Some wood shavings are used, but very little. In all cases seen, a minimal amount of straw is used, because of its high cost. Built-up litter (litter used for several broods) is common and will probably become the "acceptable" technique.

## SOURCES OF INPUT TO THE POULTRY INDUSTRY

A graphic display of the sources of input is in Appendix H. The weak segments are asterisked for quick appraisal. Each area will be discussed briefly.

### Chicks-Broiler

Presently, broiler chicks must be imported, but within 6 to 15 months there will be at least two and possibly three hatcheries selling broilers. The weekly sales may be near 10,000. This would be a good start.

### Chicks - Egg Production

Presently, chicks must be imported. Within three months, USAID-Taiz will begin selling about 600 females per week. This could be tripled in a year or so, but this quantity is a "drop in the bucket." To move the industry, either the Middle East Project or the Amran Project needs to bring in parents and sell offspring. It also may be that import through Omeri and/or Sallah & Sons will cease once they have broiler parents. The supply of egg production stock will then be gone.

### Feed-Broiler

Omeri and Sallah & Sons both sell feed. The Yemen-Holland Project will start sales within 1.5 years, and Omeri will start using local feed ingredients. There will be a ready supply of feed from these entrepreneurs within a relatively short time.

### Feed - Egg Production

The USAID Project mixes it now and sells at below cost. Once Omeri and Sallah & Sons see a demand, they will probably mix the layer diet, too. It could be that the people getting subsidies now will expect them for a long time, the low prices may become institutionalized.

### Financing

The Ag. Credit Bank, Commercial Bank, the Dutch, and the private sector will take care of financing.

### Equipment

There is no source of equipment in Yemen. It must be imported, but there are strong indications from Sallah & Sons and Al-Wataary Co. that they will do some importing. The private sector will probably meet the demand quickly.

### Medicants

There is no commercial source in Yemen, but Sallah & Sons have indicated they will soon begin stocking a variety. Again, the private sector will fill this gap.

### Education

Only USAID has a functional poultry training center. The British will do some very basic training, but not much. The Yemen-Holland Project will do some training, too. After seeing such obvious lack of basic husbandry, there is no doubt that the greatest weakness in the poultry industry is in the area of technical expertise. This is where the USAID Project can be most effective - training poultrymen, training extension people, and doing extension work.

## PRICES AND COSTS OF INPUTS - EGG PRODUCTION BUDGETS

### Feed Costs

Large commercial operations will mix feed at a cost of about 2.0 R. per Kg. for ingredients. Milling (.06R/Kg.) and transportation costs (0.15 R/Kg.) will increase this to about 2.21R/Kg. This feed will be sold to the medium size operations for 3.0 R/Kg. The small operators will be able to purchase feed from USAID and/or the Yemen-Holland Project at the cost of production. For the village flock, transportation will be 1.5 R/Kg, whereas for the medium producer, due to volume, transportation will be 0.9 R/Kg.

Both the small and medium operators can reduce their feed costs by purchasing a concentrate at 2.5 R/Kg. from the large mills and mixing with local grains. The small producer has an advantage, because home grown grains can be used. Grinding costs would be about 0.07 R/Kg., assuming that this is done by a village mill and not one owned by the poultry farmer.

### Feed Consumption

Regardless of the operation, 8 Kg. of feed per bird will be needed to 20 weeks and 41 Kg. per bird will be needed from 20 to 72 weeks. No force molting is assumed, due to the vary large salvage value of the spent hen.

### Chicks

USAID pays 6 R/chick to Omeri when a load is brought in. This price was used, since there is no other source of information. Possibly when USAID begins selling chicks from its own breeders, the price will be less.

### Water

At the village level, the 20 liter (5 gallons) per day would mean an extra trip to the well, but no added expense. For the medium producer, he might have to pay 7 R/400 liters as is commonly practiced. The complexity of computing the cost of a well, pump, and electricity for an on-farm well precluded a calculation here. Again, 7 R/400 liters was used. From one day to 72 weeks, about 95 liters is needed per bird.

### Medicants

Vaccines were the only item calculated. Sallah & Sons import them at the cost of about \$600/100,000 doses. The firm will sell individual vials of 1000 doses for 25 R. The small operator uses only 100 doses, but must discard the remainder. To minimize vaccine costs by getting together with neighbors is highly unlikely.

### Labor

Yemeni in the villages receive 40 R. cash plus 10 R worth of cat, plus a lot of tender talk. This is for about four hours of work. Thus, 12 R/hour was used in the calculations for the small flocks. A full-time worker receives 1500 R per month. For brooding, 20 minutes per day is needed for the small flock to 20 weeks, then 15 minutes per day is required. One full-time person cares for the medium size flock, and one and one-half person cares for the 8,000 bird flock. The other half person works in the feed mill.

### Transport of Chicks

The village operator will transport chicks as an additional item, but the other operators will have to make special arrangements. A pick-up costs about 500 R to transport 2,000 chicks from Sana'a to Ibb.

### Fuel

Based on Butagas, cost of 25 R per tank, and 8 tanks per 1,000 chicks, the cost of .2 R/chick was derived.

### Litter

A bag of straw, costing 10 R, 9 R, and 8 R for the three operations respectively, will cover four square meters. Nest litter is included under Miscellaneous.

### Buildings

Based on a bird density of .28, .23, and .20 square meters per bird, the areas needed will be 28, 460, and 1600 square meters for the small, medium, and large operations. The cost per square meter will increase (400 R, 600 R, and 800 R respectively) due to improved construction from a modified or mud building to one of sheet metal or concrete block. The large operation will use two buildings of 800 square meters.

### Land

Land prices vary by area of the country and whether it is near or far from large cities. Land is valued at 45, 136, and 227 R per square meter for the three sizes, respectively. The large commercial is most expensive, because of nearness to the city.

Land area needed must include a buffer space around the building(s) and, in the case of the large commercial flock, land must be available for a feed mill. Estimates are 30, 700, and 2800 square meters, respectively.

#### Feed Mill

A small mill with an imported mixer of 500 pounds (230 Kg.) and a hammer mill will cost about 49,500 R. The cost of this initial investment for the building is spread over fifteen years, and the equipment will be usable for ten years. Maintenance and repairs will be 3150 R per year, and one-half man is 9,000 R per year. With 261,000 Kg. mixed each year, the milling cost is about 0.06 per Kg.

#### Power (Electricity)

The City of Sana'a charges .65 R per KW, but due to the assumption made that artificial light will not be used in the two smaller operations (the large commercial operation would probably only use electricity for the mill), the cost there will be very minimal.

#### Miscellaneous

In North America, a rate of .5% of the variable cost is miscellaneous. An additional 0.5% was used here as a buffer against unexpected expenses. Taxes would be included here.

## PERFORMANCE STANDARDS AND INCOME DATA - EGG PRODUCTION BUDGETS

### Egg Production

Because of slightly inferior management, due to minimal technical assistance, a production rate of 240 eggs per hen-house is anticipated. For the commercial operations, 260 eggs per year is a reasonable expectation.

### Mortality

Mortality to 20 weeks is calculated to be four percent. It is assumed that the custom of giving four percent extra from the hatchery will be created in the near future. If not, then a proportional error is present across the board. Mortality in the lay period will be 15% for all operations.

All inputs take into consideration mortality. Most inputs to 20 weeks are on a survivor basis and most inputs in the lay period are on a hen-housed basis.

### Egg Size

Since neither the YARG nor the sellers of eggs differentiate to any great extent on egg size, no egg size distribution data need be calculated.

### Egg Quality

Apparently, consumers only differentiate between eatable and uneatable eggs (interior quality) and not on grades partially based on exterior quality. Therefore, all eggs produced are assumed to be saleable, whether they are checked, cracked, dirty, mishapen, et cetera.

### Selling Price for Eggs

The Yemeni method is to quote a price per flat (30 eggs), but eggs are sold individually also, therefore, the price per egg, rather than per Kg. or dozer, is used here.

The price per egg varies from 0.5 R, where the Ministry of Supply enforces prices, to 1.0 R in the more out-of-the-way places. Assuming that consumers in the villages will recognize a high quality product and knowing that they will not have to discard eggs, it is proposed that 1.1 R per egg be the selling price. The same general assumption of sensitivity to quality and economics justifies a selling price of 0.7 R for the 2,000 bird flock. Only 0.6 R can be budgeted for the 8,000 bird flock, because of more wholesaling and greater competition in the locality of the operation.

### Selling Price for Spent Hens

A live, backyard chicken weighing about .5 Kg. sells for 25 R. The price does not increase proportionately with size. Live birds have been priced at 15, 20, 29, 40, and 55 R, depending on the location and size. Considering that the spent hen will weigh over 2 Kg., 40 R would seem to be a reasonable value. This is a large source of income for the egg production operations.

### Selling Price for Poultry Manure - Litter

A bag of poultry manure - litter is traded for a bag of straw, which has a value of about 8 R in large volumes. Each egg layer will produce about 1.2 cubic feet, which is about one bag. The sale of this product should not be neglected.

## RETURNS OF EGG PRODUCTION BUDGETS

Budgets based upon the prices and cost of inputs have been developed for village flocks and commercial flocks of medium and large sizes. These have been developed for both egg production and broiler production. Egg production requires total investments (lands, buildings, equipment) of 13,550 - 381,600, and 1,930,000 R for the three sizes, respectively - see Appendix I. The production cycle will require 74 weeks, and significant returns are obtained from sale of aged hens and litter, as well as the eggs. For the entire cycle, pure profit for the various sizes would be 2,934, -70,377, and 233,647 R respectively. These adjust to 20,062, -49,454, and 164,184 R on an annual basis. If only variable costs are considered, which might be the important factor in periods of high levels of inflation, returns are 11,243, -19,391, and 601,250 R for the entire cycle, or 7,900, -13,626, and 422,500 R on an annual basis.

In the event the village and medium sized commercial producers would learn the technology of buying a concentrate and mixing with local grains, cost could be decreased 7,550 and 128,600 R, respectively, for the cycle. On an annual basis, these reduce costs 5,305 and 90,367 R. Returns above total costs with this additional technology are 10,484 and 58,223 R for village and medium sized flocks, respectively, for the cycle, or 7,367 and 40,913 on an annual basis. Returns above variable costs are 29,277 and 147,991 R for the entire cycle, or 20,593 and 103,994 R on an annual basis. Calculations on an annual basis are provided for comparison with the profitability of broiler production on an equal basis.

## PRICES AND COSTS OF INPUTS - BROILER PRODUCTION BUDGETS

### Feed Costs

Sallah & Sons, Yemen-Holland Project and Omeri mix their own broiler diets. The cost per Kg. for the ingredients is about 1.65 R and 1.5 R for the starter and finisher diets respectively. Transportation of the ingredients to the mill adds on .15 R per Kg. with large loads of 6,800 Kg. The milling cost is 0.06 R per Kg. Therefore, the total cost per Kg. is 1.86 and 1.72 for the starter and finisher respectively. All three operations indicate they will sell these diets at 3 R per Kg.

Sallah & Sons sells concentrate at 5 R per Kg. Three parts of this mixed with 7 parts of grain will decrease costs to the small and medium operators. Hired grinding of the grain will be 0.07 R per Kg. Transport of the concentrate will be 1.5 R and 0.9 R per Kg. respectively for the small and medium producers.

### Feed Consumption

Egg broiler will consume 1 Kg. to 4 weeks and an additional 3 Kg. to market (10 weeks). This gives a 2.5 feed conversion for a 1.6 Kg. live broiler at market time. Mortality has been considered. Fairly good management is assumed. To this point, Yemeni poultrymen have not done this well, but their feed quality should improve rapidly within the next couple of months, due to their own milling operations.

### Chicks

Imported broilers cost 2.5 to 3 R each. Omeri sells them for 3 to 3.5 R to Sallah & Sons, Yihia Brothers, and the Yemen-Holland Project. Once breeders arrive at the Yemen-Holland Project, the price will be 3 R, therefore, this price was used.

### Number of Broods

Assuming ten weeks per brood, that gives 5 broods per year. Four and one-half broods might give more cushion for marketing and clean-out, but with experience, the industry will quickly become more efficient in marketing, and built-up litter will minimize clean-out time.

### Transport of Chicks

The villager will just put the four boxes of chicks into his truck along with all the other goods he buys in Sana'a, therefore, there is a minimal charge. The commercial producers will need to make a special trip at a cost of 500 R per pick-up holding 2,000 chicks.

### Water

Each broiler will require 7 liters of water to market time. The cost is 7 R per 400 liter. It is assumed that the larger operations will have their own well, but cost data is not available.

### Medicants

A single vaccination for Newcastle is needed. The commercial will pay \$600 per 100,000 doses, and the small operator can buy from Sallah & Sons at 25 R per 1000 doses. That actually means 25 R per group of 400 chicks.

No other medication is included, although the large operators have medication on hand and Sallah & Sons uses a sulfa product at times, but for an undisclosed reason.

### Labor

The single group of 400 broilers will require .5 hour per day for two weeks, then .25 hour per day to market, for a total of 21 hours. The medium producer will use one full-time man and the large producer will use four full-time men at 1500 R per man per month.

### Fuel

Using 25 R per tank of Butagas and 8 tanks per 1000 chicks, a value of 0.2 R per bird was calculated.

### Litter

The straw litter will cost 10, 9, and 8 R per sack for the 3 respective size operations. One sack will cover 4 square meters. Old litter will be removed after the third brood.

### Buildings

Based on a bird density of .14, .11, and .09 square meters per bird, which is 1.5, 1.2, and 1.0 square feet per bird for the village, medium and large operations respectively, the areas needed will be 56, 550, and 1800 square meters respectively. The 5,000 birds will be split between two houses, and the 20,000 birds will be in four houses.

The cost per square meter will be 400, 600, and 800 R respectively - increasing as the quality of the building increases.

### Land

Additional land beyond that needed for the birds makes a land requirement of 60, 1026, and 4280 square meters, respectively. Land prices will be 45, 136, and 227 R per square meters, respectively. Land near cities is more expensive than mountainous land.

