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PROSPECTS FOR INVESTMENT IN
THE TURKISH LIVESTOCK INDUSTRY

A Study Conducted By

The U.S. Trade and Development Program

of the

International Development Cooperation Agency
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SUMMARY

INTRODUCTION

This report is a result of a survey of the Turkish beef and dairy cattle sector conducted by U.S. Trade and Development Program at the request of the Turkish State Planning Organization (SPO). The survey was organized by U.S. Feed Grains Council.

CONCLUSIONS AND RECOMMENDATIONS

- I. Turkey can become a major supplier of meat to the Middle East. Meat exports have already grown ten fold during the past three years. Domestic livestock product demand should also register sharp growth.
- II. The Turkish livestock and meat industry desperately needs to improve production, processing and marketing technology if it is to take full advantage of favorable market demand. This represents major investment opportunities for foreign as well as Turkish firms.
- III. There is little knowledge or application of modern sanitation or quality control measures in the meat industry. This must change if markets are to increase and the health of the Turkish consumer is to be protected.
- IV. Due to rapidly increasing export demand for meat and the low productivity of the national livestock herd, Turkish livestock numbers are lower than official statistics indicate and are slated to drop even faster in the future unless immediate remedial measures are taken.

THE LIVESTOCK SECTOR

There is no separate beef sector in Turkey and only the beginnings of a commercial dairy industry. Production methods and facilities are generally outmoded and inefficient. The state industries related to livestock are inefficient and obsolete.

THE FEED BASE

The present feed base in Turkey is adequate to support an expanded and more efficient beef and dairy industry. At some point in this expansion, however, particularly with the growth of a modern, integrated poultry sector, it will

probably be necessary to import feedgrains and soybeans to support continued industry growth.

COMMERCIAL FEED MILLING

There is an estimated total feedstuffs demand of nine million tons per annum in Turkey, but mixed feed production is only about 1.5 million tons, with the difference accounted for by on-farm mixing. There is a pressing need to upgrade feed quality and to promote a more competitive, marketing oriented feed industry.

MEAT SLAUGHTER AND PROCESSING

Commercial livestock slaughter, which was a government monopoly until recently, is characterized by obsolete, inefficient methods and facilities in the public sector. A majority of total slaughter is done in the country, under uncontrolled conditions by individual butchers. The new private sector slaughter plants being planned or under construction should gradually supplant the public sector facilities.

INVESTMENT OPPORTUNITIES

Provided appropriate actions are taken by government and private industry, a number of potentially profitable investment opportunities exist within the Turkish livestock industry, particularly in the areas of processing and marketing.

Note: The exchange rate used in this study is US \$1.00 = Turkish Lira 208

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INTRODUCTION

This report results from a survey of the Turkish livestock industry conducted by the U.S. Trade and Development Program at the request of the Turkish State Planning Organization. The survey was one follow-up to a Trade and Development Program general survey of agribusiness investment opportunities in Turkey conducted in October 1982.

The livestock survey was conducted by a team of consultants made up of the following: Donald M. Taylor, team leader and project economist; Dr. J.D. Aughtry, feeds and nutrition specialist; Charles W. Gibson, Jr., beef cattle management specialist; Homer Porter, feed milling specialist; John M. Stull, meats specialist; and Dr. Terrance Vorachek, feed management specialist. The survey was coordinated by the U.S. Feed Grains Council, a non-profit export expansion group supported by U.S. farm organizations, agribusiness and producer check-offs, headquartered in Washington, D.C. The Council conducts market development activities worldwide under a cooperative agreement with the U.S. Department of Agriculture.

The conclusions and recommendations contained herein are the findings of the survey team and do not necessarily represent the opinions of the U.S. government nor those of the U.S. Feed Grains Council.

The survey team spent approximately three weeks in Turkey. During their mission they made site visits to major production and consumption centers in Western and Southern Turkey, including Ankara, Istanbul, Izmir and Adana. It should be pointed out that no site visits were made to regions in Eastern Anatolia. Therefore, team findings relative to conditions in Eastern Turkey are based on interviews with people knowledgeable in the area and on written reports.

The survey team during the Mission coordinated their activities closely with the Directorate of Foreign Investment, State Planning Organization. Team members met with officials of the Ministry of Agriculture, the Agricultural Bank, state organizations responsible for feed milling, livestock slaughter and processing and dairy processing. They also met with livestock producers, meat exporters, public abattoir operators, private and public dairy processing and

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feed milling firms, farmers, dairymen, and several major Turkish industrial firms that are planning or are involved in development of large scale livestock feeding and slaughter operations.

Major conclusions and recommendations of the report were discussed with SPO officials who expressed their general agreement with the analysis, conclusions and recommendations.

It should be noted that official statistics used throughout this report tend to be of questionable accuracy and difficult to verify. For this reason, data should be used as indicators only.

In accordance with the original request from SPO, the report deals primarily with beef and dairy cattle rather than sheep.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSION I: Market Potential

Turkey, because of common religious heritage, proximity and productive resources, has the potential of becoming a major supplier of beef and sheep meat to Middle East markets. Domestic meat consumption will also expand rapidly provided Turkey's economy continues to improve and present product quality problems can be overcome.

While dairy products in general will have difficulty competing with low cost products from the European Economic Community and New Zealand, market opportunities exist in the Middle East, as well as among the ethnic Turkish communities in Europe, for specialty dairy products such as the white cheeses, yogurt, ghee, etc. Poultry meat probably does not represent a significant area of opportunity as long as exports from the EEC and Brazil continue to be heavily subsidized.

Turkey is not now, however, taking full advantage of the potential for meat exports, because of lack of adequate knowledge of the market and because of domestic meat production problems.

Recommendations

Market Research: A sophisticated market survey should be carried out in the major Middle East market countries to analyze significant market segments and their requirements. While it appears that the primary requirements are for beef, that is roughly comparable to U.S. Standard, cut in quarters, and for whole lamb carcasses, this does not characterize the total market.

There is a growing network of modern supermarkets in Saudi Arabia, for example. There is also throughout the region a sizeable market for better quality beef represented by the hotels and restaurants catering to the tourist and business traveler. The large number of expatriate European, North American, Japanese, Korean and other workers who are accustomed to consuming better quality beef at home also represent a potential market for higher quality, portion controlled boxed beef, and perhaps boneless beef for further processing. These all represent possibilities for marketing specialty Turkish meat products at premium prices.

U.S. Trade and Development Program should consider funding of such a market survey as a follow-up to the Livestock Mission reported herein, given the opportunities for productive U.S. inputs into the Turkish livestock and meat sector. Provisions should also be made by the Turkish meat trade and/or Turkish government to conduct such market surveys on a continuing basis in order to keep abreast of changes in Middle East market demand and preferences.

Product Changes: The Turkish meat producer and exporter should modify and improve their product in such a way as to better serve Turkey's own interests while continuing to satisfy Middle East market demand. This can be done by producing younger, heavier carcasses, both beef and lamb; by segmenting the market and producing products designed to meet the specific needs of each segment; and by improving the quality of meat products and the efficiency of meat production through means discussed in later sections of this reports.

CONCLUSION II: Technology Needs

The Turkish livestock and meat industry desperately needs to improve the level of technology throughout if it is to continue to increase meat exports and indeed, to satisfy potential domestic demand. This critical need to upgrade the entire industry will require large and continuing investments probably throughout the next decade. Most of the required technology and a significant portion of the investment must come from outside Turkey. Given the opportunities for selling Turkish meat to the Middle East, where it is greatly preferred, and the anticipated increase in domestic consumption, the needed investments in technological improvement can be profitable for domestic and foreign investors alike.

While it will be necessary for the Turkish government to fund essential infrastructure requirements, it has already been conclusively demonstrated that the needed investment in productive facilities will be far more efficient and effective if made by the private rather than the public sector.

Recommendations

Public Policy Issues: It is recommended that the Turkish government continue to strengthen both its policies aimed at encouraging private sector investment in the livestock industry and its application of these policies. At the same time the government should as rapidly as possible phase out any remaining special incentives for public sector livestock related industries and refrain from encouraging any further expansion of these industries. The government already

has at hand a package of policies designed to encourage domestic and foreign investments in the livestock and meat industry. These need to be vigorously applied and a continuing surveillance made of policies which might act as a deterrent to such investments.

Such deterrents presently include certain import policies as well as other regulatory measures. Negotiations usually go smoothly with the SPO but problems can be encountered when it is necessary to go to other government agencies for approvals or permits. In certain specific instances, the Agricultural Bank has been a source of lengthy delay in major investment projects. Generally, however, government policies toward livestock industry investments are sound and enlightened.

U.S. Government Support: Investments in the Turkish livestock industry represent potential profits, a means of breaking into the Middle East markets for U.S. firms and a point of entry for sale of U.S. goods and services in Turkey. There is a great need for U.S. technology in the Turkish livestock sector.

Since it is in the best interests of the U.S. government to encourage the U.S. private sector to become more involved with Turkish commercial interests, it is recommended that appropriate agencies of the U.S. government such as U.S. Trade and Development Program, Overseas Private Investment Corporation, the Private Enterprise Bureau of the U.S. Agency for International Development, U.S. Export-Import Bank, U.S. Department of Commerce and others implement organized, coordinated programs to actively seek out and encourage qualified U.S. agribusiness firms to make investments in the Turkish livestock industry and to support such firms in these investment efforts.

