PN-AAK-420

Tanzanian Livestock-Meat Subsector

Volume I: Consultants' Report

Texas A&M University
and the
United States Agency for International Development

October, 1976

TANZANIAN LIVESTOCK-MEAT SUBSECTOR

Volume I: Consultants' Report

International Programs

College of Agriculture, Texas A&M University

College Station, Texas 77843

AID Contract No. AFR-C-1095 (Tanzania)

TAMU/USAID

PREFACE

This study of the Livestock-Meat Subsector is a part of a larger project of Livestock Development in Tanzania. The field work was conducted in 1975 and preliminary drafts were made available to TAMU/USAID and Tanzanian officials of LIDA in July, 1976. The study is designed to assist in planning the development of the Livestock-Meat Subsector. It is assumed that specific projects will have their own detailed plans. This study was designed to examine the industry and document detailed information concerning the traditional herd and make recommendations for an improved subsector.

The study is reported as follows:

Volume I	Consultants' Report
Volume II	Livestock Survey Data and Marketing Model
Volume III	Regional Survey Data for Mara, Mwanza, Shinyanga, and Tabora Regions.
Volume IV	Regional Survey Data for Singida, Dodoma, and Arusha Regions.

D. E. Farris, Subsector Study Coordinator

TANZANIAN LIVESTOCK-MEAT SUBSECTOR

Volume I: Consultants' Reports

Table of Contents | Page

Recommendations - D. E. Farris	- 1
Cattle Production - L. D. Wythe	- 8
Disease and Parasitic Control - T. J. Galvin	- 15
Small Stock Production - J. W. Bassett	- 37
Range Management - R. Penderson and J. L. Schuster	- 45
Water Development - R. E. Armstrong	- 56
Marketing Livestock and Meat - D. E. Farris	- 71
Livestock Marketing - K. W. Stokes	- 84
Commercialization of Traditional Herds - G. M. Sullivan	- 101

International Programs

College of Agriculture, Texas A&M University

College Station, Texas 77843

AID Contract No. AFR-C-1095 (Tanzania)

TAMU/USAID

LIVESTOCK-MEAT SUBSECTOR RECOMMENDATIONS

by D. E. Farris, Coordinator of the Sub-Sector Study

The livestock-meat subsector study was planned as a part of a larger Livestock Marketing Project. The study was done in two parts. Part I involved short-term consultants in various fields reporting on field trips and review of available material. It is published as Volume I. Part II involved an analysis of livestock markets, beef markets and packing plants by use of a national marketing model. In addition, a detailed sample of the traditional livestock industry was conducted. Almost 800 herdsmen were interviewed on management practices, livestock inventory, and herd characteristics and productivity. This is published as Volume II, and district data for the survey is published as Volumes III and IV.

For the traditional livestock industry, the survey documented the extent and nature of the high death rate, low birth rate, and lack of proper animal health care. It explored the reasons the herd is regarded as a subsistence, multipurpose enterprise. In addition, marketing practices, attitudes and experiences in livestock marketing are reported. The study provides data on the complex role played by livestock in the social and economic systems of the rural people in the seven regions where the cattle population to people ratio is the highest.

Recommendations for improvement of the livestock-meat subsector are made recognizing that many problems are involved with implementing them. Otherwise, the recommendations would likely have already been adopted. If the recommendations of this team are to be of value, a commitment must be made by policy makers, management, employees and producers to improve the entire system. Piecemeal improvements will not have as great a pay-off as an effort to improve the system.

Generally, the system lacks clear incentives to make improvements at all levels. Incentives can be built into any economic and political system, and the job of policy makers and management is to develop incentives that fit the system and the culture. Additional education is badly needed at all levels to get improved practices adopted; however, where the social system and communal grazing results in conflicts between self and family interests and those of the village or nation there is a reluctance by the herdsmen to adopt improved practices that are already known and understood.

Recommended Programs And Practices

1. Controlled Grazing - The range in many areas is overstock grazed leading to low nutrition, higher incidence of parasites and disease and low production. Individual herdsmen do not have sufficient incentive to destock or to invest time and money in range improvement due to the communal grazing tradition. Little range improvement can be made without some control of stocking rates and rotational grazing. Range Associations and villages have not generally been effective in controlling stocking rates. To be effective, some procedures for control and a means of affecting that control is required. All productive range operations in different parts of the world have at least partially solved that problem. The Villages and Ujamaa Villages Act of 1975 provides broad enabling powers to individual villages to control range development and grazing practices, however, more specific programs and procedures are needed to guide and aid villages in implementing this authority. It is recognized that this is a difficult recommendations to implement in light of the long history of communal grazing, but it is fundamental to improving livestock production and some pilot projects could demonstrate its value.

The degree of overstocking varies in different regions of the country. Some areas outside of the main livestock producing areas are understocked (mainly due to tsetse infestation). In the present producing areas the stocking rate is estimated to be about 25% too high for the available forage in average years. Proper grazing use, resulting from proper stocking of these lands, would provide an estimated 20% increase in forage growth and a 10% increase in meat production. In some areas brush clearing and establishing improved pastures would increase output without destocking but stocking rates would need to be controlled to achieve the most benefit from the improvement. Fencing to control grazing is a possibility for some situations.

Destocking or range improvement and management of grazing would provide better nutrition for cows, increase calving rate, reduce calf death rates and produce marketable cattle in a shorter period.

2. Tsetse Fly Control - Control of Tsetse and the disease it transmits, trypanosomiasis, can be controlled with proper management. Some of the best rangeland in the country is not productive partly because of this problem. Currently there is little incentive for any individual or group to make the necessary investment in brush clearing. Education programs and incentives provided villages, organizations or individuals to make the necessary investments would pay good dividends to the country.

3. Calf Death Loss - Calf death loss was estimated at 28% in 1975. Better nutrition and disease control can sharply reduce it. Under most current management systems it is difficult for calves to obtain adequate nutrition. As a result they are more susceptable to desease and the problem is compounded. This problem goes back to management of grazing. Usually calves only have access to the most overgrazed land around the boma. Only a few herdsman reported feeding

grain to calves. Lactating cows and calves should be separated from the rest of the herd and permitted the best grazing and any supplemental feed available. The family need and the market demand for scarce milk are often high enough that it is not profitable to use milk for all bull calves. Milk consumed by some bull calves may be more valuable than the calf itself.

4. Supplemental Feeding of Cattle - Where stored feed is available, the stocking can be increased as livestock can be fed supplemental feed during the periods of high stress. At current prices, the first practical solution would be to reserve enough pasture for the dry season. Also, some reserve pasture needs to be available near railroad loading pens and near markets. Mineral supplements and vitamins are essential but seldom available in the bomas.

5. Control of Disease and Parasites - The survey documents that animal health practices in the traditional sector are inadequate for efficient production. Less than 20% of the herdsmen surveyed dip every week, and for 75% the average time since last dipping was over 4 months. Vaccinations are not used to sufficiently control diseases. Only 45% of the herdsmen surveyed reported treating their cattle for diseases. Only 5% reported drenching cattle for internal parasites. The figure for sheep and goats was 2%. Proper animal health practices are required to increase productivity, but the investment is small compared to the returns if the system is improved to handle the increased output. Clearly, better education programs in animal health are needed.

6. Increase Available Water - A program to increase the water availability is in operation. Clearly, lack of water is a substantial limit to increase in livestock productivity and an effective dipping program. Investment in water must be tied to controlled stocking rates and increased offtake, if it is to yield the highest returns. Village ranchers need to be given encouragement, education and

incentives to exercise their authority to take the next step beyond developing water to control stocking rates and manage grazing. Future programs providing facilities for livestock producers might consider payment of fees by producers for the maintenance and upkeep of the service. Value of the program can best be realized when producers pay for these services.

7. Increasing Commercial Sales - A part of the overgrazing problem is the reluctance to sell cattle. Efforts could be made to provide greater incentives for sale. One alternative is to remove or adjust maximum prices at retail as well as those back through the system. Price differentials could be paid for livestock to achieve objectives such as improvement in quality, increased marketings prior to dry seasons, etc. Stronger measures may be required, to increase off-take to reduce stocking rates to acceptable levels. For example, a tax on five year old or older steers and extra bulls carried into the dry season might be necessary if other methods are not successful. Since the individual operator regards grazing land as essentially free he is likely to hold all types of cattle longer than is desirable from the standpoint of the village or area. A grazing fee to pay for water development and range improvement would encourage marketing of unproductive cattle.

8. Improve Local Markets - Local markets could be markedly improved at relatively little expense. Measures to speed up sales, provide more holding pens and adjust market charges in relation to value of the animals, could increase market volume and lower unit cost. A variety of educational activities could be conducted at markets using visual aids to demonstrate improved production and marketing practices. A part of the market fees collected in an area should go to directly improve the facilities of that market.

9. Control Death Loss and Shrink in Marketing - Proper care in marketing is understood but is difficult to accomplish. Economics also is not clear, but it

appears that up to Tshs. 75 per head could be spent on reducing the excessive shrink and death loss. Recent experience from purchase up-country to delivery in Dar es Salaam resulted in 7.5% death loss and 20% shrink in live weight. Plant(s) in the interior will help, but cattle on the railroad more than two days justify some drastic measures that provide for off loading for feed and rest and providing supplemental feed and water prior to loading. Experiments with alternative methods of reducing this loss of meat could be justified.

10. Transportation Costs - The transportation system for fast and efficient movement of live cattle is not available. This is a bottleneck in improving marketing and in efficient utilization of available grass. The Shinyanga packing plant now under construction will reduce the number of live cattle shipped long distance by rail but a canning line needs to be added for this plant to be most cost-effective. The plant at Dar es Salaam might then be used for fresh meat and operate the canning line seasonally.

11. Pricing - Rigid price policies that are not attuned to demand and supply have created distrotions and encourage wasteful allocation of resources and provide no incentive for better quality or service. When minimum prices for cattle are the same for all locations and qualities it distorts the natural shipping patterns and allocates the weakest and poorest quality cattle to the long train rides to Dar es Salaam. Due to transportation cost differences alone the Dodoma minimum price should be 54 shs per head above Shinyanga. Shrink and death loss costs would reduce it further. Pricing based on value of the location, quality and time could result in lower death loss, and savings in transportation cost per pound of meat delivered. Flexible prices at least within a minimum and maximum range would be an improvement. Since Tanzania is generally a surplus livestock producer, prices are generally lower

than most countries and fixed maximum meat prices are a questionable long term value.

Conclusions

Some of these recommendations have been made before in other studies. The livestock-meat subsector is a complex and diverse bundle of activities and stages. Thousands of separate decisions are required in the system because the process cannot be standardized or centralized. Adoption of these recommendations depends on improved management that will establish clear objectives and delegate authority and responsibilities to meet the objectives. Incentives, penalties and accountability needs to be more sharply focused on the general objective of improving the livestock-meat subsector and specifically on improved quality, service and efficiency. At the same time the system needs to be allowed flexibility to adjust to changing conditions and events. For example, when there is adequate forage during the rainy season producers are reluctant to market cattle and cities often experience meat shortages. If retail prices and prices back through the system are allowed to rise to attract cattle to markets there will be a better balance between consumer and producer utility or preferences. More detailed recommendations are presented in the consultant reports.

TANZANIA BEEF CATTLE SUB-SECTOR STUDY

Major Problems and Recommended Procedures for the Improvement of Beef Cattle Production in Tanzania

by Landon D. Wythe, Jr.

I. Supply and Distribution of Stock Water

It has been reported by Mackenzie (1973) that lack of water is the main factor restricting beef cattle production in one-third of the country of Tanzania. My observation (July-August 1975) was that the availability and location of stock water has a tremendous effect on the management and system of production of beef cattle in most areas of Tanzania. To a large extent the availability and location of stock water determines where and how efficiently the cattle are produced.

The poor distribution (in most areas during the dry season) of water along with the lack of private ownership of land and lack of fencing results in large concentrations of cattle (as well as sheep and goats) around water resources which results in overgrazing, soil erosion, disease and parasite transmission and inefficient utilization of the vast forage and nutrient producing capabilities of the soil. This in my judgment is the major overriding factor responsible for the very low offtake and low efficiency of beef cattle production in Tanzania. This situation must be improved before much progress can be expected in the overall long range production of beef in Tanzania.

Adequate stock watering systems have been developed and are in use on the Manyara Ranch, the Malya Research Station and some of the NARCO Ranches and other research stations. In order for livestock watering systems to be most effective the people (stock raisers) must put their resources (time and money) in them and have the responsibility and be trained with the technical knowledge to maintain them. Many of the bores on the TLMC Holding Grounds were not operating (in July and August 1975) because of lack of proper maintenance on the pumps, motors and storage tanks and lack of the skills and parts required to repair and maintain them by those employed by the T.L.M.C. There is an urgent need for people trained to develop and maintain adequate supplies and distribution of stock water in Tanzania. Without this it appears to me that all other efforts for improvement in beef production will be unsuccessful.

II. Incentives to Improve Quality and Quantity of Beef

Under the conditions (production, marketing) I observed in Tanzania (July-August 1975) there appeared to be few incentives for the producers to improve the quality and weight of livestock. Most cattle were selling by the head and prices were such (low) that in most cases the average family with cattle had only one major reason to sell and that was to obtain enough money to provide the essentials of food and clothing. Many of the cattle were bought and sold by traders.

The major purpose and function of beef cattle in Tanzania must change rather drastically before a significant improvement in the quality or quantity of beef produced can be realized. Most people with cattle in Tanzania apparently do not raise them with the main idea in mind of producing the most beef (protein) the most efficiently with the resources available. Cattle are kept for many other reasons which have been enumerated in many publications.

Tanzania has a major education program on its hands to convince the people that beef cattle should be considered as a machine that harvests the forage and converts it into an edible product (beef) and that they should be sold and slaughtered at a relatively young age and at a time when they will yield a quality product. Beef cattle must be considered as a cash crop that is produced and sold at a profit. This profit must be large enough to provide for the family's necessities and allow for improvement of production from both an enviornmental and genetic standpoint.

III. Disease and Parasite Control

Much effort and many resources have gone into Disease and Parasite Control Programs in Tanzania. Much progress has been made in these areas. In order for beef cattle production to improve strong disease control efforts must be maintained. New methods must be developed to eradicate some of the existing diseases. Immunization against diseases and control of external and internal parasites must be recognized as an essential part of efficient beef cattle production in Tanzania. With increased concentration of cattle around villages the problems of parasites become more acute and require more attention. Many areas of Tanzania could be utilized for the production of beef cattle if the tsetse fly, foot and mouth disease and East Coast Fever could be brought under control. In some areas wild game must be controlled as they serve as carriers for vectors for many of the diseases that endanger the domestic livestock.

IV. Adequate Nutrition

Pasture management is difficult under a system of communal land tenure and communal grazing. It is difficult to prevent overgrazing in areas close to the water supply, bomas, and villages. Overgrazing results in the loss of the more desirable and nutritious grass and the invasion of weeds, brush and less desirable species of grass. Continued overgrazing results in soil erosion (both water and wind). Adequate nutrition appears to be a major factor limiting the production of beef in Tanzania. The country has vast resources in the form of nutritious grasses and feedstuffs for ruminant nutrition. The problem is how to best utilize these resources and harvest them in the form of beef and by-products such as leather. When grazing land is owned by the community (village) and every member may without restriction utilize it for his own herd, stocking rates and range management become very difficult to control. The man with the largest herd receives the greatest beneift during the wet season and may also suffer the greatest death loss in case of drought or a disease outbreak. Stocking rates based on maximum carrying capacity during the wet season do not seem logical since little

grass is left for grazing during the dry season and in drought periods. This system without making provision for supplemental feed or moving the cattle to another area results in excessive weight and death losses during each dry season and causes major death losses during drought periods. About one-third to one-half of the grazing land needs to be held in reserve (not grazed in the wet season) for utilization during the dry season. These areas would have to be protected against fire and the wild game. Some areas of Tanzania are suitable for the production of hay (cured grass) which could be utilized as supplemental feeding during the dry season. Modern haying equipment (1500 pound round bales) would only be economically feasible if the efficiency of production and price of beef cattle improved from their present level.

Adequate nutrition would significantly reduce the death rate of calves and yearlings. Many young calves have to compete with man for their dames milk and do not receive the quantity required for maintenance, much less growth and normal development. If they survive, many become stunted and never have the opportunity to reach their growth potential. Adequate milk and palatable, highly digestible feedstuffs are essential for survival and proper growth of young calves. Lack of proper nutrition for heifers results in many calving for the 1st time at 4 or 5 years of age and having a calf every other year. Efficient beef production is based on first calving at two years or less and a 12 month calving interval (1 calf each year). Vitamin A deficiencies probably account for some of the reproductive problems. With adequate nutrition beef cattle should reach slaughter weight at 1 to 3 years of age. Selling bulls and steers at 5 to 8 years of age is evidence of inadequate nutrition. It also hinders genetic improvement.

There was little evidence of mineral supplementation for cattle in Tanzania. Many cattle have to depend on the termite hills and natural mineral licks for their mineral requirements. Adequate nutrition includes 15 essential minerals of which salt (NaCl) calcium and phosphorous need to be available at all times. Sources of these minerals must be available to producers and they must be alerted to their importance to adequate cattle nutrition.

Much of the dry grass and forage is low in protein and energy. Sources of protein supplementation (cottonseed and other oilseed products) should be made available to cattle during the dry and drouth periods. This is particularly essential for the young growing cattle and the lactating cows.

Due to lack of fences and due to the danger from wild animals it is necessary in many areas to pen (in bomas) the cattle every night which results in inadequate nutrition and inefficiencies. Much valuable grazing time is lost in the late afternoons and early mornings due to keeping cattle in the bomas.

V. Breeds and Breeding Programs

The Tanzanian Shorthorn Zebu is the most numerous breed of cattle in Tanzania. They have by "survival of the fittest" become adapted to the climatic and management conditions of most of Tanzania. They have acquired

resistance to some of the diseases and parasites prevalent in the country. They are heat tolerant and many have the ability to go two or three days between waterings and survive on a very low plane of nutrition. They are docile and therefore easy to trek (herd) to grazing and water areas and to and from bomas and markets.

Due to nutritional deficiencies and little or no planned or practiced breeding programs the breed is small and has a slow growth and development rate. Inbreeding depression is evident in many herds since no outside breeding or outcrossing has been introduced, no cows are sold and the same genetic material remains generation after generation.

The Tanzanian Shorthorn Zebu has proven to be an efficient producer of beef with adequate nutrition management and breeding programs. Some of the NARCO Ranches and Beef Cattle Experiment Stations have obtained satisfactory results with the T.S.Z. cattle.

The T.S.Z. cow has proven to be an excellent producer when crossed with Boran, Charolais, Angus and Hereford bulls. Most of the crossbreeding work in recent years has been to upgrade the T.S.Z. with the Boran. This has proven very satisfactory when the Boran bulls are protected against disease and receive adequate nutrition. If they are not dipped 1 or 2 times a week and provided with adequate nutrition their death rate is high. This has been true with any non-indigenous breed brought into Tanzania. Excellent Boran x T.S.Z. calves, yearlings and 2 year olds have been produced on most of the NARCO ranches and several of the Research Stations and Multiplication Stations.

One of the best examples of cow-calf production I observed while in Tanzania (in July-August 1975) was on the Malya Research Station. They had crossbred cows in fenced, watered, rotated pastures with 200 to 250 kg. (440# - 550#) 6-8 month old calves that were fat enough to butcher and yield quality beef. These were ½ Angus ½ Boran, ½ Hereford ½ Boran and ½ Charolais ½ Boran cows with 3/4 Boran calves. They had an outstanding set of purebred Boran and ½ Boran ½ Charolais, ½ Boran ½ Angus, ½ Boran ½ Hereford young mature bulls. This was an excellent example of what can be accomplished in beef production in Tanzania with good management and adequate nutrition.

Within the traditional sectors where nutrition and management is fair to poor the T.S.Z. Breed apparently offers the most potential for beef production. Selection should be for efficient reproduction and milk production in the cows and growth rate, size and muscling in the bulls. Bull calves should be castrated when one week to three months of age. Cows that don't calve every 18 months should be culled or sold for slaughter. In areas where management and nutrition is good the T.S.Z. cow should be bred to improved Boran, Mpwapwa, Friesian or Angus bulls. The heifers from this cross should be kept and all bulls castrated and sold as steers. The heifers should be bred to a small type bull for their first calf. These F-1 crossbred cows (second calf and later) should be bred to a large breed of bull (such as Charolais, Simmental) to produce a three breed terminal cross calf which can be slaughtered as a weanling calf or pastured and sold as a yearling or two year old. The Azimo Ranch of the Sisal Cooperation has a successful beef cattle crossbreeding program similar to this type in operation.

VI. Management Practices Which Should Increase Production Efficiency in Traditional and Parastatal Herds.

Production coefficients of traditionally managed herds (T) and parastatal (P) managed herds as estimated and reported by Stokes (1976) and future production goal (G), suggested by Wythe (1976) are shown in Table 1.

TABLE 1. AVERAGE ANNUAL LEVELS OF PRODUCTION OF TANZANIAN SHORTHORN ZEBUS IN TRADITIONAL (T) AND PARASTATAL (P) RANCH HERDS AND FUTURE GOALS (G) FOR PARASTATAL RANCH HERDS.

	T	P	G
Females over 3 years of age which calve	45%	60%	75%
Deaths of calves before one year of age	30%	15%	10%
Deaths of cattle over one year of age	10%	5%	3%
Selling age of males	7 yrs	4 yrs	2-3 yrs
Sale of surplus and cull females	3%	18%	30%
Market offtake	4.5%	12.7%	25%-30%

Suggested management practices which should bring traditional levels of production up to (1976) Parastatal levels of production.

1. Make it possible for calves to receive more milk and adequate nutrition and therefore reduce their death rate.

   a. Let young calves have sufficient dam's milk. Do not milk 2 to 3 quarters and leave only 1 or 2 quarters for calf.

   b. Increase milk production of cows by breeding and selection (possible infusion of dairy breeding) and more adequate nutrition during lactation period. It appears that in some herds the milk potential is there if adequate nutrition is available. Lack of adequate nutrition is a major problem. Lactating cows and calves should be separated from other cattle and permitted the best grazing and any supplemental feed that is available.

   c. Too much cattle time is spent in bomas and other unproductive areas. Many cattle do not have adequate time to graze and sufficient water to satisfy maintenance and milk production requirements. If it is necessary to keep the cattle in bomas at night then get them out at kaylight and allow them to graze till dark.

d. Improve quantity and quality of water. Lactating cows and calves cannot reach potential without adequate quantities and quality of water. Additional sources of year around water must be developed in the traditional cattle areas.

2. Immunize all cattle against all contagious diseases. Dip or spray cattle for ticks and other external parasites at least one time per week. Many dips are not properly charged and maintained. There is an apparent lack of competent health supervision and control out in the traditional herds. The livestock health regulations need to be studied and possibly reorganized with a more practical, realistic approach that is applied and enforced throughout the livestock producing areas.

3. Reduce and control the size of the cattle population to help prevent overgrazing, soil erosion, invasion of bush and weeds, shortage of forage during the dry seasons and parasite infestations. This will have to be enforced and controlled on a fair and equitable basis. Stocking rates should be based on forage availability and production during the dry season and not during the wet season. Sufficient grazing areas near water supplies should be saved for grazing during the dry period. Controlling the size of the herds would necessitate and increase the percent of cows sold for slaughter. Fencing would certainly help control grazing.