### Feed Mill

A small mill costing about 49,500 R with a full-time worker could produce the 400,000 Kg. of feed needed each year by the large operation. Building depreciation is over 15 years, and the 230 Kg mixer and hammer mill are depreciated over ten years. Repairs and maintenance adds on 3150 R per year. The milling cost is near 0.06 R per Kg.

### Power (Electricity)

Only the feed mill needs electricity, and this will be minimal. A generator may be justified for the large operation, but the individual situation must be studied closely.

### Miscellaneous

One percent of the variable costs are used to cover unexpected expenses, even though the "Standard" is only 0.5% in North America.

## PERFORMANCE STANDARDS AND INCOME DATA - BROILERS PRODUCTION BUDGETS

### Broiler Weight

The Yemen-Holland project expects to sell 1.6 Kg. live broilers. For a 10-week-old bird, by Western standards, standards are low, but considering the stage of technical assistance, this would be very reasonable. To this date, no producer has indicated any sale of birds above 1.5 Kg., and it is fairly certain that none of the producers actually weigh the birds at market time.

### Mortality

A death loss to 10 weeks is estimated at 10%, even though two producers experience over 30% mortality on a regular basis. The operations with imported managers have about 8% mortality to market time.

### Broiler Quality

The consumers do not buy "ill" birds, but there is no indication that poor feather, conformation, breast blisters, etc. decreases the value of the birds. This assumption should be explored.

### Selling Price for Broilers

Yihia Brothers receive 15 R/Kg. live, but they do not weigh them. Sallah & Sons sells at 15 R/Kg. retail and 14 R/Kg. wholesale. Omeri sales at 15 R/Kg., also, and the Yemen-Holland Project will sell those below market price, therefore, at about 13 R/Kg. The 15 R/Kg. appears to be an appropriate price for the small and medium size producers, but the large producers may need to wholesale half of the production, therefore, 14.5 R/Kg. is budgeted for him.

### Selling Price for Poultry Manure-Litter

A 1.2 cubic foot bag of poultry manure-litter is valued at 8 R in large volumes. Village producers are anticipated to sell .14 cubic feet per square meter since they will sell litter less often. Commercial producers are anticipated to sell .90 cubic feet per square meter. This is a significant return which should not be overlooked.

## RETURNS OF BROILERS PRODUCTION BUDGETS

Cost of production for broilers were calculated for village and medium and large sized commercial flocks, as well. These require investments of 25,910, 404,300, and 2,476,800 R, respectively, see Appendix J. Income is primarily from the sale of chickens weighing 1.6 kilogram. The litter would comprise only from 1 to 5 percent of the sales value. Pure profit for village, medium, and large flocks over the five broods anticipated per year are -10,449, -15,077, and 702,121 R, respectively. Returns over variable costs are 1,159, 62,641, and 1,049,178 R. These assume the purchase of complete feed. As with egg production, additional calculations were made to allow for greater technical expertise, purchase of a concentrate which is mixed with ground local grains for the village and medium sized flocks. This reduced costs by 13,800 and 122,500 rials, respectively. The change results in pure profit of 3,351 and 107,423 R for village and medium size flocks. Returns above variable costs increase to 12,641 and 185,141 R, respectively.

## ECONOMICS OF SCALE

### Egg Production

The influence of size on cost of egg production is significant, see Appendix K1. Full cost of production for eggs are 1.153, .997, and .649 R in the village, medium, and large flocks, respectively. Variable costs are .806, .824, and .472 R for these sized flocks. Only the largest size flock can compete with an import price of .46 R, even when only variable costs are charged. However, the village producer who would mix his own feed and provide his own labor, management, litter, and interest could produce at .420 R per egg. Thus, there is a place for small village flocks as complementary enterprises, and domestic production could be expected to occur, due to the higher quality and locational advantage. The question of quality in eggs is interesting, however, the Yemeni appear to recognize two qualities, eatable and uneatable.

### Broiler Production

Economics of scale exist for broiler production, see Appendix K2. Full cost of production are 18.786, 16.206, and 10.411 R per Kg. of broiler produced in village, medium, and large sized flocks when a complete feed is fed. Variable costs are 15.560, 14.047, and 8.001 R for each Kg, respectively. With the increase in technology, the village and medium sized flocks buying the concentrate to be mixed with ground local grains reduces full cost to 13.994 and 12.804 R/Kg. respectively. Variable costs decrease to 10.768 and 10.645 R/Kg. If the village producer will mix his own feed and provide his own labor, management litter, and interest on operating capital, he can produce at 10.248 R/Kg. This would be a complementary enterprise. Under such conditions, all sizes of producers can compete with an import price of 10.5 R/Kg. of frozen broiler. Yemeni will pay a premium for live birds. This may reflect concern for quality.

## ECONOMICS OF TECHNICAL COMPETENCE

### Egg Production

These budgets have been developed assuming a relatively high level of technical competence of the manager and key workers. If such competence is lacking, the enterprises will not perform as well. A lay rate of 66 and 71 percent of hens housed was assumed for the village and commercial flocks, respectively. The impact on cost of lower levels of production at 60 and 80 percent of budgeted standard has been computed, see Appendix L1.

Various sized flocks are affected differently. Village flocks can produce a profit above all costs when feed is purchased ready mixed, so long as production is above 90 percent of standard and a price premium is obtained to allow for the true value of the eggs when all are eatable. If a purchased concentrate is mixed with ground local grain, production above 65 percent will generate a profit even at the nominal price. The medium sized commercial producer cannot obtain a pure profit with purchased complete feed. However, with the increased technology of mixing ground local grain with a concentrate production of over 85 percent of the standard will result in profit at the premium price. The manager of a large commercial flock is assumed to have the technology and equipment to prepare feed in quantity, yet he must maintain production above 85 percent of standard if he is to reap any pure profit at the premium price.

### Broilers Production

Broiler production is considered from two factors, production and feed efficiency, see Appendix L2 and L3, respectively. Production is a combination of survival rate and weight at time of sale. Though each is listed, any combination of the two factors which would provide a given proportion of the standard would result in the specified cost of production. The village producer who feeds a complete feed cannot produce at a profit, though he attained the budgeted standards. If he mixes ground, local grain with purchased concentrate, he must obtain greater than 90 percent of standard in order to obtain a pure profit. The medium sized producer cannot cover all cost when using a complete feed and must obtain greater than 80 percent of standard to obtain a pure profit if he buys concentrate to mix with ground local grains. A commercial producer of large size will generate pure profit, so long as he obtains 70 percent of standard production.

The influence of feed efficiency, since feed is a major cost, has an influence on pure profit. However, it has a smaller effect than does production, see Appendix L3.

## VALUE OF TECHNICAL EFFICIENCY

Perhaps the importance of technical efficiencies is most easily discerned by its effect on profit, see Appendix M, for egg and broiler production. The graphs represent break-even charts. Value of technical efficiencies are illustrated in two ways, the greater profit obtainable through learning how to mix a concentrate with ground local grain and in the influence of using better husbandry to obtain greater production. The former can be observed on the graphs. The latter can be calculated from budgeted data. In egg production, the value in Rials of:

	Village	Medium	Large
a 20% increase in production	6192	85280	295320
a 1% increase in production	310	4264	14766
a 1% increase adjusted to annual learning to properly mix feed	218	2996	10376
	5305	90367	--

A manager in the village will gain 218 R a year if he learns and applies sufficient technology to increase egg production one percent. The value, as well as the amount of learning and application, increases for larger sized flocks. At the large commercial size, a one percent increase in egg production is worth 10376 R a year.

Pure profit in broiler production is affected by technology, as well. The return to improved technology is:

	Village	Medium	Large
a 20% increase in production	8731	113667	440266
a 1% increase in production	437	5683	22013
learning to mix feed	13800	136300	--

The returns to good husbandry, or the penalty for poor husbandry, is greater in broiler production than in egg production. In either case, technological knowledge and its application will determine the profitability of the poultry enterprise.

## BENEFIT-COST RATIOS

Benefit-cost ratios have been calculated for poultry enterprises, see Appendix N1 and N2. These have been developed on expected cash outlay costs. Thus, management has not been charged for any of the operations, and the village flocks have not been charged for land, interest, labor, or litter. Under these assumptions, the village flock for egg production has the highest ratio of benefits, 1.65, and if the improved technology of self-mixing the feed is used, it is 2.78. For broiler production, the large commercial flock has the highest ratio, 1.56. Except for the small flocks, broiler production exhibits higher benefit ratios than egg production. This is borne out through a comparison of annual pure profitability of the enterprises. A conclusion might be that village producers would be advised to produce eggs, while the commercial sector should concentrate on broiler production, under current conditions. The possibility of dual purpose birds in the villages has not been explored since, at present, there is no source of chicks.

## DEMAND INFLUENCING FACTORS

In order to obtain data on which to project demand for eggs and broilers, several surveys were performed in Sana'a during late March and early April, 1978. The surveys were developed recognizing the limitations of questioning cross-culture and literacy of the respondents. Time was severely limited as well, thus the surveys were conceptualized and implemented immediately. The results may have raised more questions than they answered. They would have been excellent presurveys. Lacking better data the results were tabulated and analyzed.

### Purchase Habits

Based on the consumer survey (Appendix 0) most eggs are purchased on a weekly or twice-weekly basis. Since there is no refrigeration in the homes, it is necessary to buy perishables, such as eggs, fruit, and meat, on a frequent basis. This frequency of buying is not greatly different than in the U.S.A.

The eggs are normally purchased by the flat, holding 30 eggs, and carried away from the retail outlet on the flat. The survey indicated that some small quantities were purchased. Consumption, based on the survey, was six eggs per person per week.

Consumers in Sana'a were asked to estimate their own buying response to a decrease in price for eggs of 33 percent from the set price of .5 R per egg. The arc elasticities of demand were calculated on the set price basis. There were 17 respondents in the city and 12 respondents on the USAID compound for a total of 29 completed surveys. The enumerator had the respondents fill out the questionnaires, thus there is a high probability of an education bias in the results. For the entire sample the elasticity of demand for eggs is -5.78, which is classed as highly elastic. The coefficient indicates a one percent change in price would result in an almost six percent change, in the opposite direction, of quantity of eggs desired.

The subgroups differed in their estimated responses. Buyers in the city would be more responsive to changes in the price of eggs, elasticity of -6.90 compared to -.342 elasticity of the respondents at USAID. When the information is divided into other subgroups, families which consume larger number of eggs per person, over 15 per week, tend to be smaller and their price elasticity for eggs is calculated to be -9.39. Those with families of less than six have a price elasticity of -10.97. Considered in terms of how much consumption would expand almost half, 45 percent, said they would increase from 1½ fold to double, one fifth would more than double to triple, and one seventh would more than triple purchases of eggs.

### Eggs - Customers at AID Project

Buyers of eggs from the USAID poultry project were surveyed (Appendix P) in early April. The sample was limited by the fewness of eggs available at that time. A total of nine responses would indicate these consumers buy more eggs per person than was true for the consumer survey, 12 compared to 6. They also reported almost no uneatable eggs. This was the expected answer. These quality conscious buyers were asked what their response would be to a decrease in egg prices in the city. In effect, would they be willing to pay a premium for the quality eggs at the project? The response was, two thirds would drive out and buy at a price differential of 60 percent; over one fifth would drive out and buy so long as the price differential were no more than 30 percent; and one respondent, 11 percent, would not pay any price premium for these quality eggs.

### Eggs - Consumption and Handling in Restaurants

Managers of restaurants reported more uneatable eggs per flat than the private living groups. (Appendix Q) The range reported was from 5 to 25 percent and the average was 12 percent which is the same as the average of consumers in Sana'a. This may indicate the USAID respondents purchase eggs from the project and thus found fewer uneatable than would occur in normal trade channels. Trade channels do not provide conditions to maintain egg quality - temperature or humidity control. The four respondents were evenly divided on the question, "Would you pay more to obtain higher quality eggs?"

### Eggs - Handling by Storekeepers

Concern for quality of eggs available to consumers in the normal trade channels lead to a survey of storekeepers in Sana'a, Appendix Y. Eggs are not refrigerated while soft drinks are. When asked about this, the respondents were almost unanimous in not refrigerating. Their reasons for not refrigerating ranged from "not necessary because of fast turnover" to "they will become inedible." The first reason may reflect pure economics and that consumers normally recognize two qualities only, eatable and uneatable. The latter reason may indicate a lack of knowledge which might be overcome through extension. Probably extension should be directed to the consumer, as well. The marketing channel would have greatest response to the economics created by consumer desire.

### Poultry Meat - Yemeni Consumers in Sana'a and the USAID Project

Some consumers purchase frozen broilers and/or live birds daily (Appendix O) but most commonly, it is weekly or twice weekly. The purchase of live vs. frozen birds was not separated out in the survey; but, with the small quantity of live birds available in the market, it could be assumed that the frozen birds were the ones referred to in the survey.

The frozen birds are wrapped in newspaper or placed in a paper bag. The bird is transported in this fashion. The average purchase, by a purchasing unit, was five birds each week. Consumers in Sana'a were asked to estimate their own response to a decrease in price for broilers of 33 percent from their set price of 15 R/Kg. Arc elasticities of demand calculated from the set price for broilers is -1.21 for all respondents. A price change of one percent would result in an opposite one and one fifth percent change in quantity demanded. Consumers from the city would be less sensitive to price change, elasticity -.70 than all respondents. At USAID, the response is greater, -2.73 elasticity.

When divided on the basis of other subgroups, few overall trends could be identified. However, those purchasing units which currently consume over two broilers a person each week would not respond to price changes, whereas those consuming less would be responsive, elasticity of -1.83. Purchasing units of six to ten would be most price sensitive for broilers, elasticity of -3.09. Other than these, the change in desire for broilers in response to change in price appears to be rather consistent.

Eggs and poultry meat buying habits definitely are established in Yemen. The Yemeni people desire more poultry products as population and as income increase.