U.S. Private Sector Considerations: This report should be widely distributed to U.S. firms and organizations that have the potential to supply the needed technology and investment to the Turkish livestock industry. Due to transportation costs, type of products and lack of familiarity and contact with the market, it is difficult, if not impossible, for U.S. firms to market any important volume of livestock products in the Middle East. These problems can be overcome for U.S. firms willing and capable of working in partnership with qualified Turkish companies to establish a Turkish base for penetration of the Middle East. This type of partnership will also increase market opportunities for U.S. products and services, including machinery and equipment, breeding livestock, feedgrains and others.

Tripartite Joint Ventures: The SPO has contacted numerous Middle Eastern meat importers who would be interested in considering investments in the Turkish livestock and meat industry, providing that they were assured such investments would be well managed. This interest should provide opportunities for American firms to supply technology, management and various other inputs to three way ventures which include Middle East investment. Such tripartite ventures would combine the Turkish resource base, the required technology and management and the Middle East market outlets as well as investments into an attractive package. It is recommended that the SPO work through TDP, OPIC and other U.S. agencies to identify appropriate U.S. firms and assist in putting together this type of package.

CONCLUSION III: Health, Sanitation and Quality Control

With a few exceptions, such as the Pinar Dairy operation at Izmir, sanitary and quality control conditions in the Turkish meat and dairy industry must be rated as deplorable. There is little knowledge or application of even the most rudimentary sanitation or quality control measures.

Industry operating methods and conditions endanger the health of the Turkish consumer. There is also the possibility that foreign customers for Turkish food products will at some point become sufficiently aware of the sanitation and quality control problems to curtail their purchases of these products.

The livestock feed sector, which provides the most important input into the livestock industry, is also producing products that are generally of less than desirable quality. This represents an important constraint to improvements in the efficiency of livestock production.

Several new private sector slaughter plants that are either under construction or on the drawing boards reportedly are designed to meet U.S. and European sanitary standards. This will help alleviate the situation. But it will take a complete revamping of industry facilities and practices to meet basic sanitation and quality control needs.

Recommendations

Public Policy Measures:

All future livestock slaughter plants should be required to fully meet U.S. and/or EEC sanitation and product quality control standards as a condition of getting approval to do business.

An appropriate time period should be set, perhaps three years, during which all presently existing slaughter and meat processing plants must upgrade their facilities and methods to meet the above standards. Those failing to do so within the allotted time period should be closed down.

The Turkish government should set quality control and sanitation standards based on appropriate U.S. and European standards and establish an inspection system modeled after that of the United States.

A cutoff date should be set, at perhaps six or eight years, after which all meat sold to the public (as opposed to animals slaughtered for home use) must come from approved slaughter facilities which meet minimum government standards, with specific requirements based on number of animals slaughtered in each plant. In addition to improving national health conditions, this would gradually force the estimated 40 to 60 percent of total slaughter that is performed in the country under uncontrolled conditions into commercial channels and help rationalize the entire meat industry.

The Turkish Ministry responsible for the meat industry should undertake an active educational campaign to instruct wholesalers and retailers in the rudiments of meat handling and storage in order to maintain quality. The consumer should also be educated to expect and demand better quality products.

The Private Sector Meat Industry: Abattoirs and meat processing plants were until recently a public monopoly. Now the private commercial sector is being encouraged to go into slaughter and processing. Those firms entering the business should realize that product quality can be an important merchandizing tool.

This is graphically illustrated by Pinar, whose dairy products are in greater demand among those who can afford them, because they have an image of quality and safety. In addition to the importance of quality control and product form for the export market, there is almost certainly a very large, unmet consumer demand for meat and dairy products that the consumer can be confident are safe for him and his family, that taste good and that are readily available and reasonably priced.

The Turkish consumer is quality conscious. Their problem now is that they have lost confidence in the products being offered them by the Turkish meat industry.

Public Policy Measures, Dairy Industry:

Requirements should be introduced, supported by extensive extension programs, to improve sanitation, health and disease prevention measures and milk quality at the level of the individual commercial dairy farm. These measures should focus on waste handling and general cleanliness of facilities, milk handling from farm to collection station, prevention and control of mastitis and other diseases, particularly tuberculosis which can affect humans, and proper control of temperature levels in milk holding tanks at collection centers. Specific measures are discussed in the dairy section of this report.

A deadline should be set, perhaps six to eight years, after which all milk sold to the public (not including home use), will have to be pasteurized or sterilized in an approved processing plant. This could be one of the most important public health measures to be adopted by Turkey. It would also serve to spur the development of a modern dairy processing industry.

In order to accomplish the above, minimum standards should be set for all new dairy processing plants, based on U.S. or European Community standards. A cutoff date of three or four years should be set during which all existing plants must be brought up to standard or shut down.

Public Policy, the Feed Industry: The government has already adopted fairly stringent measures aimed at ensuring feed quality control. These should be vigorously applied. The industry should also be encouraged to adopt modern computer technology for feed formulation, and to establish feedstuffs analysis facilities at central points throughout Turkey.

CONCLUSION IV: Improving Production Efficiency

This Mission concludes from available evidence that official Turkish government statistics which claim livestock population of 17 million cattle and 46 million sheep with a growth rate of one percent per year are erroneous, and numbers are actually much lower. The reasons for this conclusion are as follows:

A comprehensive livestock census has not been conducted for more than a decade.

Meat exports to the Middle East have grown ten-fold during the past three years.

There has been a proliferation of feedlots throught Turkey as a result of the increasing market demand.

The majority of slaughter in Turkey is uncontrolled and uncounted.

The productivity of Turkish livestock, particularly cattle, is quite low. In 1976, a World Bank team reckoned that the productivity of the cattle sector was one-eighth that found in developed countries.

The preferred animals being fed for export are primarily two to four year old bulls. Thus, it can take as long as four or five years to take an animal from birth to market.

Despite the preference for feeding older bulls, as these animals become harder to find, more and more younger cattle are showing up in feedlots.

These conclusions have been corroborated through discussions with feedlot operators and exporters of meat and live animals, who are experiencing increasing difficulty in finding suitable animals, and by a major Turkish firm which has made an extensive personal survey of livestock numbers in connection with a planned slaughterhouse and feedlot.

While no one can state with any accuracy the exact size of the cattle or sheep population, estimates by knowledgeable observers place actual numbers at 10 to 20 percent below official figures. The statistics department of the State Planning Organization, based on a recent vaccination program in Eastern Turkey which encountered far fewer cattle than anticipated, has reduced their own internal estimates of cattle numbers by 15 to 20 percent.

Even more alarming is the conclusion by team members that unless immediate measures are taken, livestock numbers will decrease even faster in the near future. If this trend continues to accelerate, Turkey, instead of earning foreign exchange through beef exports to the Middle East, could be faced with the necessity in three or four years of importing beef to meet domestic demand.

Also relevant is the fact that most cattle are in the hands of small-holders. As prices increase, the small farmer who has a few head of cattle will tend to sell them for slaughter rather than hold them to increase his herd, choosing an immediate payoff rather than waiting several years for an even greater return.

It should also be pointed out that the above conclusions are based partially on personal observations over a period of years by several team members in countries experiencing situations similar to that of Turkey. These countries include among others, Japan, Korea, Indonesia and the Philippines.

If team conclusions relative to the impending drop in livestock numbers are correct, there are some obvious implications for those Turkish industrial groups that are planning to go into integrated livestock slaughter and feeding programs, as well as for national meat export programs. Turkey still has, however, the largest livestock herd in Europe and the Middle East, and is, therefore, in a good position to increase meat exports provided remedial action is taken immediately to begin improving livestock production efficiency.

Recommendations

The following recommendations are related to cattle rather than sheep since that was the primary focus of the Mission.

Program Goals: Since it would be difficult, if not impossible, to reach and obtain results through programs aimed at the very small producer who has only a few head and who may be isolated, efforts to increase the national herd should be aimed at the medium size cattle grower who perhaps owns eight to 20 head. The government has already built the base for a program of small farmer incentives. Price controls on meat and milk have been removed. Farmers can obtain subsidized loans for up to 70 percent of capital cost for farm improvements from the Agricultural Bank. The small farmer is also protected by the Bank from any foreign exchange losses on such loans if a foreign component is involved. The existing programs should be coordinated with new measures as discussed below.

Infrastructure Needs: The most important shortcoming of the various livestock improvement programs in Turkey has been the failure to provide an adequate technical and marketing infrastructure. This is particularly evident in the series of World Bank financed cattle development programs, which have concentrated on imports of breeding stock but have not put sufficient emphasis on the ability of the Turkish government to provide adequate technical extension services. (The newest World Bank program, now being formulated, evidently attempts to address this problem).

Starting with the World Bank projects, the Turkish livestock extension service should have its skill levels upgraded and should be further professionalized. Consideration should be given to establishment of a specialized agricultural skills training center with U.S. assistance to provide extension staff and others who deal directly with farmers with the up-to-date technical husbandry and management skills which are present largely lacking in Turkey, even at the highest technical levels within the government.

Private Sector Support Services: Regardless of the extent to which government extension services are upgraded, the private agribusiness sector must play an increasingly important role in providing technical backup for the small farmer. This will, and should, increasingly become a competitive tool in the hands of the better private companies. The sooner agribusiness companies recognize the need for and apply this concept, the better for themselves and for the livestock sector as a whole.

For example, the feed miller seeking customers will find it helpful to analyze the farmer's home grown feeds and formulate concentrates that complement these feeds. The integrated meat processor and feedlot operator will find it important to provide technical advice and assistance to the livestock producer in order to improve his access to feeder cattle.