4. Provide needed minerals and vitamins for cattle. Analysis should be made of forage during both wet and dry seasons in each area to determine the mineral and vitamin deficiencies. Salt and a good source of Calcium and Phosphorous (Steamed bone meal) should be available for cattle at all times. It would be convenient and practical to have these mineral supplements available for the cattle at the dips and public watering places where they could at least obtain mineral one time per week. During the dry periods there are probably shortages of Vitamin A. Vitamin A shot could be conveniently given as the cattle are brought into the dips. This would bring about improvement in conception rates and calf crop percentages.

5. Bring in bulls from other areas and proven strains of bulls from the parastatal ranches (Boran, Boran crosses, Mpwapwa) to use as an outcross at least ever four years to produce hybrid vigor and to prevent excessive inbreeding.

6. Sell bulls, steers and surplus females before they reach four years (48 months) or age.

7. Pay more for younger and/or fatter higher quality cattle.

8. Provide adequate markets for old cull cows and bulls.

9. Sell all cattle destined for slaughter by weight and quality rather than by the head.

10. Provide more trained livestock people to educate and work with cattle raisers.

11. Provide Banks for people to keep money and other resources in after they sell cattle.

Suggested management practices that should improve production efficiency of Parastatal ranches.

1. Build, repair, rebuild and utilize fences to control grazing, internal parasites (by pasture rotation) and encroachment by other livestock.

2. Provide and maintain more watering facilities.

3. Make more use of supplemental feed in dry seasons by harvesting and preserving excess growth in the wet seasons.

4. Determine the most efficient use of each ranch. Draw up long range plans (25 years or more) and stay with the plan. Keep the same managers on each ranch for long periods of time so a breeding program can be established and followed and carried through.

5. Increase the cooperation and exchange of knowledge between the Research stations, Multiplication stations and Parastatal Ranches. The knowledge gained and proven on the experiment stations should be utilized on the Parastatal Ranches.

6. Improve facilities (trucks, roads and railroads) so cattle can be quickly and efficiently moved (transported) from one ranch to another Ranch and from Experiment Stations and Multiplication units to the Ranches. To make the most efficient use of all the Government controlled and operated ranches and livestock units, maximum flexibility must be maintained to move the livestock.

7. Establish additional markets that will provide outlets for the offtake of quality beef from the Parastatal Ranches at prices which will permit the ranches to make a profit. Profits should be utilized to make capital improvements on the ranches and to improve the cattle.

8. Initiate and maintain pasture imporvement programs.

LIVESTOCK HEALTH PROBEEMS IN TANZANIA - 1975

by Thomas J. Galvin, D.V.M., TAMU

During August, 1975, observations were made on livestock health problems in Tanzania by (1) visitation of selected farms and ranches in a restricted area of the country, located generally within a few miles of the road from Dar es Salaam to Dodoma, (2) discussions with senior veterinary officials, ranch managers, and staff members at training institutions and the Central Veterinary Laboratory at Temeke, and (3) examination of annual and other reports by various agricultural groups, veterinary investigation centers and special disease projects. Except for one instance the ranches and farms visited consisted of a portion of Tanzania's parastatal ranches in addition to educational institution herds. Because the livestock numbers on all the parastatal ranches comprises less than two percent of the country's total livestock population, the geographic area seen was restricted, and the observations were made only during the dry season, the conclusions drawn by ranch visitations may not be completely representative.

More records are available on disease losses on parastatal ranches than in the "traditional sector" where approximately 95 percent of the livestock population is located. The results from a questionnaire should soon be available detailing some aspects of disease losses and control procedures used in the traditional sector. Except for government administered vaccinations for such diseases as foot-and-mouth disease and rinderpest, the only formal disease prevention practiced is the application of acaricides at government provided facilities.

It is intended to describe the observations made and relevant comments under the following headings:

1. Manpower and facilities in animal health.
2. Major health problems in production.

No effort will be made to discuss all disease problems in detail. Instead this report is an attempt to permit someone with little knowledge of livestock production in Tanzania to become familiar with the major disease problems of domestic ruminants, and to provide current views on certain of these diseases, the training needs for animal health personnel, and diagnostic facilities available. Hopefully, the report will also be of benefit to the TAMU Livestock Marketing Team and interested Tanzanian livestock health personnel.

Manpower and Facilities in Animal Health

There are approximately one hundred veterinarians in Tanzania. A significant proportion of these are assigned to special projects supported by UNDP, FAO, USAID and other organizations, or have administrative duties. As a result there is a severe shortage of veterinarians for training institutions, diagnostic facilities and research.

Except in rare instances veterinarians have received their BVSc degrees from the Faculty of Veterinary Science of the University of Nairobi in Kenya. There are less than ten Tanzanian students per class in Kenya in the four-year curriculum. No college level pre-veterinary training is required for entrance in the Faculty of Veterinary Science. The veterinary curriculum tends to emphasize animal husbandry more than North American veterinary schools, and at the expense of other subject matter. In general the material deleted, as compared to United States veterinary schools, tends to be evenly distributed in the basic sciences

require a broad selection of journals for optimal stimulation, particularly when textbooks are not available for individual use.

2. Visual aids. Almost no visual aids were observed. Overhead, transparency and film projectors and associated equipment would greatly benefit training, together with a collection of movie films, Kodachromes, and other transparencies. Training sets of Kodachromes and other aids are available from a variety of sources.

3. Laboratory equipment. For optimal training in diagnostic methods, an adequate number of good quality microscopes is essential. At the present time only a few are available, prohibiting or curtailing their use in many courses. A wide variety of other laboratory items is likewise unavailable or in short supply.

4. Transportation. The location of several parastatal ranches and the prison farm near Morogoro provides an excellent opportunity for students to get practical experience in disease diagnosis and control. However, transportation is inadequate even for the present number of students.

5. Staff. Increased effectiveness in training should result if the number of permanent staff members could be increased. Short-term staff should continue to be used, but over-utilization of personnel from diagnostic laboratories and administrative positions creates mediocrity due to inadequate time for preparation.

Possibly the most important impact of having so few veterinarians available is that many BVSc graduates are thrust immediately into positions of tremendous responsibility without the benefit of an adequate background. This is particularly crucial for veterinarians going into research, diagnostic and teaching

and most marked in the clinical sciences. It appeared that increased emphasis should be given especially to ante-mortem and post-mortem diagnostic methods. Only a few veterinarians have advanced degrees, some from Nairobi and others from foreign institutions.

There are two other types of veterinary education in Tanzania. These are the Certificate program in Veterinary Science and the Diploma program in Animal Health. The Certificate program consists of two years of training at Mpwapwa-Morogoro or Mbeya. The program syllabus indicates the coverage of a broad field of animal husbandry and health. However, the time limitation prohibits detailed study.

The Diploma program, also taught at Morogoro and Mbeya, provides an additional year of classroom instruction to students who have completed the Certificate program and have had at least two years of field experience.

Certificate and Diploma holders have provided much help to disease control efforts. The Tanzanian government is now intending to increase the number of students in these two programs, though apparently funds are not available to improve the quality of the graduates. From discussions with many people directly or indirectly associated with the training programs and by examination of the library and other training facilities, it seems that special emphasis should first be placed on upgrading the quality of training in the Certificate and Diploma programs. Improvements in these programs could be made in the following areas:

1. Library facilities. The library at Mpwapwa apparently subscribes to only three veterinary journals and has a completely inadequate number of reference books on animal health. By comparison, the Veterinary Library at Texas A&M University subscribes to approximately 500 periodicals. Inquisitive students

facilities. It is important for new graduates to have the guidance and motivation that frequently only experienced and capable staff can provide.

Perhaps equally as important is the fact that of necessity, field diagnoses frequently must be made by Certificate or Diploma holders (sometimes by personnel with even less training) because the number of veterinarians available does not permit their involvement in many field diagnoses.

Diagnostic laboratories should have additional staff,equipment and supplies to provide better support.

Recommendations for Manpower and Facilities in Animal Health

1. Increase, as rapidly as possible, the number of veterinarians in Tanzania. This can be done by increasing the number of Tanzanian students at the Faculty of Veterinary Science in Nairobi, by arranging for overseas training, or construction of a veterinary school in Tanzania, presumably in conjunction with the Faculty of Agriculture at Morogoro. Although the latter course could ultimately provide the most graduates, the cost of construction and staff would be almost prohibitive, and the first students could not be admitted until satisfactory facilities were completed. It would appear that the other two choices are preferable.

2. Provide graduate education for motivated BVSc graduates. Although some graduate degrees can be obtained in Kenya, it is recommended that more emphasis be placed on overseas training, particularly at schools of veterinary medicine which have indicated an interest in training in tropical diseases. Overseas graduate education generally will provide a wider range of training than is available in Nairobi.

3. Improve the quality of Certificate and Diploma program graduates by providing adequate library holdings, training aids and transportation.

Reliance on disease statistics furnished by inadequately trained personnel leads to a decrease in productivity and erroneous emphasis in control methods.

Health Problems in Production

Several infectious diseases which are spectacular because of high morbidity and/or high mortality have greatly affected cattle production in Tanzania. The general concensus, and one shared by an FAO study team in 1965, is that the four most economically damaging diseases are (1) tick-borne diseases, primarily East Coast Fever, (2) foot and mouth disease, (3) helminthiasis, and (4) trypanosomiasis. Two other diseases which were extremely damaging in prior years are rinderpest and bovine pleuropneumonia. However, due to extensive vaccination campaigns, these two diseases have not been reported in Tanzania for approximately eleven years.

Malnutrition, though much less spectacular, is also of major concern. Although this problem will likely be discussed in detail by other members of the TAMU consultant team, it is prudent to mention in this report that stress from malnutrition creates additional problems with many other disease agents, particularly the helminths.

Tick-borne diseases and Ticks

Five protozoan and rickettsial organisms are included here because of their current or possible importance to livestock production. Ticks are mentioned because it is known that "tick worry" has a subtle but definite influence on

weight gains. (Turner and Short, 1972)

Theileria parva, the cause of East Coast Fever (ECF) is the most notable of the tick-transmitted diseases. The distribution of this disease coincides with that of the primary tick vector, Rhipicephalus appendiculatus. The tick is widely distributed in parts of Tanzania, Kenya, Uganda, Zaire, and Zambia. Current control depends almost entirely of reduction of tick numbers by weekly dipping or spraying. Frequently when ECF cases appear in certain herds, the frequency of acaricide applications is increased to two per week. Toxaphene is the most frequently used acaricide. Fortunately for disease control, apparently no attention is given to acaricide residues in slaughtered animals. Surprisingly, in view of the length of time that intensive dipping practices have been used, tick resistance to acaricides seems not to be a major problem. Never-the-less, monitoring is underway at Temeke to determine if resistance does develop.

Other methods of control have been ineffective for several reasons. Once signs of disease have appeared there is no effective treatment. Oxytetracycline when administered shortly after infection is effective in preventing or lessening clinical signs of disease, which leads one to suspect that the experimental long-lasting oxytetracycline "Terra ECF" may have some value in special instances involving valuable cattle.

Immunological studies until recently have been unrewarding. Of primary concern has been the fact that repeated natural infections possibly with a single strain, and certainly with different strains, of T. parva have been observed. One conclusion could be that development of an effective vaccine is not possible. However, recent preliminary studies have indicated that a trivalent vaccine is effective in preventing ECF when vaccinated animals are exposed to a variety of

field strains of *T. parva*. Little data is yet available to indicate the length of time after vaccination that protection is effective. In any case a promising vaccine such as this would have many applications, particularly for imported cattle and valuable breeding stock.

The new International Laboratory for Research on Animal Diseases (ILRAD) located at Kabete, Kenya, has as one of its two primary objectives the development of immunological methods for the control of ECF.

Theileria mutans

This protozoon is transmitted primarily by *Amblyomma variegatum*. Although infections are common, usually no signs of disease are noted. Recently, however, several instances of pathogenic infections have been reported.

Anaplasma marginale

Anaplasma marginale is a rickettsial organism affecting cattle. It is widely distributed in tropical and subtropical areas and can be transmitted biologically by certain ticks, and mechanically by man and blood-feeding Diptera. Although there are strain variations in pathogenicity, calves up to nine months of age are more resistant to the organism and frequently exhibit only slight signs of disease. Once infected, recovered cattle usually remain carriers for several years even in the absence of reinfection. During the carrier state, cattle are resistant to the effects of reinfection, again unless severely stressed.

Severe problems result usually only when cattle are mature when first infected. This is of particular concern when dairy cattle or breeding stock from a non-endemic zone are introduced into an endemic zone such as occurs in many areas of

Tanzania. Anaplasmosis is frequently assumed to be as unimportant in Tanzania, probably because of two more spectacular hemoparasitic diseases, ECF and trypanosomiasis. An accurate diagnosis of this disease can also be difficult if improper techniques are used for preparing blood smears, or if adequate microscopes for blood examination are not available.

Treatment with oxytetracycline is effective when given soon after signs of disease appear. However, it is more practical to use some type of immunization to prevent the disease when valuable susceptible cattle are being introduced into an endemic situation.

A commercially available killed vaccine has not given consistent results, and its use has resulted in neonatal isoerythrolysis in calves born to vaccinated cows. It is recommended instead that a live vaccine be used. Depending on availability, age of cattle to be immunized and other factors, there are in general three techniques using live organisms which may be used to accomplish this. (Kuttler and Todorovic, 1973; Todorovic and Tellez, 1975) One involves the use of an attenuated strain. A second involves the use of a virulent strain followed by chemotherapy to moderate but not sterilize the infection. The third method involves the use of a closely related but non-pathogenic species, Anaplasma centrale, as a vaccine. It is probable that the A. centrale vaccine would be optimal in Tanzania, especially for valuable susceptible cattle and in situations where the disease is considered to cause losses such as the Patel Dairy near Dar es Salaam.

It would appear that the planned importation of Holsteins by Tanzania without regard for anaplasmosis prevention would entail unnecessary risks.

Babesia spp.

Babesiosis is a tick-borne hemo-protozoan disease. Of the several species which affect cattle, apparently only Babesia bigemina and B. bovis occur in Tanzania. These organisms are transmitted transovarially by the one-host ticks Boophilus decoloratus and B. microplus. As with anaplasmosis, young cattle are more resistant to the disease, and recovered cattle remain carriers for extended periods of time. Carrier cattle are resistent to the effects of reinfection.

Although the strains of Babesia in Tanzania are usually assumed to be almost non-pathogenic, it has been demonstrated that severe disease and death can occur after infection. It is likely that many infections are not diagnosed because (1) of the frequent occurrence of more notable hemoparasitic diseases and (2) many calves in endemic areas are infected early in life when colostral antibodies and other immune mechanisms prevent signs of disease.

Methods of immunization with live Babesia, sometimes followed by treatment to moderate but not sterilize the infections are known, and possibly have application in Tanzania for imported cattle. It is important when using drugs to moderate immunizing infections, because a sterile immunity with Babesia has a short duration. (Todorovic, 1974; Todorovic et al, 1975)

One drug which has been used to moderate immunizing infections is Berenil (Ganaseg) at a dosage of 0.5 mg/kg body weight. Dosages of 2 mg/kg or higher usually sterilize the infections. In Tanzania and other African countries where tsetse flies are prevalent, Berenil is commonly injected at a dosage of 3 mg/kg body weight at two-week intervals to control trypanosomiasis. If after one or more injections at this dosage, cattle are maintained for extended periods of time in babesiosis endemic areas, it is likely that they will be completely susceptible to Babesia infections.

Trypanosomiasis

Three *Trypanosoma* spp., *T. brucei*, *T. congolense*, and *T. vivax*, are extremely important in cattle production in Tanzania. All three can be transmitted by tsetse flies. Control has been difficult because no effective method of immunization has been developed, primarily because of the characteristic and continual antigenic shift by the protozoa after the infection is initiated. ILRAD in Nairobi is initiating basic studies on immunity to trypanosomiasis.

In the meantime efforts to control trypanosomiasis have centered on the use of chemoprophylactic drugs and on control of tsetse flies.

Samorin and Berenil are the most commonly used chemoprophylactic drugs, injected at three month and fourteen day intervals, respectively. The severe reactions frequently seen after infection with Samorin could probably be prevented or reduced if better techniques of injection were used to insure that leakage from intramuscular sites to subcutaneous tissues did not occur and the sites of intramuscular injection were more varied.

Currently the most exciting prospect in trypanosomiasis control is the use of sterile male tsetse flies to eradicate the vector. Previous efforts to control *Glossina* spp. especially by clearing of vegetation and insecticide spraying have been beneficial but not effective in eradication. After proving that the sterile male technique, which was so effective in the screwworm eradication campaign, could be adapted to tsetse flies, one chief concern was the ability to produce adequate numbers in the laboratory for field use. To illustrate this problem, one female screwworm fly will produce 500-600 eggs which will hatch, pupate and emerge in approximately eight days. One tsetse fly female will produce 8-12 larvae in her lifetime at the rate of one each 9-10 days. Each larva will pupate and the adult emerge in approximately thirty days. The slow reproductive life necessitates the concurrent use of other methods of control to reduce natural tsetse populations to a more manageable level.

Although studies on tsetse fly control are underway at several sites including Tanga, Tanzania, increased emphasis and funding is needed for tsetse control efforts.

Helminthiasis

Helminth problems are similar to those found in domestic ruminants in many other tropical and sub-tropical areas.

Trematoda

Among the trematodes *Fasciola gigantica* is by far the most important, but rumen flukes of the family Paramphistomidae may be damaging when the immature stages are developing in the duodenal mucosa. Snails of the family Lymneidae which serve as intermediate hosts are difficult to control. Apparently the best control at present is to use effective anthelmintics strategically, possibly twice each year, to attempt to reduce fluke populations to a level where severe damage to the host is not caused. Economic loss would still be great solely from condemnation of infected livers.

Cestoda

In general tapeworms cause little damage to the host,but have the reputation, probably because of their size, of causing severe losses. *Moniezia* spp. and *Avitellina* spp. are common in the small intestine, but are generally considered to be non-pathogenic. *Stilesia hepatica* occurs in the bile ducts and causes economic losses because infected livers should be condemned.

Tapeworm larvae cause economic loss primarily because of condemnations at slaughter rather than pathogenicity.

Cysticercus bovis occurs in the skeletal and cardiac musculature of cattle. Their chief importance is that when ingested by humans in raw or insufficiently cooked meat, they develop to the tapeworm Taenia saginata, which itself is non-pathogenic. Still, meat containing tapeworm larvae must be condemned or specially managed, depending on the degree of infection.

Cysticercus tenuicollis larvae are generally attached to abdominal viscera, such as the liver of ruminants. The adult, Taenia hydatigena, is a parasite of dogs and other carnivores. Because the only damage caused is when the immature larvae are migrating in the liver, only the cysts and grossly evident migratory tracts in the liver have to be discarded. The discarded cysts found at slaughter should not be fed to carnivores.

A third larval tapeworm found in ruminants, usually in the liver or lungs, is the hydatid cyst, the larval stage of Echinococcus granulosus which is parasitic in canines. The chief importance of this parasite is that eggs when accidentally ingested by humans develop to the hydatid cyst. There is no chemotherapeutic drug effective against tapeworm larvae, so the only methods of control are to treat infected dogs to remove adult tapeworms, and to dispose of hydatid cysts found at slaughter or necropsy in such a way that dogs and other carnivores cannot eat them.

Nematoda

Nematodes cause more economic loss than other helminths, but except for Heamonchus (stomachworm) infections in sheep and less often Dictyocaulus (lungworm) infections in ruminants, death losses are uncommon. Instead, parasitism

is more commonly characterized by poor weight gain, poor feed conversion and other equally unspectacular signs. Parasitism is frequently a result of malnutrition, but overcrowding, overgrazing and other factors can result in severe parasitism in animals on a good nutritional level.

Other nematodes which are known to be important in Tanzanian domestic ruminants are Oesophagostomum and Trichostrongylus. Ostertagia appears not to be important, though in some countries it is the most damaging in cattle.

Although no interest was evident during discussions, there is a possibility that Toxocara (=Neoascaris) vitulorum is a cause of losses in calves. Examination of Veterinary Investigation center reports indicates that this parasite may be common in the Mbeya-Iringa area. Death losses are common in young calves in many endemic areas and should be suspected to occur in Tanzania. The climate and presumably soil characteristics in the Mbeya area are conductive to T. vitulorum endemicity. This parasite is mentioned also because the method of transmission is completely different from most other gastro-intestinal nematodes. Calves become infected apparently only by ingesting larvae with the colostrum and milk from infected cows. The larvae mature in two to four weeks. The adult worms generally survive only a few months, but during their reproductive life produce as many 200,000 eggs per female worm per day. After a period of development on the ground, the eggs are infective and when ingested by female cattle migrate to the mammary glands.

In general it appeared that although helminthiasis is known to be important, little emphasis is placed on research or training programs in this area. It is recommended that staff at Temeke and the veterinary investigation centers be encouraged to develop projects on the epidemiology of ruminant gastro-intestinal parasitic diseases and fascioliasis in various ecological zones in Tanzania.

More knowledge on their epidemiology should enable the formulation of better recommendations for parasite control. It would seem especially important to be aware of the situation in Tanzania as regards seasonal larval inhibition and hypobiosis in the epidemiology of gastro-intestinal nematode parasites in cattle, sheep and goats.

Reproductive Diseases

Brucellosis and possibly other infectious diseases causing abortion are widespread in Tanzania, but are generally considered to be of secondary importance. Leptospirosis, trichomoniasis and vibriosis are probably present, but no data were seen indicating incidence.

Brucella infections ranging to as high a prevalence as 60 percent have been reported. Heifers at government institutions and on parastatal ranches are regularly vaccinated at weaning. However, apparently few others are given the vaccine.

Outbreaks of abortions especially in sheep and swine appeared not to receive much attention. Some senior staff at parastatal ranches said that after serum samples were collected and sent to diagnostic laboratories for examination, the results were not made available. Others indicated that abortions are frequently due to unspecified plant poisonings and therefore serum samples are not collected for evaluation.

Obviously, better methods need to be utilized to define the causes of abortions to enable coordinated efforts to control them.

Toxic Plants

Annual reports and consultations indicated that toxic plants are a problem. However, adequate manpower is not available to define the general situation with regard to species of plants involved and their geographic and seasonal distribution. It is also probable that adequate facilities for diagnosis of plant poisoning are not available. Many reports of deaths from toxic plants appeared to be unconfirmed.

Suggestions for a Vaccination and Anthelmintic Medication Program

Vaccination to prevent bacterial and viral diseases, and administration of anthelmintics to help control helminth parasites, if correctly used, should result in lower mortality and weight loss from disease and greatly increased beef production. The questionnaire results, examination of annual reports from the diagnostic laboratories and review of the literature concerning animal disease incidence in Tanzania suggest that the following vaccination and anthelmintic medication program be considered for parastatal ranches and in the private sector.

1. Brucellosis: All heifers should be vaccinated with *Brucella* strain 19 vaccine preferably at 4-8 months of age. It is imperative that the vaccine be refrigerated at recommended temperatures until used. *Brucella* strain 45/20 vaccine has the advantage of not having to be refrigerated, and can be used in both sexes, but requires two (2) injections initially and an annual re-vaccination. The resulting increased cost makes the 45/20 strain less useful except for vaccination of valuable bulls.