### Population

The World Bank has projected a population at near 5.9 million for Yemen by 1980, from 5.2 million in 1975, but the 1976-1977 Statistical Year Book stated that 4.5 million was the population in 1975. In any case, the population appears to have a steady year-by-year growth.

Of interest, also, is the distribution of population throughout the country (Appendix C). This distribution will, of course, have a bearing on consumer buying, because the most populated areas will have the most sophisticated transportation system, therefore, the most commodities, the most competition for the consumer, and probably the lowest retail prices.

The specific cities of Sana'a, Ibb, Taiz, and Hodeidah, being the largest, will be the centers of commerce. Their growth rates will be important. These cities will probably grow at a much faster rate than the YAR as a whole. The World Bank, September, 1976, projected Sana'a to increase from 327,000 in 1975 to 456,000 by 1980.

### Income

With several hundreds of thousands, maybe several million, Yemeni working outside the YAR, there will continue to be a three million dollar per day remittance. This value may even increase, as more workers leave the YAR, but data indicating drifts in migration rate over the years is not available.

Domestic income will be high, as is inflation and the demand for consumables. The average monthly salary of 1500 R for a poultry worker will increase considerably in the next few years. Possibly the holding of two jobs (moonlighting) will become common, if not already so. This is unknown.

### Convenience Foods

#### Barbequed-Roasted Chicken

The same type upright 5 rotisserie rotor was seen in many localities: Amran, Sana'a, Yarim, Ibb, Taiz, Zabid, and Hodeidah. These were not present several years ago. The birds used are those imported as ready-to-cook. The average size is slightly more than one kilogram and they sell for 16 to 20 R, depending on the location.

The authors have consumed a number of these birds and have found them to be very good. The Yemeni also consume them readily. The Cold Store manager indicated that the barbequed-roasted chicken market accounts for 20-30% of the Cold Store sales. That is about 8 tons per month.

#### Hard-Boiled Eggs

Hard-boiled eggs selling for 1 R per egg have been almost everywhere the imported eggs have been seen. In Sana'a, it is common to see a vendor with 200 eggs in a large pan on his head selling individual eggs to occupants of automobiles. Salt and other types of seasoning is commonly provided. The quality of the product is not known to the authors.

## THE POULTRY INDUSTRY: 1978-1981

### March, 1978

The poultry industry of the YAR is based around imports -- chicks, feed, equipment, technical assistance, medicants, building materials, and many other items for production purposes. For many individual items, especially some feed grains, it is less expensive to import than to purchase locally.

The eggs consumed are obtained from the 5 million indigenous (estimate) hens laying 20 eggs per year (estimate) and from imports of over 100 million eggs per year.

The meat birds consumed are obtained from the indigenous stock or from imports of 1,428 ton per year (Appendix S) or from the commercial producers who are able to produce about 2 million kilograms per year. (Appendix D)

### Between 1978 and 1981

There is little doubt that broiler production will expand greatly. Commercial producers plan to expand, new producers are coming in, and more people are realizing the great profit potential as the budgets have indicated.

Egg production will begin and increase at a slower rate, due to the competitive import product.

The rate of expansion can only be estimated so that support systems, especially technical assistance, can also be expanded.

By only considering the existing and planned operations, Appendix T has been created.

### Implications of Projected Increased Supplies

#### Poultry Meat

The five-year plan projects 3,140 tons for 1980/81, whereas if all eight private and one public operation function at full capacity during that year, over 9,912 tons will be produced. Imports are expected to be near 40,000 tons. The total of 51,312 tons supplied 8.6 Kg. per person per year for the expected population of about 6 million people.

The 9,912 tons of poultry produced in the country will require about 30,000 tons of feed. If the diets contain 70% grain, that is 21,000 tons of grain. The five-year plan indicates domestic grain production to be about 1,363,000 tons (Appendix D2). Poultry would then use 1.5% of the domestic production. The low percentage is questionable.

### Eggs

The five-year plan projects 235 million eggs for 1980/81, whereas if the three operations proposed and/or under construction are in full operation, there will be 198 million eggs produced -- not including the indigenous stock. The 800,000 hens will require 32,500 tons of feed, which is about 70% grain. The grain requirement would be 22,750 tons, which would be 1.7% of the domestic production. The low percentage is unusual.

### Planned Expansion of Existing Commercial Firms

Omeri has talked about adding 60,000 bird capacity. Also, broiler breeders and a hatchery. Egg production stock was once discussed, but not lately.

The Yemen-Holland Project will bring in adult broiler breeders, but probably not egg production stock. This project will begin training Yemeni also.

Sallah & Sons will bring in broiler breeders and probably expand, but they are getting into dairy cattle, so their poultry expansion may trail off.

Yihia Brothers are quadrupling their operation to 25,000 per brood. They may even go further.

Ibb Poultry and Yemen Poultry Farms are unknown. There has been some indication that Yemen Poultry Farms will put in a hatchery and feed mill and expand, but it's very uncertain.

The Lohmann Project has not begun to function yet, so expansion there is unknown. The broiler houses are ready.

### Planned Operations

The Middle East Project is planned for the Sana'a area. It is so big that if completed it will have an immense impact on the poultry industry, especially in the Sana'a area.

The Amran Government Project has no land, but if it gets located, its impact will also be great.

## RECOMMENDATIONS

### Sana'a and Taiz Poultry Project - USAID

The poultry project should:

1. Educate poultrymen and women, whether they are from commercial or village environments.
2. Educate extension poultrymen in basic husbandry knowledge.
3. Establish an active poultry extension service, with key persons based at Taiz and Sana'a.
4. Establish demonstration flocks at prime locations throughout Yemen (see Appendix U & V for suggested locations and details of use).
5. Assist in maintaining the demonstration flocks for several years and use these as educational centers for seminars, publication distribution, extension, etc.
6. Reconsider its policy of subsidizing farmers to start flocks. Reasonable budgets indicate that profit-making is possible at high levels of technology. The long-term results may not be advantageous, because of the development of dependency. However, chicken production may offset the decrease in sheep and goat production in the villages.
7. Continue the policy of getting out of the feed business as soon as possible. Encourage Omeri, Sallah & Sons, and the Yemen-Holland Project in this area.
8. Not consider the supplying of equipment, medicants, financing, or other input items which would unduly detract from the primary goal of educating. The private sector will take care of these inputs.
9. Reconsider its policy of establishing village flocks. Unless there are adequate resources of time, people, vehicles, etc., to service these small flocks, they should not be started.  
  
Greater impact on the poultry industry will occur per unit of resource expended by working with the commercial and semi-commercial flock owners who have a direct and obvious interest in profit-making and expanding.
10. Establish, as soon as possible, small feeding trials to check the value of deomestically produced feed stuffs.
11. Encourage a highly qualified poultryman to advise the poultry project personnel and others in the YAR during 1979 or, at least, until it is recognized that the present poultry project and its "outreaches" (small flocks in the villages) are well established.

### Yemen Government

The YARG should:

1. Establish a poultry extension service, starting at Taiz and Sana'a and later, as men are trained, station one agent in Ibb, Yarim, Amran, Hodeidah, and Zabid.
2. Those persons selected for training and enlistment into the poultry extension service must have shown an interest in poultry.
3. Hire qualified Yemeni individuals from the USAID Poultry Project to manage that same operation after the present USAID staff depart.
4. Encourage the inclusion of egg production parent breeders within the Amran-Government Poultry Project and/or the Middle East Poultry Project.
5. Support the educational function of the Sana'a and Taiz poultry projects.
6. Allow financial loans to non-land owners through the Agriculture Credit Bank. Develop plans for portable poultry houses.
7. Encourage private firms, such as Sallah & Sons, to import and maintain a distribution system for medicants, equipment, and other poultry equipment.
8. Reconsider the establishment of light and temperature (environmentally) controlled poultry houses. Discussion in this area is presented in Appendix W.
9. If the quality of the domestic and imported eggs is to be maintained to the point of retailing, there should be an enforced law requiring refrigeration or a subsidy to support refrigeration or an allowed increase in the retail price of eggs, so that retailers can pass the added cost of refrigeration on to the consumer, who will actually benefit at the increased cost, because of fewer uneatable eggs.

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## SOURCE MATERIALS: INDIVIDUALS

Barrows, Tim	British Vet. Team, Sana'a
Beer, George	Manager, Omeri Farm, Sana'a
Chahir, Anwar	Import/Sales Manager, Al-Wataary General Trading and Agricultural Development Company, P. O. Box 61, Sana'a
Fosail, Hassan Al	Director of Livestock Division, Ministry of Agriculture, Sana'a
Kraft, Herman	World Bank Representative, Ministry of Agriculture Compound, Sana'a
Lohman Ranch	The Yemen Poultry Producing and Marketing Company
Martinez, Vic	Engineer, US/AID Mission, Sana'a
Meyer, Thomas	Poultry Project, US/AID Mission, Sana'a
Mosberger, Werner	German Project, Sana'a
Ross, Pixie	Statistician, US/AID Mission, Sana'a
Saleh, A. M.	Manager Director, National Cold Store and Supermarkets P. O. Box 2224, Sana'a
Sallah, A. N.	Mohamed Nasser Sallah Farm, Sana'a
Sankoff, Leo	Poultry Project, US/AID Mission, Sana'a
Stewart, Don	Sorghum Project, US/AID Mission, Sana'a
Suleiman, Dr.	Ministry of Agriculture, Advisor, Sana'a
Uphouse, Charles	US/AID Mission, Sana'a
Vernier, Mr.	Construction, US/AID Mission, Sana'a
Voigt, Robert	Sorghum Project, US/AID Mission, Sana'a
Wilsmore, Tony	British Vet. Team, Sana'a
Witterman, Wilhelm	Yemen-Holland Poultry Project of Rawdah, Yemen
Yihia, (Brothers)	Village of Khao near Yarim
Young, John	Agriculture Development Officer, US/AID Mission, Sana'a
Zabarrah, Abdullah	Livestock Division Chief, Ministry of Agriculture, Sana'a

LOCAL PRICES FOR SELECTED POULTRY PRODUCTS, FEED GRAINS AND SUBSTITUTE PRODUCTS  
 YEMEN, MARCH, 1978  
 YEMEN RIALS PER UNIT

ITEM	UNIT	NADID	TAIZ	BAHTAL FAKIH	HODAYDAY	BAJIL	MANAKAH	SANA'A	AMRAN
Wheat, Local	kg								1.8
Wheat, Imported	kg	1.0	1.1		1.5	3.0	1.2	1.5	1.1
Barley	kg	1.4	2.0				.8	1.3	2.1
Maize	kg	1.1			4.0		2.3	1.8	
Millet	kg			4.0					
White Sorghum	kg			3.0				1.3	1.4
Red Sorghum	kg	.6		1.0		1.6			
Beans	kg	1.6	6.0	2.3	2.5			1.8	
Lintels	kg	1.6			5.5				
Sesame Cake	kg			2.2			1.3		
Salt	kg		.7					.3	1.1
Fish	kg		10.0	5.0					
Eggs	ea	.7	.5	1.0	.6	1.0		.5	.7
Live Chicken	kg	40.0				29.3		55.0	
Beef, Local	kg		26.0			30.0		30.0	
Beef, Imported	kg					22.0		18.0	
Veal	kg	30.0	30.0					40.0	
Frozen Broiler	kg	13.0	11.0			13.6		10.5	12.5
Hard Boiled, Local	ea		.75						
Hard Boiled Imported	ea	1.0	1.0						
Broasted Chicken	kg	18.0	18.0	20.0	20.0			18.0	

Source: Individual Survey

LOCAL PRICES FOR SELECTED GRAINS, YEMEN, 1974  
YEMEN RIALS/KILOGRAM

<u>GRAIN (English)</u>	<u>(Yemen)</u>	<u>IBB</u>	<u>TAIZ</u>	<u>KAEDA</u>	<u>RAHIDA</u>	<u>WADI SAHERL</u>
White Sorghum	Durra	1.12	2.06	1.81	1.72	1.62
Red Sorghum	Gahreb	1.12	1.88	1.25	1.25	1.25
Millet	Dokhn	1.12	2.06	1.62	1.72	1.62
Maize	Hind	1.0	1.72	1.56	1.25	1.75
Wheat	Ma'Da	1.0	2.06	1.75	1.69	2.19
Barley	Shaeer	.94	1.41			.94

Source: Sankoff, Poultry Planning Project

DISTRIBUTION OF POPULATION



Source: Central Planning Organization, Statistical Yearbook, 1976-1977

## DISTRIBUTION OF POPULATION IN FEBRUARY, 1975, BY GOVERNORATE

<u>GOVERNORATE</u>	<u>% OF TOTAL POPULATION</u>
Sana 'a	17.8
Dhamar	10.0
Ibb	17.4
Taiz	19.3
Hodeidah	15.0
Al Mahwat	3.9
Hajjah	8.7
Sa'ada	3.4
Merib	1.0
Al Beidah	3.5
	<u>100.0</u>

## Average Domestic Production and Imports for Recent Years

		Average Domestic Production <sup>1</sup>	Imports		
			1975/76 <sup>2</sup>	1976/77 <sup>2</sup>	1977 Adjusted <sup>3</sup>
Beef	ton	11756	100	1585	2108
Mutton & Goat	ton	27539	n/a	158	n/a
Chicken	ton	1325	74	2412	16433
Eggs	thousand	198143	1370	26206	111106
Wheat	ton	44250	119662	167869	234000
Maize	ton	58250	6249	5588	n/a
Millet & Sorghum	ton	742750	6	7115	n/a
Flour	ton	n/a	55797	47326	n/a

<sup>1</sup>Statistical yearbook - averages, Livestock 7 years 69-70 to 75-76 and crops 8 years, 69-70 to 76-77

<sup>2</sup>Central Bank - Research Department No. 6

<sup>3</sup>Ministry of Supply data for ten months, March-December adjusted by 120 percent for comparison.

n/a Not available

Feed Ingredient Production for 1981 Based on the 5-Yr. Plan

<u>Ingredient</u>	<u>Tons</u>
Sorghom	1,042,000
Corn	110,000
Barley	83,200
Wheat	<u>128,000</u>
Total	1,363,200
Cotton	35,500
Sesame	10,800