The government should encourage agribusiness to provide technical backup services to the producer. Regulations and policies that inhibit this should be amended. One such regulation is the present ban on private companies providing artificial insemination services to farmers who sell them milk or cattle. The benefits of having quality of cattle in a particular region upgraded through a cooperative program between an agribusiness firm and its farmer-suppliers should far outweigh any potential administrative disadvantages.

Separation of Beef and Dairy: It must be recognized by both government and industry that in order to upgrade the national herd, development of beef and dairy must be separated. Thus far, the development emphasis has been on introduction of dual purpose cattle or on using imported dairy type cattle to cross-breed with local cattle to improve milk production while retaining meat output.

This was probably satisfactory as long as the small farmer depended on his cattle as a source of family milk and draught power and beef was not a particularly desired meat. Now, however, there is a growing commercial scale beef industry as well as a discrete and rapidly increasing market for both beef and dairy products.

The dual purpose animal, at least for the commercial as opposed to the subsistence sector, is an unsuitable and counterproductive compromise. Steps should be taken to encourage improvement of two separate industries and development of separate breeding herds for beef and dairy.

The first such step should be the rescinding of the recently imposed ban on imports of breeding cattle. While farmers should not be coerced into buying imported cattle, they should be allowed to do so at their own discretion and should be encouraged to do so through low cost credit, exemption from import taxes, etc.

The World Bank Livestock Programs are not necessarily the best vehicle for future Turkish commercial livestock development, although they may have been helpful in the past. World Bank bidding procedures result in imports of the lowest quality cattle within any given set of specifications. Unlike writing specifications for industrial equipment or construction materials, it is difficult to design specifications for breeding animals which reflect all of the desired genetic characteristics. Farmers purchasing cattle through the program, therefore, have not had access to the best quality animals.

Given the lack of technical support and infrastructure, the World Bank approach was undoubtedly more successful than a program for bringing in high quality animals would have been. In the future, however, it would be a serious mistake for Turkey to continue to import dual purpose animals or those whose genetic makeup limits their or their offspring's production capabilities.

In addition to allowing import of high quality beef and dairy breeding stock, the Turkish government should also allow import of semen by the private sector for their own use or for distribution to farmers. Embryo transplants should also be considered as a means of rapidly improving herd quality.

Maintenance of Cow Herds: The government and private agribusiness should cooperate to provide incentives to the farmer for maintaining and increasing his cow herd. One such means might be extension by the Agricultural Bank of credit on favorable terms to livestock producers with such credit administered by feedlot operators. The feedlot operator would be required to contract in advance with the farmer for feeder cattle. A loan would be given to the farmer in installments, perhaps in the form of feedstuffs, to enable him to maintain his cows and young animals throughout the winter.

The feedlot operator would take delivery of the feeder calves, repay the bank and pay the farmer the remainder of the sales price. This might help remove the greatest deterrant to small farmer herd maintenance, the lack of winter feed. The incentive for the feedlot operator will be a secure source of feeder cattle, which will become an increasingly important factor as competition for the available supply of feeder cattle continues to mount.

Model Feedlots: At least four model feedlot projects should be developed in various areas of the country, by private firms with the cooperation and support of the government. Purpose of these model feedlots will be to demonstrate the application and results of modern feedlot technology and management.

The models will incorporate training programs and should be open to observation by others interested in cattle feeding. Such models have been very useful in a number of other countries where they have been developed.

Cattle Census: A comprehensive, all inclusive cattle census should be made as soon as possible. Unless this is done, it will be difficult to work out any constructive program since the actual state of the resource will not be known. Given the urgency of the situation, financial assistance for the census might be obtained from FAO, the European Community Development Fund, or similar international agency.

Changing Product Type: The practice of feeding older bulls is wasteful and should be changed. Keeping a bull until it is two to four years old before putting it into the feedlot means that the animal will consume feed for several years that should be used for feeding cows and calves.

Estimates of present carcass weights vary widely, but probably average around 135 to 140 kilograms, with carcasses in the east being smaller and those in the south and west, particularly for the export trade, averaging considerably larger. Improved feeding programs from calthood through the feedlot could be expected to result in greatly increased carcass weights and more meat output from the same number of animals. This alone, however, will not be enough to stem the decrease in cattle numbers.

With appropriate changes in management and feeding practices and the use of the right kind of animals, Turkish feeders can successfully feed young animals (six months to one year) for longer periods and still produce a product at a profit that will satisfy the market.

Changing Feeding Practices: The producer generally does not have access to adequate winter feed with the exception of low grade fodder such as straw. Those animals that are not sold at the beginning of winter continue to lose condition throughout the winter months. The producer needs access to better quality winter feeds, including concentrates. If he cannot afford these feeds, means must be found to help him, such as the feed loans mentioned above.

The cattle feeder also needs to upgrade his feeding programs. A common misconception exists in Turkey, as in many other countries, that feeding less to cattle saves money. This just isn't true.

Since it takes a certain amount of feed just to maintain an animal, growth can only occur if feed intake is more than adequate for maintenance. The return on the feed investment comes in the form of meat added to the carcass. It is also important to feed a ration that is balanced and contains the proper nutrients.

Feed Grain Supplies: The present Turkish feed base is large and varied enough to support a larger and more efficient beef and dairy industry. As beef and dairy production increases and a modern, integrated poultry sector is built up, however, it will probably be necessary to import some feedgrains to support these industries, at least until such time as the planned irrigation projects are put in place in Eastern Turkey.

The government should realize the necessity of providing adequate feedstuffs in order to support the growth of livestock production and exports, and should put as few barriers as possible in the way of feedgrain and soybean imports, as well as assisting in development of necessary infrastructure including grain storage and handling facilities.

Trade Associations: Turkish industry traditionally does not look favorably on industry-wide cooperation, such as industry trade associations. The formation of such associations, however, could be one of the most useful tools for fostering industry development. Despite the difficulty of doing so, government should actively encourage association formation and carry on educational campaigns aimed in this direction among all segments including cow/calf producers, feedlot operators, feed millers, etc.

THE LIVESTOCK SECTOR

There is no beef cattle sector as such in Turkey, although the beginnings of a commercial dairy industry are present. Turkish agriculture is characterized by small farmers who generally own their own land, except in the Eastern mountains where tenants farm land owned by large scale absentee owners

The small farmer has traditionally kept cattle as a source of draught power and to provide milk for home consumption, either fresh or in the form of cheese

and yogurt. Until quite recently, beef was less desired, with lamb and mutton being the meat of choice for Turkish consumers and relatively smaller market demand for beef. Most cattle are held in herds of less than 10 head.

The situation is changing rapidly with domestic beef consumption increasing, but particularly as a result of the growth in Turkish meat exports to the Middle East. The growth in demand for beef is putting increasing pressure on a cattle population that, while representing the largest herd in the region, is primarily in the hands of smallholders and is characterized by low productivity. The government estimates offtake of only 20 percent (the number of animals available for slaughter from all sources each year.)

There has been no organized development programs for beef and very little attention paid to the beef industry until the past two years when the rapid growth in exports to the Middle East began. Imports of cattle for breeding have consisted of dairy types or dual purpose animals aimed at upgrading milk production capabilities of local animals.

The local cattle are generally of poor quality for either beef or milk. There are an estimated one million head of exotic cattle in Turkey, consisting of imported animals, descendants of imported cattle or descendants of crosses between imported and local cattle. These numbers, however, like most statistics relating to the Turkish livestock industry, are open to question and difficult to verify.

Present livestock industry development emphasis, including investment by the public and private sectors, is focused almost entirely on increasing cattle feeding and slaughter facilities to take advantage of the Middle East market demand. The greatest challenge facing the industry today is finding viable means to reverse the trend in livestock numbers which will decline at an accelerating rate as planned investment projects for livestock feeding and slaughter are realized. Unless this trend is reversed, at some point in the near future, there may not be sufficient animals available to maintain these new feedlots and slaughter plants.

According to a World Bank report dated October, 1981, "Demand projections for livestock products made during the Bank's latest Agricultural Sector Survey indicate that Turkey will move from its present state of relative self-sufficiency to one where in 1985 it is estimated it would need to import over 30 percent of its milk and meat and over 20 percent of its wool and mohair

requirements, unless there is a major change in historical production and consumption trends. The importance of livestock products in the national diet is demonstrated in rural food consumption patterns. About 26 percent of all expenditures and 35 percent of all expenditures on food are allocated to milk and other livestock products, with hardly any variation across income groups. The consumption of livestock products is equally as important to the rural poor as to the more favored rural households in Turkey."

The situation is being worsened by the rapid expansion of exports to the Middle East, which have grown ten-fold during the past three years.

Beef Considerations

Turkish meat and live animal exports to the Middle East (Iran, Iraq, Syria, Lebanon, Saudi Arabia, Kuwait, etc.), including beef and sheep meat, have increased from U.S. \$108 million in 1980 to \$344 million in 1982. Beef is an important item in this trade. Beef exports are expected to reach U.S. \$~~70~~⁴ million in 1983. Beef ~~imports~~^{exports} in 1981 were 1,708 tons. By 1982, they reached 12,500 tons, valued at U.S. \$~~40~~⁴ million.

Great improvements are being made by Turkey in national recovery, reduced inflation and increases in per capita national income during a period of general worldwide recession. Official estimates of 1982 GNP show a real growth rate of 4.4 percent. Inflation was reduced from 107.2 percent in 1980 to 25.2 percent in 1982 and should dip even further in 1983. Domestic beef consumption is expected to increase as Turkey's standard of living improves and unemployment problems are reduced.

Turkey's beef exports need to continue and be expanded because of the favorable market opportunities and the contribution they make to the national balance of payments. The cattle being fed, slaughtered and exported as meat or as live animals, however, represent a national resource that cannot be quickly or easily replaced.