2. Anthrax: Stern's strain non-encapsulated spore vaccine should be injected in all cattle annually in areas where the disease is a problem.

3. Clostridial diseases: All cattle should be vaccinated to prevent blackquarter and malignant edema when approximately 5-6 months old and again when 15-16 months old. If Black Disease is a problem, presumably in *Fasciola gigantica* endemic areas, annual vaccination to prevent this disease is indicated.

4. Leptospirosis, Vibriosis and Bacillary Hemoglobinuria: Information was not encountered to indicate that any of these diseases occur. However, if any of them is a problem, effective vaccines (requiring annual re-vaccination) are available.

5. Anthelmintic medication: A standard effective, efficient and economic program for control of helminth parasites to cover all situations is impossible to develop. In comparison to bacterial and viral vaccines which enable the maintenance of completely immune cattle, anthelmintics do not have this capability. In general, anthelmintics are used for one or both of two purposes - to reduce the severity of disease in infected cattle and to reduce the contamination of pastures with parasite eggs and larvae. Anthelmintics will only rarely remove all the adult parasites (depending on the species) present in an animal; larval parasites are much more resistant to anthelmintics than adult parasites.

Two general types of anthelmintics are available for use in cattle, i.e. those effective against flukes and those effective against nematodes. Adult tapeworms in cattle generally are not associated with weight losses or lack of weight gains and treatment is not indicated. Anthelmintics are not effective against larval tapeworms such as the hydatid cyst and *Cysticercus bovis*.

Fasciola gigantica and rumen flukes are endemic only in the limited areas where snails of the family Lymneidae occur. Control of this group of snails has proven impractical and treatment of infected cattle does nothing to improve any liver lesions already present. Judging from several reports, liver flukes are responsible for many deaths in some areas of Tanzania. In these highly endemic areas, repeated treatments may be advisable. If it could be demonstrated, especially on parastatal ranches, that isolated areas are responsible for the greatest source of metacercariae, it might be advisable to limit grazing in these areas at times of the year when viable metacercariae are in greatest numbers. Specific studies would be needed to determine these times.

On parastatal ranches located in less endemic areas, treatment twice annually may be of some benefit. The exact timing of the two treatments for maximum benefit would depend on the ecology of the intermediate host snails and an epidemiological study to determine differences in seasonal acquisition of the infective metacercaria.

Because of grazing practices, it is doubtful if treatment of private sector cattle for flukes would be of much benefit in a control program, so any anthelmintic medication would be primarily intended to aid individually treated animals. Much of the damage is done by immature flukes migrating through the liver parenchyma prior to entering bile ducts. Since stages in the parenchyma are relatively much more difficult to kill than those in the bile ducts, satisfactory methods for prevention of disease are not available.

Gastro-intestinal nematodes and lungworms, when present in large numbers, can be responsible for deaths, weight losses, and retarded weight gains. However, the usual situation with cattle is one where spectacular or even easily observable losses do not occur. Differentiation between gastro-intestinal parasitism and malnutrition is sometimes difficult or impossible, because in many cases large numbers of parasites can be present without measurable ill effects.

Although it is a common practice in many areas to routinely worm calves only at the time of weaning, I believe that a more beneficial time would be at a somewhat earlier age than many calves are weaned. Depending on many factors which include seasonal rainfall, availability of pasture and density of animal population, calves will frequently have acquired a significant number of nematode parasites by the age of four months. At this time calves are not sufficiently immunologically competent to maintain control of a parasite burden. Medication at this age with a broad spectrum anthelmintic such as Nilverm is more likely

to be of benefit than a single treatment when the calves are nine months old.

The optimal frequency of anthelmintic medication again depends on a number of factors including the previously mentioned ones in addition to types of parasites most prevalent in a given area. Epidemiological studies in representative areas would assist in the formulation of recommendations. Depending on circumstances, anthelmintics are sometimes of no value in promoting weight gains in ruminants, while under other circumstances monthly medication is not sufficient to prevent parasite losses.

6. Ticks: The benefits of dipping at weekly intervals to prevent or reduce losses from East Coast Fever have been demonstrated. A primary factor to consider with frequent dipping is the production of resistant strains of ticks. In some areas of Australia, there are strains of ticks resistant to most chlorinated hydrocarbon and organic phosphate acaricides, so certainly tick resistance can have serious consequences. A constant monitoring to detect this phenomenon is essential.

Two important factors which can initiate the development of resistance are concentrations of acaricides lower than those recommended and inadequate coverage of tick-infested parts of the body. In this regard it is necessary to ensure that dips are maintained at recommended concentrations, that spray races have all nozzles working and proper pressure, and that if spray races are used, special care be taken to get acaricide to inaccessible parts of the body such as in the ears.

It is felt, at least by some entomologists, that the one week dipping interval is less likely to result in resistance build-up than for instance a 3-4 week interval. Conversely, a much longer dipping interval, such as could occur if dipping was completely stopped during seasons of very low tick populations, would help deter resistance build-up by allowing time for loss of a resistant gene pool.

Summary

The greatest obstacle to increasing efforts to reduce losses from livestock diseases appears to be a shortage of adequately trained personnel. The manpower requirements necessary to continue control programs for such important diseases as East Coast Fever, trypanosomiasis and foot and mouth disease prevent adequate emphasis from being placed on less spectacular diseases. Diagnostic capabilities need to be improved so that so much responsibility for accurate field diagnosis is not left to inadequately trained certificate and diploma holders.

The number of Tanzanian veterinarians should be rapidly augmented by increasing the number of students at the Faculty of Veterinary Science in Kenya, by training at overseas veterinary schools, or possibly by creating a veterinary school at Morogoro in conjunction with the Faculty of Agriculture. Interested Tanzanian veterinarians should be encouraged and given the opportunity to obtain graduate degrees at overseas institutions. The quality rather than quantity of Certificate and Diploma holders in veterinary science should be augmented by improving the staff, library and other facilities at such sites as Mpwapwa and Morogoro.

It appears especially that helminthiasis, diseases of reproduction and losses from toxic plants deserve much more attention than is presently being given them. The epidemiology of these three groups of diseases needs to be defined.

References

1. Kuttler, K.L. and Todorovic, R.A. 1973. Techniques of premunization for the control of anaplasmosis. Proceedings of the Sixth National Anaplasmosis Conf., Las Vegas, Nev., March, 1973, pp. 106-112.

2. Little, D.A. 1963. The effect of cattle tick infestation on the growth rate of cattle. Aust. Vet. J. 39: 6-10.

3. Todorovic, R.A. 1974. Bovine babesiasis: Its diagnosis and control. Amer. J. Vet. Res. 35: 1045-1052.

4. Todorovic, R.A. Lopez, L.A., Lopez, A.G., and Gonzalez, E.F. 1975. Bovine babesiosis and anaplasmosis: Control by premunition and chemoprophylaxis. Exp. Par. 37: 92-104.

5. Todorovic, R.A. and Tellez, C.H. 1975. The premunition of adult cattle against babesiosis and anaplasmosis in Colombia, South America. Trop. Anim. Hlth. Prod. 7: 125-131.

6. Turner, H.G. and Short, A.J. 1972. Effects of field infestations of gastro-intestinal helminths and of the cattle tick (Boophilus microplus) on growth of three breeds of cattle. Aust. J. Agric. Res. 23: 177-193.

Livestock Subsector Study
Sheep and Goats
USAID/TAMU/TANZANIA

James W. Bassett

Descriptions of traditional livestock production practices in Tanzania have been presented by individuals and organizations during the past several years. Many of these have been based on extensive periods of observation and personal experiences and consultations with a broad spectrum of individuals involved in livestock production. This report will therefore not attempt to redescribe or suggest changes in what are already graphic presentations of livestock production in Tanzania. Rather it will seek to point out areas where improvement are possible and suggest some alternative practices or management techniques which can be feasibly initiated.

Many of the problems associated with livestock production in Tanzania are based on traditional practices built up over hundreds of years, and these are not easily changed by logical discussions or governmental decrees. When people are involved in legislative changes through elected representation, as is found in Tanzania, change generally comes slowly. There must be a purpose behind the change which can be understood, there must be some benefit to the majority of those involved and there must be a consistent, strong push from those in authority.

Role of sheep and goats in the overall livestock production picture

In 1970 Tanzania was reported to have 4,439,000 goats, 2,823,000 sheep and 13,141,000 cattle. There has been speculation as to the accuracy of these figures, but they probably indicate the relative picture with regard to the three species.

Sheep and goats are found in the greatest numbers in those regions which also have the greatest numbers of cattle. This is both a complementary and competitive situation. Sheep and goats will utilize some brush and browse species which will not be utilized by cattle, but they also eat grasses which would be eaten by cattle. They also contribute to overgrazing of the range, particularly in the vicinity of the villages and bomas as they do not graze out as far as the cattle. Decreasing

sheep and goat numbers, however, would aggravate the situation rather than help if the reduction led to an increase in cattle numbers.

Sheep and goats are not considered as major agricultural or economic enterprises and consequently relatively little time and effort are expended inimproving breeding, management, production or marketing practices. This is unfortunate since market prices and the potential for increased production are such as to indicate that they can be quite profitable in some areas.

There appears to be no system or awareness of the need for a selection program for improving production and reproduction. Flock size is determined by a reproduction rate which is low, death losses which are high, the need to sell animals for specific monetary purposes which is quite variable and the killing of animals for meat purposes. Animals are not usually removed from the flock to specifically reduce flock numbers because of feed or water shortages or other such situations. There may be some potential benefit to reproductive performance if the animal to be sold or slaughtered is a barren female which is in better physical condition and thus should bring a higher price or be more desirable for eating.

Sheep and goats are an important source of protein within the country. The meat itself is preferred by a large segment of the population and is ideal from the standpoint of family consumption since an animal can be utilized before any part begins to spoil. The potential for an export market for mutton and goat meat has not been fully explored. The competition within many markets would be very strong, but probably no more than is now present within the export beef market. The potential for export markets within adjoining African nations where Tanzania could have a freight and convenience advantage has been studied but not actively pursued.

All of these factors would indicate that sheep and goats should continue to be a viable part of the livestock production section and that programs should be encouraged and initiated to strengthen and improve both production and marketing.

The following suggestions are offered with this recommendation in mind.

A. Ujamaa ranches.

The value of controlling grazing numbers has been demonstrated on NARCO and Kilimo ranches. Improved reproduction with heavier weights of stock ready for market at younger ages have been possible when stocking rates were controlled in line with forage available. This potential for increased offtake is not readily evident to the great majority of traditional livestock producers. They have little or no exposure to what is taking place on NARCO or Kilimo ranches and if they did, would probably feel that the results are due to the large scale operations and govermental advantages.

Plans have been made for Ujamaa ranch centers in several areas of the country. These plans should be implemented as rapidly as possible, recognizing that changes in traditional practices must come slowly and will only be successful if the people recognize the advantages or need for them. Success in the development of Ujamaa ranches with controlled stocking rates and specific land boundaries will do more to promote these concepts than the good work being done on the NARCO and Kilimo ranches. The Ujamaa concept is accepted by the people of Tanzania and the development of Ujamaa ranches is needed for those parts of the nation where extensive livestock production is the most feasible agricultural land use. The development of needed watering facilities to make forage utilization more efficient and the essential need for controlling numbers is not feasible for each small producer.

B. Watering facilities.

It is well recognized by everyone involved in the livestock production sector that water is the major limiting factor in most of the areas where livestock production is concentrated. This is the case for both forage production and sustenance of the animals themselves. Present limited watering facilities create areas of severe overgrazing adjacent to the facilities, limit nutritional intake of the

animals as they must spend more time each day in travel between grazing grounds and water while using higher levels of energy for the traveling involved.

It is recognized that the development of ground water storage may not be feasible in all areas of the country, but every effort should be made in this direction. Total dependance on mechanical pumping for water availability can be very costly in case of pump breakdowns and also in costs of pump maintenance and operation. The ground water storage facilities on the Manyara Ranch (NARCO) indicate the potential for such development. Development of ground water facilities which would provide water for even the first part of the dry season would be an advantage in that travel to and overgrazing around a permanent watering facility would begin later in the dry season.

Conflicting statements were heard relative to the potential use of wind power for pumping water. Maintenance is essential for efficient windmill pump operation but it should be less complicated and less costly than diesel or gasoline powered pumps. Certainly the costs of operation would represent a considerable savings. The potential use of wind power for pumping water should be considered.

Development or expansion of watering facilities must be associated with some system for controlling or maintaining grazing numbers. If increased water facilities stimulates an increase in animal numbers above range capacity then increased numbers are available for consumption or export in the short run, but with increasing areas of the land in overgrazed condition. The land and forage resources appear to have a tremendous potential for recovery during the rainy season, but prolonged drouth or less-than-normal rain causes large losses in animals, body weight and reproduction rate, and eventual decreases in forage production.

c. Increasing sheep and goat production.

Sheep and goat meat provide a major source of protein in the diet of a large segment of the population, particularly in the areas away from the major cities.

This is due to a variety of reasons, one of which is a preference for the meat while another reason is the fact that a family can consume the meat from a sheep or goat without any of it spoiling, which would not be true of cattle. One of the reasons for a decrease in consumption of sheep and goat meat in the cities is the higher costs of transportation and handling when considering the number of animals which must be handled to provide an amount of meat equivalent to beef carcasses. This makes the sheep and goat meat more expensive and also more difficult to obtain because of competition for limited transport facilities.

There is probably little advantage in advocating improved breeding stock for the traditional flocks until changes are made in grazing, watering and management systems.

The indigenous sheep and goats are undoubtedly as well adapted as any to the tremendous variabilitiy in forage availability that is found in most of the country under present conditions. If more grazing areas or expanded use of present areas can be obtained through expanded or more effective water distribution systems and improved management is practiced, there may be a place for use of imported genetic material to improve performance and meat characteristics. The sheep on the west Kilimanjaro Ranch (NARCO) and Manyara Ranch (NARCO) show what can be done to improve size, condition and uniformity, but adequate nutrition is needed to permit reaching a genetic potential. There must also be a marketing system which will pay a price differential for increasing size and improving quality.

Castration is well understood and practiced in varying degrees. The major advantage to castration would be the prevention of indiscriminate breeding, since male and females will generally be herded together throughout the year. However, there was no indication that definitive standards or goals are used in determining those animals which are to be castrated and those which will be left intact.

D. Goats for milk production.

Goats are kept for meat production and for their role as a savings or bank account and little consideration has been given to their potential for protein production in the form of milk. This may be feasible only in those areas of the country where higher rainfall permits higher quantity and quality forage production, but serious consideration should be given in those areas. Some research has been initiated at the Livestock Research Station at West Kilimanjaro (Kilimo) aimed at improving the milk production of native stock by crossbreeding with Saanan, Toggenburg and Nubian breeds. A great deal more support is needed for facilities and imported stock to determine the genetic type and management methods for effective use in the traditional sector. Goats have the potential for more efficient production of milk than dairy cows, and are an economic and production unit size which is feasible at any level on the economic scale. Goat milk should not be considered as being feasible only for lower income production and consumption, as it is a very desirable source of protein and should be considered as a potential additional source of protein for local consumption or as a substitute for cow milk which may be sold for income production.

E. Corriedale sheep and Kitula Ranch.

This type of sheep production is probably feasible only in the area of the Kitula plateau where the elevation is sufficient to decrease the temperatures which would normally expected at that latitude. The economic feasibility is questionable if the sheep graze improved pastures the year around as the costs of establishing, maintaining and renovating these pastures is large. The potential for improving native pastures through overseeding and minimal fertilization should be determined for utilization of these areas by non-pregnant and early gestation ewes and wethers. The improved pastures should be reserved for and used during breeding, late gestation and lactation when high quality feed can have it's greatest impact on production and reproduction.

A systematic system of breeding, lambing, shearing and pasture utilization needs to be developed which will increase reproductive performance and weight of lambs and wool sold. It should be possible to develop a year around lambing, shearing, marketing program which would more efficiently utilize labor and provide an even supply of lamb and mutton carcasses for domestic consumption or export. If the animals are to be slaughtered at the ranch, the slaughter facilities must be greatly improved from both the standpoint of sanitation and efficiency of operation. Shipping of carcasses offers some advantages but also requires refrigeration or freezing facilities in or near Mbeya and transport facilities that offer the same service. It will be necessary to have or develop a local market for by-products other than pelts.

A marketing program should be developed which would market as large a number of carcasses as possible to the hotel, resort and restaurant trade. These animals should be marketed at as early an age as possible to provide a more tender and less fat carcass and to reduce grazing pressures on pastures. The possibility of exporting mutton and lamb carcasses to Zambia also needs to be considered.

There is probably no ready alternative to the present system of sorting fleeces and shipping the wool to Great Britain for sale. There is a potential for developing home industries which spin and weave the wool into fabric for blankets, garments or articles for the tourist trade. This would be an alternative potential source of income for people in the area, but would not utilize a significant portion of the wool currently or potentially produced by the Kitula Ranch. The maximum potential production of wool from the Kitula Plateau would not warrant development of facilities for wool manufacturing unless there is an urgent need for wool or wool blend fabrics or products which are currently being imported.

F. New land development.

Agricultural production will increase as funds, new techniques and improved control methods are available for increasing the land area free of tsetse fly. A lot of

these lands are in areas of higher rainfall and soil types which will permit not only crops production but more intensive livestock production. Some of this is currently being practiced with beef cattle on sisal plantations, prison farms and NARCO units. It will be possible and in some cases desirable to include sheep and goats in intensive production plans. Goats in particular can be a very effective brush control management tool if used properly.

Expansion of sheep and goat production into these areas has several potential benefits. First of all the areas are generally closer to the large population centers so that transportation charges would be reduced in getting them to those consumption areas.

The potential consumption in the cities has probably never been fully determined or developed because of the current high marketing charges for getting the animals from the production areas to the cities. Australia is currently shipping sheep to the mideast in a situation where shipping costs greatly exceeds the value of the animal. Tanzania is much closer to the mideast market and produces a type of sheep comparable to mideast breeds and should be in a position to actively compete for that market.

G. Sociological-economic concepts.

This is the area where changes are essential and where change will be the slowest to occur, no matter what country is involved. The concept must eventaully be accepted that shillings are a form of wealth that does not lose weight during the dry season or die during drought, is not subject to theft if put in a bank and is as much a sign of prestige and good business or livestock management as a large herd of cattle, sheep and goats. This concept must be tied in with a marketing system which encourages the improvement of the breeding flocks and the sale of animals in a uniform orderly fashion The vagaries of livestock production are such that no system will accomplish all that is desired, but it can improve on the present situation.

LIVESTOCK-MEAT SUBSECTOR STUDY

Range Management

Rudy J. Penderson - Range Science Advisor (TAMU Contract)
J. L. Schuster, Professor & Head of Range Science, TAMU

Tanzania is indeed a cattle country and has the potential to be the leading and greatest cattle country in Africa. Tanzania has about 70 million hectares of rangeland which supports millions of livestock and wild grazing animals. These rangelands supply meat, milk, water, wood products, fuel, construction materials as well as aesthetic and recreational values. It is the environment for many people and their cattle and wildlife. This large resource justifies more support and emphasis than it now receives for its sound management and development to produce useful products efficiently.

It is recognized that the maximum expression of an animal's genetic potential for production can be limited by environmental conditions. To achieve optimum animal production levels, deliberate and knowledgeable mainpulation of the environment, particularly those factors related to grazing and nutrition is necessary. Improvements through breeding, disease and parasite control measures and other management imputs directed toward increase in production can be only partially effective unless there is a corresponding improvement in the nutrition of the herd.

Data from many surveys and records show the coefficients for livestock performance to be far below the Tanzania Shorthorn Zebu breed potentials. Dr. G. W. R. Getz Livestock Training Officer MATI Mpwapwa (USAID CONTRACT) reported at the Tanzania Livestock Production Society Conference that the general levels of performance of Tanzania Shorthorn Zebu cattle under moderate to good levels of management is:

Birth weight	18 - 22 kg
Weaning weight	120 - 135
Two year old	210 - 240

Three year old . . . . . 270 - 300 kg

Mature cow . . . . . 290 - 310

Calving percentage . . . . . 80 - 90

Most livestock operations do not come near to their potential. There are many causes for this, and most of them have been recognized and discussed in other reports. Some causes that relate directly to range management and suggestions for improvement are as follows:

1. Grazing the vegetation too closely for plants to remain vigorous and to reproduce also reduces consumption by livestock. This results in malnutrition of animals, excessive weight loss, lowered reproduction rates, grazing and poisonous plants and other problems. Overstocking is a local problem particularly in the traditional livestock areas.

Efforts are being made to increase the off-take of mature and non-productive animals and reduce the stocking where there is overgrazing. There is much rangeland in parts of Tanzania which is unstocked or where there are few cattle such as in tsetse fly areas. There is a need for re-distribution of cattle reducing the numbers where there are plenty and introducing them where there are none or few. This involves expenditures for dips, stock water and other facilities as well as trained personnel to put to use these unstocked rangeland areas. This work is proceeding but financing and efficiency of operations will be needed.

Sound grazing plans made and carried out on existing ranches, grazing associations, holding grounds as well as on traditional land allotments can materially aid in solving overstocking problems there.

Sound grazing management on lands overgrazed generally can be expected to provide 25% increase in forage and 10% increase in beef produced. This varies with each case and includes proper stocking as well as deferred rotation grazing.

2. Low quality forage, particularly during the last of the dry season contributes to malnutrition. Plenty of standing dry forage is the first requirement. This can be provided by proper stocking and deferred grazing. However, if the dry season extends over several months the mature forage becomes deficient in energy values, protein and minerals. These deficiencies and methods to overcome them have been reported on by Lito Calo of NARCO. His data indicates that supplemental feeding on rangeland using local and by-products feeds could meet with success when prices are right. The actual costs and benefits to be obtained are not known. Therefore it would be good to establish a pilot to test supplemental feeding of salt and minerals on reageland or in the boma.

3. Herding cattle in groups of 200 to 300 causes concentrated grazing. The stocking density is close to 300 head per acre; this results in competition for the best forage plants and also the grazing of poor quality forage as well as poisonous plants. As a result some cattle may not consume enough for maintenance. This is compounded by eight hours or less of actual grazing time, usually missing the early morning or late evening as well as night grazing when cattle are put into bomas at night.

Some tests should be made using night pastures instead of bomas. The problem of predators and fences will have to be overcome at least in test areas.

4. There is a need for feeding salt and minerals such as phosphorous. A small increase in calf crop and reduction of death loss readily pays for salt and minerals. Where there are minerals needed the improvement in animal performance can be very large.

5. Adequate stock water contributes to good animal performance and distribution of grazing. Stock water development is a continuous problem but progress is being made. Rangeland within grazing distance of the year-round permanent water locations should be saved for use in the dry season. Range near the wet season water

locations should be grazed in the wet season. This may involve use of more bomas or temporary bomas to avoid excessive travel.

6. Burning of much of the range each year has deteriorated the quality, quantity and diversity or variety of range forage. Most species now present are fire resistant or adapted to reproduce under conditions of frequent burning. Wildfires do a lot of damage, but it is recognized that prescribed or planned burning by qualified people can be beneficial in range management to control bush and provide for fresh regrowths for grazing. However, wildfires and indescriminate burning needs to be stopped.

There is a need for a research project to determine the guidelines and specifications for use of fire for bush and specifications removal of excess rough.