Inventory of Yemen Commercial-Sized Poultry Operations,  
Proposed or in Operation, as of August 23, 1977

<u>Location</u>	<u>Name of Operation</u>	<u>Stage of Development</u>	<u>Production Capacity*</u>	<u>Colateral Functions**</u>	<u>2/78</u>
Taiz	AID Trng. Center	50% complete	1,200 L	B, FM, H, TC	1200 0
Taiz area	Yemen Poultry Prod. & Mktg. Co.	Prefabs on site, const. started	50,000 B 20,000 L	B, FM, H	200,000 20,000
Alquadah-Ibb area	Yemen Poult. Farm	5 houses completed, plans expansion	75,000 - 100,000 B; L. later	B, FM, H	200,000
Sana	Sallah & Sons	In operation, expansion planned	50,000 B 4,000 L	B, FM, H	400,000 4,000 L
Sana	AID Trng Center	In operation	2,000 L	B, FM, H, TC	2,000
Sana	Omeri Poultry Farm	To start Oct. '77 expansion planned	100,000 B; 20,000 L later	FM	720,000 2,000
Rawdah area	Dutch Poultry Center	Prefabs on site, const- ruction started	120,000 B 24,000 L	B, FM, H	400,000
Amran Valley area	Quasi-Govt. Project	In planning stages	50,000 B 120,000 L	FM, H	200,000 120,000

\* B = broilers; L = laying hens

\*\* B = breeding hens; FM = feed mill, H = hatchery; TC = training center

Source: John West

INVENTORY OF COMMERCIAL POULTRY OPERATIONS  
PROPOSED AND IN OPERATION AS OF FEBRUARY, 1978

<u>NAME OF OPERATION</u>	<u>LOCATION</u>	<u>SIZE*</u>	<u>STATUS</u>	<u>FEED REQUIRED**</u>
US/AID Demo-Training Centers	Sana'a	2,000 L	Operating	70
	Taiz	1,200 L	Operating	40
Omeri Poultry Farm	Sana'a	720,000 B	Operating	1300
		20,000 L	Planned	680
Sallah and Sons	Sana'a	400,000 B	Operating	720
		4,000 L	Planned	140
Dutch Poultry Center	Rawdah	400,000 B	Operating	720
		24,000 L	Planned	830
Amran Poultry Project	Mixed Sector	200,000 B	Planned	360
		120,000 L	Planned	4100
Ibb Poultry	Ibb	20,000 B	Operating	40
Yemen Poultry Production and Marketing Company	Taiz Area	200,000 B	Planned	360
Yemen Poultry Farm	Alquadah	200,000 B	Operating	360
		20,000 L	Planned	680

Layers CALC at .25 Pound Feed/Bird/Day @ 75% FG  
Broilers CALC at 6 Pound/Bird (to 1-1½ kg) @ 60 FG

Total presently projected number of layers is 191,200 @ 60% lay @ 115000 eggs/day  
3,450,000 eggs/month

Total projected broiler capacity is 2,140,000 birds/yr .75 kg dried/bird yields  
1605 metric tons/yr (134 tons/month)

Recorded imports, first 10 months of CY 1977, 11500 m tons frozen broilers  
(1150 tons/month); 85,000,000 eggs (8,500,000/month)

Thus even with the presently planned poultry units on line there will still be an enormous gap between production capacity and total demand.

\* Number of Birds per Year

\*\* Tons Feed Grain per Year

Source: C. M. Uphas

INVENTORY OF YEMEN COMMERCIAL SIZED POULTRY OPERATIONS  
PROPOSED AND IN OPERATION AS OF APRIL 1, 1978

<u>LOCATION</u>	<u>NAME OF OPERATION</u>	<u>STAGE OF DEVELOPMENT</u>	<u>CAPACITY*</u>	<u>FACILITIES</u>
Taiz	US/AID Training Center	80% complete, partially in operation	1,200 L	B, TC, (H, FM planned)
Taiz	Yemen Poultry Production & Marketing (Lohmann)	61% complete, not in operation	90,000 B 45,000 L	B, H, L, FM (all planned)
Ibb	Ibb Poultry	In operation	30,000 B	
Ibb	Yemen Poultry Farm	In operation	40,000 B	(Plan for H, FM)
Yarim	Yihia Brothers	In operation 3 buildings started	4,000 B 21,000 B	
Sana'a	Sallah & Sons	In operation	60,000 B	FM, H (Plan for B)
Sana'a	Omeri Poultry Farm	In operation Plan another	110,000 B 60,000 B	FM
Sana'a	Yemen-Holland Poultry Project	In operation	35,000 B	FM, TC (B, H Planned)
Sana'a	US/AID Training Center	In operation	2,000 L 2,400 Brooding	B, H, FM, TC
Sana'a	Middle East	Planned	600,000 B 576,000 L	B, FM, H (all planned)
Sana'a	Amran Government Poultry Project	Planned	189,000 B 170,000 L	B, FM, H (all planned)

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B = Broilers  
L = Layers  
B = Breeding Hens  
FM = Feed Mill  
H = Hatchery  
TC = Training Center

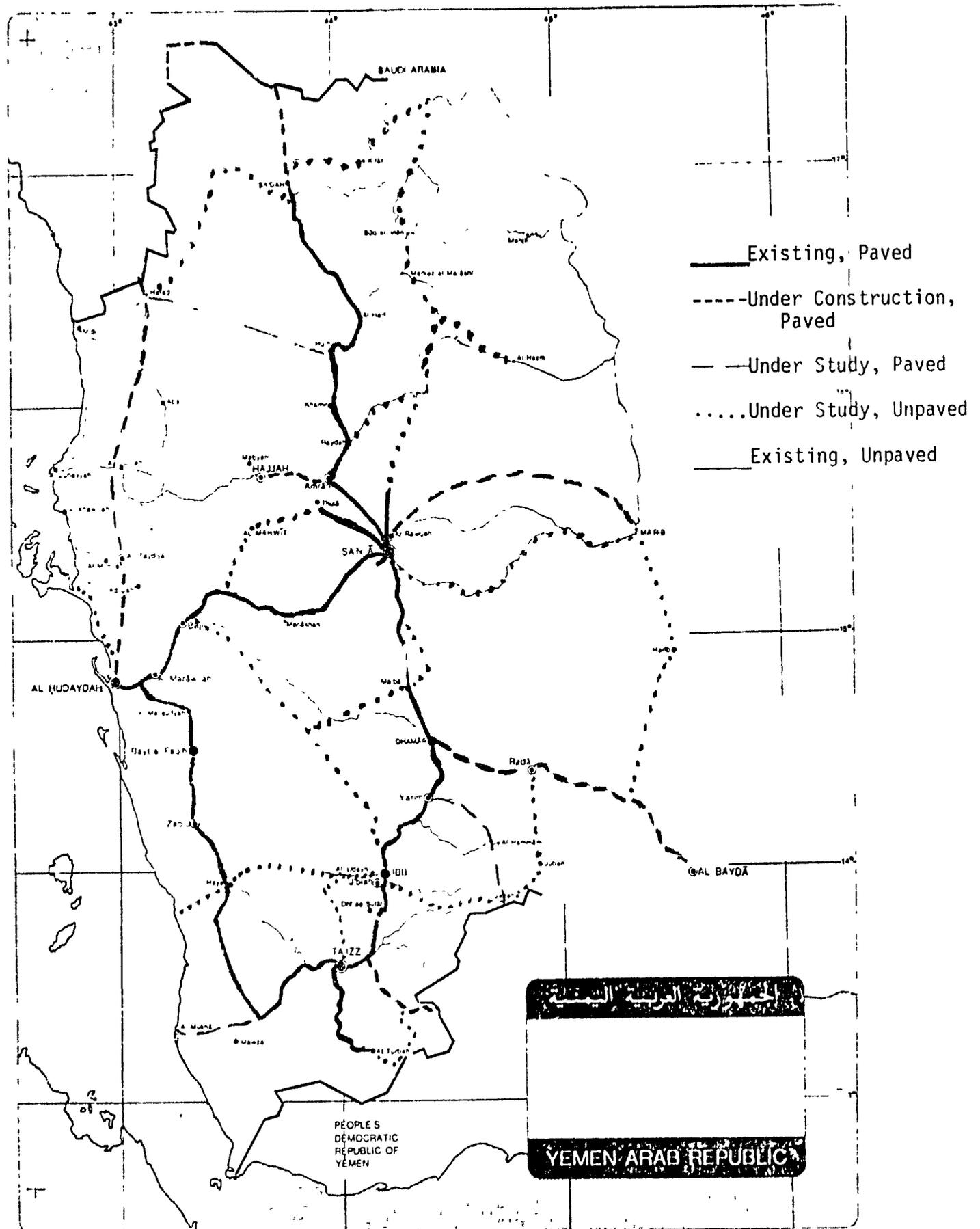
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\* Per Brood/Group

## RECIPIENTS OF POULTRY FROM US/AID PROJECT

<u>DATE</u>	<u>COOPERATOR</u>	<u>LOCATION</u>	<u>FEMALE</u>	<u>MALE</u>
June 12	Mohamed Hadid	Ibb	50	5
June 15	General Distribution	Waddi Benna Area		34
June 18	General Distribution	Bardin Area		35
June 21	General Distribution	Nashama Area		35
July 6	Hodeidah Boys School	Hodeidah	15	3
July 19	Abdulla Asar	Amran	37	4
July 20	Abdulla al-Kabaita	Taiz Province (near Aden)	20	4
July 22	Monsur Ali	Baith Shalla	7	1
August 7	Nasser al-Rada	Sana'a	7	1
August 7	Nasser el-Muafa	New Marib Road	201	15
August 10	Mansoor Kadas	Al Hagrith Area	8	1
August 10	Adbo Saeed	Jebal Sabaran	8	1
August 10	Mohamed Ali Saeed	Jebal Sabaran	8	1
August 15	Yah Yah Hashidy	No Kom Area	5	1
August 15	Adbo Thabit	Al Safiah	5	1
August 16	Adbul Kassim	Taiz Area	25	5
August 20	Hodeidah Boys School	Hodeidah	8	
September 20	Ali Saleh Nozeli	Ibb (Surdu)	120	
September 20	Ali Abdalah	Ibb (Surdu)	48	
September 20	Head of Senah Board	Senah Area (36 K S.E. Taiz)	40	

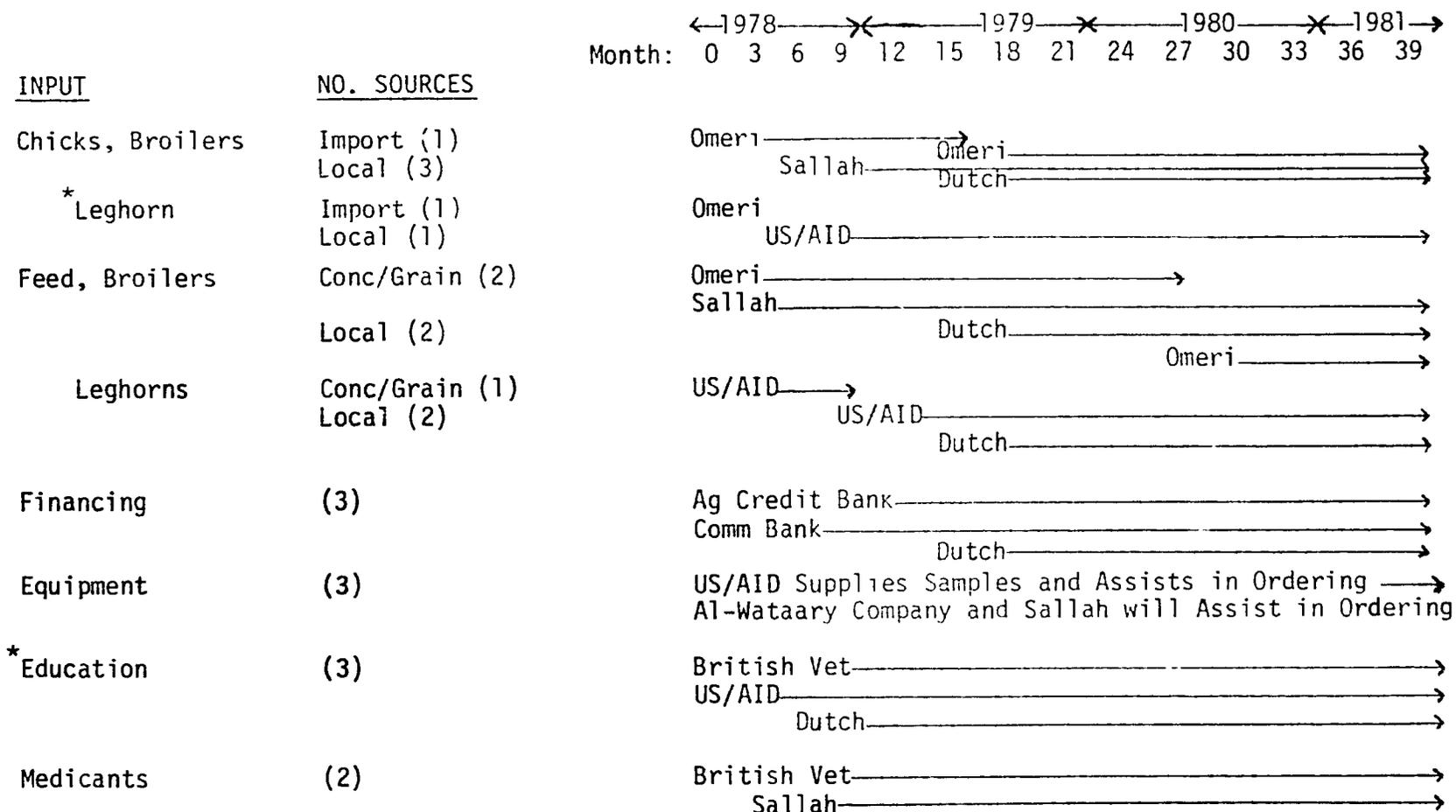
PRESENT AND PROPOSED ROADS IN YEMEN



## PROPOSED ROAD PRODUCTION

<u>Proposed Road</u>	<u>Yr. of Planned Completion</u>
Hodeidah to Jaizan	4
Sadah to Aba As Su'ud	3.5
Sana'a to Marib	1.5
Dhamar to Al Bayda	2
Taiz to Ar Rahidah	1
Sana to Arhab	3
Huth to Harad	3
Amran to Hajjah	2
Sana'a to Al Mahwit	3
Al Marawiah to IBB	5

SOURCES OF INPUTS OF POULTRY PRODUCTION, UNTIL 1981



NOTE: Names identify when the company intends to commence providing the service.