A variety of problems exist within the Turkish beef industry. Most cattle are raised by small farmers, with 10 head or less and fattened prior to export in small to medium size feeding operations (10 to 500 head). Some prepared feeds are purchased but for the most part each feeder purchases ingredients as needed and mixes them with feedstuffs he produces on his own farm. Typical purchased feedstuffs include barley, cracked wheat, whole corn, flour mill by-products, oil seed meal, meat and fish meals, minerals and vitamins.

Small farmers typically sell their calves at the onset of winter to either cattle feeders or stockers who graze the animals and feed them poorer quality fodder for one to two years. Feeder cattle are purchased to go into feedlots weighing about 200 to 300 kilograms, as two to three year old bulls.

The most common feedlot facility is a concrete barn with little ventilation. Cattle are tied to feed bunks, hand fed and not allowed to move about. This type of housing is typical in many countries besides Turkey, but is not the ideal facility for efficient cattle feeding.

Most feedlots do not make any accurate measurements of either feed or animal weights. Animals are sold two or three at a time when the desired degree of finish is reached. Cattle are purchased for export by slaughter plants or by exporters who then have the slaughter done on a fee basis. Cattle for domestic markets in urban areas are sent through market places maintained by cattle dealers, with sales negotiated between owners and dealers.

Perhaps the most serious industry problems revolve around management and feeding. Feedlot operations lack any semblance of modern feeding and accounting practices. Most feedlots do not have any scales with which to weigh cattle in and out nor do they have any way of accurately measuring how much feed each animal receives. A good record keeping system is an essential part of managing cattle feeding for profits.

Feeding regimes in Turkey basically provide maintenance diets and are inadequate for making rapid, efficient gains, which require high energy, low fiber feeding programs.

The cattle barns currently in use are inefficient, too expensive, and unhealthy for animals and humans because of faulty ventilation. Some of the more modern dairy barns observed provide good examples of efficient space utilization, economical construction, and excellent ventilation. Barns for both beef and dairy cattle should be well ventilated, roofed shelters, with no sides or at the most, one side enclosed.

Animal health conditions observed were quite good. Both government and private veterinarians seemed to be doing a good job. There is a need for more planned animal health programs for feedlot cattle, however. Bovine diseases reported include foot and mouth (type O and A), theileriosis, septicemia, brucellosis, anthrax, blackleg, tuberculosis, bovine virus diseases, mastitis, internal and external parasites.

The feedlot market situation is perhaps the most favorable aspect of the entire business. As a direct result of the very strong export demand combined with a good domestic demand, in most areas there are many buyers for feedlot cattle. Some buyers even contract with feedlots for future delivery. Typical market prices during the Mission visit to Turkey were: live animals, 100 kg., TL 450 per kg.; live animals, 300 kg., TL 200 per kg.; live animals, 400 kg., TL 250 per kg.; wholesale carcasses, 220 kg., TL 500 per kg.; retail carcasses, 220 per kg., TL 600 per kg.; retail beef cuts, TL 700 to 800 per kg.

Some of the needed improvements in the cattle industry will be expensive and require long periods to implement. Others can come relatively quickly and inexpensively. Some industry problems can be solved through establishment of model feedlot projects dedicated to introducing modern technology to producers throughout the country. These model projects should be organized by private firms, but should receive financial support for training and demonstration programs which will benefit the entire industry.

Feeding programs should include more energy and less fiber to produce faster, more economical gains. Complete feeds should be formulated by competent nutritionists using computer technology, so that each animal receives a well balanced diet. Live weight gains will be more economical even though feed costs per kilogram may increase. Well formulated cattle feeds can also help prevent many diseases common to the industry. Free choice feeding will generally produce more efficient gains than will limited feeding.

More feed production will eventually be required if the Turkish feedlot industry is to prosper in the long term. A single feedlot with 4,000 cattle will require approximately 40 tons of feed per day, or 15,000 tons per year.

Feedlot facilities should be open type designs as shown in Illustrations 1 and 2, Annex III. These are cheaper to build and provide more efficient and economical gains. Waste disposal should be planned in such a manner as to prevent pollution of surrounding areas.

A well designed health program is a vital necessity for any feedlot. Such a program, designed by an experienced and competent veterinarian, will include vaccination for certain prevalent major diseases, and preventative measures for other health problems. Movement of animals into and out of feedlots, mixing of cattle from different sources and concentration of cattle in a feedlot environment will intensify disease incidence and severity.

The Turkish Dairy Industry

Turkish dairy production consists largely of small dairy farmers who either use their milk at home or sell it to dealers who retail raw milk from bicycles or other small vehicles in urban streets. The housewife must in turn boil the milk before using it. Only about 10 percent of the total milk produced in Turkey is processed through a modern milk plant.

Annual milk production is estimated to be about six million tons. Per capita consumption according to government figures is about 110 kg. The dairy processing industry collects only about 100,000 tons per annum. The dairy processing industry consists of the government milk organization (SEK) with 38 plants in operation nationwide and three more under construction, and three private dairy processing firms, of which two are quite small.

SEK in 1982 purchased 85 million liters of milk, through its national system. The largest private dairy firm, Pinar, by contrast, purchased 63 million liters in one region only, which was processed through a single plant but enjoyed a national market due to its quality reputation.

Much of the milk produced is consumed in the form of yogurt, cheese and butter. Only Istanbul and Izmir have more than 50 percent fluid milk consumption. Milk prices have shown a steady increase during the past several years, with recent prices averaging approximately TL 35 per liter.

Pinar's example illustrates the ability of the private dairy sector to compete effectively with the state dairy organization. The two most important aspects of this competition are services provided to producers, and product quality control.

Pinar provides various technical services to its farmer-suppliers, including regular technical publications, veterinary advice and services, and will soon provide mixed feeds. Pinar also has a reputation among the general public as well as institutional users for providing safe, high quality dairy products.

The major barriers to increased productivity in the dairy sector include low genetic potential, lack of adequate quality and quantity of feed, low level of technology and management skills, and lack of adequate health care and disease control.

While all of these aspects are important, perhaps the one that promises the greatest long-term improvement lies in the area of genetics. The cattle thus

far imported by Turkey for purposes of upgrading the national dairy herd have generally been of relatively low genetic quality.

The introduction of higher quality dairy cattle through imports of breeding animals, better quality semen for artificial insemination, and possibly embryo transplants, will be necessary if the Turkish dairy industry is to become efficient and profitable. Source of the required quality of cattle is generally the U.S. Holstein.

There is a pressing need for dairy development to focus more on the milk producer while continuing to improve and expand processing and marketing activities in the commercial sector.

THE FEED BASE

The total feed grain base in Turkey can be placed at about 6,477,000 metric tons. Should all of that feed grain be formulated into high energy, minimum roughage feedlot rations, the total feed availability would be about 12,954,000 mt per annum.

Total commercial feed production in Turkey in 1982 was about 1,923,000 metric tons. Total feed demand for the year was estimated to be 9,000,000 mt. Thus, commercial mixed feed represented about 20 percent of total estimated feed demand. If the data above are correct, the total potential feed base may exceed current demand for feed by as much as 44 percent. This indicates the opportunities for expansion of beef and/or dairy feeding.

Feed grain usage in Turkey in 1982 was 6,477,999 metric tons which represented about 30 percent of the total grain production of 21,198,000 tons. Total area planted to grain was 12,780,000 hectares. Relative amount of each grain utilized for feed was:

	<u>Metric Tons</u> (1000)	<u>%</u>
Wheat	700	10.81
Corn	600	9.26
Barley	4,650	71.79
Oats	325	5.02
Rye	10	.15
Millet	17	.26
Mixed Grains	175	2.71
	<u>6,477</u>	<u>100.00</u>

Priority in resource allocation may determine whether more of the current grain production should be dedicated to cattle feeding and whether more land should be planted to feed grains. Profit potential should play a role in that determination. Importation of feed grains is an alternative that should be explored when necessary.

The fundamental principles of feeding cattle in Turkey are the same as for any other country. Application of modern feeding methods in Turkey would result in improved performance and efficiency. When applied with good business judgement, advanced technology should improve the profit picture for both cattle feeding and dairy production. Regardless of type of cattle, genetic potential and feeding objectives, a fundamentally sound and practical nutrition program is essential. Nutrition directly affects any animal fed regardless of circumstances.

New technology is critically important for an expanded beef and dairy industry. Computer technology has much to offer the Turkish cattle industry, particularly in the areas of feed formulation and management. Introduction of computer technology will help increase the efficiency of feed utilization and the production of meat and milk.

One area of needed improvement is cow-calf nutrition. Cattle probably receive satisfactory nutrition during the grazing season when green grass is available, although over-grazing is reportedly a major problem.

During the winter months, however, animals are fed a low-grade roughage that is inadequate in both quality and quantity. In addition to meeting energy needs, protein, mineral and vitamin supplementation would also be helpful in raising production.

Present feeding programs in Turkey are highly inefficient in every respect. In order to make optimum use of the available feed base, rations must be formulated according to feed materials available, type of cattle fed, and market requirements.

The method for achieving this will be to catalog all available feeding materials in each given region of Turkey, analyze these materials for nutrient values, and then plug them into a computer program including market prices and

availability. The computer will then prepare specific formulas according to specific feeding objectives at least cost.

The spectrum of feed ingredients in Turkey is adequate to formulate almost any feed formula that would be required. The genetic potential of Turkish cattle will help determine exact ration formulas.