7. Improvement in the quality of forages by seeding and growing legumes and grasses appears to have potential for development. Some small tests and studies have been made. There is a need for local seed production and field scale testing with planned grazing use to determine feasibility and benefits to be had.

8. Training in range management is done at Morogoro. There is a two year course and graduates are in much demand in the livestock industry. Very few Tanzanians have a degree in range management. People with this type of training and with local experience are needed to guide the development and management of the large and diverse range resource of Tanzania. They could make effective contributions to practical research needed in so many problems as well as support and improve ranch management work. Consideration should be given to establishment in Tanzania of a school leading to a degree in range management.

9. There are many publications and articles on various segments of range management. Also there are people who have alot of practical experience and know how. This knowledge is not interpreted and recorded for use in an organized way so that many can use it.

It is suggested that their information be interpreted into useful technical guides or standards and specifications on how to carry out improvement practices, and guidelines on where they should be applied. These would need updating from time to time as actual experience and research finds better or alternative methods and specifications.

10. The presence of tsetse flies has been the main factor limiting the use of much rangeland. Prophylactive and curative drugs for tryponosomiasis are available and are used. Also, effective methods for control involving brush cleared barriers and insecticide spraying have been developed. However, many cattle are grazed in tsetse areas.

The expense of drugs and effects of treatment on cattle as well as losses associated with tsetse control possibly could pay for the inclusion of a herbicide with the insecticide, followed by burning when fuel had increased, should be investigated. Also, more chaining where it is effective could possibly be justified to save the expenses of losses and medication as well as improve the range for grazing use in the tsetse control program.

TABLE 1

LAND USE BY REGIONS IN TANZANIA

Region	Land in agricultural use Rough grazing land					SHC + LSA	Land not in agric. use		
	ha	A %	B %	SHC %	LSA %	%	%	ha	%
1. ARUSHA	7598318	93.6	17.22	1.7	0.3	2.0	4.4	8115410	9.
2. COAST	2491875	74.6	5.65	5.8	1.8	7.6	17.8	3340800	3.
3. DODOMA	3141808	76.9	7.12	7.8	0.9	8.7	14.4	4083200	4.
4. IRINGA	3192880	56.4	7.38	4.2	---	4.2	39.4	5662050	6.
5. KIGOMA	930000	25.4	2.11	7.7	---	7.7	66.9	3660890	4.
6. KILIMAN-JARO	936190	71.7	2.21	8.3	5.0	13.3	15.0	1305600	1.
7. MARA	1928723	89.7	4.37	9.6	---	9.6	0.7	2150400	2.
8. MBEYA	4560030	55.5	10.34	3.0	---	3.0	41.5	8217240	9.
9. MOROGORO	2453750	34.0	5.56	3.0	2.3	5.3	60.7	7219200	8.
10. MTWARA	2623360	32.1	5.95	3.8	0.6	4.4	63.5	8179200	9.
11. MWANZA	968224	49.8	2.19	21.0	---	21.0	29.2	1945600	2.
12. RUVUMA	32500	0.5	0.07	2.0	---	2.0	97.5	6054400	6.
13. SHIN-YANGA	2974970	59.3	6.74	6.7	---	6.7	34.0	5017600	5.
14. SINGIDA	2762820	56.7	6.26	3.2	---	3.2	40.1	4876800	5.
15. TABORA	3496590	29.0	7.92	1.8	---	1.9	69.1	12057600	13.
16. TANGA	1791990	67.6	4.06	8.1	4.9	13.0	19.4	2649200	3.
17. WEST LAKE	2067435	72.8	4.69	8.6	1.5	10.1	17.1	2841600	3.
18. ZANZI-BAR PEMBA	162310	62.2	0.37	25.4	11.5	36.9	0.9	261120	0.
TOTAL	44113773	50.3	100.00	4.6	0.7	5.3	44.4	87637910	100.

A = % of the regional total; B + % of rough total grazing land;

SHC = Small holder cultivation; LSA - Large scale agriculture

Inclusive of area under NDC ranches - 0.29%

Source: Berry and Berry (1969)

Reference: Mehta, R. K., "Current Pasture Production in Tanzania," (mimeo) no date but about 1975.

TABLE - 2

Meat production in Tanzania in 1970 or nearest year
(including the meat equivalent of cattle exported on hoof)

		Modern Sector	Traditional Sector	Total
Animal numbers (1000 Heads)	C	100 (0.77)	13040 (99.23)	13140 (100.00)
	S	-	2820	2820
	G	-	4440	4440
	P	-	25	25
Take-off rates (%)	C	18[e] (225.00)	8 (100.00)	8.1
	S	-	25	25
	G	-	25	25
	P	-	50	50
Exports (1000 heads)	C	-	50	50
	SG	-	50[e]	50[e]
Slaughtered heads (1000 heads)	C	18	1043	1061
	SG	-	1815	1815
	P	-	12	12
Carcass weight (Kg)	C	200 (166.66)	120 (100.00)	121
	S	-	10	10
	G	-	10	10
	P	-	45	45
Meat production (1000 t)	C	3.6	125.2	128.8
	S	-	7.1	7.1
	G	-	11.1	11.1
	P	-	0.6	0.6
	T	3.6	144.0	147.6

C = Cattle; S = Sheep; G goats; P = Pigs; T = Total; e= Estimates

Figures in brackets show percentages

Source: ECA/FAO. African Livestock Development Study, 1973.

TABLE 3

Production and disposal of meat in Tanzania in 1970.

	Beef	Sheep and goat meat	Park	Total
Local production (1000 t)	128.8	18.2	0.6	147.6
Import of live animals (1000 t eq. meat)	-	-	-	-
Import of meat (1000 t)	-	-	-	-
Export of live animals (1000 and eq meat)	5.7	0.5	-	6.2
Export of meat (1000 t)	12.0	-	-	12.0
Total export (1000 t)	17.7	0.5	-	18.2
Consumption (1000 t)	111.1	17.7	0.6	129.4

Source: ECA/FAO. African Livestock Development Study, 1973.

TANZANIA

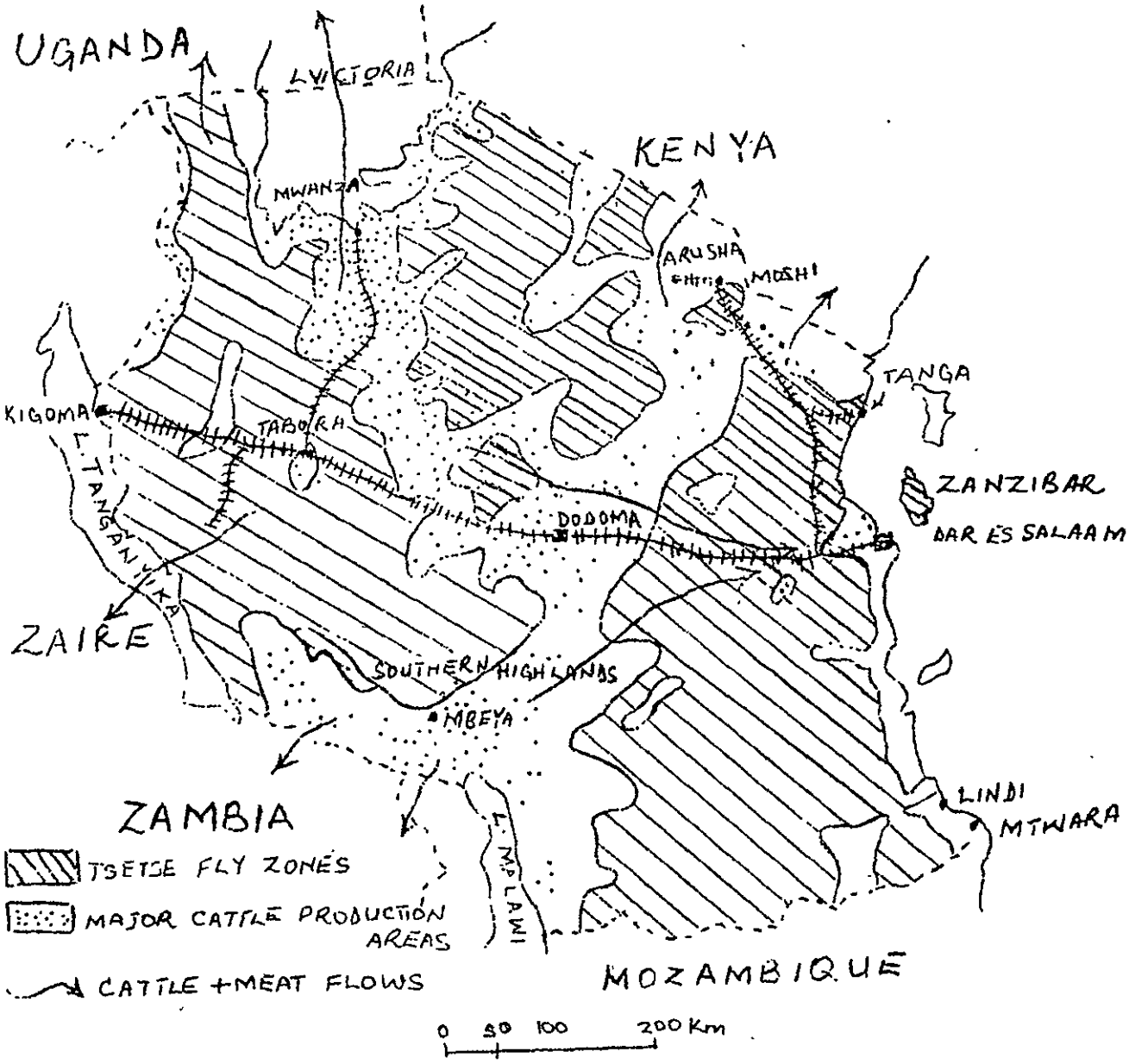

Fig. 1

Source: ECA/FAO. African Livestock Development Study Part I 1973.

The Grass Cover Types of

TANZANIA

(Rattray 1960)

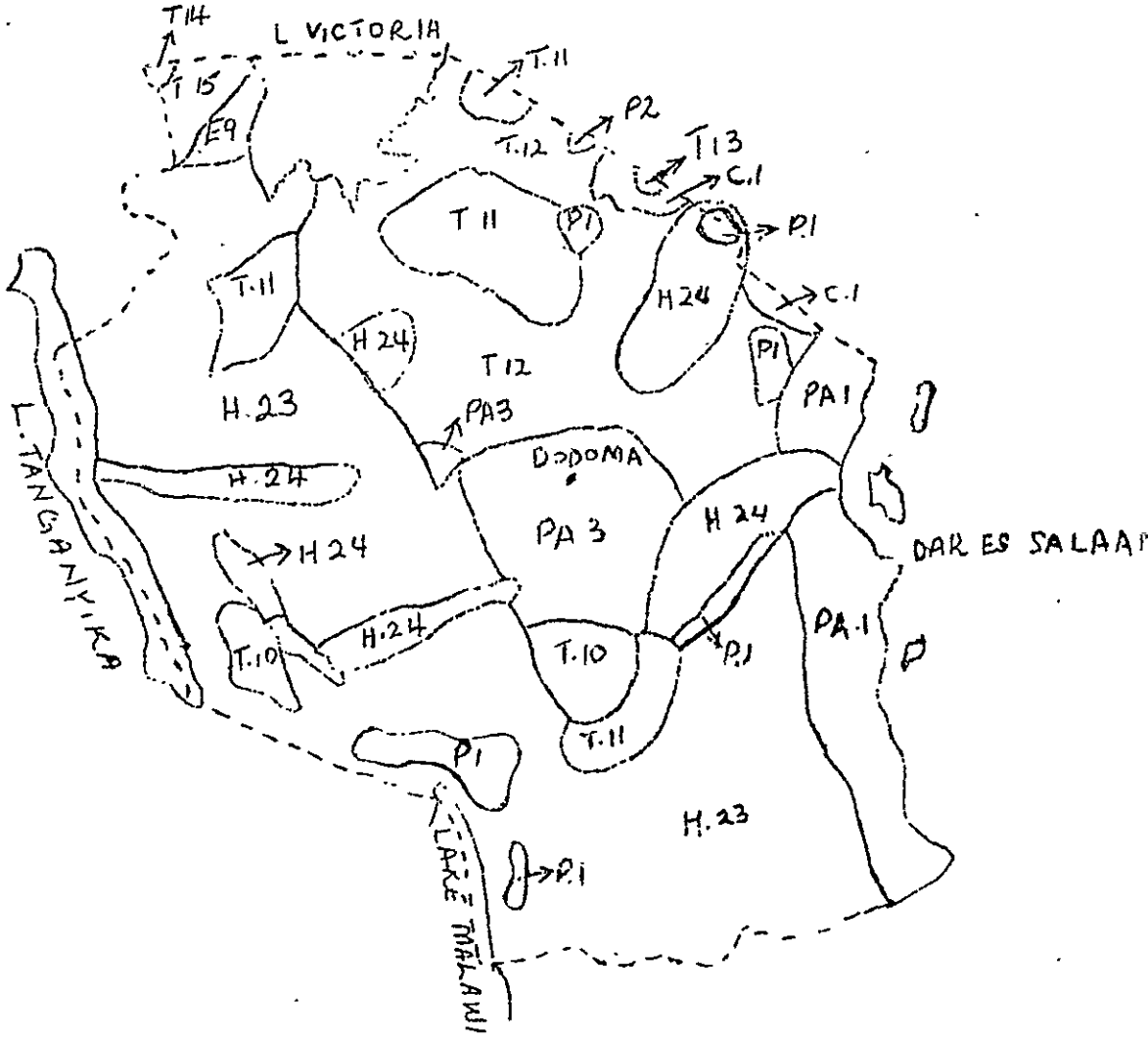

Fig. 2

1. Chlori Type	C.1
2. Eragrostis Type	E.9
3. Hyparrhenia Types.....	H.23, H.24
4. Pennisetum Type	P.1
5. Panicum Types.....	PA.1, PA.3
6. Themeda Types	T.10, T.11, T.12, T.13 T.14, T.15.

Grassland and Potential Grassland Types

(Heady, 1960)

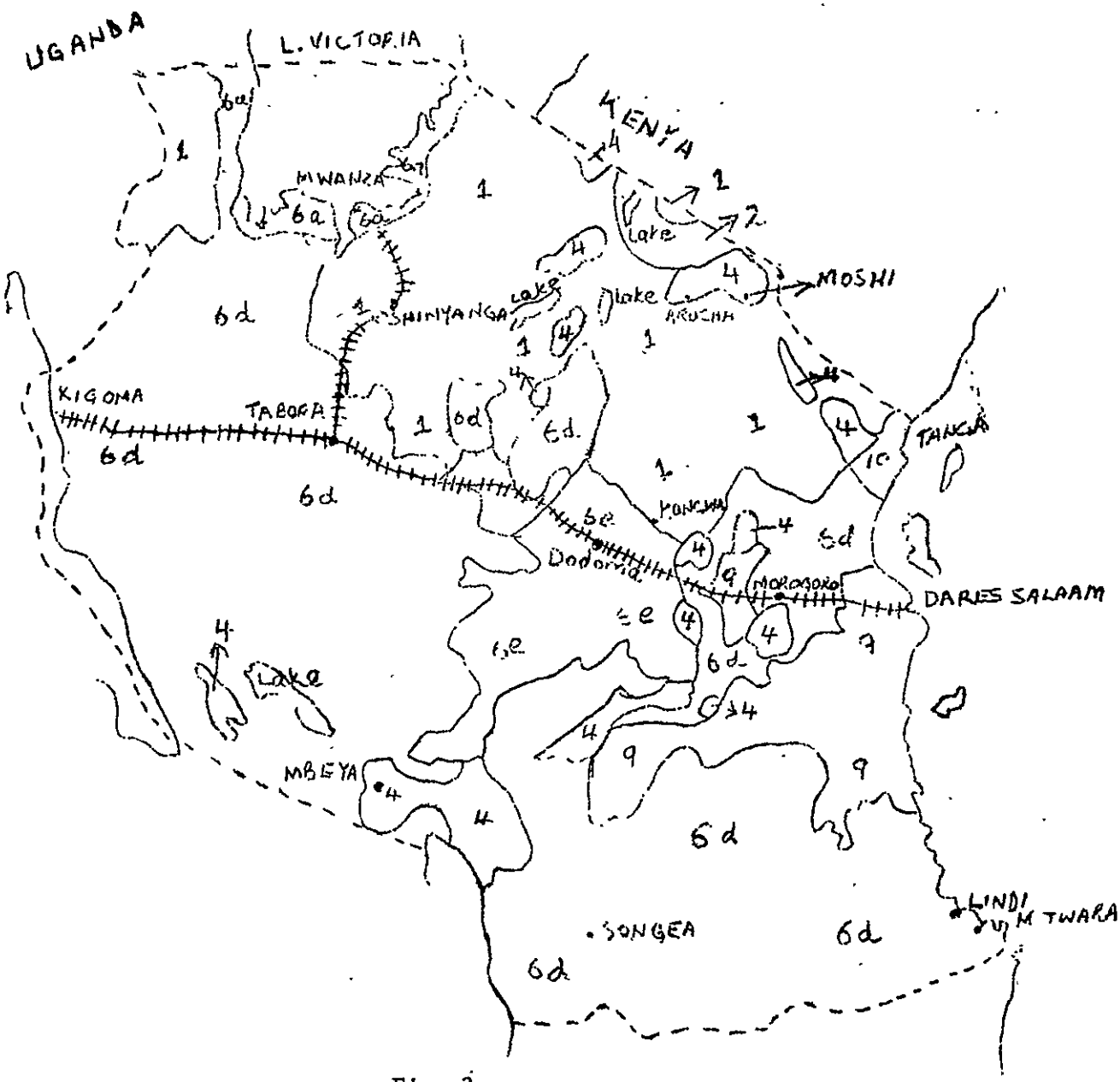

Fig. 3

1. THEMEDA-HYPARRHENIA - Scattered-tree Grassland.
2. CHRYSOPOGAN - CHLORIS - ARISTIDA- Desert Grass - Bush.
4. HIGLAND GRASS AND FOREST.
6. HYPARRHENIA TYPES:
   - 6a - HYPARRHENIA RUFA - Scattered tree Grassland low tree/high grass
   - 6d - HYPARRHENIA - LUDETIA SIMPLEX -MIOMBO WOODLAND.
   - 6e - HYPARRHENIA WITH VARIOUSSPECIES - Scrub & Thicket.
7. SPECIALIZED THICKET.
9. PANICUM - HYPARRHENIA -MIOMBO WOODLAND.
10. PANICUM - DIGITARIA -COASTAL BUSH.

TANZANIAN LIVESTOCK - MEAT SUB-SECTOR REPORT
AGRICULTURAL ENGINEERING PHASE

By R. E. Armstrong

I. INTRODUCTION

Water for livestock is an awesome problem and it cannot be discussed without some consideration given to water for rural domestic use. The general problem is well known and has already been addressed by many studies and programs supported by foreign governments. The major problem appears to be a lack of an effective water development program due to a shortage of trained manpower and adequate equipment.

II. DISCUSSION

Field Livestock Marketing personnel, Ranch Planning personnel and others were contacted to determine the desired distances between and the desired geographic locations of dependable livestock water sources. Following are the distances obtained:

1. At livestock markets, there should be ample water available within ½ mile or 1 kilometer of each auction ring.
2. On holding grounds and production areas, the maximum average distance between water sources should not exceed 5 miles.
3. On stock routes, the average maximum distance between water sources should not exceed 15 miles or 25 kilometers.

The present water sources provide about one half the amount of water required for the present number of livestock (1,2). This situation is the result of the following conditions:

1. Low number of water sources including:
   a. surface water sources
   b. sub-surface water systems

2. Low output of existing water system involving water pumping system due to:

   a. poor management
   b. unavailability of repair parts and replacement units
   c. absence of responsible management of water systems

3. Inbalance of water demands and water supply.

4. Lack of capable manpower throughout the livestock industry.

Grazing

There is a definite inbalance of water sources and potential grazing areas. The greatest problem is inadequate water sources in most cases which will be discussed later in this report.

On the organized ranches operated by the Parastatal Companies, the ranch development plans have been generally well prepared in terms of having a good balance between the wet and dry season grazing area and adequate water sources. The normal pattern has been to develop a permanent water source for every 4,000 hectares. However, the actual grazing pattern of the ranches has led in many cases to serious overgrazing in the areas near the ranch headquarters, bomas, dips, and water sources and to under utilization of grazing in other areas. There has been generally inadequate supervision of herdsmen in terms of insuring that the ranch grazing plans were being implemented and insuring that the grazing time for the cattle was sufficient for the cattle to get their fill.

In the traditional sector, the grazing is done on a communal basis in a loosely organized way. Cattle are grazed near the village which results in overgrazing around the village and water sources. Responsibility for the maintenance of stock watering places and the management of the range is

generally not accepted by anyone and leadership is slow to carry out this responsbility. However, efforts are being made by the government to correct this situation in the Ujamaa village development program.

Bomas (Night Holding Corrals)

Cattle are kept in bomas at night for protection from predators and theft. These bomas vary in construction from a high fence with steel posts and woven wire to a small area encircled by thorn bushes.

In many cases, cattle are located at the headquarters area and without water or salt. Cattle are kept in the boma for as much as 16 hours per day without feed or water. If bomas with water and salt were strategically located throughout the ranches, the grazing time on good ranges could be more than doubled each day, which would reflect increased animal growth.

On the NARCO ranches, bomas are being planned at locations away from the headquarters but this program has not been implemented partially because of the lack of water sources and personnel housing. Boma locations should contain cattle herder accommodations and housing, and they should be coordinated with dip locations as well as water sources. Boma development is also needed on the holding grounds as well as on the ranches.

Holding Grounds and Stock Routes

The purpose and present status of these after-market livestock holding areas are described in the Appendix. These holding grounds have definite boundaries and can be managed as controlled areas, charging fees to private traders for its use. This is not the case with stock routes as they are available for public use. With the present land tenure status in Tanzania,

there are some good arguments for abandoning range and water development on the stock routes.

If the stock routes do not contain water sources, it would mean that cattle would be driven between holding grounds and TLMC would manage and maintain only holding grounds. If this is practiced, the holding grounds would need to be located at closer intervals. With the development of well distributed bomas and water sources, range utilization could be greatly improved.

The present holding grounds are lacking in range and water management more than the ranches but this will be improved under the present TLMC management system. The holding grounds were formerly managed by the Veterinary Division of the Ministry of Agriculture.

Water

Water supply and range utilization for livestock with their associated needs must be planned and developed together in a coordinated program. Good ranch planning must include both of these as an integral part of the program. Boma distribution for good range utilization is dependent upon a matched distribution of water sources. Dips and spray races are used for control of tick borne diseases, particularly East Coast Fever which causes serious losses especially in the traditional livestock sector where routine dipping is not practiced. On the parastatal ranches and holding grounds, routine dipping is stressed. The government is taking steps to provide dips on a service basis for the traditional sector. Presently there are about 1,000 dips in use. Dipping is required weekly and a well managed dip could dip 1,000 head per day.

The water requirement for each dipping is about one gallon per head of livestock. Present plans for dips include water requirements of 500 gallons per week but these dips are utilized at their full capacity. Strategic locations of the dips and spray races are important in good range management, and they should be located close to water sources but they should not drain into surface water catchment areas.

Spray races are used more for dairy cows, mostly to prevent injury, especially to the udders. Ranch managers prefer spray races over dips because they report that they can better control the concentration of the insecticide and that cattle drink less than in a dip. The water requirement for a spray race is 2,500 gallons per week.