\* Weak segments in the Development of the Poultry Industry

## EGG PRODUCTION COST BUDGETS IN YEMEN RIALS

Three sizes of flocks, feeding complete feed over a 72 week cycle

	<u>TOTAL</u>			<u>PER EGG</u>		
Number of Hens	100	2,000	8,000	100	2,000	8,000
Production	24,000	520,000	2,080,000	1	1	1
<b>Investment</b>						
Land	1350	95200	635600	.056	.183	.306
Buildings	11200	276000	1280000	.467	.531	.615
Equipment	1000	10400	14400	.042	.020	.007
Total	<u>13550</u>	<u>381600</u>	<u>1930000</u>	<u>.565</u>	<u>.734</u>	<u>.928</u>
<b>Investment Costs*</b>						
Interest	596	19072	102624	.025	.037	.049
Depreciation	817	19188	86725	.034	.037	.042
Repairs	122	2864	12944	.005	.005	.006
Total	<u>1535</u>	<u>41124</u>	<u>202293</u>	<u>.064</u>	<u>.079</u>	<u>.097</u>
<b>Production Costs**</b>						
Feed	16740	382200	867200	.697	.735	.417
Chicks	605	12500	50000	.025	.024	.024
Labor, 1-20	560	6750	10120	.023	.013	.005
Labor, 21-72	1095	18000	27000	.046	.035	.013
Fuel	20	400	1600	.001	.001	.001
Litter	70	1040	3200	.003	.002	.001
Medicine, 3 Vac.	75	150	600	.003	.000	.000
Water	0	3325	13300	.000	.006	.006
Miscellaneous, 1%	192	4244	9730	.008	.008	.005
Total	<u>19357</u>	<u>428609</u>	<u>982750</u>	<u>.806</u>	<u>.824</u>	<u>.472</u>
<b>Management Costs</b>						
Management	6000	31500	126000	.250	.061	.061
Interest*	774	17144	39310	.032	.033	.019
Total	<u>6774</u>	<u>48644</u>	<u>165310</u>	<u>.282</u>	<u>.094</u>	<u>.080</u>
<b>TOTAL COST</b>	<b>27666</b>	<b>518377</b>	<b>1350353</b>	<b>1.153</b>	<b>.997</b>	<b>.649</b>
<b>Income***</b>						
Salvage	3400	68000	272000	.142	.131	.131
Litter	800	16000	64000	.033	.031	.031
Eggs	26400	364000	1248000	1.100	.700	.600
Total Income	<u>30600</u>	<u>448000</u>	<u>1584000</u>	<u>1.275</u>	<u>.862</u>	<u>.762</u>
<b>Profit Above</b>						
All Cost	2934	-70377	233647	.122	-.135	.113
Variable Cost	11243	19391	601250	.468	.038	.290

\*Investment costs are interest at 8% on land and  $\frac{1}{2}$  of building and equipment depreciation over 15 years. Repairs at 1% on buildings and equipment. Interest at 8% is charged on  $\frac{1}{2}$  of cash costs or variable costs in the management section, as well.

\*\* As detailed in text.

\*\*\* Salvage of 85% of the hens @ 40 Rials per hen, litter value of 8 Rials per hen. Egg production per hen is anticipated to be 240 for village flocks and 260 for commercial flocks. Egg prices of 1.1, .7, and .6 YR are anticipated due to location.

## BROILER PRODUCTION COST BUDGETS IN YEMEN RIALS

Three sizes of flocks, feeding complete feed with five broods a year.

	<u>TOTAL</u>			<u>PER KILOGRAM</u>		
	400	5,000	20,000	400	5,000	20,000
Number of Birds per Brood	400	5,000	20,000	400	5,000	20,000
Investment						
Land	2700	139500	971500	.937	3.875	6.747
Buildings	22400	330000	1440000	7.778	9.167	10.000
Equipment	810	24800	65300	.281	.689	.453
Total	<u>25910</u>	<u>494300</u>	<u>2476800</u>	<u>8.996</u>	<u>13.731</u>	<u>17.200</u>
Investment Costs*						
Interest	1144	25352	137932	.397	.704	.958
Depreciation	1555	23772	100855	.540	.660	.700
Repairs	232	3548	15053	.081	.099	.105
Total	<u>2931</u>	<u>52672</u>	<u>253840</u>	<u>1.018</u>	<u>1.463</u>	<u>1.763</u>
Production Costs**						
Feed	36000	390000	700000	12.500	10.833	4.861
Chicks	6100	81250	325000	2.118	2.257	2.257
Labor	1260	18750	75000	.437	.521	.521
Fuel	400	5000	20000	.139	.139	.139
Litter	240	2000	6000	.083	.056	.042
Medicine, 1 Vac	126	625	2500	.044	.017	.017
Water	245	3063	12250	.085	.085	.085
Miscellaneous	444	5007	11408	.154	.139	.079
Total	<u>44815</u>	<u>505695</u>	<u>1152158</u>	<u>15.560</u>	<u>14.047</u>	<u>8.001</u>
Management Costs						
Management	6000	21000	84000	2.083	.584	.583
Interest*	359	4046	9217	.125	.112	.064
Total	<u>6359</u>	<u>25046</u>	<u>93217</u>	<u>2.208</u>	<u>.695</u>	<u>.647</u>
TOTAL COST	54105	583413	1499215	18.786	16.206	10.411
Income***						
Broilers	43200	540000	2088000	15.000	15.000	14.500
Litter	456	28336	113336	.158	.787	.787
Total Income	<u>43656</u>	<u>568336</u>	<u>2201336</u>	<u>15.158</u>	<u>15.787</u>	<u>15.287</u>
Profit Above						
All Cost	-10449	-15077	702121	-3.628	-.419	4.876
Variable Cost	- 1159	62641	1049178	-.402	1.704	7.286

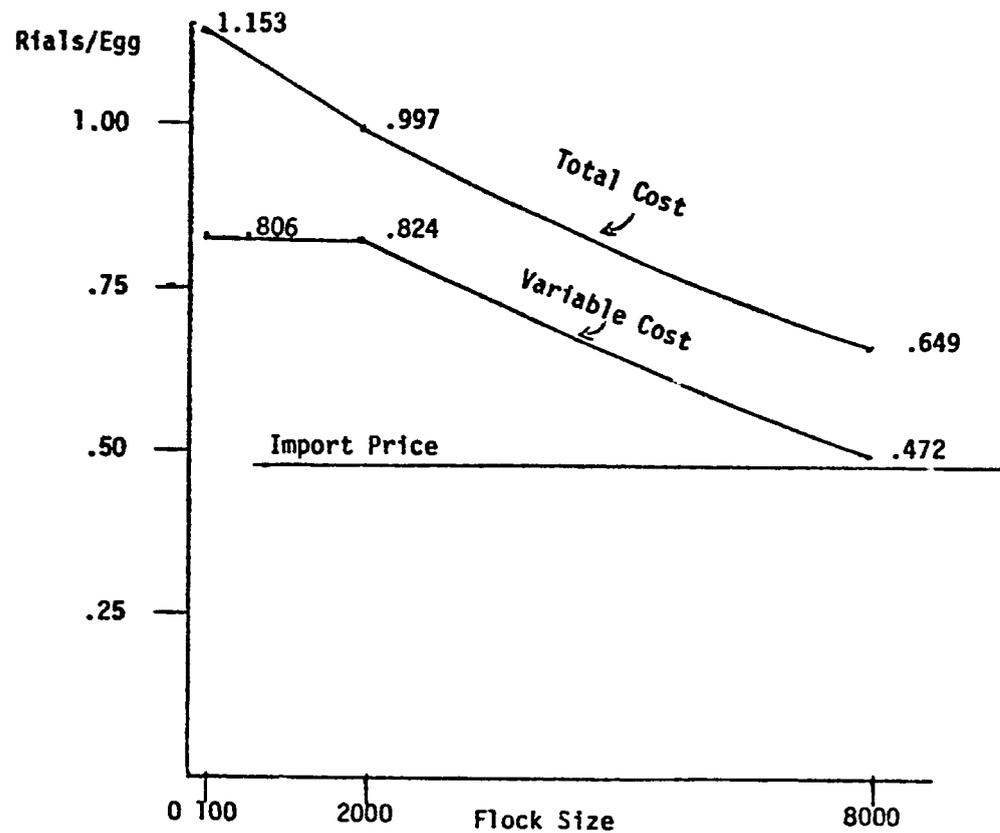
\* Investment costs are interest at 8% on land and  $\frac{1}{2}$  of buildings and equipment depreciation over 15 years. Repairs at 1% on buildings and equipment. Interest a: 8% is charged on  $\frac{1}{2}$  of variable costs in the management section as well.

\*\* As detailed in the text.

\*\*\* Sale of 90% of the birds at 1.6 kg, liveweight at 15 R/kg for small and medium and 14.5 R/kg for large commercial producers.