A general feed formulation for dairy cattle might appear as follows:

<u>Ingredient</u>	<u>Percent</u>
Grain	30
By-products	10
Protein supplement	10
Molasses	5
Roughage (air dry)	42
Premix	3
	<u>100%</u>

Cows normally eat according to size and milk production. A 550 kilo cow should eat about 20 kilos of a feed with 60% total digestive nutrients (TDN) and produce up to 20 liters of milk.

It is probable that few cows in Turkey produce more than 15 liters of milk but may consume the larger amounts of feed if it is available.

Current Turkish feeding programs provide about 30% concentrates, and 70% roughage in dairy feeds.

A typical beef ration might resemble the following:

<u>Ingredient</u>	<u>Percent</u>
Grain	50%
By-products	20
Protein supplement	5
Molasses	5
Roughage	17
Premix	3
	<u>100%</u>

Currently, cattle are fed for only about 100 days. It would take between 1.0 and 1.25 metric tons of feed per animal for a 100 day feeding period depending on the size of the animals. That translates into feed intake of about 11 to 12 kilograms per animal per day.

COMMERCIAL FEED MILLING

The Turkish feed milling industry is made up of the public sector under the national feed organization, accounting for 30 percent of total capacity and the

private sector including some 102 mills which make up the remaining 70 percent. The feed milling organization administers some 30 wholly owned mills as well as 13 joint ventures with private industry. Three new feed organization mills are under construction.

There are 102 private mills, with production capacity of 1,696,000 metric tons per annum; 20 government mills, with total capacity of 585,000 mt.; and 13 state/private mills with 274,000 mt. capacity, for a total production capacity nationwide of 2,855,000 mt. While 1982 mixed feed production estimates differ, if the figure of 1,500,000 is used, the feed milling industry appears to have considerably more capacity than is being currently utilized.

The government is predicting, however, that by 1985, there will be 185 feed-mills in Turkey with total combined capacity of 6,100,000 mt. The difference between the current feed output and the government estimate of nine million tons feed demand is accounted for by the tendency of farmers to consider feed prices high, as well as the generally poor quality of feeds and the lack of consumer education concerning importance of using high quality, well balanced rations.

The feed milling sector is the one area where government firms are successfully competing with the private sector. Their main marketing tool in this regard is extension of credit, which the private mills are unable or unwilling to match. The solution for the private mills will be to use product quality and client service as competitive tools.

Feed prices in Turkey range from U.S. \$105 to U.S. \$130 per ton. Of this total, ingredient prices make up 86%, shrink 2%, operations 8%, and profits 4%. One government plant reported production of 60 tons per day, utilizing 49 employees, including 20 in manufacturing, 15 for administration, and 14 drivers and miscellaneous. Almost all of the mixed feed is shipped bagged.

Most feed mill equipment is manufactured in Turkey with the exception of a few specialized pieces of equipment such as pellet machines and bagging scales. Feed plant design and equipment utilized appear to be consistent with current technology. Knowledgeable and competent engineers and construction people are available.

The feed industry, like other Turkish agribusinesses, has received relatively little attention during Turkey's drive to industrialize. As a result, the industry has a number of shortcomings which need to be corrected if it is to play its true supportive role in Turkish livestock improvement.

Feed manufacturers lack aggressive marketing programs. They tend to leave extension services to the government extension organizations rather than using technical services as a marketing tool. The feed miller is in the best position to educate the commercial livestock producer to the benefits of feeding a high quality, well balanced ration.

Because of poor quality, even though the producer may buy from a commercial mill, the feeds may not produce the desired or promised results. The industry, with the exception of one mill, does not use computer technology in feed formulation. Lack of quality control programs results in fluctuations in feed quality. Facilities for feedstuff analysis are non-existent at the commercial level.

Credit facilities for providing operating expenses for the livestock producer are also inadequate or lacking in many cases. Problems of cash availability make it difficult for farmers to purchase commercial feeds.

The lack of grading and standards for meat, which means no premiums for the producer who does a better job of growing livestock, makes it more difficult to convince the feeder to spend a little more money on better quality feed.

The Turkish feed milling industry, in addition to representing an all-important support facility for the livestock industry, is also in a good position to export mixed feeds and concentrates to adjacent Middle Eastern markets such as Iran, Iraq, and Syria. To do this successfully will require renovation of the industry and improvements in quality of product and in marketing methods and strategies.

MEAT SLAUGHTER AND PROCESSING

In mid-1982, private sector firms were allowed, and even encouraged, to enter into meat slaughter and processing in competition with the state meat and poultry organization. At the present time, there are only three private sector slaughterhouses in operation in Turkey, but at least a half dozen more are being planned or are under construction.

At the present time, the state meats organization (EBK) administers 20 slaughter plants, 11 cold stores, and several meat processing plant, scattered throughout the country. There are also 761 municipal slaughterhouses in Turkey. Most of these are obsolete, however.

The total slaughter by state, municipal and private slaughterhouses is about

80,000 to 100,000 tons per annum. The EBK accounts for only about 10 percent of the total slaughter in Turkey. An estimated 50 to 60 percent of all slaughter is done by individual country butchers.

It is difficult to obtain precise data on slaughter volume at individual slaughter plants. Record keeping is poor or non-existent. It appears obvious, however, that most plants are operating at less than capacity.

The state slaughter plants work only about 240 days per year on average, one shift per day. During the summer months, the supply of cattle and sheep to the slaughter plants drops off drastically, because of the availability of grazing. Thus, the plant may operate only part time during a significant portion of the year.

Meat marketing is generally disorganized, with form and utility of cuts very limited. Modern marketing methods are virtually unexplored. Meat cutting methods result in considerable waste. Handling of carcasses and meat is generally inefficient. Some of the more valuable cuts are used for grinding.

Cutting areas lack the basics for good operations. Lighting, sanitation, refrigeration, quality control, materials handling, and allocation of labor all leave much to be desired.

Basic equipment is generally outmoded. By-product recovery systems are inadequate in the state plants and generally lacking in municipal slaughter plants. This represents a sizeable economic waste.

Suggestions for industry improvement include immediate attention to rendering and other by-product profit potential. There is a critical need for industry-wide initiation of sanitation programs, improved refrigeration systems, and quality control measures. This is important enough that it deserves adoption by the government as national policy. At the present time, the recognition of the importance of consumer protection is nonexistent.

Another pressing industry need is for basic meat operations record keeping. Required records include yields on each lot of cattle or sheep, with reasons for variances; allocation of production time per lot of cattle, sheep, etc.; and establishment of base costs with identification of causes for any variations.

There is a need for extensive cost and yield analysis of the optimum type carcass to produce and sell. A slight increase in fat cover, for example, should greatly increase retail yields.

There is also a market for expansion of the present line of manufactured products (frankfurters, salami, etc.) Quality levels and consistency need to be improved.

New techniques in meat slaughter and processing should be investigated for possible application in Turkey. Some of these include electro-stimulation, hot boning, mechanical tenderization, restructured products, etc.

There is also a need for institution of government training programs. These could be for employees from the private sector, for first line management in-plant, and for the sales force.

It should be recognized by the Turkish government that the present level of inefficiency and obsolete conditions in the public sector meat plants will inevitably mean their eventual loss of market share to the more efficient, modern meat slaughter and processing plants that are presently planned or under construction. The government's most constructive role in the future will be in support services, infrastructure development and regulation.

INVESTMENT OPPORTUNITIES

As pointed out earlier in this report, the necessity for upgrading the status of the entire livestock industry poses a need for massive new investment. Given the favorable market outlet for Turkish livestock products, both in the Middle East and among domestic consumers, these investments can be profitable for Turkish and foreign investors alike.

Whether or not the anticipated investment opportunities materialize, or prove to be profitable, will depend in great part on a series of actions that need to be taken by the Turkish government as well as the private sector firms interested in livestock and meat industry ventures. Unless action is taken by the government to gradually force dairy production into commercial processing channels, for example, there will be little incentive to invest in dairy production modernization.

Investments in dairy processing, on the other hand, can be profitable as evidenced by the growth of Pinar. Again, however, the degree to which a modern dairy processing industry can penetrate the market will depend on the extent to which the current practice of selling raw milk on urban streets is ended by the Turkish government.

The beef picture is even more complicated. No additional investments can be recommended unless an organized, coordinated program is undertaken to ensure the continued availability of feeder cattle. This program must be the responsibility of both the Turkish government and those private sector firms involved in feedlotting and slaughterhouses.

Other government policy measures that need to be taken deal with various import regulations and various other administrative matters, as discussed earlier in the report.

Provided these measures are taken and prove successful, investors in the Turkish livestock industry should enjoy a unique opportunity, since the market can largely be taken as a given while the challenge is to increase production. In the case of most agricultural development situations, the exact opposite is usually the case.

Specific areas of involvement that should prove interesting include slaughterhouses and meat processing; integrated ventures in meat wholesaling and retailing, as well as fast foods; cold stores and distribution facilities; and dairy processing and distribution.

Such investments along with general livestock development will also open up additional markets for sales of products and services to Turkey. While most items of equipment can be and are manufactured locally, such as feedmill equipment, there is a place for specialized machinery and equipment. Examples are pelleting machinery and bagging scales, laboratory analytical equipment, and other specialized items.

If the livestock industry is to reach its full capacity, there will also be a need for imports of feedgrains and soybeans, at least until the major irrigation projects being planned for Eastern Turkey are put in place.

The other large category of need with the livestock industry is for genetic improvement. This will create a demand for improved breeding stock, both beef and dairy; for semen; and perhaps embryos for transplant.

Improvements of the cow-calf sector will require more attention to improvement of forage crops, particularly from the standpoint of bringing in a greater volume and variety of forage crop seeds.