They are presently getting one producing well for every 2.25 holes (55 percent dry holes). A typical existing 200-foot well here has approximately 50 feet of overburden, then approximately 150 feet of layers of hard and very hard grey and/or brown fractured rock with an 8-inch steel casing forced 2-3 feet into a 6-inch hole in the top rock layer and the remainder of the 6-inch hole is not cased. (This provides a good economical well if the seal between the casing and the top rock layer holds.) They normally get a yield of 1,000-1,200 gallons per hour.

A well with these conditions would cost:

Drilling $(200)\frac{(1)\ \text{shs. } 150.-}{0.45}$	= shs.	66,666.-
Test pumping 24 hours @ shs. 425.-/hour	= shs.	10,200.-
Casing 50 feet @ shs. 175.45/foot	= shs.	8,772.50
Pump with diesel engine	= shs.	25,000.-
TOTAL	shs.	110,638.50

Borehole (Well) Development

Borehole well development in Tanzania is expensive and not dependable because of the serious shortage of trained manpower and equipment. Also, good water bearing strata is scarce here. The Ministry of Water Development and Power reports a total of 52 well drilling rigs in Tanzania:

19 Schramme rotary rigs, model 985H-661, similar models supplied on an Australian AID program (operated by young Australians with limited training and experience).

2 Bomay units, (German built) rotary type.

1 Romanian built reverse circulation type, model FA 12 (still at dock area in Dar es Salaam where it has been for two years).

18 Percussion rigs, cable type.

10 Pilcor percussion type, (used only for well cleaning and shallow wells).

2 Diamond drill type, (used only for test bore holes).

The units are operated on a custom or service basis by the Ministry of Water Development. The charges are:

Drilling of 10 3/4-inch or 8-inch holes @ shs. 150.- per foot.

Test pumping @ shs. 425.- per hour (usually for a 24-hour test period).

Well casing -- 8-inch steel @ shs. 175.45 per foot.
6-inch steel @ shs. 88.65 per foot.

Well screens, made of PVC pipe class 40 with 1/8-inch holes, 4 meters long, made locally by Terging Company in Dar es Salaam --
8-inch ID shs. 199.20 per foot.
6-inch ID shs. 105.40 per foot.

Pumps, Mono of Australia, a long pitched stainless steel wobble rod 5/8-inch diameter, rotating in a stainless steel pipe with a molded rubber interior matching wobble rod rotating at 435-1,650 rpm, powered by 3-10 hp surface positioned diesel engine @ shs. 20.- 30,000/unit.

Piping Systems

Piping systems, excluding windmills, require two expensive items in Tanzania -- petroleum fuel and pipe. Although piping to dips, headquarter areas and bomas is required, considerable effort is made to keep piping systems to a minimum. Diesel fuel is shs. 2.00 per litre (3.8 lit/US gallon) or shs. 7.60 per US gallon. Piping systems are too expensive on ranches if surface water collection can be developed.

Windmills

Windmills have not been used here. The Southern Cross Company of Australia has erected one windmill at Dodoma since November, 1975 and 10 more arrived in Dar es Salaam on January 2, 1976 for installation. These mills are direct drive and can operate on wind velocities as slow as 4 mph. The average daily wind velocity at the Kongwa Ranch near Dodoma is 7.3 mph. Other one-day tests show 8-10 mph at West Kilimanjaro and Rongai, and 10-12 mph at the Dakawa Ranch near Morogoro. We are arranging to get daily windmill recordings throughout Tanzania. The Shinyanga survey (3) listed wind miles upward from 60-120 miles per day or an average of 2½ to 5 mph which is too low for these windmills.

Surface Water

Surface water collection and storage is achievable and is our best means for livestock water sources and is much more practical in the cattle producing areas than boreholes. In certain areas though, such as the Ardai plains west of Arusha, the Sunanjiro plains west of Arusha, the Kilwei plains and the areas west of Lake Eyasi, it is hard to collect enough rainfall to fill dams.

Rainfall may occur in all months of the year in Tanzania and is highest during January to March in the south and during March to May in the north. This difference is due to north-south movements of the Equatorial Trough. The northern movement of the trough brings with it the first long wet-season rains that are derived from cool and unstable southeasterly air streams laden with moisture accumulated over the Indian Ocean. The southerly movement of the trough is associated with northeasterly air streams that are largely continental in origin and are warmer and drier. The southerly movement of the trough causes a second wet season of shorter duration and less rainfall. Two peaks of rainfall occur in the northern area and a single rainfall peak in the southern areas; The length of the dry season varies throughout Tanzania but is longest in the central plateau regions; any month receiving less than 40 mm of rain can be regarded as a dry month. For more details on rainfall see Appendix C.

Runoff is an important factor in surface water collection and it determines the amount of water yield collected in the catchment area. It depends on such factors as rainfall intensity, soil texture, vegetative cover, slope of land, temperature, etc. Conditions vary considerably; however, some practical rules can be used here for rough estimates of yields of catchments where the rainfall is between 25 and 40 inches per year. These are:

Catchment area of 1 square mile or less - 15-20 percent runoff

Catchment area up to 5 miles - 5 percent runoff

When considering intensity of rainfall, the following should be considered:

Rainfall in 24 Hours	Percent of Runoff
0.25 inch	0
0.50 inch	Up to 10%
1.00 inch	Up to 15%
2.00 inches	Up to 25%
3.00 inches	Up to 40%
4.00 inches	Up to 60%

This runoff from rainfall is the most important source of water here for livestock except permanent streams. Ranch lands in Tanzania are located in land areas of widely differing topography and the method of conserving or impounding this water depends on the available topography and the nature of the water sources.

The most favorable location for a dam is where the minimum amount of earthwork can be put across a valley to catch and store a good quantity of water with good depth. In flat areas where there are no defined water sources, a storage below ground line is excavated if impervious soil is found. Here tanks are called charcos.

Charcos are usually used in conjunction with a hafir. A charco consists of an excavated storage tank with a minimum capacity of 5,000 yrds.^{3} or 0.7 million gallons and is located immediately downstream from a small collecting reservoir formed by small bunds, which may be a modified hafir. A hafir in practice is a shallow dam quite long in length on flat land where the water is stored above ground. The water is transferred from the modified hafir to the charco by means of a pipe, usually 6 inches in diameter, to permit the silt to settle in the hafir before flowing to the charco. The charcos are normally fenced to prevent contamination, and water is removed by a pump for domestic use or to a watering tank. The application is limited but is required on some terrain.

The minimum size dam that should be considered is one with a storage capacity of 1,200,000 US gallons with a minimum storage depth of 10 feet or 3 meters, which under average conditions would require moving 3,000 cubic yards of soil. In constructing a dam of this size, we should obtain approximately 400 US gallons per cubic yard of soil moved. (The storage yield ranges from 300-1,000 gallons per cubic yard moved.)

It is estimated that a D-6 caterpillar and dozer will move 45 yards an hour at which rate it will require 67 hours to build this dam. The suggested hourly service charge for a D-6 and dozer is shs. 200.- per hour which gives a cost of shs. 14,000.- This is an attractive cost for this small dam at shs. 0.12 per gallon if we can average 45 cubic yards per hour with a D-6 and dozer with our inexperienced operators for the first year. This dam is too small and too shallow. We can anticipate a 35 percent evaporation and seepage loss over 180 days with a 10-foot depth of water.

A larger dam of 12- to 14-foot depth is more efficient for storage and from a construction cost standpoint. It should yield about 500 gallons per yard of soil moved. A 13-foot dam will store approximately 2,000,000 gallons. Figuring 500 gallons per yard of soil moved equals 3,333 yards of soil moved at 45 yards per hour at shs. 200.- per hour gives a construction cost of shs. 14,815.- or .0074 shs.

A 2,000,000-gallon dam less 30 percent for evaporation and seepage over a 180-day period would supply 1,400,000 gallons. This would supply water at a rate of 5 gallons per animal per day (3) to 1,555 head for 180 days or 3,777 for 90 days and 2,616 for 120 days. There is a difference of opinion on daily water requirements for cattle. Several sources use 5 gallons per day which I think is low for mature cattle in these temperatures.

Ranch plans developed here propose a water source for every 4,000 hectares which would provide water sources in 3-mile intervals. It is reported that the present water sources will supply approximately 50 percent of the water needed to utilize the total range areas (1,2).

On the TLMC holding grounds, there is a total of 145,000 hectares (Appendix A) of range. If 50 percent of this area (72,500 hectares) needs water sources at a rate of one for every 4,000 hectares, it would mean that 18 dams or other water sources need to be developed.

If water is to be supplied on the stock routes with a water source every 25 kilometers (Appendix A) with one half of the needed sources now available, it would mean that water sources must be developed on 1,100 kilometers of the existing routes and on the 2,300 kilometers of new stock routes. This would require developing a water source every 25 kilometers on 3,400 kilometers or 150 dams or other water sources.

Other factors that will locally affect water source developments are:

1. Evaporation of water surfaces here is high and amounts to 5 mm per day, especially in central Tanzania. In some cases, 50 percent of the water collected, especially in shallow storage, can be lost through surface evaporation.

2. Rainfall data is available, but very little runoff data is available. Special care must be taken to assure that runoff actually happens.

3. Some areas, especially in eastern Tanzania, have been mapped at 1:50,000 and some of these areas have been photographed, but very few areas where dams must be developed have been photographed.

III. RECOMMENDATIONS

The program we are recommending here is to concentrate mostly on earth dam construction as quickly as possible. The main reasons for this is that dam construction is our quickest and lowest cost method of establishing water sources; furthermore, the earthmoving equipment for the Phase II Livestock Loan has arrived. This equipment consists of:

6 D-7 caterpillar tractors with angle dozers, rippers, 2 tree pushers, and 2 tree shears.

3 D-6 caterpillar tractors with angle dozers and rippers.

4 Caterpillar 613 wheel scrapers.

2 Champion motor graders.

400 feet of used 2-inch anchor chain.

Although we do not have experienced operators, supervisors, mechanics or service equipment for this equipment, we plan to get this equipment operating as quickly and effectively as possible.

We plan to develop boreholes (wells) only where no other water source can be developed. This is because of the high development costs and lack of available drilling equipment. Where it must be used, it will take a minimum of 18 months to schedule the Ministry of Water and Power on a service basis to do the drilling. The costs for this service is shown on Page 5.

IV. REFERENCES

1. Appraisal of Second Livestock Development Project - Tanzania. Document of International Development Association 3/14/73.

2. Phase II Livestock Development Project Vol. 1 Sector Review and Project Description - University of Agriculture and Cooperatives and Tanzania Rural Development Bank, November 1971.

3. Shinyanga Water Supply Survey, Water Master Plan Study for Shinyanga Region, Main Report - Final Report by Nedco Hague, October 1974.

V. APPENDICES

APPENDIX A

Holding Grounds

Within TLMC, there are 23 holding grounds containing 145,000 hectares which are a part of the government parastatal livestock transfer or transfer system after the cattle have been marketed.

The purpose of the holding grounds is to provide feed and water for the animals before slaughter and for an isolation or a control area to implement effectively the veterinary requirements for the vaccination period.

Cattle normally lose weight during trekking or shipment and the objective is for the holding grounds to provide feed and water to permit the animals to gain weight so that the animals can retain their market weight.

Stock Routes

There are 2,200 kilometers of stock routes in Tanzania that vary in approximate width from 10 meters to 1 kilometer. They are used to "trek" or drive the cattle from market to market, market to shipping point and from shipping point to slaughter house. They are not fenced and, in many cases, do not have established boundaries other than villages, shambas (cultivated fields), railroads, roads or city streets. They are public byways in practice. Any feed or water sources on stock routes are treated as public property.

It is estimated that there is a water source of some sort on these routes at approximately every 50 miles. These water sources serve as both domestic and livestock water sources.

The plan is to add 2,300 kilometers of stock routes to a total of 4,500 kilometers.

APPENDIX B

Shinyanga Survey

In August, 1971, an extensive study of the water needs was started by the Netherlands in the Shinyanga Region (3) where a very inclusive evaluation of all water factors was made. They concluded that water development for livestock alone was marginal; but when domestic use was considered, it was beneficial to develop a water supply system. They considered surface water collection and both shallow and deep wells. The program includes a development program extending through 1991. Estimated development and operational costs for domestic use are:

1. Shallow wells or river wells with hand pump with a daily yield of 3,000 US gallons per day for 500 customers at shs. .01 per gallon (20 litre - 5 gallons per day per head).

2. Boreholes up to 40-feet deep with hand pumps with same yield shs. .02 per gallon.

3. Boreholes 1,320-feet deep with motor pumps with simple distribution system with daily yield of 3,250 gallons per day for 500 customers at a cost of shs. .07 per gallon.

4. Charco (a fenced south Texas earth tank) with hand pump with daily yield of 5,000 US gallons for 700 consumers at a cost of shs. .08 per gallon.

Marketing Tanzanian Livestock and Meat*

By Donald E. Farris**

Tanzania has a large livestock population and vast range resources. It has been an exporter of both livestock and meat and has the potential to increase both domestic and export sales. This industry can substantially increase its contribution to economic development by improved technology and improved management at every stage of the livestock and meat-subsector.

Modern methods of marketing livestock and meat are generally not employed which results in low quality of marketing services and in high costs for those activities where livestock and meat are moved a distance from local markets. Lack of modern flexible transportation is a severe handicap to livestock and meat marketing and is responsible for much of the high marketing costs.

A striking characteristic of the marketing system is that parastatal organizations operate much of the marketing system and fixed prices and charges are applied, but not in the case of all markets or on all products.

Very limited use is made throughout the sub-sector of price differentials to adjust for seasonal, geographic or quality costs and incentives. Where the open market is allowed to operate these differentials do exist to some extent. Fixed prices result in shortages of meat in urban areas during periods of favorable grazing conditions.

International Marketing

Canned beef has been the major meat product export but a variety of products have been exported. Tanzania has preferential import tax arrangements in the European Common Market for canned meat fixed under a GATT agreement. This agreement provides for an exemption from the 26% import tax and yields a competitive advantage compared to South America or Oceana, if the health and sanitation requirements can be met. Failure to maintain access to this market in 1975 cost the country a great deal. Every effort should be made to develop the canned beef export market, and to establish management that can make decisions and binding committments on export matters. The packing company (TPL) carried excessive inventories of canned beef in 1975 tying up capital needed for the purchase of cattle.

Exports of live cattle and fresh and frozen beef to neighboring countries offer opportunities to generate foreign exchange. Because the range is chronically overstocked it would be in the best interests of the economy to provide export incentives and not to provide export restrictions of unfavorable foreign exchange conversion. Encouraging exports can increase the market offtake and relieve some of the grazing pressure. Making it easier to export live cattle is one of the ways to increase producer income and reduce grazing pressure in the area along the borders with other African countries.

---

*Relates to conditions in 1975 and events up to July, 1976. Other aspects of this subject are covered in the paper by Kenneth W. Stokes.

**Professor, Department of Agricultural Economics, Texas A&M University and Coordinator of the Livestock-Meat Subsector Study.

National Marketing

The national market focuses on shipping cattle by rail to Dar es Salaam for slaughter. During July, 1975 the plant was slaughtering 590 head per day, 220 for the Dar fresh trade and 370 for canning. TLMC has the responsibility for procurement of these supplies for the packing company. Local markets were supplied mostly by local producers and traders and are influenced by the demands from the Dar market but generally are influenced more by local conditions. Fixed carcass prices, fixed delivered live cattle prices and fixed country purchase prices resulted in both TPL and TLMC losing their cash flow as inflation increased costs in 1975-76.

Pricing

Prices of cattle are determined on the one hand by the open market, especially those for local markets, but purchases by TLMC for Dar es Salaam were fixed at Tshs. 1.55, 1.50 and 1.45 per kg. of liveweight based on weight groups. These prices have remained the same over different seasons. Apparently this is an effort to establish a "floor" under cattle prices. In July, 1976, the concept of price differentials for weight and quality was approved for TLMC purchases of live cattle.

Retail prices are fixed by the Dar Development Corporation which operates the retail meat shops in Dar es Salaam. In other regions retail prices are set by other Development Committees. Even though prices are changed from time to time at different levels by administration decision, there was no plan to provide price differentials to reflect transfer costs, supply availabilities due to season or quality prior to July, 1976.

Retail markets do have rough quality differences that remain constant. These are usually for fillet steak, steak and meat with bones. "Graded beef" has a higher price structure. (See appendix for examples.)

Pricing can serve many functions in an economy. A primary function is for consumers to signal to producers the quality, quantity and time a product is desired. Producers and suppliers have incentives to react to those signals that make them the most profit and in turn signal back to the consumer what is feasible to supply. Clearly the policies of parastatals have reduced the opportunity for pricing to perform this function and have by maintaining low fixed prices at retail increased the role of pricing in income transfer from rural to urban areas.

For an efficient marketing system to be achieved in a heterogeneous product like livestock and meat, price differences must be placed on the different qualities, times and geographic locations. Striking improvements can be achieved in marketing in any economic system by placing price incentives on the products, times and locations consistent with consumer desires and industry costs. The open market does this automatically given a competitive framework, or skillful management can do it in a more formally controlled market.

Transportation

Live cattle are generally trekked to local markets, and if purchased for

use out of the area, are trekked to holding grounds and then to the railroad. Goats and sheep are sometimes trucked to the more distant markets, but trucks have not generally been used to move cattle.

Marketing puts tremendous stress on cattle. TLMC is in the process of improving the trekking routes, adding watering places and dipping facilities; however, there seems to be no plans to cope with the problem of the long ride (2-4 days) on the train without feed or water. High death losses and high shrink are not unusual for cattle purchased in the distant interior points like Shinyanga. Since the TLMC price for live cattle was the same except for each weight group, they tend to purchase a larger share of cattle in the more remote areas. Local markets out bid TLMC for cattle of higher quality and at more valuable locations. This increases the death loss and shrink.

The most inefficient aspect of marketing is the movement of cattle long distance by rail. Not only is it expensive to transport the cattle, but the 5-10% death loss and 15 to 20% shrink is also expensive.

Budgeted marketing and processing costs for August, 1975 when subtracted from the f.o.b. export price of U.S. $10 for canned beef left nothing to pay for live cattle in Shinyanga. (Table 1) Live cattle marketing costs can amount to as much as the price paid for the animal at interior points. The new plants can reduce this problem, however, differential pricing that reflects costs will shift the points which furnish live cattle to closer locations. Furthermore, off loading, providing forage and water should be seriously considered. Death loss from purchase to the plant at Dar has been about 7.5%. Shrink in weight has been about 20% for recent years. At a delivered price of Tshs. 2.70 lw./kg., the breakeven cost for canned meat was U.S. $18.55 per case in 1974 and U.S. $25.43 in 1975 f.o.b. the port at Dar es Salaam (Table 2).

If a saving of 5% in death loss and 10% shrink can be accomplished by providing feed before loading and/or off loading this would save TShs. 8910 per 100 head purchased. Part of this could be used to pay for the expense of such treatment of 100 cattle.

i.e., 5 hd x 220 kilo x Tshs. 2.70 = 2970 - saving in death loss
10 hd eq.x 220 kilo x Tshs. 2.70 = 5940 - saving in shrinkage
8910

In other words, controllable loss has been about Tshs. 89 per head and it would be profitable to spend up to 75 Tshs. if necessary to cut death losses to 2-3 percent and shrink down to 10%. At higher cattle prices, obviously more could justifiably be spent if required to cut losses.

Currently an off-loading charge is shs. 32/80 to 42/20 per head (Stokes). Officials may want to examine this rate and see if it can be reduced if other cattle can be loaded back on the same cars from the previous off-loading.

The Shinyanga plant should help reduce some of this transportation expense, death loss and shrink. Productivity can be increased 15 to 25 percent compared to recent experiences for those cattle that do not have to spend 3 days on the railroad without feed and water. Clearly, shipment of cattle requiring more than two days without feed and water is an unusual waste and considerable expense can be justified to avoid it.

Table 1. Estimates of Costs and Price Spreads for Beef - August, 1975.

	Steer 250 kg or 550# (up-country wt.)	
	Price/cost Tshs./hd.	Price/cost U.S.$/hd.
1. Canned Corn beef (24 x 12 oz.) 5 cases/hd. @ $10 per case f.o.b.	356.5	50.00
2. By-product value		
a. Extract @ 30.9/case	154.5	21.64
b. By-products @ 14.16/case	70.8	9.92
3. Total value products	581.8	81.50
4. Processing Cost	342.4	47.96
a. Material cost	(100.0)	(14.00)
b. Direct labor cost	(37.6)	(5.27)
c. Direct overhead	(31.9)	(4.47)
d. Fixed overhead	(172.9)	(24.22)
5. Sales cost Export tax 3%, Sales Comm. 5%	46.5	6.51
6. Transportation cost	80.0	11.20
7. Marketing cost	100.0	14.01
a. Marketing fees	(20.0)	(2.80)
b. Vet and holding ground	(14.00)	(1.96)
c. Other	(15.00)	(2.10)
d. Death losses @ 10%	(51.00)	(7.14)
8. Residual live price in country	12.9	1.81
Items 1-5 adapted from FAO/UNDP		
Items 6-7 adapted from LIDA(C)/M/6, Apr. 2, 1975.		
9. If eliminate fixed cost and death loss:	223.9	
Residual live price in country	12.9	
Residual live price per head becomes:	236.8	33.17
10. If eliminate ½ of fixed cost and ½ of death loss	111.8	
Residual live price in country	12.9	
Residual live price per head becomes	124.7	17.42

Conclusions:

1. Item 8 - If all costs of processing, transport and marketing are charged - up-country cattle essentially have a value of zero on today's (Aug. 1975) International canned beef market.

Conclusions (Contd.)

2. Item 9 - If eliminate fixed processing charge and death loss expense, 250 kilo steer has country value of 237 sh or 0.95 sh/kilo or U.S. $33/hd.

3. Item 10 - If eliminate 1/2 of fixed processing cost and 1/2 of death loss expense then 250 kilo steer has country value of 125 sh/hd or 0.50 sh/kilo or $17.42/hd. or 3.2¢/# which is best estimate of todays value of LAQ steer (Aug. 1975).

4. At $15/case f.o.b. value of steer = $535.5 + 225 extract + by prod. = 760.5 leaves a residual value of 191.6 sh./hd or 0.77 sh./kilo or $27 hd. up country.

Table 2. Data Used in Calculating Feasibility and Cash Flows of Dar Canning Plant (TPL) 1975.

	Sales	Tshs. Per hd.	U.S. $ Per hd.
1.	Canned Corned Beef @ $25.43/case. 24 x 12 oz. case (mixture of 1st and 2nd grade) @ 133.52 yield of 5.25 cases per head. (94.5#/hd) 58,600 hd.	701.00	98.18
2.	Extract and By-Products	268.53	37.61
3.	Pet Food and By-Products (4800 hd)	277.09	38.81
4.	Fertilizer and By-Products (1600 hd)	100.98	14.14
5.	Total Revenue from Canned Meat (Assumes Dar Butchery trade of 95,000)	1347.60	188.74
	Operating Expenses		
1.	Cattle purchases - Canning Line (191.67#) shs.2/70 kg from TLMC over the weighbridge	517.50	72.48
2.	Pet Food Cattle from Dar Trade	178.39	24.98
3.	Fertilizer Cattle	89.98	12.60
4.	Materials - Canning carcass	100.80	14.11
5.	Materials - Pet Food Carcass	93.70	13.12
6.	Materials - Fertilizer Carcass	6.00	.85
7.	Direct Labor (shs. 20/carcass over 65,000 hd/yr.)	20.00	2.82
8.	Overhead (shs. 50/carcass over 65,000 hd/yr.)	50.00	7.00

Another alternative is to work with the railroad officials and establish provisions for express trains to move cattle. There is little economic advantage to attempting to improve production practices if 25% of the slaughter cattle gross weight is lost enroute to the plant at Dar es Salaam. At least 5% death loss and 10% shrink, or 15% gross weight loss is avoidable with reasonable management practices.