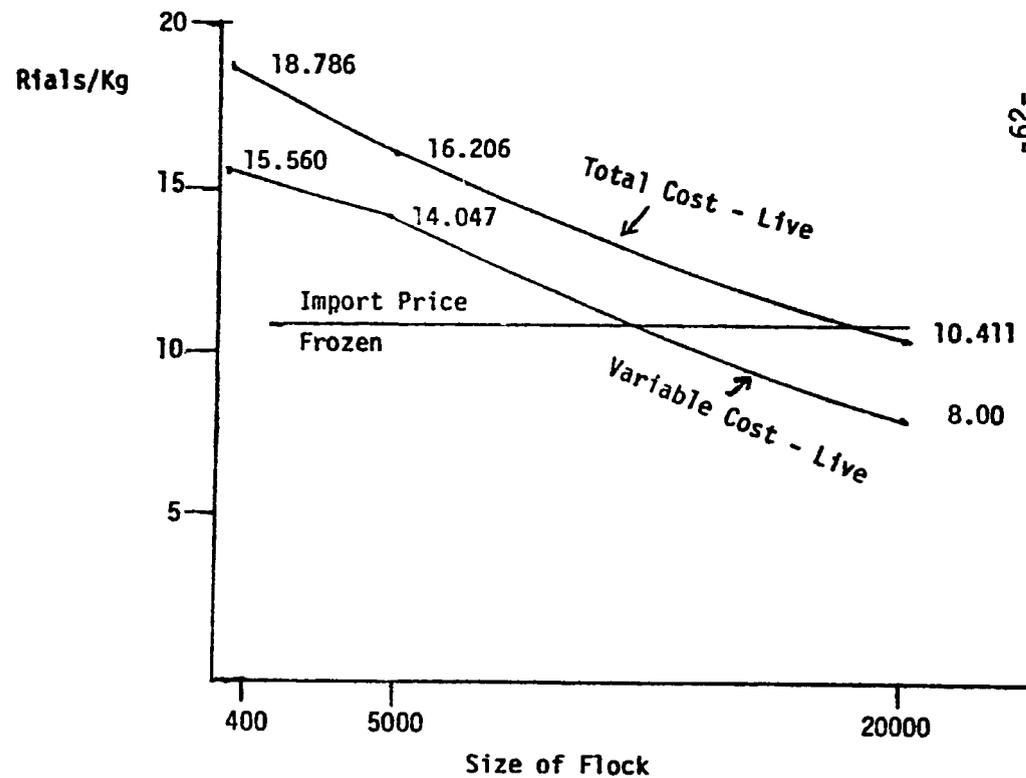
Appendix K1

EGG PRODUCTION FOR VARIOUS SIZED FLOCKS, FEEDING COMPLETE FEED IN A 74 WEEK PRODUCTION CYCLE

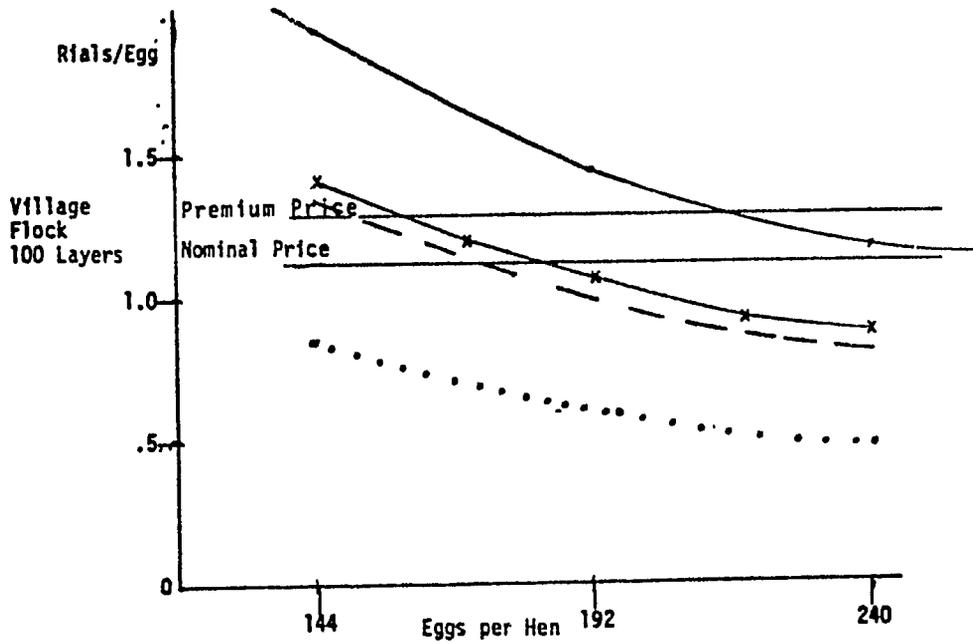


Appendix K2

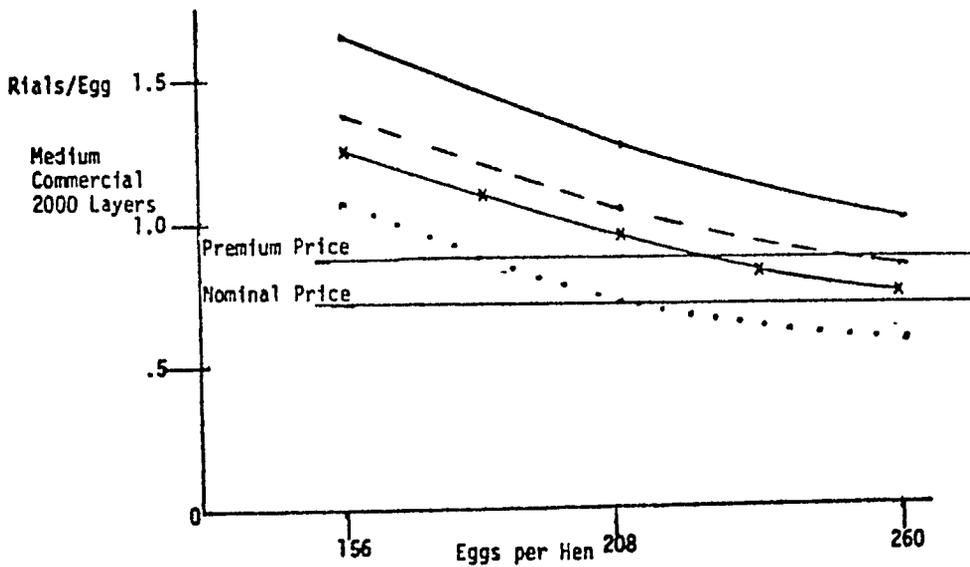
BROILER PRODUCTION COST FOR VARIOUS SIZED FLOCKS FEEDING COMPLETE FEED WITH 5 BROODS A YEAR



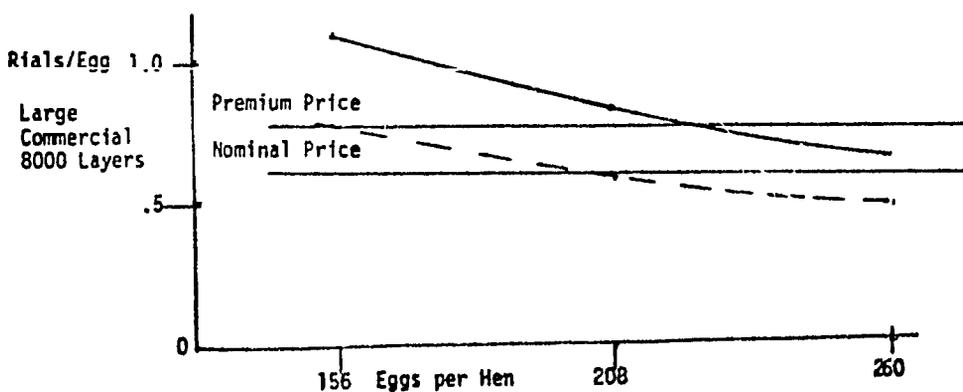
EGG PRODUCTION COSTS AT 60, 80, AND 100 PERCENT OF BUDGETED PRODUCTION FOR VARIOUS SIZED FLOCKS



Complete Feed:			
	144	192	240
TC	1.921	1.441	1.153
VC	1.343	1.007	.806
Conc and Grain:			
	144	192	240
TC	1.343	1.007	.838
VC	.820	.615	.492
Nominal Price 1.10			
Premium Price 1.29			



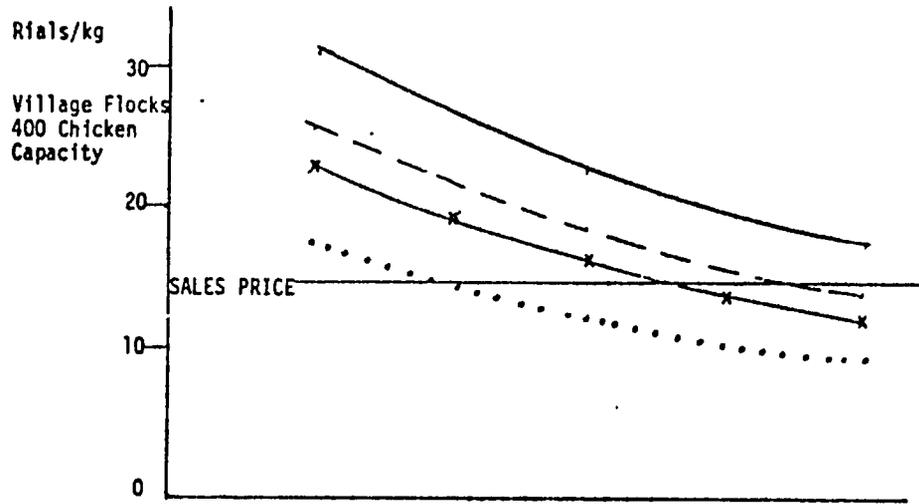
Complete Feed:			
	156	208	260
TC	1.661	1.246	.997
VC	1.373	1.030	.824
Conc and Grain:			
	156	208	260
TC	1.250	.937	.750
VC	.962	.721	.577
Nominal Price .70			
Premium Price .82			



	156	208	260
TC	1.082	.812	.649
VC	.787	.590	.472
Nominal Price .60			
Premium Price .71			

- Total Cost Complete Feed
- - - - Variable Cost Complete Feed
- x — x Total Cost Concentrate and Grain
- ..... Variable Cost Concentrate and Grain

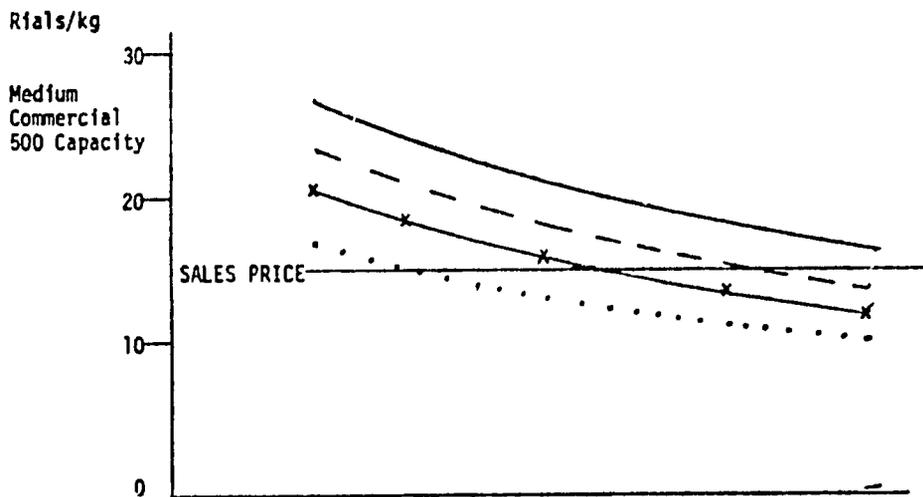
BROILER PRODUCTION COSTS AT 60, 80, AND 100 PERCENT OF BUDGETED SURVIVAL OR WEIGHT OR COMBINATION OF ANTICIPATED PRODUCTION FOR VARIOUS SIZED FLOCKS AT FIVE BROODS PER YEAR.



Complete Feed:			
	54	72	90
	.96	1.28	1.60
TC	31.31	23.48	18.79
VC	25.93	19.45	15.56

Conc and Grain:			
	54	72	90
	.96	1.28	1.60
TC	23.32	17.49	14.00
VC	17.95	13.46	10.77

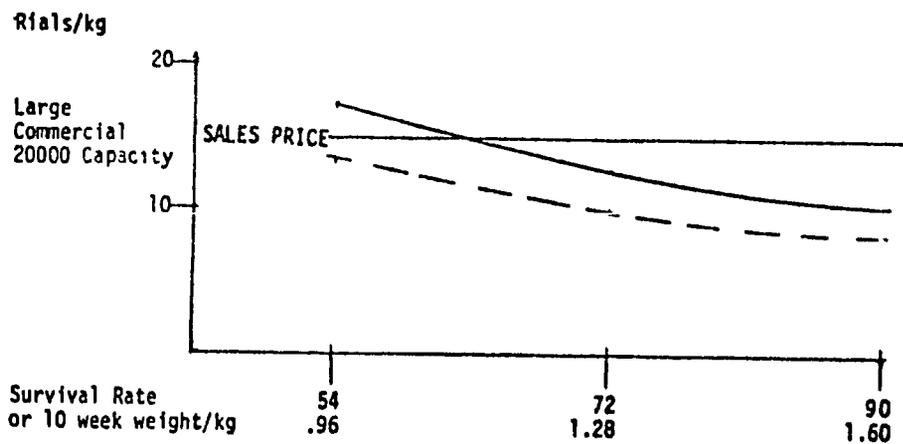
Sales Price: 15R



Complete Feed:			
	54	72	90
	.96	1.28	1.60
TC	27.01	20.26	16.21
VC	23.41	17.56	14.05

Conc and Grain:			
	54	72	90
	.96	1.28	1.60
TC	20.70	15.52	12.42
VC	17.10	12.83	10.26

Sales Price: 15R

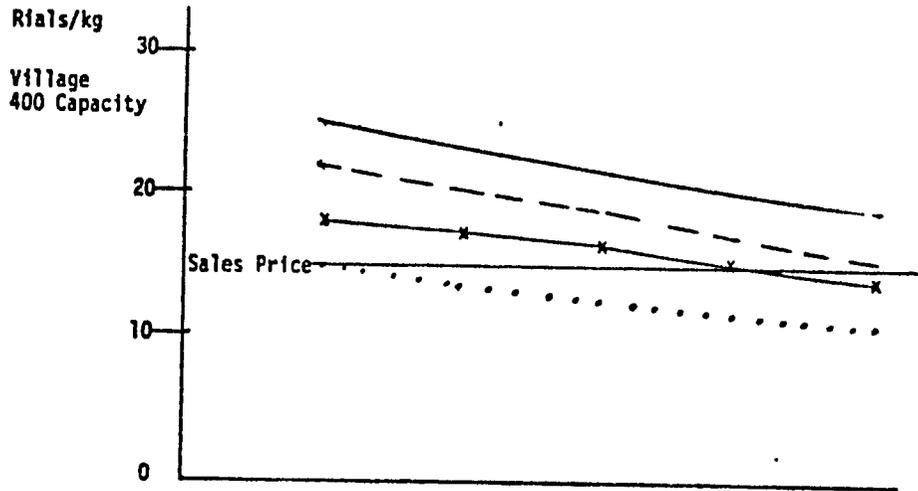


	54	72	90
	.96	1.28	1.60
TC	17.35	13.01	10.41
VC	13.33	10.00	8.00

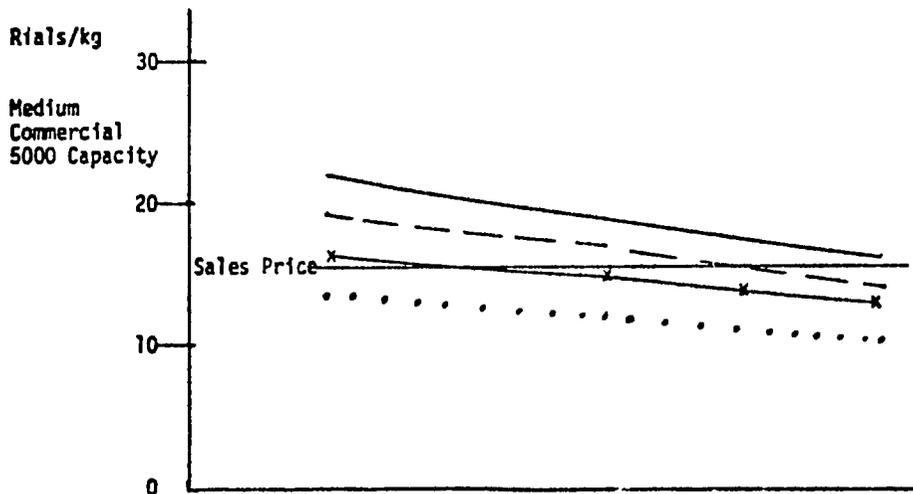
Sales Price: 14.5R

- Total Cost Complete Feed
- Variable Cost Complete Feed
- x-----x Total Cost Concentrate and Grain
- ..... Variable Cost Concentrate and Grain

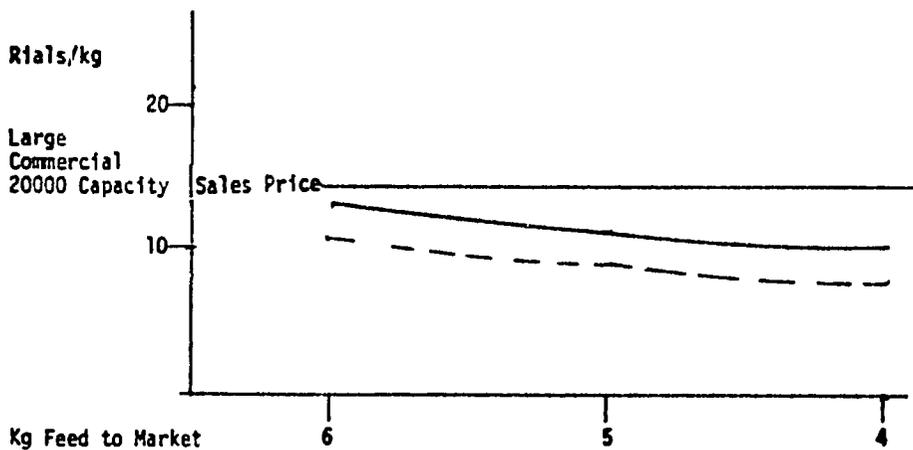
BROILER PRODUCTION COST AT 60, 80, AND 100 PERCENT OF BUDGETED FEED EFFICIENCY TO MARKET WEIGHT FOR VARIOUS SIZED FLOCKS AT FIVE BROODS PER YEAR