Table 1.

LIVESTOCK EXPORTS
Cattle, Sheep, Goat, Buffalo

		<u>Live Weight</u>	<u>Red Meat</u>	<u>Total</u>	
1982	<u>Metric Tons</u> (1,000)	154	57	134	Carcass meat projected at 50% boning yield.
	<u>Dollar Value</u> in millions	\$348	\$147	\$495	
1981	<u>Metric Tons</u> (1,000)	99.5	26.5	76	
	<u>Dollar Value</u> in millions	\$232	\$ 81	\$313	
1980	<u>Metric Tons</u> (1,000)	42.6	5.6	27	
	<u>Dollar Value</u> in millions	\$ 98	\$ 17	\$115	
1979	<u>Metric Tons</u> (1,000)	22	3	14	
	<u>Dollar Value</u> in millions	\$ 40	\$ 8	\$ 48	
1978	<u>Metric Tons</u> (1,000)	26	3	16	
	<u>Dollar Value</u> in millions	\$ 47	\$ 9	\$ 56	

Notes:

There are no official figures for domestic consumption.

Table 2.

FEED INGREDIENT COSTS

TURKEY

ITEM	Turkish Lire/Kilo
Wheat	21
Corn	25
Barley	20
Oats	18
Rye	18
Cottonseed, whole	21
Lentils, ground	19
Wheat bran	18
Wheat screenings	12
Barley screenings	18.5
Corn gluten feed	58
Soybean meal, 44%	48
Cottonseed meal, 41%	34
Sunflower meal	38
Brewers grains, 10% moisture	18
Brewers grains, 80% moisture	4
Meat meal	42
Fish meal	100
Alfalfa	20
Vetch hay	20
Cottonseed hulls	12
Wheat straw	4
Grass hay	18
Cereal hay	18
Corn silage, 10% moisture	19.5
Corn silage, 70% moisture	6.5
Lentil hulls	20
Rice bran	14
Lentil bran	15
Tallow	19
Molasses	7
Sunflower oil	127
Vitamin/mineral premix	150
Salt	5
Ground limestone	1.2
Bone meal	43

ANNEX I.

DAIRY ECONOMIC MODEL

The following model illustrates estimated costs and returns to a Turkish dairy farmer who adopts improved production methods and facilities. These costs and returns are based on the use of U.S. origin Holstein cattle producing 7,000 liters per cow per year. If data reflecting the much lower production of local cattle or even of European Friesians are used, the results are even more decisive.

In summary, the model illustrates the fact that under present cost/price relationships in the Turkish dairy industry, it would not pay for a dairy farmer to upgrade his operation, install new equipment and facilities, and use modern technology. Part of the problem is that most milk is now produced under primitive conditions and sold raw by the individual farmer or small dealers.

Under these conditions, the price of milk can be kept artificially low. While this may at first seem to benefit the consumer, it in fact has a net adverse effect due to health hazards, poor quality products and the lack of incentive to upgrade and modernize dairy operations. This is one more reason why all milk sold to the consumer, should, over time, be forced into commercial dairy processing channels.

DAIRY ECONOMIC MODEL - TURKEY

<u>ITEM</u>	<u>US HOLSTEIN</u>	<u>US HOLSTEIN</u>
Project Size		
Production Goal (Liters)	3,050,000	3,050,000
Number of Cows	501	585
Production/Cow/Year (Liters)	7,000	6,000
Project Investment (Turkish Lira) *		
Cattle	187,574,400	219,024,000
Facilities		
Housing	62,524,800	73,008,000
Feed Storage	20,841,600	24,336,000
Milking Facility and Equipment	35,921,600	35,921,600
Machinery	26,052,000	30,420,000
Land **		
TOTAL INVESTMENT	332,914,400	382,709,600
Operating Income (Turkish Lira) *		
Milk	126,880,000	126,880,000
Calves-Male	7,301,855	8,526,118
Calves-Female	9,122,577	10,652,111
Salvage Value	13,005,158	15,185,664
TOTAL INCOME	156,309,590	161,243,893
Operating Expenses (Turkish Lira) *		
Feed		
Forage	38,064,000	38,064,000
Concentrate	25,566,320	25,566,320
Bedding	1,250,496	1,460,160
Labor	2,994,888	3,450,907
Management	4,867,200	4,867,200
U.S. Technology Transfer and Mgt.	varies	varies
Utilities	2,084,160	2,433,600
Fuel	4,168,320	4,867,200
Building and Equipment Repair	8,720,400	9,821,136
Insurance	1,453,400	1,636,856
Depreciation	14,534,000	16,368,560
Interest	33,291,440	38,270,960
Herd Replacement	46,893,600	54,756,000
Veterinary	833,664	973,440
Supplies-Office and Dairy	3,126,240	3,650,400
TOTAL OPERATING EXPENSES	187,848,128	206,186,739
Project Analysis (Turkish Lira) *		
Total income	156,309,590	161,243,893
Total Expenses	187,848,128	206,186,739
Net Return Over Expenses	-31,538,538	-44,942,846
Total Annual Expense/Cow	374,946	352,456
Production Cost/L. Milk	61.59	67.60
Feed Cost/L. Milk	20.86	20.86
Annual Return on Investment (%)	-9.47	-11.74

* Exchange Rate: US\$ 1.00 = Turkish Lira 208

** Land varies according to location.

DAIRY ECONOMIC MODEL PARAMETERS

<u>ITEM</u>	<u>US HOLSTEIN</u>	<u>US HOLSTEIN</u>
Project Size		
Production Goal (liters/year)	3,050,000	3,050,000
Production/Cow/Year (liters)	7,000	6,000
Project Investment (Turkish Lira) *		
Cattle (Replacement cost/head)	374,400	374,400
Facilities		
Housing	124,800	124,800
Feed Storage (cost/head)	41,600	41,600
Milking Facilities and Equip. Cost	35,921,600	35,921,600
Machinery (cost/head)	52,000	52,000
Land	0	0
Operating Income (Turkish Lira) *		
Milk (price/liter)	41.6	41.6
Calves-Male (value/kg)	800.8	800.8
Calves-Female (value/kg)	1000.48	1000.48
Salvage Value (/kg)	199.68	199.68
Operating Expenses (Turkish Lira) *		
Feed		
Forage (cost/kg)	16.64	16.64
Concentrate (cost/kg)	27.04	27.04
Bedding (cost/cow)	2,496	2,496
Labor (cost/hour)	120.64	120.64
Management (cost/mo/200 cows)	135,200	135,200
Utilities (cost/cow)	4,160	4,160
Fuel (cost/cow)	8,320	8,320
Building and Equipment Repair (rate)	.06	.06
Insurance (rate)	.01	.01
Depreciation-Gldg and Equip (rate)	.1	.1
Interest on Ave Investment (rate)	.2	.2
Herd Replacement (cost/head)	374,400	374,400
Veterinary (cost/cow)	1,664	1,664
Supplies-Office and Dairy (/cow)	6,240	6,240
General Information		
Mature Body Weight (kg)	650	650
Annual Herd Culling Rate	.2	.2
Annual Mortality Rate	.05	.05
Live Calves/Yr (Fr Mature Females)	.8	.8
Number Milking Facility Units	1	1
Monetary Unit (/US Dollar)	208	208
All Herd Replacements PurchasedYESYES
All Labor and Management HiredYESYES

* Exchange Rate: US\$ 1.00 = Turkish Lira 208

ANNEX II

DAIRY INVESTMENT MODEL

Purpose of Model: The following model commercial dairy farm is designed to illustrate investment requirements and other inputs for a viable size dairy unit with incorporation of smaller satellite farms which market their milk through the nucleus farm.

Basic Model

Herd Makeup	425 cows in milk 75 dry cows 215 heifers 130 heifers 1.5 to 10 months 65 calves under 6 weeks
Land Requirements (Feed Production)	500 milking age cows X 0.8 ha/cow = 400 ha.
Investment for 500 Cow Herd	
Land	Depends on local cost
Buildings	\$ 487,500
Double 10 herringbond parlor and equipment	\$ 150,000
Feed Storage	\$ 125,000
Machinery-dairy plus cropping	\$ 225,000
Cattle-500 pregnant U.S. Holstein heifers @ 1,700/hd. landed	<u>\$ 850,000</u>
Total	\$1,837,500

Total annual feed requirements for 600 kg. cow producing 7,000 liters of 3.5% butterfat milk per year.

Corn silage	5.7 mt
Alfalfa/grass hay	2.4 mt
Corn grain equivalent	2.5 mt
Soybean meal	0.6 mt

Sample dairy ration for milking herd

Corn silage (35% dry matter)	15.9 kg
Alfalfa/grass hay (86% dry matter)	4.8
Concentrates (grain)	6.8

Nutrients Supplied

	Dry Matter (kg)	TDN (kg)	Crude Protein (kg)
Corn silage	5.6	3.92	0.50
Alfalfa	2.2	1.23	0.35
Concentrate	5.8	4.40	1.04
Total	<u>13.6</u>	<u>9.55</u>	<u>1.89</u>

ANNEX II (cont.)

Satellite Units

Satellite units should be at least 25 cows each for a minimum economic unit. They should be located within a reasonable radius of the model nucleus dairy farm so that management and technology can be easily transferred from the nucleus to the satellite units and so that milk can be collected.