Marketing Costs

Approximate marketing costs of live cattle in 1975 approached 50 percent of the value of the animal delivered to the TPL plant in Dar es Salaam. This can be illustrated simply by the TLMC buying and selling prices.

TLMC's selling price to TPL shs.	2.70/lw. kg.
TLMC's country buying price shs.	1.50/lw. kg.
Live cattle marketing margin shs.	1.20/lw. kg.
Live marketing margin	44%

Slaughter cattle marketing in the United States where most packing plants are located in the production areas, live marketing margins would generally not exceed 10%. Likewise, the cattle slaughtered locally in Tanzania would not likely cost more than an average of shs. 25 per head for marketing or about 10 percent of their value at shs. 250. Some of these cattle would move directly to slaughter with trekking costs being about the only expense. Consequently, the marketing costs that are of the main concern are those where cattle need to be transported out of the area.

Because of the need for moving cattle from one area to another due to widely fluctuating grazing conditions, lack of adequate railroad transportation, and lack of stored feed supplies--the NACO ranches need to work into their long range plans a system of cattle trucks and/or the "gooseneck" cattle trailers similar to those available in the U.S. Other countries have found that trucks and/or trailers are efficient modes for moving cattle. Railroads are too slow and inflexible. Lack of good roads present difficulties, but greater use of trucks and trailers can likely be justified.

Local Markets

Local market operations are generally characterized by once a week or once a month sales. They are generally low volume and have high unit costs. Facilities are minimal, most do not have water. Many small markets are needed because of the necessity to avoid long trekking distances by producers.

Market facilities need to be designed to improve the handling process to move cattle through at a more rapid rate. Herders typically sell 1-3 head per time and are discouraged to use the facilities if it takes the entire day to sell his cattle. TLMC could speed the process by using their own employees to handle cattle in the auction ring (or at least hire someone at the market to do this job). Owners have a tendency to want to keep their cattle in the ring as long as possible to get a little higher bid.

Fees could be adjusted to be more in line with the value of the animal. A flat fee of 20 shs. discourages the operator with lower valued animals to use the market. Regardless of the level of the charges, there is a basis

for charging different fees for the mature bulls and steers than for the cows and immatures.

It is desirable that a water source be available at or near the markets operated on a weekly basis as a minimum service. Although local markets seem to function adequately compared to the rest of the sub-sector, improved facilities and improved service would likely aid in more equitable pricing and in greater use of the facilities. Because of the low volume of sales and market revenue it appears that market fees may not cover the overhead and variable cost at some markets, but additional revenue from higher volume would likely pay for improved facilities at most locations.

Weighbridges are a desirable improvement that should improve equity and knowledge when installed at most markets by reducing error in pricing individual cattle, but other improvements such as additional pens, improved handling of sales and water are also important.

Recommendations

1. Introduce price premiums and discounts to provide the incentive to produce and deliver quality at the time and place it has the most value. This needs to start at the country buying points. Seasonal differentials are needed to attract more cattle when they are in good condition for slaughter and reduce grazing pressure in dry weather. Parastatal management can implement such a change by gradual adjustments of differentials to achieve the desired objectives. Although the traditional herdsmen is not always responsive to price changes there are always some operators that will respond.

2. Make a commitment to reducing death loss and shrink in transit. Experiment with providing good grazing or harvested forage before cattle are loaded. Experiment with off loading when cattle have been on the railroad two days. Begin longer run planning for the use of trucks and cattle where roads and capital permit.

3. Many auction markets need improved facilities, but they also need to adjust charges and operating practices that encourage buyers and sellers to use the markets. These operations have considerable overhead and may not pay their way if volume is not increased. Adequate pens for holding cattle before and after the sale, a number tag to identify owners cattle, a blackboard to record sales prices and a commitment to complete the sale in a reasonable time are a few changes that do not require much expense and would improve local markets.

4. Divide carcasses into quarters at the slaughter plant in Dar es Salaam and use forequarter meat in the canning operation. Hindquarter meat has a higher relative value in the fresh or frozen trade than in the canned product.

5. Establish clear lines of responsibility and authority for international sales and commitments. Servicing these markets requires being competitive on price, quality and on ability to deliver. It also requires constant study and communication with potential markets.

6. Retail markets need general improvement in sanitation, in facilities and in pricing and selling practices. There was no indication that the recommendations of the thorough study or meat retailing completed in 1973 by FAO/UNDP were being implemented. Retail costs appeared high only with low volume sales outlets.

7. Review the possibility of establishing a canning line at the Shinyanga plant. In addition, consider renovating the plant at Arusha for a canning line that would operate at least seasonally. In light of the high cost of transporting live cattle and refrigerated beef most of the canning should be done in the interior.

APPENDIX

Detailed Marketing Information from Interviews July, 1975

Meat Packing

The plant at Dar es Salaam was currently slaughtering 590 head of cattle per day. Fresh trade was using 220 head that were sold to the Dar es Salaam Development Corporation (DDC), and 370 head were being canned. The company had 1200 employees and operates six days per week. Cattle are slaughtered at night and the canning line operates during the day to process cattle slaughtered the night before. The British have required that these carcasses be chilled prior to deboning and canning. TPL is currently building the facilities to meet this requirement.

Unlike many canning operations in South America, TPL cans most of the carcass rather than using the lower quality portions. However, NCCO (National Cold Chain) markets some hindquarters and filet steak from the canning line. It would appear that the DDC could provide a better product to consumers if they would purchase a greater proportion of hindquarters rather than straight carcasses. My observation is that the parastatal organizations have great difficulty in developing pricing policies between themselves that facilitate efficient utilization of the various qualities and types of meat and livestock.

Current investment plans call for (1) renovation of the TPL plant at Dar es Salaam and addition of refrigeration facilities for chilling beef before boning, (2) construction of a slaughtering and freezing plant at Shinyanga, and (3) construction of a slaughter and freezing plant at Mbeya. The Shinyanga plant is to ship frozen meat to Dar es Salaam for canning and the Mbeya plant is to slaughter for export to Zambia and ship frozen meat to Dar es Salaam. Because of the problem and cost of shipping frozen meat from Shinyanga it appears to me that a canning line would be more economical at Shinyanga.

The current buying policy of a low flat price over the country results in TPL and TLMC buying many cows from distant areas that do not have the stamina to make the long trip. TPL's death loss for cattle purchased up-country was over 17% in 1973 and was 7% in 1974. Reducing death loss to 2 or 3 percent has been accomplished at times and should be a goal of the TLMC operation.

Few sales have been made from the 1975 TPL pack and most of the inventory is in storage in Dar es Salaam. Estimated cost of production is: U.S. $18.55 per 24 x 12 oz. case. The world market is far below that level. Prices have been as low as U.S. $10 f.o.b. Slaughter for the fresh trade cost about 39.60 TShs. per head, or U.S. $5.60 head.

New Packing Plant Construction

(1) TPL - major renovation start October - will take 13 months	31.56M TShs.
(2) Shinyanga plant started May 1	46.00M TShs.
(3) Mbeya plant start September 1	43.9M TShs.
Total bill for all plants	121.8M TShs.

Part of fund from ID U.S. $6.1M.

Part from Sweden (Grant) U.S. $16.0M

NCCO has a cold storage facility in Dar es Salaam (2100 cubic feet or 500 ton capacity). At the time of the visit it was not being used to capacity.

Refrigerated truck fleet consists of:

4 trucks - 20 ton capacity - operate at 16 ton because of poor roads. Trucks are 2 years old.

3 trucks - 9 ton insulation only.

Plan to buy:
1 truck - 9 ton insulated only
1 truck - 9 ton refrigerated

NCCO is to haul frozen meat from the new Shinyanga plant, but has not officially been advised to get ready. Orders for trucks take a long time for delivery. It will take 5-20 ton trucks to handle the expected volume.

Estimated cost of shipping boneless beef from Shinyanga is 1.56 TShs./kilo or .56 TShs./kilo live weight equivalent assuming there is no back-haul. This compares with .88 TShs./kilo live.

The NCCO accountant stated that to cover replacement costs the rates on refrigerated trucks would need to be increased by 50%. This suggests the only saving in transportation costs due to the Shinyanga operations will be the reduced shrinkage and death loss from the live cattle shipments. If this exceeds the cost of freezing the boneless beef in Shinyanga, then it will be an efficient operation. However, if the frozen product could be moved by rail there should be additional saving. If insulated only trucks can be used this would result in additional saving.

Cost of deboning and freezing beef is now US$300/M.T. Ocean freight cost to Alexandria, Egypt is US$160/M.T. from Dar es Salaam. Cost of graded beef f.o.b. Dar es Salaam is US$1050/M.T. Adding US$300 for deboning and freezing gives US$1350/M.T. f.o.b. This assumes 2.70 TShs./kilo liveweight and a conversion of .36 from liveweight to deboned. This means a cost of $1510/M.T. delivered to Alexandria and Uruguay recently sold 3,000 tons to Egypt for US$780/M.T. delivered (these were frozen carcasses).

Australia offered Alexandria beef at US$936/M.T. Zambia has purchased 200 M.T. of frozen deboned beef from Australia. It comes through Tanzania and NCCO trucks are hauling part of it. Tanzania is shipping 5-7 tons/week of deboned beef to Commores at US$1400/M.T. f.o.b. This allows 7.75 TShs./kilo to be paid for carcass beef to break even (or US$0.46/lb.).

Cold Storage and Distribution

NCCO sells meat to hotels, universities, railroads, Bank of Commerce, etc. Also sells freezer orders to individuals. Mostly expatriates. Beef is 50% of sales and 35 of sales is graded beef. Processed meat is 14% of volume, poultry is 12%, mutton and pork is 9% and fish is 15%. "Graded" beef carcasses cost $6.50 TShs./kg from Konowa. TPL beef is 6.10 TSHS./kg.

(5.50 + .60 transportation). The prices of pork, chicken, lamb and goat are higher than beef and are not controlled. Likewise prices of "graded" beef from Konowa is not controlled.

At the moment there is excess truck capacity on hand. Some of it is being used to haul cement, grain, etc. Refrigerated truck rates are 90¢/kilometer/ton loaded distance for a 20 ton truck. Over most roads trucks only carry 15 tons because of poor road conditions.

Insulated only trucks haul Konowa beef at 75¢/kilometer/ton and the 1.5 ton insulated truck hauls for 5 Shs./kilometer/ton. A very small percentage of the beef supply in the country is refrigerated. Most is slaughtered in the city in which it is consumed. Little refrigeration is available at the wholesale, retail or consumer level and it is necessary to cook meat within 24 hours after it is slaughtered. This is true despite excess capacity in the National Cold Chain storage and in their trucks.

Retailing

Dar es Salaam Development Corporation

The (DDC) operates 90 retail butcher shops. Eighteen months ago they sold 700 tons of beef per month. Now they sell 500 tons per month because of the increase in private sales. TPL is their primary supplier but another slaughter house in Dar es Salaam provides 50 head per day. Private sales account for about 100 head per day. These are sold outside the old city but include the Dar es Salaam region. Future plans call for all retailers to buy from DDC. Prepackaging is being done for some stores and they plan to prepackage for the small volume stores. The current system involves a one kilo plastic bag of meat with bones. One small store had a small refrigerated case and sold only the one kilo packages. The store was operated by two ladies. They reportedly sold 200 kilos per day. They had no other meat or poultry on hand. Customers were doing a great deal of sorting to find the best package as quality was not uniform and price per pound was the same.

Most of the stores clearly have more employees than they need. Retailing costs (not including distribution) ranged from .10 - .60 TShs./kilo, partly because of the volume per employee. The following prices were currently being charged in Dar es Salaam:

Meat with bones	Tshs. 5.90/kilo
Steak	11.00/kilo
Filet steak	15.00/kilo

No price control on the following:

Goat meat	Tshs. 9.00/kilo
Sheep meat	9.00/kilo
Chicken	12.00/kilo
Graded beef	
filet steak	18.00/kilo
sirloin	19.00/kilo
Pork	(no prices reported)

DDC shops sell 100 sheep and goat carcasses/day and 10 graded beef carcasses per week. These come from Dewhurst. Formerly DDC provided a wider variety of cuts and prices but said they stopped and went to the more simple pricing because of corruption.

DDC pays TSh. 2.70 per kg. liveweight across TPL scales and TLMC bears the cost of down-graded carcasses. This is about 5.40/kilo for carcasses. The average price received by DDC for hindquarters was 6.25/kilo and 5.80/kilo for forequarters. Private butchers get their beef carcasses for about 5.25/kilo.

Most butcher shops did not have the minimum facilities for cleanliness and sanitation and there apparently had not been any incentives or instruction for the employees in proper sanitary and handling methods even for the available facilities.

The thorough study of retailing completed in 1973 entitled "A Development Program for DDC's Meat Distribution, 1975-1980," FAO/UNDP apparently had little impact on the operation and management of the markets. I recommend this study be reviewed again by the DDC. It appears the quality and service could be substantially improved with improved management and accounting control and a minimum of capital expenditures. However, better facilities at most locations would indeed be desirable.

DDC has 1200 people on the payroll. Meat cutters get the minimum wage of 380 TShs./mo. Butcher shop personnel get 440 to 1500 TShs./mo. This is related to volume of sales in the shop. About 14 shops are using the prepackaged meat. This saves an estimated 0.25 TShs./kilo.

DDC has a problem getting good meat from November to February. This is when cattle are thin. DDC is considering developing a fattening ranch to solve part of this problem.

Piggyback trucks could help in the transporting of carcasses from Shinyanga to Dar es Salaam. Roads are too bad for direct truck delivery. Railroad rates on refrigerated cars are about 1/3 of the refrigerated truck cost from Shinyanga, but all refrigerated cars are in Kenya. Unless refrigerated cars are available for the Shinyanga to Dar es Salaam rail route the frozen meat line will not likely be able to operate at capacity and will be a high cost operation due to transportation cost.

Cattle Marketing

Cattle in Arusha have been quarantined because of FMD. In the past have been trekking a few cattle to Monyoni holding ground, holding for one week and then shipping to Dar es Salaam by rail. Arusha has no cattle wagons available for shipment to Dar nor can the prevailing price justify shipping to Dar. Buyers at a small market (Shambari) paid an average of 2.60 TShs./kilo for cattle (25 miles SE Arusha and 40 miles from Moshi). This is a higher net price than the delivered price to TPL in Dar when the shrink and death loss is considered.

TLMC marketing charges

4.00 TShs./head for sheep and goats
23.60 TShs./head for cattle include:
20.00 TShs. marketing charges
2.60 TShs. holding ground fees
1.00 TShs. stock route fees

TLMC needs to adjust these fees because it encourages trading outside the market. A possible schedule might be:

Old cows and immatures	10 TShs./head
Bulls	15 TShs./head
Steers and oxen	20 TShs./head

In Arusha TLMC was only operating the markets. Cattle were not being bought because they were not able to ship to Dar or compete in the local markets.

The market at Shambari, 25 miles S.E. of Arusha had 200 head of cattle. About 70 were passed out unsold. The average price offered was 2.60/kilo. Steers were selling as high as 800 TShs./head or 2.70 TShs./kilo.

Goat prices	Range TShs. 60 - 180, Ave. = 100 TShs./head
Sheep	Range TShs. 80 - 200, Ave. = 120 TShs./head

The auction was terribly slow. No market personnel were in the ring to move the cattle out--only owners. The auctioneer started the cattle low and bids were slow. Many of the cattle were brought in by traders, and there was brisk private treaty trading taking place on the market just as there was before TLMC established an auction on the grounds.

LIVESTOCK MARKETING - EXISTING SITUATION AND RECOMMENDATIONS FOR CHANGE*

K. W. STOKES, LIVESTOCK ECONOMIST
TEXAS A&M UNIVERSITY AND
TANZANIA LIVESTOCK MARKETING COMPANY

INTRODUCTION

Marketing is the major problem facing the Livestock Industry in Tanzania today, because everything which has been discussed in the Conference must come back to the economic aspects. Consideration must be given to the consumer demand for meat and to the farmer who produces the beef.

The farmer and consumer meet in the market place to determine what quality, how much and when beef is required. The mode of communication is in terms of prices for livestock and meat products.

How well this communication occurs depends very much on how the marketing system is organized. To evaluate the marketing system we need to examine the farmers production potential, consumers wants and efficiency of the marketing system in terms of costs and price determination.

THE TRADITIONAL HERD AS A SUPPLY SOURCE

Reasons for Owning Cattle:

It is generally thought that farmers operating in the traditional sector are not responsive to prices and other economic forces due to the widely held belief that farmers place more emphasis on the social factors of cattle ownership than on the economic factors. This belief has prevented an in depth analysis of farmers response to market forces from being conducted. Outside of a few educated guesses, little is actually known about what forms traditional production takes. Preliminary data from the survey of traditional livestock producers conducted by Greg Sullivan of Texas A&M University indicates that farmers engaged in livestock production for basically only one reason which is the satisfaction of his consumption needs. In answer to the question covering the most important reasons for keeping cattle over ninety percent of livestock owners in Arusha Region stated for milk, meat and cash income.

Environmental Factors:

It has been long recognized that, if the traditional herdsmen adopted improved disease control and husbandry practices, substantial increases in productivity could occur. Higher production resulting from the use of improved husbandry practices has been demonstrated on research units and commercial ranches over the years. However, few of these improved techniques have been actually accepted and adopted by traditional producers. The usual justification for producer's failure to accept change has been that the farmers keep cattle for social reasons rather than economical ones. If the husbandry methods employed by traditional herds were evaluated from the farmers viewpoint, taking into account the goals that the farmer has established for himself and the environment with which he must deal, a more accurate answer would be available. Over the years herdsmen in Tanzania have experienced outbreaks of Rinderpest, East Coast Fever and severe drought which has caused large number of deaths and reduced herd size. In recent times Rinderpest has been brought under control, but the traditional herdsmen still probably

*Presented to the Third Annual Scientific Conference of the Tanzania Society of Animal Production, Mwanza, May, 1976.

operate under the expectation that new outbreaks will occur in the future. Even with Rinderpest under control, the producer must still deal with East Coast Fever and recurring droughts. Faced with this type of environment, he has probably adopted the attitude that the more cattle that he carries into the year, the more he is likely to have surviving at the end.

Communual Grazing Rights:

The system of communually owned pasture land, also, influences his attitude toward herd size. Under this system any one farmer is better off grazing as many cattle as he possibly can acquire because if his cattle are not grazing on pasture land, someone else will. Any reduction in herd size by one man will be met by increased herd size by another.

Store of Wealth:

Another factor which reinforces the tendency toward large herd sizes is that cattle serve as a fairly safe means by which wealth can be stored and in addition serve as good hedge against inflation. It should be remembered that with few exceptions, cropping is the main income source for most farmers and cattle account for only a minor portion of his total income. After a successful crop year a farmer is more likely to invest his savings from his crops in cattle than in a savings bank account. Outside of the fact that he probably has a distrust of things he does not understand, the interest rate paid on savings accounts is less than the inflation rate in cattle values. The calves which are born also contributes to increased wealth. Even under traditional husbandry techniques, investment in cattle is better than placing savings in the bank.

Consumption Needs:

Cattle also serve the nutritional and cash income needs of the rural people. Milk is an important item in the diet of cattle owners. The milk consumption of calves is often limited to increase the amount available for family needs and for sale. The value of milk is best demonstrated by the prices paid for milk in the rural markets. It is not usual for milk to sell for over shs 2/- per litre in some areas. Milk fat sales for ghee production is an important income item in a few areas such the Mara and Nzega. The value of milk used for domestic consumption and sale often exceeds the value of the weaned calf.

There appears to be no general concensus of opinion concerning the use of cattle for meat in rural areas. Livestock officers generally feel that farmers rarely slaughter cattle to meet his consumption needs. Various studies have to a large extent confirmed that healthy cattle are slaughtered only on very special occasions. If these statements are true and the live animal offtake is approximately five percent, then where do the rural people of Tanzania get the 7.3 kg of beef which the 1969 Household Budget Survey estimated that they consume? It is my contention that farmers in most cattle areas do eat the meat of animals which have just died, or have been slaughtered just before dying. Deaths of people due to eating meat of cattle which have died of anthrax and thefts of carcasses on holding grounds bears this contention out. The health hazard of eating sick and dead animals is just not apparent to many rural people. This does not occur in all areas of Tanzania, but it is wide spread enough to warrant its evaluation from nutritional and economic viewpoint.

Cash Income:

Cattle are sold when the need arises for converting savings into cash income. Bulls and steers are marketed as a slaughter stock sometime after their fourth year and will continue to grow up until their sixth or seventh year. If the farmer is not pressed for cash, it is easy to understand why he may delay marketing cattle. Any additional death losses are probably offset by rising cattle prices and the slight weight gains. No additional cost of grazing are incurred due to communual grazing rights.

Social Factors:

From an economic viewpoint, the social factors of prestige, dowry, tribal traditions have developed around the economic justifications for keeping cattle. The man who owns more cattle is better off than the non cattle owner because he has accumulated greater savings which provides him protection against bad crop years. It is natural that the cattle owner is going to have greater community prestige than the non cattle owner.

Brief Analysis of Alternatives Facing the Traditional Producer:

To obtain some measure of the probable supply response from the traditional herd, a simple analysis of the adoption of improved husbandry techniques from the producers viewpoint has been undertaken. From economic theory we know that the amount of beef that farmers are willing to produce and sell depends upon the price he receives, his cost of production, and the opportunity cost of other types of production. His cost of production is primarily affected by the production techniques he adopts and the prices he must pay for his inputs.

Examining the differences in level of production in a herd of Tanzania Shorthorn Zebus managed under traditional and improved methods, impact of acceptance of improved practices by livestock owners can be measured in terms of increased productivity. Production coefficient of the traditionally managed herd are based on widely quoted but unconfirmed estimates. It is recognized that these coefficients vary from year to year and from herd to herd, but most officials would not find any major objection to them. The estimates for the traditional herd are as follows:

Females over 3 years of age which calve	45%
Deaths of calves before one year of age	30%
Deaths of cattle over one year of age	10%
Selling age of males	7 years
Sale of surplus and cull females	2.8%
Market offtake	4.5%

The same herd managed using the production techniques and management levels presently employed on parastatal ranches would reasonably be expected to produce the following coefficients:

Females over 3 years of age which calve	60%
Deaths of calves before one year of age	15%
Deaths of cattle over one year of age	5%
Selling age of males	4 years
Sales of surplus and cull females	18.0%
Market offtake	12.7%

The composition of herd, deaths, and sales as a percent of herd under traditional and improved management techniques are shown in Table 1. The sales output per animal held in herd shows an increase of over 300 percent after the higher selling weights are considered (from 11.03 kg to 34.24 kg liveweight per head).