Complete Feed:			
	6	5	4
TC	25.04	21.91	18.79
VC	21.81	18.69	15.56
Conc and Grain:			
TC	17.85	15.92	14.00
VC	14.62	12.70	10.77



Complete Feed:			
TC	21.62	18.91	16.21
VC	19.46	16.76	14.05
Conc and Grain:			
TC	16.14	14.28	12.42
VC	13.98	12.12	10.26



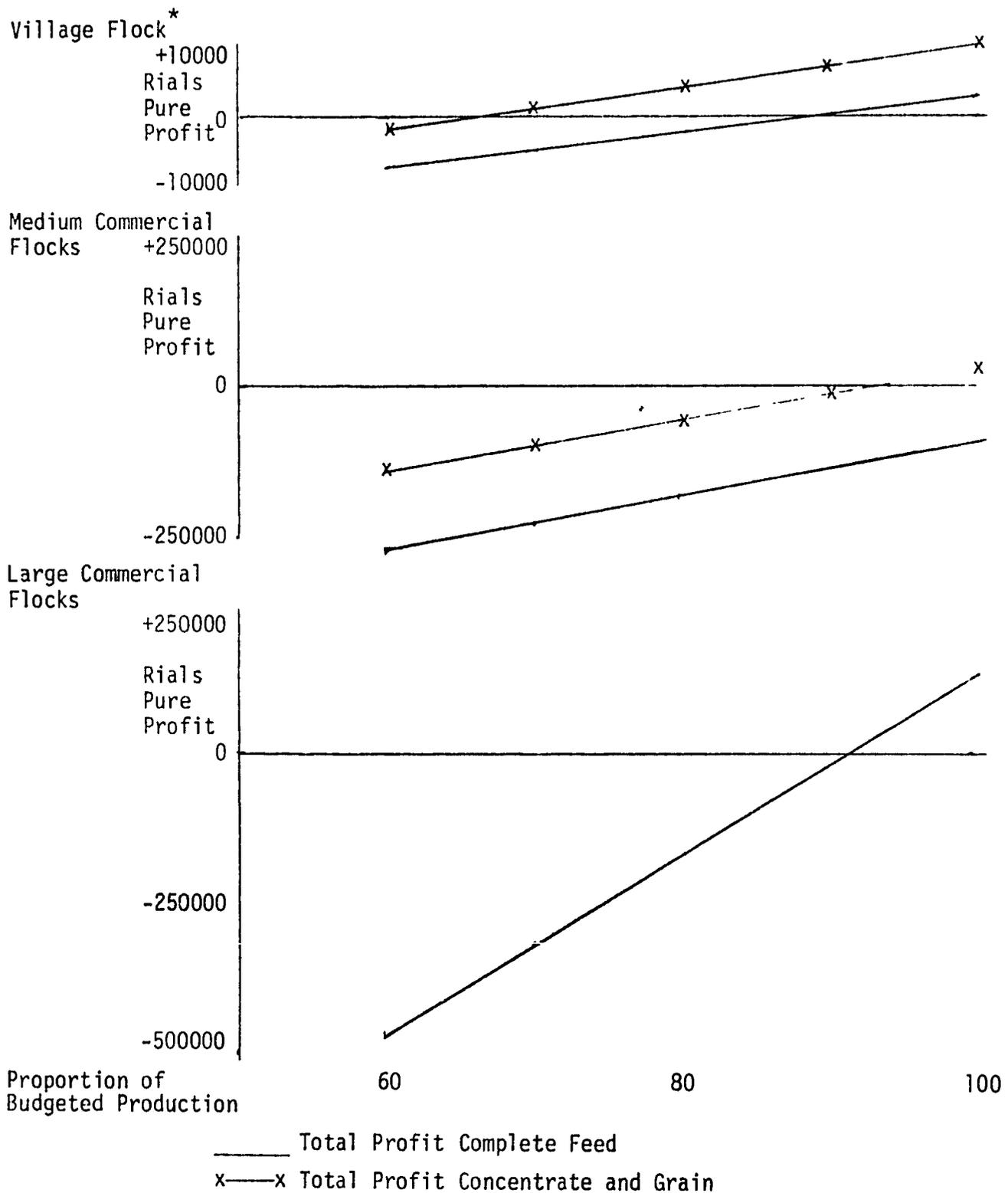
TC	12.84	11.63	10.41
VC	10.43	9.22	8.00

- Total Cost Complete Feed
- - - - Variable Cost Complete Feed
- x — x Total Cost Concentrate and Grain
- ..... Variable Cost Concentrate and Grain

## VALUE OF TECHNICAL EXPERTISE IN EGG PRODUCTION FOR VARIOUS SIZED FLOCKS

PROPCRTION OF BUDGETED PRODUCTION	60	80	100
Village Flocks			
Production	14400	19200	24000
Revenue @ 1.29 Rials	18576	24768	30960
Complete Feed Cost - 27666			
Pure Profit	-9090	-2898	3294
Concentrate and Grain Cost - 20116			
Pure Profit	-1540	4052	10844
Medium Commercial			
Production	312000	416000	520000
Revenue @ .82 Rials	255840	341120	426400
Complete Feed Cost - 518377			
Pure Profit	-262537	-177257	-91977
Concentrate and Grain Cost - 389777			
Pure Profit	-133937	-48657	36623
Large Commercial			
Production	1248000	1664000	2080000
Revenue @ .71 Rials	886080	1181440	1476800
Total Cost - 1350353			
Pure Profit	-464273	-168913	126447

VALUE OF TECHNICAL EXPERTISE, LEARNING TO MIX FEED AND OBTAIN HIGH LEVELS OF PRODUCTION IN EGG PRODUCTION FOR VARIOUS SIZED FLOCKS

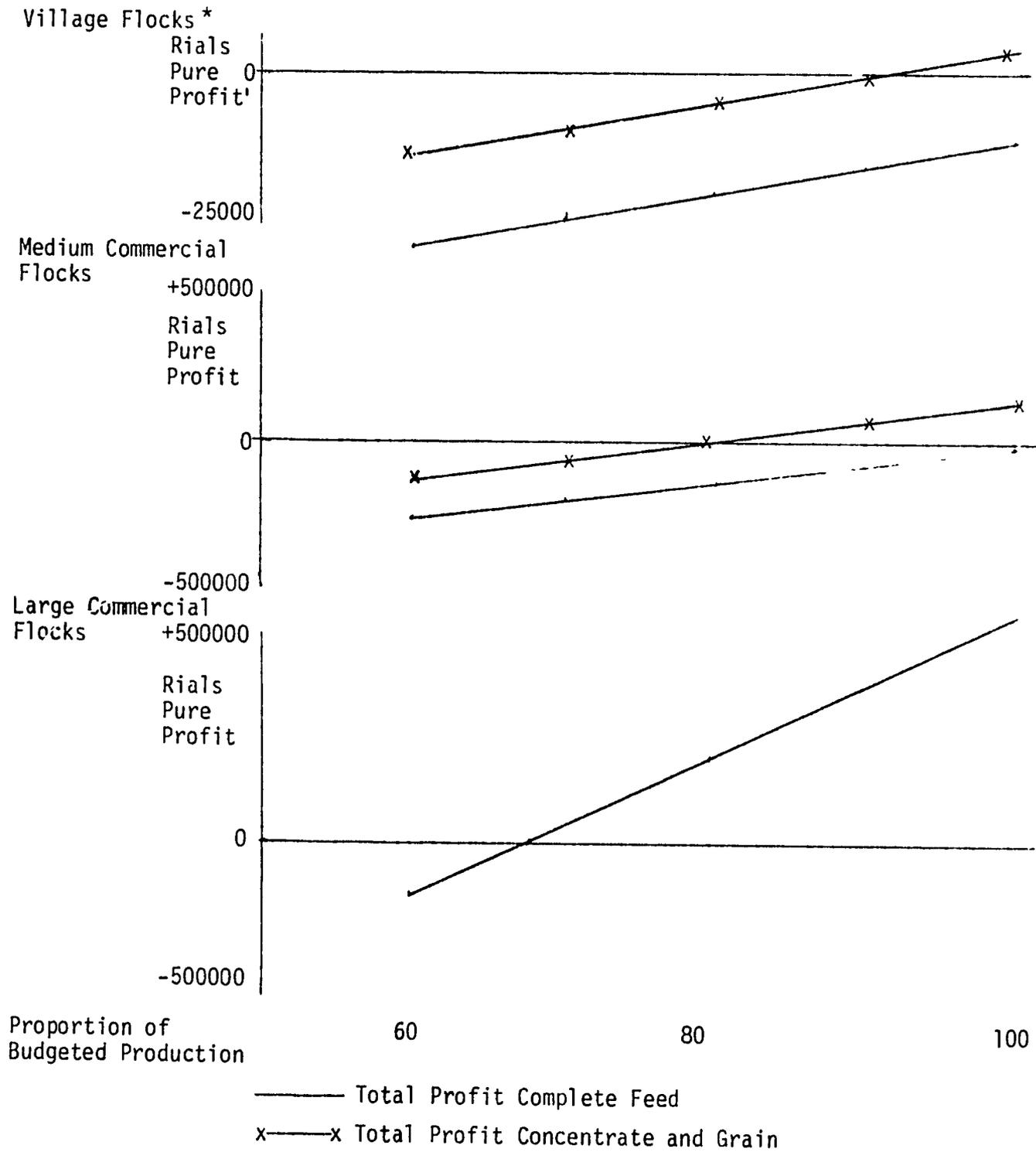


\* Note Difference in Scale

VALUE OF TECHNICAL EXPERTISE IN BROILER PRODUCTION FOR VARIOUS SIZED FLOCKS

PROPORTION OF BUDGETED PRODUCTION	60	80	100
<b>Village Flocks</b>			
Production kg	1728	2304	2880
Revenue @ 15.158	26193	34924	43655
Complete Feed Cost - 54105			
Pure Profit	-27912	-19181	-10450
Concentrate and Grain Cost - 40305			
Pure Profit	-14112	- 5381	3350
<b>Medium Commercial</b>			
Production kg	21600	28800	36000
Revenue @ 15.787	340999	454666	568332
Complete Feed Cost - 583413			
Pure Profit	-242414	-128747	- 15081
Concentrate and Grain Cost - 447113			
Pure Profit	-106114	7553	121219
<b>Large Commercial</b>			
Production kg	86400	115200	144000
Revenue @ 15.287	1320797	1761062	2201328
Total Cost - 1499215			
Pure Profit	-178418	261847	702113

VALUE OF TECHNICAL EXPERTISE, LEARNING TO MIX FEED AND OBTAIN HIGH LEVELS OF BROILER PRODUCTION FOR VARIOUS SIZED FLOCKS



\* Note Difference in Scale

## BENEFIT COST RATIOS ON CASH FLOWS IN EGG PRODUCTION FOR VARIOUS SIZE FLOCKS FED COMPLETE FEED

NUMBER OF LAYERS:	100	2000	8000
Investment			
Land	0	95200	635600
Buildings	11200	276000	1280000
Equipment	1000	10400	14400
Total	<u>12200</u>	<u>381600</u>	<u>1930000</u>
Investment Costs			
Interest	0	19072	102624
Depreciation	817	19188	86725
Repairs	122	2864	12944
Total	<u>939</u>	<u>41124</u>	<u>202293</u>
Production Costs			
Feed	16740	382200	867200
Chicks	605	12500	50000
Labor	0	24750	37120
Fuel	20	400	1600
Litter	0	1040	3200
Medicine	75	150	600
Water	0	3325	13300
Miscellaneous	192	4244	9730
Total	<u>17632</u>	<u>428609</u>	<u>982750</u>
Management Costs			
Management	0	0	0
Interest	0	17144	39310
Total	<u>0</u>	<u>17144</u>	<u>39310</u>
TOTAL CASH COSTS	18571	486877	1224353
Benefits			
Salvage	3400	68000	272000
Litter	800	16000	64000
Eggs	26400	364000	1248000
Total Benefits	<u>30600</u>	<u>448000</u>	<u>1584000</u>
EXCESS OF BENEFITS OVER COSTS	12029	-38877	359647
Benefit Cost Ratio	1.65	.92	1.29

BENEFIT COST RATIOS ON CASH FLOWS IN BROILER PRODUCTION FOR VARIOUS SIZED FLOCKS FED COMPLETE FEED, WITH FIVE BROODS A YEAR

NUMBER OF BIRDS PER BROOD	400	5000	20000
<b>Investment</b>			
Land	0	139500	971500
Buildings	22400	330000	1440000
Equipment	810	24800	65300
Total	<u>23210</u>	<u>494300</u>	<u>2476800</u>
<b>Investment Costs</b>			
Interest	928	25352	137932
Depreciation	1555	23772	100855
Repairs	232	3548	15053
Total	<u>2715</u>	<u>52672</u>	<u>253840</u>
<b>Production Costs</b>			
Feed	36000	390000	700000
Chicks	6100	81250	325000
Labor	0	18750	75000
Fuel	400	5000	20000
Litter	0	2000	6000
Medicine	126	625	2500
Water	245	3063	12250
Miscellaneous	444	5007	11408
Total	<u>43315</u>	<u>505695</u>	<u>1152158</u>
<b>Management Costs</b>			
Management	0	0	0
Interest	359	4046	9217
Total	<u>359</u>	<u>4046</u>	<u>9217</u>
<b>TOTAL CASH COSTS</b>	46389	562413	1415215
<b>Benefits</b>			
Broilers	43200	540000	2088000
Litter	456	28336	113336
Total Benefits	<u>43656</u>	<u>568336</u>	<u>2201336</u>
<b>EXCESS OF BENEFITS OVER COSTS</b>	-2733	5923	786121
Benefit Cost Ratio	.94	1.01	1.56

QUESTIONNAIRE FOR CONSUMER SURVEY IN SANA'A

CONSUMER SURVEY, SANA'A - March 22, 1978

First questions to assure the person is a Yemeni

Second observe if male or female

Questions:

1. How many eggs do you buy at each purchase?
2. How often do you buy?
3. How many people will eat these eggs?
4. How often do you find eggs that are not useable? Number/Flat
5. If egg prices were 10 Rials a flat, how many would you buy?
6. How many chickens do you buy at each purchase?
7. How often do you buy?
8. If broilers were sold at 10 Rials, how many would you buy?