<u>Investment Requirements</u>	<u>25 cow</u>	<u>50 cow</u>	<u>75 cow</u>
Land		variable	
Cattle	\$ 42,500	\$ 85,000	\$127,500
Feed storage	\$ 6,250	\$ 12,500	\$ 18,750
Machinery	\$ 11,250	\$ 22,500	\$ 33,600
Housing	\$ 24,375	\$ 48,750	\$ 73,110
Milking facility and equipment	<u>\$ 22,000</u>	<u>\$ 26,000</u>	<u>\$ 30,000</u>
	\$106,375	\$194,750	\$282,960

In order for the nucleus unit to provide services to the satellite units including technical assistance, training, various production inputs, etc., it will be necessary for some support to be provided by government for those activities which are extraneous to the actual business activities of the nucleus unit.

ANNEX III.

BEEF FEEDLOT INVESTMENT MODEL

The following model feedlot is presented as a guide to planning a modern facility and feedlot program.

Capacity

The model is designed to hold 4,000 head on feed at any one time. Average feeding period is 10 months, thus total annual capacity is 4,800 head.

Facilities

Facilities consist of four sections of open pens, each of which will accommodate 1,000 animals. The design features bunk feeders on each side of a central feed alley. The feed alley, feed bunks and concrete feeding apron are covered by a roof to protect the entire area from rain. Four pens of equal size are provided on each side of the feed alley, for a total of eight pens in each unit. Approximately nine square meters per animal are provided in the pen area.

Facilities should also be provided for loading and unloading, sorting, working, weighing and doctoring cattle. Feed storage facilities and a feedlot office may also be required. Total space required is about five hectares.

Equipment

Construction of a feed mill is not necessary. Feed preparation is accomplished through use of a tub grinder and stationary forage chopper. The chopper will cut coarse, long-stemmed feed materials to usable lengths. The tub grinder pulverizes and to a degree mixes all of the materials used in the feedlot ration.

The feed is then elevated into mixer trucks or trailers (somewhat similar to the truck mixers used for redimix concrete). The mixer trucks or trailers include a scale for weighing batches of feed to each pen. The feed is continually mixed as it is distributed to the feed bunks. Other equipment includes scales, working chutes, etc.

Feeding Programs

The model feeding system utilizes the computer to formulate least cost rations.

The nutritional value, cost and availability of all local feedstuffs are entered into the computer which is programmed to select that particular combination of ingredients which best satisfies nutrient specifications of each ration at the lowest comparative cost.

The computer program is updated each time a significant change occurs in the cost of availability of any of the ingredients. The computer, when properly used, is one of the most profitable tools that can be employed by a feedlot.

(See the discussion regarding feedlot rations and feed ingredients in the foregoing section on the Turkish feed base).

Cattle Performance

Feedlot

In weight	136 kg
Out weight	455 kg
Days on feed	300 days
Average daily gain	1.0 kg
Total gain	319 kg
Feed conversion	7.5 kg feed per 1 kg gain
Total feed required.	2,386 kg

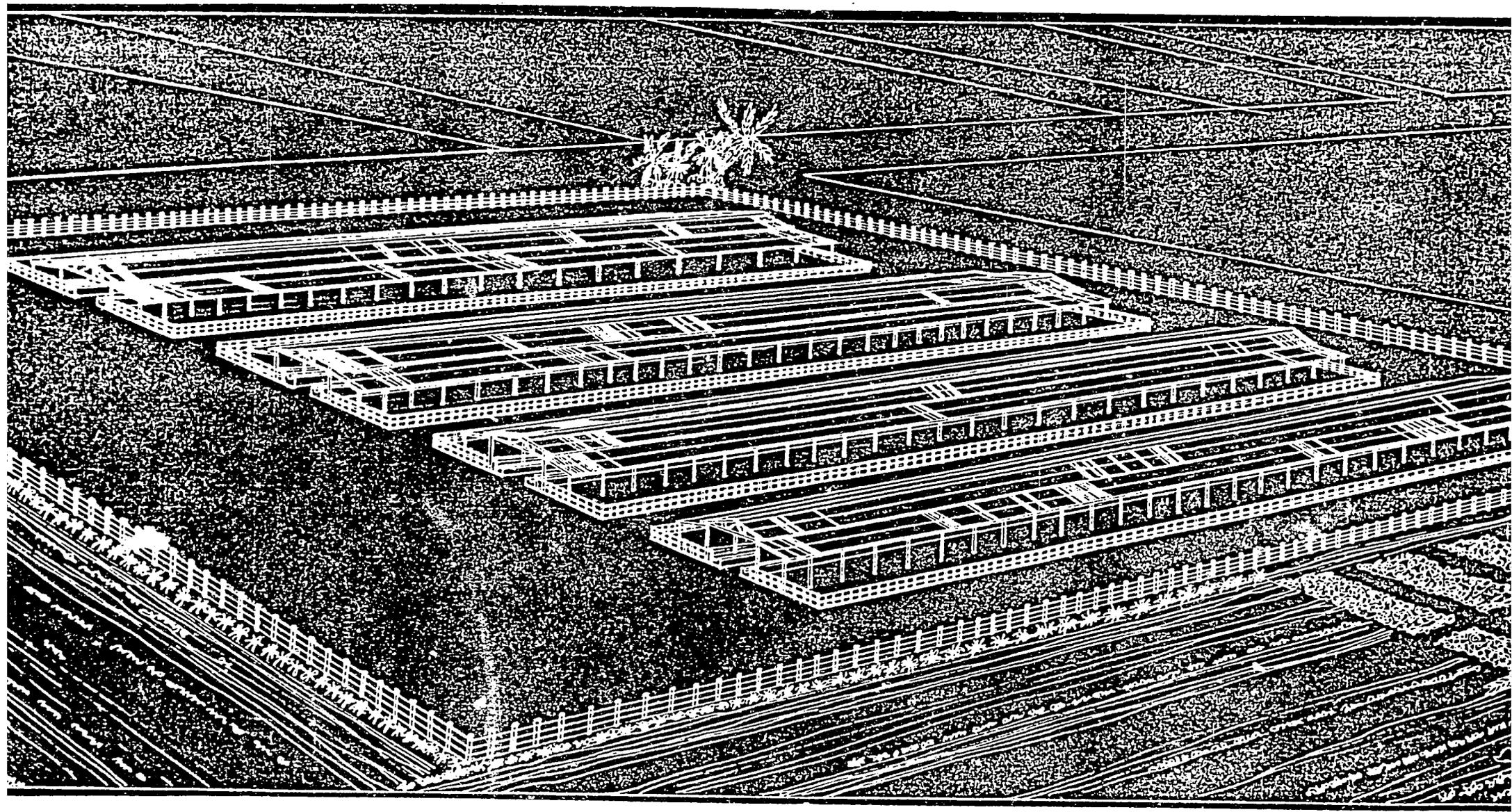
Marketing

Slaughter weight	455 kg
Dressing percentage	61.5 %
Carcass weight	280 kg
Saleable beef	196 kg

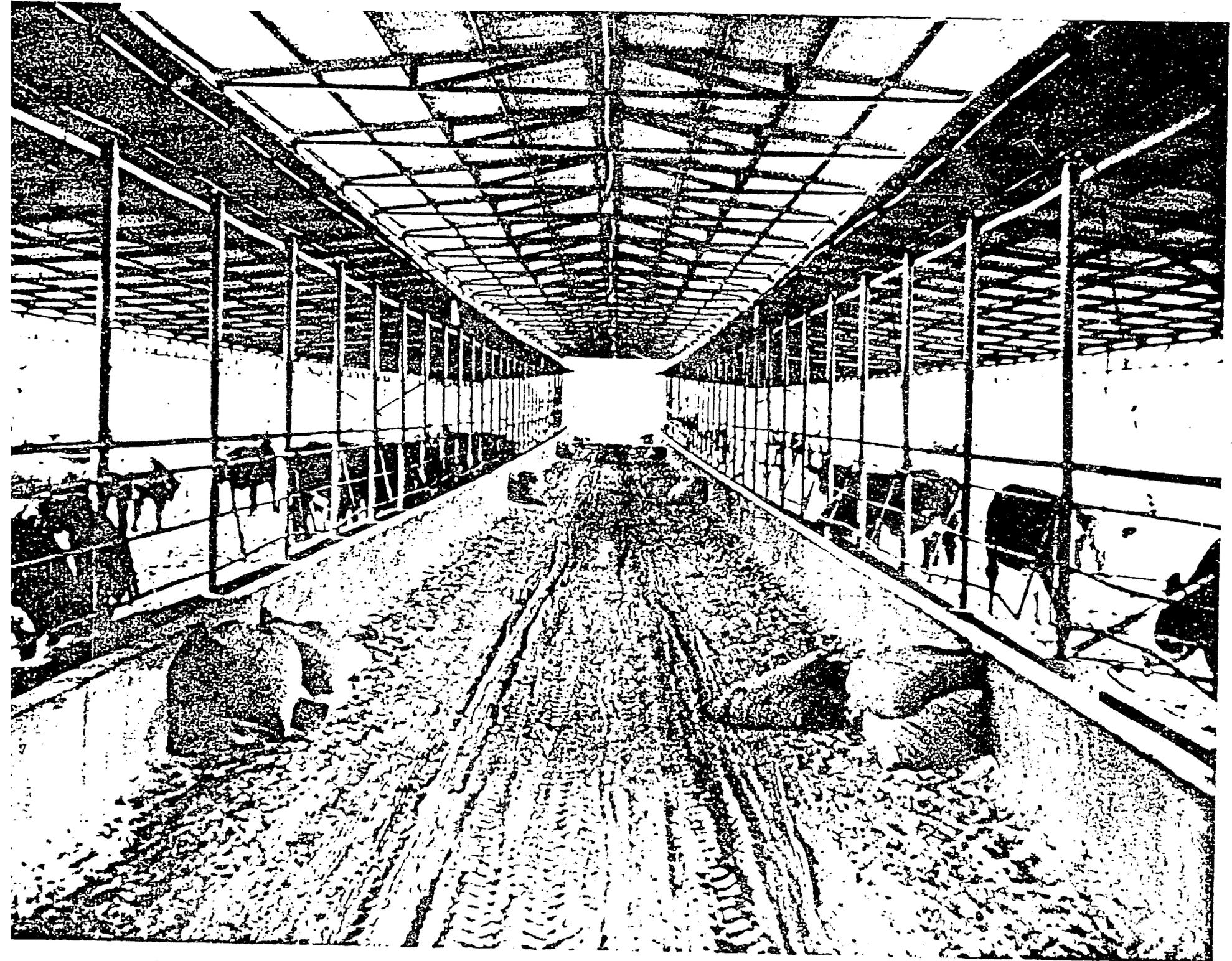
It should be noted that the above performance estimates will vary depending upon the genetic makeup of the cattle used.