Now the question arises, as it has many times in the past, of why doesn't the farmer change his methods to achieve these higher production levels and improve his income and economic well being? The typical answer given is that farmers are more interested in the social aspects of cattle ownership than the economic ones. Before this easy answer is accepted lets review the changes which must take place before the higher production levels can be achieved. The most important one change that must occur is that the cattle owners must match his cattle number with his grazing availability to ensure ample feed supplies for the cattle. Under commumual use of the land with no control over grazing rights, farmers as individuals cannot do this, because any reduction made by one farmer will be offset by another. Some form of grazing control must be started. The most likely way of initiating some form of grazing control is in the organized villages which are being formed by Government and the Party. These villages will be granted use rights to a piece of land and will have the power to control stocking rates. Once the grazing has been controlled, then, it will be necessary to apply other changes to achieve the production levels presented in Table 1. These changes include regular control of ticks, ample water and watering facilities, some supplemental feeding of salt and minerals, and a strong animal health program etc.

If these improved techniques were available without costs, they could be expected to be widely adopted by farmers. Since there is a cost we must consider these added costs in relation to the value of the incremental production. Consideration must also be given to present beef consumption levels of producers. As pointed out earlier, some meat from the estimated deaths is consumed at the present time. To obtain a proper evaluation some of the increased production will have to go for rural consumption. The difficult part is this simple analysis is the questions of how much reduction in stocking rates, what amount of cost increases, and how much beef consumption.

The only conclusions to draw from this analysis is that there are situations where adoption of improved techniques could lead to reduced income to farmers. In situations where the returns are positive, the risk associated change may outweigh the benefits. It is unlikely that a mjaor increase in production will be forthcoming unless substantial extension and investment efforts are directed toward the following areas:

1. Removal of the older and unproductive stock as barren and weak cows and males over five years of age.
2. Controlled stocking rates by village management committees.
3. Increased grazing area for the remaining herd - additional stock water in present ungrazed areas and removal of tsetse fly infestation.
4. Strong efforts toward insuring all dips are operating and are at proper strength.
5. Simple meat inspection at village level.
6. Wide availability of veterinary supplies to producers and instruction on proper use.
7. Increased cattle prices to producers.

TABLE 1: Hypothetical herd composition, deaths and sales, using estimated production coefficients of traditional and Improved Management Techniques.

	TRADITIONAL				IMPROVED		
	Est. Livewgt. Trad/Imp.	Precent of Total Head	Deaths as % of Total	Sales as % Total	Percent of Total Head	Deaths as % of Total	Sales as % of Total
Cows over 3 yrs.	220/250	40.21	4.02	1.11	32.86	1.64	5.92
Calves born	-	18.09	5.43	-	19.72	2.96	-
Heifers							
12-24 Mo.	120/135	6.33	.63	-	8.38	.42	-
24-36 Mo.	175/195	5.70	.57	-	7.96	.40	-
Males							
12-24 Mo.	130/145	6.33	.63	-	8.38	.42	-
24-36 Mo.	195/220	5.70	.57	-	7.96	.40	-
36-48 Mo.	235/265	5.13	.51	-	7.56	.38	-
48-60 Mo.	245/275	4.62	.47	-	7.18	.36	6.82
60-72 Mo.	255/285	4.15	.41	-	-	-	-
72-84 Mo.	255/285	3.74	.37	3.37	-	-	-
		100.00	13.61	4.48	100.00	6.98	12.74

Sales output per animal held in the herd	Traditional	Improved
Cows (kg/yr)	2.44	14.80
Males (kg/yr)	8.59	19.44
TOTAL	11.03	34.24

Deaths plus rural consumption per head held in herd (kg/yr)	16.86	8.93
Total offtake per animal held in herd (kg/yr)	27.89	43.17

TABLE 2

ESTIMATES OF CATTLE AND HUMAN POPULATION

	Cattle Population		Human Population Est. 1975	Cattle Per Capita	
	Kilimo 1969	FAO 1972		Kilimo 1969	FAO 1972
Arusha	1,848,376	2,376,891	800,000	2.3	3.0
Coast	71,518	8,986	581,000	.1	*
Dodoma	1,454,375	767,300	853,000	1.7	.9
Iringa	780,040	235,705	886,000	.9	.3
Kigoma	45,767	79,438	534,000	.1	.1
Kilimanjaro	249,828	241,542	851,000	.3	.3
Mara	849,319	769,868	718,000	1.2	1.1
Mbeya/Sumbawanga	726,364	422,745	1,218,000	.6	.3
Morogoro	108,139	92,477	804,000	.1	.1
Mtwara/Lindi	12,200	6,512	1,361,000		
Mwanza	733,782	872,777	1,308,000	.6	.7
Ruvuma	7,196	25,818	491,000		.1
Shinyanga	3,661,813	1,381,949	1,109,000	3.3	1.3
Singida	780,764	775,795	513,000	1.5	1.5
Tabora	595,078	872,263	666,000	.9	1.3
Tanga	281,078	176,546	955,000	.3	.2
West Laka	117,427	164,338	773,000	.2	.2
Dar es Salaam	-	-	517,000	-	-
TOTALS:			14,934,000		

*Less than .05

TABLE 3 Required Cattle per capita to meet consumption requirements.

Consumption Requirement	Consumption		Offtake	
Kg.	5%	7.5%	10.0%	12.5%
5.0	1.0	.67	.50	.40
7.5	1.50	1.0	.75	.60
10.0	2.00	1.33	1.0	.80
12.5	2.50	1.67	1.25	1.0

The above recommendations have been made many times in the past, hopefully under the villagization program, the required changes will occur and production will increase.

PRESENT LEVEL OF PRODUCTION AND CONSUMPTION IN TANZANIA

Data Limitations:

There are no reliable estimates of the level of beef production or consumption in Tanzania at the present time. Even the level of beef consumption in Dar es Salaam cannot be accurately estimated because of the number of private butchers which operate in the fringe area not covered by the Dar es Salaam Development Corporation. Mackenzie of the Economic Development Bureau raised serious doubts about the reliability of the 1965 cattle census and the Ministry of Agricutrure projections of continuous growth in the National herd. The FAO census carried out in 1972 is still not available for analysis, except the preliminary data on district basis. Village counts are being carried out by the regions, but most have not been completed. Livestock sales in TLMC markets is available but these figures do not account for many sales outside the organized markets. No measure of the level of beef consumption has been taken since the 1969 household budget survey. Data on urban slaughter is not available from the Ministry of Agriculture.

Given this limitation of data, any attempt to estimate production and consumption of beef is a risky operation. To obtain some measure of cattle available for local consumption and export, certain assumptions will be made which are subject to a wide degree of variation and arguement.

Production Estimate:

Two estimates of the cattle population will be used, namely the Ministry of Agriculture 1969 official estimate and the primary figures of the FAO census. Four level of cattle offtake available for consumption will be used, ranging from 5% to 12.5%. Based on the hypothetical herd shown in Table 1, a 12% consumption offtake would mean that approximately 60 percent of estimated cattle deaths would be available for consumption. An average carcass weight of 100 kg. is used to estimate beef available.

Consumption Estimate:

The consumption of beef varies considerable between areas based on beef prices, average income, availability, prices of ohter meats, and cultural differences. The 1969 Household Budget Survey estimated beef consumption per capita at 7.3 kg for the rural mainland, 21.5 kg for Dar es Salaam and 18.8 kg for the nine largest towns.

Four estimates ranging from 5 to 12.5 kg is used to estimate consumption for all areas. The projected 1975 population published in the Population of Tanzania by Bralup and the Bureau of Statistics is used to estimate regional population figures.

In Table 3, the two estimates of cattle population and the estimated 1975 population are compared to estimate the number of cattle per capita in each of the regions. In Table 4 the estimates of per capita consumption are matched with consumption offtakes (assuming 100 kg carcass) to determine cattle per capita necessary to meet the requirements. Using the 1969 Kilimo estimate, nine regions can be considered beef deficit areas using the estimated 5 kg per capita consumption offtake. Under similar conditions using the FAO cattle population estimate, eleven

areas are deficit. This means that between 45 and 60 percent of the population of Tanzania live in cattle deficit areas. The largest deficit areas are Lindi, Mtwara, Ruvuma, Kigoma and the coastal areas. The major surplus areas are Arusha, Shinyanga, Nzega, Singida, Mara and Dodoma.

AREA ANALYSIS OF SUPPLY AND DEMAND SITUATIONS

The Northern area comprising Arusha, Kilimanjaro and Tanga region is probably the largest market in Tanzania. The area is fairly well in balance with cattle to human ratio of about one i.e. (2.6 million cattle and 2.6 million people). High incomes and a tradition of being meat eaters tends to force cattle prices up. The smuggling of cattle into Kenya in exchange for Kenya currency also brings in additional upward pressure in price. Animal fat sells at premium prices of shs.15/- to shs.20/- per kg in the Arusha/Moshi market. Retail meat range between shs.4/50 and shs.5/50 per kg for meat with bones. There are minor flows of cattle into the area from Northern Singida and Dodoma, Maswa and Shinyanga. Attempts to obtain cattle at reasonable prices for export slaughter have not been successful. There were official sales of 161,802 head in 1975.

Singida and Dodoma are surplus areas which supply primarily the Morogoro, Dar es Salaam and coastal areas. With between 1.5 to 2.0 million cattle the two areas can be expected to market between 80,000 to 130,000 head per year (118,235 head in 1975). After accounting for some movements in Arusha and Iringa, immature stock, the urban slaughter, the supply of slaughter stock is insufficient to meet the requirements of Morogoro and Dar es Salaam markets. Prices in Dodoma are generally lower than Arusha but are higher than Singida. Male slaughter stock sells between shs.2/10 and shs.2/40 per kg in the Dodoma markets. Singida prices are 10 to 20 cents lower.

The Shinyanga and Tabora areas in particular Nzega District is a large surplus area. The size of the herd is not known. The wide difference between the Kilimo and FAO figure raises serious question about the figures. The two areas average marketings for the 1968 to 1970 period was 81,180 head. In 1975 TLMC collected fees on 111,843 head. Kilimo estimate of 3,661,813 head in Shinyanga seems unreasonably high in relation to land availability. The total area of land is 50,764 square kilimeters which gives 72.13 head per Sq. km. If the tsetse areas were excluded the figures become even more out of line. The FAO census matches fairly well with village counts which have been carried out in Tabora Region. There has been a large movement of cattle into Nzega from the north. Combined, Shinyanga and Tabora can be expected to produce a surplus over local requirements of between 80,000 to 130,000 head of slaughter cattle per year. With Singida and Dodoma basically supplying the Dar market, Shinyanga and Nzega cattle are available for export slaughter or increased sales to the southern regions of Lindi, Mtwara and Ruvuma.

Of the three regions surrounding the Lake only Mara has any significant surplus. West Lake is a definite deficit area with cattle prices averaging over shs. 2/50 per kg lw. The high cattle population of Mwanza is offset by a very large human population and cattle prices tend to rise higher than Shinyanga at above shs. 2/-. Cattle move into West Lake by boat from Mara and Mwanza by trekking from Shinyanga. If there are no movements into Kenya, Mara would be the lowest price market in Tanzania due to distance from large deficit markets.

The southern highlands areas of Iringa and Mbeya have a marketing situation similar in someways to the Northern zone. Incomes are fairly high and cattle supplies are limited. The FAO data indicates that the Kilimo estimates are possibly wrong (658,000 vs 1,506,404 head). Marketing tends to be fairly low averaging 24,000 between 1968 - 1970 and 37,127 head in 1975 by TLMC. Heavy market pressure from Ruvuma Region, also, tends to keep cattle prices fairly high. Some cattle move from the Sumbawanga area into Northern Zambia. The areas low figure of cattle per capita (FAO data) indicates that the meat plant under construction at Mbeya will operate much below capacity and will meet the same degree of success as the old Arusha plant. After the Ministry of Agriculture presented the World Bank and TRDB with an analysis of the expected throughput, financing of the plant was withdrawn. LIDA has obtained the financing of the plant from another source.

The major deficit markets are Dar es Salaam, Zanzibar, Mtwara, Lindi and Ruvuma. The Dar es Salaam market is given preferential treatment by government in order to ensure ample cattle supplies. Prices over several years have been tightly controlled and kept below the costs of cattle, marketing and slaughter. Beef consumption in Dar has grown from 47,000 head in 1969 to over 100,000 head in 1975.

Meat availability in the Southern market is generally very eratic. Probably the last time meat was available on a regular basis was before NARCO closed its Nachingwea ranch operations. NARCO use to stock up its ranch and control the flow into the markets on a monthly basis. When NARCO was faced with rising cost and the local authorities would not increase the local prices. NARCO had no choice except to sell out. At the present time TLMC has responsibility for supplying the market. Poor performance by Local District Devēlopment Corporation involved in paying for cattle prevents TLMC from sending supplies into these markets on a regular basis. Low incomes and high cattle prices also keep the consumption of beef low. With the distance from the nearest surplus market, namely Dodoma, there is little prospect for a lower beef price. A positive point, however, is that beef ranching could be profitably expanded if reasonable production coefficients could be obtained.

In summary the availability of cattle for export from Tanzania will be largely determined by local pricing policies, income levels and the success of efforts to increase production within the traditional herd. For example if consumption were increased in the southern markets, any exportable surplus would be eliminated overnight. Faced with the needs to increase export earnings and also improve the nutritional status of the people very careful consideration must be given to all factors affecting the beef industry. Price controls in urban centers are intended to increase beef consumption, however this prevents producers incomes from rising and curtails availability for export. The management of the parastatal marketing organization must be closely controlled to ensure that farmers receive all of the possible benefits available in the market place. The research and extension efforts of the Ministry must outline all the alternatives available for increased production and communicate them to the producers.

PROBLEM AREAS IN LIVESTOCK MARKETING

There are several problem areas in our existing marketing system which must be recognized and dealt with by government and the parastatal institutions involved in livestock development. To overcome some of the problems, the Government established the Tanzania Livestock Marketing Company - with the goal of maximizing the marketing services to livestock producers. The responsibilities of TLMC include operating and managing of livestock markets, stock routes and holding

grounds and buying of livestock on order for national institutions.

The efficient operation of the livestock markets located throughout the country is the most important function of the marketing company. It is in these small markets that the producers and consumers first got together to determine how much is to be produced, of what quality, when it should be available, and how it is to be produced. These questions are answered when the value of each and every animal is determined. To evaluate the efficiency of the existing marketing system in determining these values, review of several aspects is necessary.

Livestock Markets:

Market Facilities:

There are over 200 markets in the country. Most of these markets operate only once a month with a few being operated on a weekly basis. These markets are operating efficiently when the producers are able to show their cattle in the best possible condition and the value of his cattle is accurately determined. To show his cattle, well designed and properly maintained facilities are necessary. Most of the TLMC markets handle fewer than 150 cattle market per day, so there is no need for those facilities to be very elaborate or costly. Basically all that is needed is an auctionring which provides a working space and shade for the clerks, a good view of the cattle for the auctioneer, buyers and spectators, one or two holding pens for cattle after sale, and necessary pens and alleys for cattle awaiting sale. The pens and alleys should be designed to enable the farmer who arrives first to sell his cattle first. Most existing markets are poorly designed and the disorder and confusion of getting cattle into the auction ring is enough to keep many farmers away from the market.

To ensure that prices are properly determined there needs to be a number of potential buyers desiring a wide variety of cattle. Each animal is different and has a range of possible uses, and one buyer cannot properly evaluate the various alternative outlets. For example, a steer aged 3 years weighing 200 kg could go to TPL for canning, to a ranch for further growth and fattening, or for direct beef consumption. With a number of buyers bidding in the market, the farmer can be assured of obtaining the best possible price. Limited buyers with few alternative outlets are not likely to produce the best price to the farmer.

The markets also serve the buyers of cattle by providing a place with a large concentration and variety of livestock from which to choose. The buyers advantage in using the market rather than direct buying from the producer lies in the fact that his cost of collecting cattle will be lower. If the cost of using markets is higher than the cost of country purchasing, the buyers will try to avoid using the markets and producers will lose access to competitive pricing. Farmers have recognized the problem of limited number of buyers and are very reluctant to sell in the markets where there are few buyers. For example, last month in Mpwapwa and Shinyanga trading licenses were withdrawn or not renewed and farmers almost stopped bringing cattle to the markets. After seeing the effect on marketing the licenses were reissued.

Market Fees:

TLMC has introduced a fixed charge of shs.20/- per head for cattle sold in its markets paid by the buyers and shs.4/- for small stock. A fixed charge which does

not relate to value of animal does not encourage the use of the markets. The portion of cost of small cows and immatures is much higher than on large steers. An immature will sell for say shs.250/- to shs.350/- whereas top quality steer often go over shs.1000/-. To encourage sales of animals of smaller value, differential market charges should be made.

Market services like any other goods or services follows the laws of demand which state that as price falls more will be purchased. With the number of alternative ways of selling cattle available the demand for marketing services provided in the auction market is elastic. This indicates that if the charges are reduced more services could be sold and the market fee collection would increase.

In small monthly markets, the services provided by TLMC are adequate except in organizing the sales order, however, in larger markets the speed of selling is too slow and encourages sales outside the auction ring. Outside sales are no particular problem from a pricing standpoint if the prices are still competitively determined. The problem comes when TLMC collects its fee and has performed only limited services to the buyer and seller. In a way the market fee then is equivalent to tax on cattle sold which is not going to encourage increased offtake. To handle large volumes of cattle on a single day, changes in the method of handling cattle must occur or change the system to cater for private treaty sales at a lower fee. The marketing company should aim at large volume operations and will reduce operating costs per head sold and reduced fees.

Introduction of Weighbridges:

At the present time TLMC is buying cattle over the scale in Nsoga, Shinyanga, and Maswa. The price offered over the weighbridge in Dodoma is below prevailing market prices and no cattle are being offered for sale to TLMC. In the near future, additional weighbridges are expected to be introduced into about 40 markets. To prevent the rejection for the new weighbridges by farmers and buyers, it has been suggested the weighbridge pen be used as the auction ring enabling buyers and sellers to see the weights directly from the dial. Bidding could continue on a per head basis as it is now done, but buyers estimation of value would be improved. Buyers would still be responsible for estimating condition, carcass quality, fill, and health of the cattle. The initial bid could be placed by TLMC based on its outstanding orders, other buyers should be allowed to continue bidding until the final price has been determined. Bidding should stay on a per head basis to ease the introduction of weighing and prevent disruption of the selling process in the very likely event that the weighbridge is inoperable on a particular day. Using weighbridges to establish monopoly buying will lead to further damage of the present marketing system and lose of producer confidence in the system.

TLMC's Role as an Order Buyer:

Cattle procurement by large organizations such as TPL, MARCO and DDC and other organizations was recognized as a major problem. To overcome this problem Government organized TLMC with the second function of serving as an order buyer for National institutions. It was expected that the marketing compnay would solicit orders from various organizations and buy as per specification. The company was expected to be competitive with private dealers because of its complete coverage of the markets and its anticipated efficiencies. Two things, in particular, that the company was never to do were (1) to buy cattle on its own account and then find a market for them and (2) to force outside organizations to place orders with the company.

The basic reason for the company operating on an order basis is that the company is rarely in a position to evaluate final market value of meat or farmers willingness to produce cattle for sale. The marketing company can usefully serve various organizations by assisting them in procuring cattle. However, the organization requiring cattle must be responsible for evaluating their markets in terms of price and quality. Once the organization has determined what they can afford to pay for cattle, they can contact TLMC and the TLMC staff then can tell them the probable price for which the cattle can be purchased. It is then the buyers responsibility to decide whether or not to place an order with TLMC. Because of the various market forces, TLMC is not in a position to guarantee either the market prices or the final cost to the buyer. In the same light the buyer should be free to decide if TLMC is capable of supplying the required number and quality of cattle at a reasonable charge.

TLMC can also serve as a buyer of last resort for government to protect the farmers against unfair competition and temporarily depressed prices. Before TLMC assumed this responsibility of protecting farmers against low prices, it must have the financial backing of the Treasury. LIDA and KILIMO cannot back by their directives to buy cattle in financial terms without Treasury's approval and support. This is illustrated by the fact that Treasury did not support the emergency buying operations in Arusha during the 1974 drought, TPL, TLMC and NARCO are still carrying the losses and recurring interest charges on their books.

Role of Private Cattle Dealers:

Private dealers and local buyers are very important buyers in the existing market system. Outside of a few areas where the District Development Corporation still operated the butcheries, local butchers account for the vast majority of all cattle purchases. Private dealers serve the system by stabilizing prices between areas and account for most of the inter-regional cattle flows. For example the Ruvuma area would have even greater meat shortages it if were not for private cattle dealers buying in Iringa and Mbeya and shipping them into the deficit market.

In markets where traders are active the prices paid to farmers are generally above the TLMC price list. In Dodoma, private dealers which purchase cattle for sale to butchers operating in the fringe areas of Dar, comply with all the veterinary regulations, pay market fees, and sell meat at controlled prices. They are still able to pay higher prices to farmers than TLMC and provide consumers with better quality meat than the Dar Development Corporation.

If these private buyers and butchers were removed from the market place, the prices paid to farmers would drop and farmers income would suffer. The bush trader who goes to the farmers shamba and purchases cattle which would never come to the market is also helping to increase marketed offtake. Especially important is the trader who operates by trading immature stock for slaughter stock.

The practice of traders buying at the market before the auction starts for later resale in the auction ring is not providing any marketing function. This practice can be eliminated by educating the farmers that the best prices for their cattle can be obtained in the auction ring where competitive bidding takes place. Improving the operation of the market and making it less work on the farmer's part will also help eliminate this practice. TLMC must work towards the goal that all cattle produced by farmers are first sold in the official markets were competitive bidding takes place.

CATTLE MOVEMENT

As pointed out earlier in the paper, the major cattle surplus areas are located quite a distance away from the deficit areas. This makes it necessary to become involved in moving cattle over long distances. Movement occur normally in two ways in Tanzania either rail or by trekking. Lorry transport has proved to be too expensive except in special situations such as transporting weak animals from Pugu to the Kawe factory and high value animals such as dairystock.

Holding Grounds:

Before cattle can be shipped out of an area they must undergo a two week quarantine period after receiving the required vaccinations against blackquarter, anthrax, and FMD strains. These measures add greatly to the cost of marketing cattle between regions. The cost of operating the holding grounds for the quarantine period of two weeks is in the neighborhood of shs.10/- per head rather than shs.2/60 currently charged. Numerous improvements have been planned for the holding grounds and funds for them have been obtained through the World Bank and TRDB. However, inflation has eaten up most of the funds which were available.

The management of cattle and the grazing land on the holding grounds need substantial improvements if death and shrink losses are to be reduced. TLMC has experienced an average death loss of 2.9 percent for all its cattle entering upcountry holding grounds in 1975. The recommendations for improvements in management are basically same as any cattle operation. One side effect of TLMC buying on its own account is that cattle tend to build up in excess of current requirements which leads to overgrazing of the holding grounds.

Rail Transport:

One of the biggest problems which must be dealt with on a daily basis by TLMC is the movement of cattle by rail because most of the cattle slaughtered for Dar es Salaam come from Nzega , Shinyanga and Maswa District. With the limited number of cattle wagons available the job of matching cattle wagons with cattle and timing of movements is very difficult. Due to having only a limited number of cattle wagons, EARC has found it necessary to use open box cars for shipping cattle. These open wagons are not well suited for cattle and death rates on the train are generally higher than they are used. The normal shipping time from the surplus areas is between 36 and 96 hours depending upon particular circumstances. These long periods without food and water when coupled with the rough ride, previously poor condition and lack of suitable grazing in Dar puts the death after loading on train until slaughter at 4.6% in 1975 for TLMC cattle.