اسئـلات لـاع المسـتـهلكـين ، صنعـاء  
مارس ٢٢ / ١٩٧٨ م

- ١- كم نسمة تسري في كل مفقه ؟  
\_\_\_\_\_
- ٢- كم مرات تسنن السر ؟  
\_\_\_\_\_
- ٣- كم عدد الأفراد الذين يأكلون هذا البيض ؟  
\_\_\_\_\_
- ٤- كم مرات تحصن على سر غير صالح للأكل ؟  
\_\_\_\_\_
- ٥- أذا كان سدر واحد اسو بيـعـه رسـالـات ،  
ما هو عدد البـر الـذي سـتـسـتـرـه ؟  
\_\_\_\_\_
- ٦- كم دجاج تسري في كل مفقه ؟  
\_\_\_\_\_
- ٧- كم مرات تسري الدجاج ؟  
\_\_\_\_\_
- ٨- أذا كان سدر الدجاج الواحد عشـره ،  
رسـالـات ما هو عدد الدجاج الـذي نـسـتـرـه ؟  
\_\_\_\_\_

الحنس

(( / م / م / م / م ))

LETTER OF INTRODUCTION FOR CONSUMER SURVEY IN SANA'A

Storekeeper

We are performing a study of poultry product consumption in Yemen and would like to interview several of the customers as they are in your store. This would involve 10 customers who would be willing to answer several questions.

We would appreciate your cooperation in allowing the interviews in your store.

U.S.AID Poultry Project Research Team  
USAID Mission, Sana'a

LETTER OF INTRODUCTION FOR CONSUMER SURVEY IN SANA'A (ARABIC)

UNITED STATES A I O. MISSION TO THE YEMEN ARAB REPUBLIC

c/o American Embassy P. O Box 1088 Sana'a, Yemen

الولايات المتحدة الأمريكية سفارة . كالة التنمية الدائمة الى الجنب في العرية اليمنية

السفارة الامريكه ص ب ١٠٨٨ صنعاء - اليمن

الآنخ / مدير .

بعد التحية :

نحن الآن نمدد اجراء بحث عن الأسنهلراك الكد واجبن ومنتجاتها  
في اليمن ونرجو أن تحري مفايلات مع بعض المستهلكين فسي  
مستودعكم . هذا سشمل عشره من المستهلكين الكيس الكد سن برغبون  
للرد على بعض الأسئلة .

نأمل تعاونكم في السمان لنا بأجراء المقابلات

في مستودعكم .

وشكراً

الوكاله الأمريكه للتمسه الكدوليه

فرقة البحث من مشروع الكد واجبن

صنعاء

(( م / م / م / م ))

RESPONSES TO CONSUMER SURVEY, SANA'A - MARCH, 1978\*

	Number of Eggs Purchased Each Week @ .5R	Number of Times Purchased Each Week	Number of People Eating These Eggs	Number of Eggs inedible Per Flat	Number of Eggs which would Be Purchased @ .33R	Number of Broilers Purchased Each Week @.15R/kg	Number of Times purchased Each Week	Number of Broilers which would Be Purchased @ 10R/kg
<b>City</b>	210	7	15	4	420	14	7	4
	60	2	3	15	1050	4	4	7
	60	2	4	3	120	7	7	10
	30	7	3	3	420	7	7	7
	30	2	3	1	60	14	7	7
	60	2	5	3	120	7	7	14
	18	1	5	4	60	14	14	14
	50	3	12	3	100	1	1/2	2
	120	1/2	7	10	50	1	1/2	2
	30	1	3	3	57	7	7	7
	7	1/2	5	0	21	1/2	1/2	3 3/4
	30	2	7	5	60	7	7	14
	30	3	5	2	60	7	7	7
	30	1	8	1	30	7	7	14
	90	1	9	2 1/2	120	7	7	14
	21	7	1	1	42	3	3	7
	36	2	5	0	108	1 1/2	3	1 1/2
<b>Sub- Total</b>	<b>912</b>		<b>100</b>	<b>60.5</b>	<b>2988</b>	<b>110</b>		<b>135.25</b>
<b>USAID</b>	30	2	3	2	60	3 1/2	3 1/2	7
	14	2	11	3	45	2 1/3	2 1/3	4 2/3
	60	2	1	2 1/2	120	2 1/3	2 1/3	3 1/2
	7	2	3	3	120	1	1	2
	30	2	6	2	45	7	7	14
	30	2	10	0	72	1 1/2	1 1/2	2 1/2
	60	2	10	0	120	5	5	5
	30	1	6	0	60	2 1/3	1/2	5
	30	1	8	0	30	2 1/3	1/2	5
	30	1	5	0	30	2 1/3	1/2	2 1/3
	90	1	9	4	120	5	5	15
	60	1/2	3	0	180	1 1/2	1/2	2 1/3
<b>Sub- Total</b>	<b>471</b>		<b>75</b>	<b>16.5</b>	<b>1002</b>	<b>35.9</b>		<b>68.32</b>
<b>Total</b>	<b>1383</b>		<b>175</b>	<b>77</b>	<b>3990</b>	<b>145.9</b>		<b>203.57</b>
<b>AVERAGES</b>								
City	54		6	3.6	176	6.5		8.0
USAID	39		6	1.4	84	3.0		5.7
Total	48		6	2.7	138	5.0		7.0

\*Complete Questionnaires

## Survey of Egg Buyers at the AID Project - Sana'a

1. How many eggs do you buy at once?
2. How often do you buy eggs?
3. How many people will eat these eggs?
4. How many eggs are not eatable in a tray?
5. Do you like the quality of eggs available at this unit?
6. If medium eggs are selling here at 15 rials, would you come out and buy these if the same size eggs were being sold in Sana'a for:
  - a. 12 rials
  - b. 10 rials
  - c. 8 rials
  - d. 6 rials

## RESPONSES

<u>Question 1</u>	<u>Question 2</u>	<u>Question 3</u>	<u>Question 4</u>	<u>Question 5</u>	<u>Question 6a</u>	<u>Question 6b</u>	<u>Question 6c</u>	<u>Question 6d</u>
3	1	6	0	Yes	Yes	Yes	Yes	Yes
1	1	5	0	Yes	Yes	Yes	Yes	Yes
2	1	6	0	Yes	Yes	Yes	No	No
3	½	8	0	Yes*	Yes	Yes	Yes	Yes
2	½	2	0	Yes	Yes	Yes	Yes	Yes
2	1	6	0	Yes	Yes	Yes	No	No
6	1	12	0	Yes	Yes	Yes	Yes	Yes
2	1	6	0	Yes	No	No	No	No
3	½	6	a	Yes*	Yes	Yes	Yes	Yes

a = almost none

\*Especially the brown shelled eggs

## Survey of Egg Consumption and Handling in Restaurants

Sana'a - April, 1978

How many eggs do you buy each week? كم بيضه تشتري كل أسبوع؟

How many are not eatable? كم هو عدد البيض الغير صالح للأكل في الطبق الواحد؟

Would you pay more for better quality eggs? هل تدفع مبلغا أكثر للحصول على نوع أحسن من البيض؟

Do you refrigerate your eggs? هل تصع البصر الذي تستريه في التلاحع التلاحع؟

If not, why not? إذا لم تضع البصر في التلاحع ما هو السبب؟

## RESPONSES

Flats of Eggs Purchased Each Week	Number Inedible Per Flat	Would You Pay More For Quality	Do You Refrigerate Eggs If Space Available	Why
60	7½	Yes	Yes	Maintain Quality
12	3	No	No	Kept in Cold Storage
42	2½	No	No	Kept in Ventilated Storage.
40	1½	Yes	Yes	_____

## Survey of Egg Handling by Storekeepers

Sana'a - April, 1978

1. How often do you buy (receive) eggs? كم مرة تستر البيض ؟
2. Do you refrigerate your eggs? هل تضع البيض الذي تشتريه في التلاحة؟
3. If not, why not? إذا لم تضع البيض في التلاحة ما هو السبب ؟

## RESPONSES

<u>How Many Times Do You Buy Eggs Each Week?</u>	<u>Number of Cases Purchased Each Week</u>	<u>Do You Refrigerate?</u>	<u>Why?</u>
2-3	---	No	Sold within a week
2	---	If Necessary	On hot days
---	20	Of Course	
---	5-08	No	If refrigerated they become inedible
---	6-12	Never	They are bought unrefrigerated
---	10-12	No	They are sold immediately - it is not good to keep in a refrigerator
3	8-10	No	They are consumed immediately

PRODUCTION OF POULTRY MEAT AND EGGS  
The First 5 Year Plan 1976/1977 - 1980/1981

Poultry Meats

	tons				
	1976/77	1977/78	1978/79	1979/80	1980/81
Private Sector	1400	1428	1546	1678	1810
Public Sector		-	610	970	1330
Total	1400	1428	2156	2643	3140

Eggs

	million				
	1976/77	1977/78	1978/79	1979/80	1980/81
Private Sector	210	212	214	216	219
Public Sector	-	-	6.5	11	16
Total	210	212	220.5	277	235

Source: The Central Planning Organization

PROJECTED PRODUCTION AND IMPORTS OF POULTRY MEAT AND EGGS  
1976/1977-78 - 1980/1981

Poultry Meats (Broilers & Indigenous Stock)

	Metric Tons				
	1976/77	1977/78	1978/79	1979/80	1980/81
Indigenous Stock	1400	1400	1400	1400	1400
Private (Broilers)	-	1020 <sup>1</sup>	1277 <sup>2</sup>	5403 <sup>3</sup>	8400 <sup>3</sup>
Public (Broilers)	-	-	-	605	1512
Imports (Broilers)	<u>2412*</u>	<u>16433*<sup>3</sup></u>	<u>35000*</u>	<u>40000*</u>	<u>40000*</u>
Total Consumption	3812	18853	37677	47408	51312

<sup>1</sup>Five operations

<sup>2</sup>Seven operations

<sup>3</sup>Eight operations

\*Three-Four Importers

<u>Egg</u>	Million				
	1976/77	1977/78	1978/79	1979/80	1980/771
Indigenous Stock	210	210	210	210	210
Private	-	-	-	144 <sup>A</sup>	155 <sup>B</sup>
Public	-	-	-	43 <sup>A</sup>	43 <sup>A</sup>
Imports	<u>26.2</u>	<u>140</u>	<u>180</u>	<u>180</u>	<u>180</u>
Total	236.2	350	390	577	588

<sup>A</sup>Two operations

<sup>B</sup>Three operations

### Proposed Location of Demonstration Flocks

The primary determinantes are visibility to farmers, ease of access, nearness to population centers, and moderate environment.

Based on the above criteria, the first five flocks should be located within 10 Km. of:

1. IBB on the IBB-TAIZ Road
2. TAIZ on the IBB-TAIZ Road
3. SANA on the SANA-TAIZ Road
4. SANA on the SANA-HODEIDAH Road
5. SANA on the SANA-SADAH Road

The second group should be located within 10 Km. of:

1. TAIZ on the TAIZ-AT TURBAN Road
2. TAIZ on the TAIZ-AR RAHIDAH Road
3. AMRAN on the AMRAN-HAJJAH Road
4. DHAMAR on the DHAMAR-RADA Road
5. IBB on the IBB-SANA Road

The third group should be located within 10 Km. of:

1. SANA on the SANA-SHIBA Road
2. IBB on the IBB-AL UDAYN Road
3. HODEIDAH on the HODEIDAH-SANA Road
4. ZABID on the ZABID-HODEIDAH Road

## PROPOSED OPERATION AND USE OF DEMONSTRATION FLOCKS

The small flock of 100-200 hens should be located so that they are visible from the main road. A sign with writing and/or design should be near the building to indicate that it is a poultry demonstration flock and that eggs are for sale.

A technician-manager should be available at regular hours to answer questions, sell eggs, and care for the stock. Information should be on hand which can be given to interested persons. This information should include a budget, actual records, housing designs, resource persons, where the inputs of financing, supplies, chicks, etc., can be obtained.

As commercial farms are developed in the area, the demonstration farm would then begin to be a ready source of up-to-date information, seminar location, etcetera.

## ENVIRONMENTAL VERSUS OPEN-SIDED HOUSES

It is presently proposed and apparently approved that both the Amran Government Project and the Middle East Project consist of environment poultry houses. This housing should be reconsidered for the following reasons:

1. Highly trained managers are needed. Many of the best managers in nations of sophisticated poultry production will not consider managing environmental housing unless absolutely necessary, such as in the areas of extreme heat or extreme cold. The environment of Sana-Ibb-Taiz-Amran does not absolutely necessitate environmental houses. The present operation near Sana, Ibb, and Taiz clearly indicate that open-sided houses are more than satisfactory.
2. Trained mechanics are absolutely necessary. At least three full-time, highly trained persons will be needed. They will need excellent knowledge and aptitude in motors and electricity. With over 400 motors and hundreds of light switches and relays on the farm, these three men will be in constant demand and will be some of the most important people on the farm. Various disasters can occur in an environmental house. If the voltage drops to a point where 20 fan motors were to burn out in one lay house containing 97,000 birds, it would take only several hours for the temperature to raise to a point where death losses would occur. After one day with no ventilation, it is possible that all birds would be dead or near death.