Capital Requirements (Approximate Estimates)

<u>Item</u>	<u>COST</u>
Cattle pens	\$ 297,000
Other Structures	\$ 109,000
Equipment	\$ 298,000
Total	<u>\$ 704,000</u>



ANNEX III, Illustration 1. Open Type Beef Feedlot Model



ANNEX III, Illustration 2. Open Type Beef Feedlot Model

ANNEX IV.

FEED MILL CONSTRUCTION COSTS

(Ingredient storage not included)

Actual proforma for 10 ton/hour mill - estimated time of erection
590 days - (apparently average time according to Pasinir Engineer.)

<u>Machinery/Equipment</u>	<u>Turkish Lire</u>
Mfg. equipment	36,000,000
Erection of equipment (installation)	6,500,000
Steam generator unit	3,500,000
Outside piping	1,000,000
Molasses/steam unit	1,500,000
Pressurized air systems	500,000
<u>Construction Work</u>	
Feed mill, finished product and raw material warehouse	85,000,000
Steam generating house	5,500,000
Project services	3,500,000
Electrical layout	15,000,000
-lighting of mill/warehouses/ electrical power unit/ central unit	
Imported equipment - pellet mills etc. (only what can not be mfg. locally)	181,000 German Marks
Feed mill labor - training	750,000
	<hr/>
TOTAL =	160,000,000 Turkish Lire
	+ 181,000 German Marks

Note:

When copying figures some numbers were rounded by the author.

<u>Silos - steel</u>	20,000,000 Turkish Lire
5-6 mm plates bottom section	
4 mm plates upper	
costs include erection	
total capacity of silos 1,880 cubic meters	
(Silos would have to be added to make a complete mill complex.)	

ANNEX V

Representative Feed Formulations

The six feed formulas on the following pages represent a sample of current Turkish feed used for poultry, cattle and sheep. These are translations and may have some errors and vary from the original formulas.

ANNEX V. - page 1

FEED FOR GROWING CHICKEN
B-2 (PELLET)

Added coccidiostat for protecting from coccidiose types.

Basic nutrients

Raw protein	min	16 %
Methionin	min	0.30 %
Raw ash	max	8 %
Raw cellulose	max	8 %
Calcium		0.6-1.5 %
Phosphorous	min	0.6 %
Sodium		0.1-0.3 %
Metabolized energy		2700 Kcal/kg

Raw materials used: Corn, barley, wheat, lentil, corn protein, sunflower husk, cotton seed husk, meat and bone flour, bone flour, bran, fine bran, corn bran, marble powder, salt, molasses.

Vitamins and other elements

Vitamin A	min	4,000 IU/kg
Vitamin D3	min	500 IU/kg
Vitamin B2	min	4 mg/kg
Vitamin E	min	10 mg/kg
Vitamin K3	min	3 mg/kg
Manganese	min	50 mg/kg
Zinc	min	50 mg/kg

This feed is formulated taking into consideration the needs of layers. Layers are fed this ration from 7 months to 12 months of age.

Registration Date: 11/10/78
Number: 103-081
Net: 50 Kgs.

FEED FOR MEAT CHICKEN
B-5 (POWDER)

In addition to coccidiostad for a protection from coccidiose...

Basic Nutrients

Raw Protein	min	18 %
Methionin	min	0.38 %
Raw cellulose	max	7 %
Raw ash	max	8 %
Calcium		0.6-1.2 %
Phosphorous	min	0.6 %
Sodium		0.1-0.3 %
Metabolized energy		

Raw Materials Used: Corn, wheat, lentil, soybean husk, corn protein, sunflower husk, cotton seed husk, meat and bone flour, bone flour, fat, bran (fine), marble powder, salt, molasses.

Vitamins and other elements:

Vitamin A	min	6,000 IU/kg
Vitamin D3	min	750 IU/kg
Vitamin B2	min	2.5 mg/kg
Vitamin E	min	10 mg/kg
Vitamin K3	min	3 mg/kg
Zinc	min	50 mg/kg
Manganese	min	70 mg/kg

This feed is formulated taking into consideration the needs of meat chickens by adding synthetic amino acids. This ration should be used after the chick is 4 to 5 weeks old until slaughter.

Registration date: 20/5/80
 Number: 105-7
 Net: 50 Kgs.

Caged Egg Chicken Feed
C-3 (POWDER)

Basic Nutrients

Raw Protein	min	16	%
Methionin	min	0.26	%
Raw cellulose	min	9.0	%
Raw ash	min	14.0	%
Calcium	min	0.6	%
Sodium	(min-max)	0.1-0.3	%
Metabolized energy			

Raw Materials used: Corn, barley, oats, wheat, lentil, corn protein, sunflower husk, cotton seed husk, meat and bone flour, bone flour, bran, fine bran, marble powder, salt, molasses and corn bran.

Vitamins and other elements

Vitamin A	min	6,000	IU/kg
Vitamin D3	min	750	IU/kg
Vitamin B2	min	2.5	mg/kg
Vitamin B12	min	10.0	mg/kg
Vitamin E	min	10.0	mg/kg
Vitamin K3	min	3	mg/kg
Zinc	min	50	mg/kg
Manganese	min	50	mg/kg

This feed is formulated to meet the needs of caged layers which have completed growth and have started to lay eggs.

Registration Date: 20/5/80
Number: 105-9
Net: 50 Kgs.

FEED FOR CALVES AND YOUNG SHEEP
D-2 (PELLET)

Basic Nutrients:

Raw protein	min	17 %
Raw cellulose	max	11 %
Calcium	max	10 %
Phosphorous	min	1 %
Sodium	min	0.6 %

Raw Materials Used: Barley, wheat, oat, rye, lentil, malt tendril, corn core husk, sunflower husk, cottonseed husk, flaxes husk, bone flour, bran, fine bran, corn, rice, lentil husk, marble powder, salt, molasses.

Vitamins and other elements:

Vitamin A	min	10,000 IU/kg
Vitamin D3	min	1,000 IU/kg
Vitamin E	min	12 IU/kg

This feed is formulated to meet the needs of young cows and sheep. Newborns are fed with their mother's milk. Young sheep have to be suckled 2 to 2.5 months. After this time, they can be fed 200-300 gr., increasing this amount gradually for 6 months. Young cows, however, can begin using the above feed after 3 weeks. Calves begin with 0.5 kg of feed and increase amount by 2-3 kg daily. At this time, straw and bran can also be introduced according to weight gain. The need for clean water at room temperature is important at this time.

Registration Date: 11/10/78
Number: 103-085
Net: 50 Kgs.

ANNEX V - page 5

FEED FOR MILKING COWS AND SHEEP
D-4 (PELLET)

Basic nutrients		
Raw protein	min	16 %
Raw cellulose	max	15 %
Calcium		0.7-1.6%
Phosphorous	min	0.6 %
Sodium	min	0.4 %
Starch value	min	sv/100 kg

Raw Materials Used: Barley, oat, rye, lentil, malt tendril, corn core husk, sunflower husk, cotton seed husk, flaxes husk, bone flour, bran, fine bran, corn rice, lentil husk, marble powder, salt, molasses.

Vitamins and other elements		
Vitamin A	min	10,000 IU/kg
Vitamin D3	min	1,000 IU/kg

This feed is formulated by taking into consideration the needs of milk producing cows and sheep. Such cows and sheep should be given this feed 1 kg daily, in addition to straw, dry grass, bran, etc. For providing 3 kg of milk the amount of feed is increased by 1 kg. At this time, cows and sheep should also be receiving clean water at room temperature.

Registration Date: 11/10/78
Number: 103-087
Net: 50 Kgs.

FEED FOR COWS AND SHEEP
D-5 (POWDER)

Basic nutrients		
Raw protein	min	15 %
Raw cellulose	max	14 %
Calcium	max	9 %
Phosphorous	min	1,0 %
Sodium	min	0.6 %
Starch value	min	60 sv/100 kg

Raw materials: Barley, wheat, oat, rye, lentils, malt tendril, corn core husk, sunflower husk, cotton seed husk, flaxes husk, bone flour, bran, fine bran, corn, rice, lentil husk, marble powder, molasses.

Vitamins and other elements		
Vitamin A	min	8,000 IU/kg
Vitamin D3	min	800 IU/kg

This feed is formulated taking into consideration the needs of grown cows and sheep. Beginning at the age of six months, this feed should be administered $\frac{1}{2}$ kg each day, increasing gradually to 3-6 kgs daily. As always, clean water at room temperature should be given.

Registration Date: 11/10/78
Number: 103-086
Net: 40-50 Kgs.