The usual recommendation that is made is for the cattle to be offloaded and rested with feed and water freely available. The argument against this recommendation is the cost of offloading. Under the present rate structure offloading will add between shs.32/80 and shs.42/20 even before cost of feed and water is considered. It is most unlikely that the normal savings in shrink and death losses would offset the added costs.

Based on TPL and TLMC records since 1972 the death rate of cattle purchased from time of purchase up to slaughter has averaged 8.75% of purchases. This figure includes the 1974 drought period when TPL experienced 32,676 deaths out of 231,642 head purchased. TLMC has a death rate included lost and stolen of 7.5% in 1975. Shrinkage rates over the years are not available because cattle were not purchased by weight, however, TLMC data which covers most of the purchases made during the 1975 dry season indicates a shrinkage loss from time of purchase to slaughter of approximately 20 percent.

Pricing Problems:

The most difficult aspect of livestock marketing is price determination. Over the years there have been a number of conflicts which have developed and have not been satisfactorily resolved. For example everyone at this meeting will agree that farmers must be given proper price incentives to improve the quality of his cattle. However, when upcountry prices for cattle coming to Dar es Salaam either for canning or the fresh meat trade have been calculated there have been no price differential based on quality.

Another example is the policy that the parastatal ranches should purchase liveweight cattle for fattening for sale during the period when cattle supply are short. When the ranches evaluate the economics of meeting the seasonal shortages, they find that cattle fattened the best when purchased just before the rainy season and sold at the onset of the dry season. To meet the needs of Dar es Salaam during offseason, cattle need to be sold at the end of the dry season not at the beginning. Since the ranches must expect lower weight gains, they need higher prices to cover their cost. These higher prices have not been forthcoming and neither have been the cattle.

Quality Factors in Pricing:

At the current time the approved prices scheduled for slaughter cattle is fixed price per kg liveweight. The prices are as follows:-

TLMC's selling price - shs.2/70 lw per kg at Kawe after an overnight stand
TLMC's buying price - shs.1/55 lw per kg 300 kg and over
- shs.1/50 lw per kg 230 - 299 kgs.
- shs. 1/45 lw per kg 180- 229 kgs.

This method of pricing ignores the wide differences which exist between red meat yield, fat yield and quality factors in cattle of equivalent weights. Without consideration being given to these differences the value of an animal cannot be properly reflected in the price. Local butchers and traders supplying upcountry urban centers have recognized that these differences exist and pay price differentials of as high as shs. 1/50 per kg l.w. for cattle of the same weight in some markets. TLMC buyers using a fixed schedule for slaughter cattle based only on liveweight and unable to offer producers higher prices for the better cattle.

The result of this decision is that TLMC buyers are continually outbid for the better cattle in the auction markets and producers seldom bring the better cattle to the weighbridge buying points. TLMC is unable to offer higher prices for the better types because TLMC's final selling price is the same for all cattle irrespective of final yields.

Producers of the better cattle suffer in terms of price because TLMC is not an active buyer of these cattle. Meat consumers in Dar es Salaam suffer because of limited availability of meat from better quality cattle. The current pricing methods has also led to higher marketing cost than necessary because in most cases the better cattle are, also, the heavier cattle. With most of the cost of marketing (i.e. TLMC charges, railage, and slaughter costs) charges on a per head basis the marketing cost of carcass beef can be as great as shs.1/50 per kg higher on a 75 kg carcass as compared to a 150 kg carcass. This does not take into account the heavier carcass would probably yield a higher percentage of red meat.

One can see, the current price method which does not consider quality is not designed to meet the need of the industry. A grading system with associated price differentials which reflects quality and yield factors is needed for both live cattle and carcasses. The present carcass grading established by the Ministry of Agriculture takes into account the quality factors of maturity, sex, fat finish and carcass weight. The system, which has fallen into a large degree of disuse, needs to be extended to red meat yield and live animal standards.

Transport cost in pricing:

Another problem which has long existed is the lack of locational differential in pricing. TPL started this policy when it decided to pay all transport costs from upcountry. This was done to prevent private buyers from moving cattle to Dar es Salaam. Under this system cattle shipped from Shinyanga would fetch the same price as cattle shipped from Ruvu. This policy was carried into the current pricing system with the assumption that the average transport cost from upcountry would be shs.80/- per head. When TLMC assumed responsibility for Dar es Salaam supplies last May, it found that cattle prices in Dodoma were much higher than the official price schedule. So to avoid financial losses TLMC reduced its purchases in the Dodoma area and increased its purchases in the Nzega and Shinyanga areas. The cost of cattle in Dodoma were 40 to 50 cents per kg lw over the official schedule and the additional transport costs at that time was less than shs.50/- per head. TLMC's decision reduced its losses but also resulted in higher costs than anticipated. Official prices should be based on a market outlet such as TPL and prices for each upcountry areas computed based on differences in transport costs. Consideration also must be given to weight variations because of the decision by railroads to charge freight on a per head basis rather than per wagon. Under the old system a fixed charge was made per wagon over the distance moved. By placing more small animals in a wagon the cost per kg liveweight could be kept reasonable. With the present system the transport cost per kg is higher on small cattle than large cattle.

Controlled Meat Prices:

Controlled meat prices is the biggest pricing problem. Just the act of placing a control over the prices, restricts the flexibility of the industry to respond to changes in supply and demand forces. Many of the problems discussed above could have been overcome if the industry could have responded to market prices. For example, in Moshi town, a few months ago there was a tremendous meat shortage because live market prices (which are not controlled) increased in response to reduced number of cattle coming into the market. Butchers stopped slaughtering cattle due to the fact that the higher cattle cost could not be passed onto the meat consumers. They only way people could get meat was at black market prices. In Dar es Salaam TPL and TLMC have been required to supply Dar es Salaam ith cattle at controlled prices with no controls over upcountry prices and railage cost.

These fixed prices have been the main cause of TPL's shs.50 million loss. TLMC incurred losses on its cattle purchases for Dar es Salaam in 1975 due to shifting its purchases westward. With the big increase in railage rates which occurred on January first, and no action on TLMC's request for higher prices, TLMC's losses for 1976 will probably exceed shs.5 million on the Dar es Salaam supplies.

The benefits of decontrolling meat prices will greatly outweigh the disadvantages. Two benefits of controlled prices are (1) stable producer and consumer prices and (2) government's ability to control cattle and meat flows. By controlling prices, Government attempts to by-pass normal supply and demand forces in order

to regulate how producers and consumers act. In Tanzania the traditional producer is to a large extent isolated from the workings of the price system by not being aware of the production alternatives available to him and by the environment which limits his alternatives, such as the land tenure system.

On the whole, however, farmers do respond to the economic forces which affect his well being. Farmers reaction to a favorable situation for change can be expected to be slow because of traditional attitudes which tend to be conservative. However, there are enough examples in Tanzania and the rest of the world to indicate that farmers will change production techniques to take advantage of any innovation that will improve his well being. Controlled prices hamper communications between consumers and farmers in informing them of what is required in the market place. For example, the existing controlled prices with no price differentials based on quality is failing to inform producers that a higher quality animal is wanted in the market place.

In many cases low controlled prices prevent expansion of beef production in a new area. In the southern areas of Tanzania production would expand if prices were allowed to reflect consumer demand for additional beef supplies. The reaction to decontrolling prices would be that meat prices would increase to reflect that beef supplies are insufficient to meet consumers requirements. Existing parastatal organizations including local district development corporations and traders would recognize that it would now be profitable to increase cattle deliveries into the area and they would do so. Prices would eventually settle down into an equilibrium position of cattle price in the surplus area plus the cost of transfering cattle into the deficit areas. Cattle prices in the surplus area would rise to reflect the increased demand for the existing supplies. In the deficit areas prices would fluctuate around the equilibrium price in reaction to temporary over and under cattle supplies. After the higher prices have been established in the deficit areas, the profitibility of increasing production in the deficit areas will be evaluated by various organizations and new production units would probably be established. New ranches would continue to expand until the demand meat is satisfied at the price which is equal to the cost of production of the new production units or the cost of cattle from outside surplus areas. The net benefits will increase consumer benefits through expanded meat supplies and increased economic development resulting from the expansion of new ranches. Government can try to by-pass this process by attempting to control prices at the equilibrium level but past performance indicates that prices will be kept well below the equilibrium level which tends to prevent cattle flow into the deficit areas and new ranches from being developed.

Another example where controlled prices are limiting the availability of beef to consumer is in the Shinyanga area. The controlled price in Shinyanga for meat with bones has been set at Shs.4/- per kg. The market price for the lower quality animal has been established by TLMC purchases at around shs.1/50 per kg liveweight. The price of shs.1/50 would allow meat with bones to be established at between shs.3/- to shs.3/50 per kg. Consumers would purchase more meat if it were available at these lower prices.

In the West Lake area which is deficit in cattle, the controlled prices have not been adjusted to reflect higher cattle cost for a number of years. To keep meat supplies, available local butchers openly ignore the price controls by selling meat with bones at steak prices. In the Arusha area meat usually sells at the controlled prices but fat sells at premium prices.

The only reason that the Dar market is fairly well supplied with beef is because Government has forced TPL and TLMC to keep supply cattle even when the cost of cattle plus marketing cost exceed expected revenues. Upcountry urban centers do not have the capability to force sales at below market prices. A few years ago when there was a mass take over of private butcheries, most of the organizations found out fairly quickly there was not much money to be made in selling beef at controlled prices with no control over live animal prices.

On the whole, removal of controls over prices would not lead to tremendous increase in live animal and beef prices because Tanzania at the present time is a beef exporter and subject to world market forces. Prices can be expected to stabilize at export price levels unless at this price the Tanzania consumers demand is not satisfied. If consumers still want more beef at the export price level, then prices will rise above this level, and export surpluses will be wiped out by market forces. In this case there will be added incentives for the farmer to increase beef production.

Financial Responsibility:

The last point which needs to be made is that under the present system of parastatal financial management, managers are not required to be financially responsible for their company or production unit. Until managers are given the responsibility to make all the decisions which affect their economic performance and profitability, the industry will suffer from slow and misdirected development. Government decisions which force companies into situations in which losses are bound to occur must be stopped. The structure of management control must be altered so that managers cannot push the blame for losses on someone higher up. This means each manager of each unit be it a ranch, buying station, or company must have his own accounting unit and be subject to regular appraisal of his financial performance. Managers who are not capable of insuring sound economic and financial performance must be removed and replaced with someone who can meet the requirements. Without valid appraisal of economic and financial performance many incorrect decisions are bound to take place and development of the country will be slowed.

Impressions on Commercialization of the

Livestock Industry in Tanzania*

by Gregory Sullivan

Introduction

The livestock industry sub-sector of the agricultural sector has the potential of supplying domestic demand for meat products and exporting beef at competitive world prices. With a large inventory and abundance of rangeland, though, the industry is not utilizing its potential wealth. Development of the industry has been slow and the problems are numerous, interrelated, and interdisciplinary in nature hindering commercialization of the industry. Most of the problems are realized yet difficulty lies in designing national, regional and district development plans when constrained by available capital. The barriers impeding the transition of the industry can be categorized into four groups: production, marketing, education, and sociological.

Production

In many regions livestock production was not increasing proportional to the number of cows and heifers in the herd. The major reasons given by respondents was lack of dipping facilities, vaccinations, available water and grazing for cattle.

In all districts, constructing and maintaining dipping facilities seemed to be a major concern. A recurring problem in all districts was the limited budget available to officials for construction of new dips and maintenance of established dips. A recurrent budget for maintenance had a low priority and many dips had not functioned for a long time. A government policy of giving a higher priority to first

*Based on observations during 8 months of field survey of livestock owners. Data from this survey appears in another report.

maintaining established dips before construction of new dips would be advisable. A majority of the dips do not operate for three to four months out of the year. If complete protection against ticks is to be achieved, dipping should be on a regular basis. Unable to sustain a continued dipping program, livestock owners have not developed the necessary habit of dipping livestock. With construction of dips with a permanent water source, dipping during the entire year will foster the necessary habit.

On several occasions, respondents complained that the concentration of the medicine was too strong and some cattle die (primarily calves). Supervision by district officials for the most part was lax, and results of dip tests could take up to months. A better system for speedier communication of test results is needed.

Disease control programs except for the rinderpest campaigns in the Northern Regions are either ineffective or non-existent. The diseases most frequently mentioned are East Coast Fever, Trypanosomasis and Black Quarter. A high incidence of death from diseases was evident in all districts but higher in those regions of large concentrations of East Coast Fever, particularly in Kwimba and Magu districts in the Mwanza Region and Maswa and Bariadi in the Shinyanga Region. People in these areas say they prefer cattle from the Mara Region which they believe have developed some immunity to E.C.F., and these cattle infect the local cattle.

Vaccinations most frequently done on herds in order of preference:

1. Blantrax - Antrax and Black Quarter.
2. Nagana - Trypanosomasis,
3. Sotoka - Rinderpest, mostly on immatures, and
4. Foot and Mouth

Cost of Blantrax is approximately -/70 to 1/- per animal and because of its low cost and availability from the veterinarian officer was the most frequently administered. Berenil is the common prophylactic drug against Trypanosomasis. Cost ranges between 1/50 to 2/50 per animal. In Arusha Region, it was not uncommon to see a herder having his own syringe and purchasing needed drugs from traders or the veterinary office. In general, though, ineffective disease control is taking place in the regions visited due to constant shortage of drugs, and lack of transport, even bicycles, which hampers field assistants in their attempt to serve the people. Livestock officials believe that with the villagization program in the livestock regions, veterinarian services should become more effective.

The problem of grazing for livestock is not specific to one area. Cattle production areas overlap some of the driest areas in the country, and shortage of grass occurs during the months of August through January. For some areas, the shortage is due to lack of rains for the past several years, e.g., Singida, Arusha, and Dodoma; for other areas it is due to overgrazing, e.g., Maswa and Bariadi Districts in Shinyanga Region, Nzega and Igunga Districts in Tabora Region, and Monduli and Kiteto Districts in Arusha Region.

Traditional grazing practices vary across regions according to climate and grazing conditions. In the regions bordering Lake Victoria, Mara and Mwanza, cattle are not trekked long distance because of the density of human population and greater availability of grass. In Maswa, Bariadi, and Kahama, availability of open range is greater, rainfall is less, individual holdings of cattle are large, necessitating a full day's trekking of cattle. Cattle leave bomas, around 7 a.m. and do not return until the evening during the dry season.

In Shinyanga District, herders generally returned at noon for food and then release cattle for a few hours in the afternoon. It was not an uncommon site to see cattle standing in the boma for an hour or two in the early afternoon decreasing the amount of available time cattle have to graze. Competition for available land between cash crops and cattle is greatest in Shinyanga as well as Mara and Mwanza Region.

In the drier regions of Tabora, Singinda, and Dodoma, cattle do not return to the boma during the day. Cattle are trekked greater distances in search of grass and water. In these regions, cattle sometime receive water every other day. Problems of grazing in the area stem from the lack of rainfall over the past several years.

The Masai tribe located primarily in Kitito and Moduli Districts in Arusha Region are semi-pastoral in their grazing patterns. The lifestyle of the people are centered around the care of their cattle and whole bomas containing up to eight families will shift between a wet and dry season boma. In some areas, especially in Southern Kiteto District and Loliondo, Masai will graze their animals in areas infested with tsetse flies during the dry season because of no other available grazing areas. Cattle usually receive regular prophylactic treatments administered by the herder.

With the villagization program almost complete in these seven regions, livestock producers are in a better position to design village range management programs. None of the villages surveyed had designed grazing plans, though some had verbally agreed to perserve certain areas during the wet season for grazing during later parts of the dry season. After design of a village's grazing plan, the crucial question is the implementation and enforcement of range programs. Within the institutional

structure of the village, grazing schemes could be enforced by a village chairman with support from his Ward Secretary.

The problem of scarcity of water affects both livestock and human population. Cattle and inhabitants in the drier areas of Arusha, Singida, and Dodoma compete for available water supplies. Herders are assigned to groups and water their cattle communally every two or three days, trekking cattle during the night. Calves, sick or milking cows, goats and sheep will have priority over cattle in receiving water from sources near the village because they are unable to sustain long treks. In most areas where water is available, cattle are generally watered once during the middle of the day in the dry season. In Shinyanga, when herders return home at noon for food, cattle are watered on the trek in.

In William Mackenzie's report, "The Livestock Economy of Tanzania," he states that the problems in production of livestock are primarily lack of water and poor range management rather than actual overgrazing due to numbers of livestock. With the completion of the villagization program in the livestock production regions, range management programs could be tailored to the estimated carrying capacity for the area, traditional grazing patterns and practices, available improvements (water, salt), and the sociological characteristics of the community. A program of this nature is presently underway in Arusha Region.

Throughout most of the cattle regions, communal herding is usually not practiced. Each herder who keeps cattle will herd in separate groups, but it was found where conditions exist such as: high incidence of stealing or long treks for water and grazing (overnight); then cattle will move in larger groups. In Igunga District, the Waturu tribe located near

Wembele River would alternate in trekking cattle every three days 25 miles to the nearest source of water during the dry season. Similar management practices are found in Kondoa and Moduli Districts. Regular communal grazing and watering encourages establishment of village grazing patterns and educates villagers of the need to conserve the resources for use by the whole village.

Implementation of range management programs will be insufficient for successfully transforming the industry unless all phases of the production and marketing system on the micro-level (village) are restructured, there is potential for successful change for two reasons: (1) people have been resettled into villages and psychologically they are prepared for changes even though many livestock owners are suspicious of any proposed changes; (2) the presence of a strong and unified political party in the village gives stability to new programs.

Marketing:

With an estimated marketed offtake of cattle from the traditional sector of 3% based on reported hides sold, a major barrier in preventing commercialization of the industry is the lack of responsiveness by producers to the market system. Several reasons can be identified:

A. Low Prices

Comparing the margin between prices paid in the village by traders or butchers to that paid in the marketplace, there was little difference in price in some areas. Producers in Shinyanga, Singida, and Dodoma, who had sent cattle to the market but returned home with them, complained they did so because the price was too low.

Increased closing of abbatoirs unable to cover costs is because retail prices are controlled by a Regional Price Commission and is considered too low by butchers. Fixing a ceiling on retail prices in the consumption centers depresses farm level price and discourages producer in becoming commercially oriented.

B. Disorderly Market

In many of the drier regions, most of the market facilities have no grazing or water available for cattle. Producers complained that animals trekked to the market become weak forcing sellers to take any price offered rather than trek them home. A frequent complaint heard from producers in some areas was that T.L.M.C.'s buying team would arrive late in the mornings. Sellers, frustrated in having to wait and finding their cattle becoming weak, would sell to traders outside the market ring, sometimes knowingly at a lower price. The traders in turn would resell the cattle later in the day inside the ring or trek them to a primary market.

The existing market structure in some areas presents a disincentive to an individual seller if he is only selling one or two animals. Preference was given sometimes to producers who had several animals for sale rather than those who had arrived at the market first. Sellers with one or two head of cattle would rather sell outside the market ring to save the problems of having to wait hours for his opportunity to sell.

C. Marketing Institutions: Traders and T.L.M.C.

Private traders in many areas provide a service in purchasing livestock where T.L.M.C. is unable to visit at the present. In this capacity traders are not competing with T.L.M.C. but rather are an extension to the marketing facilities. Prices paid for various types of animals at the boma

were not drastically lower than market prices. Traders and butchers improve the marketing structure by competing with T.L.M.C. increasing producer's market price. Where level of competition was high, due to location of market place, herders preferred to sell in the market rather than at the village because prices would be significantly higher than in the village.

Private traders and T.L.M.C. compete directly in the auction ring. In areas such as Dodoma and Arusha, T.L.M.C. is continuously outbidded for cattle since they are compelled to follow set pricing guidelines of 1/55 per kilo or a maximum of 650/- per animal. Steers or bulls have sold for between TSh. 800/- - 1000/- in Dodoma and between 1100/- to 1400/- in Arusha. (A steer sold for a record breaking TSh. 2100/- in Karatu market, Arusha Region in 1975.) T.L.M.C. is unable to pay these prices due to the T.P.L.-Pugu price of 2/70 per kilo in Dar es Salaam. T.L.M.C. buying team is relegated to a role of market supervision and/or collecting market fees (TSh. 20/- per animal) which showed a net profit for the company in these two regions.

If prices remain fixed in Dar es Salaam, T.L.M.C. must continue to service markets established and collect market fees encouraging traders to attend markets. Market fees collected should be reinvested back into the area providing better facilities for auctioning animals, even expanding services to areas where no market service exists.

The introduction of weighbridges to auction markets would serve in changing the producer's perceptions about his livestock. Selling animals by weight will eventually begin to educate producers to the commercial value of individual animals and their value at various weights. Producer's acceptance of weighbridges is possible if proper education by livestock personnel and political officials is conducted in the villages when

weighbridges are first introduced.

Trial sites for testing reactions to weighbridges should first be undertaken at a select number of markets to determine if the system is appropriate at this stage of their livestock development. Research into the sociological and economic factors of introducing the new system of buying cattle should be undertaken before installation of large numbers of weigh scales.

Because in some areas markets were held once a month, alternative systems could be designed which would utilize the village framework. An institution within the village community could purchase cattle directly during stress periods for transferring to other areas and marketing at a later date. Some producers complained they were under pressure to sell when they trekked one animal to the market and were offered a low price.

Sociological Barriers

Livestock owners primarily keep cattle for milk and as a store of wealth in time of difficulties. Peak sales occur in drier months approaching the rainy season when shortage of food for the family and lack of grazing for cattle force producers to sell off some of their animals. Milk yield is very low and prices are generally lower during this period because of the increase in supply of cattle for sale.

In general an individual producer does not recognize his herd as a commercial enterprise. In many areas, cattle are held as a sign of status and store of wealth and have a sociological value which is higher than the commercial value. Even with increased risk from disease and starvation in holding unproductive cattle, producers are still able to consume the animal and utilize the hide. Only in Arumeru District in Arusha Region was it found that producers were managing their cattle more economically because of a

demand for dairy products and the scarcity of land for enlarging herds.

Customary transaction between members of the society require livestock as the medium of exchange. In very few areas will other forms of dowry be accepted when an individual has cattle. Some cattle would have to be purchased or borrowed for a relative to satisfy the payment of dowry which impinges on the economic utilization of the herd.

In many areas of the primary livestock regions, marketed offtake is low and selling cattle holds a lower priority to the family sustenance from meat and milk from the herd. When an animal is sold, it is to acquire money for purchasing food, clothing, household supplies or meeting family obligations.

Outside of these basic needs, livestock producers have little need for cash. With village development, demand for consumer goods will increase justifying a higher offtake of cattle. Opportunities for producers to invest in small scale enterprises in the villages should be encouraged — such as a blacksmith who makes oxen plows or tempers hand hoes. Presently, cash generated from cattle sales are not invested in the villages but flows via market traders to the towns. Transforming the cattle industry is conditional on the fact that development must be also occurring to the total environment in which the producer operates.

One difficult problem in describing is the traditional custom of ownership of cattle, in all areas, cattle, sheep, and goats are given to neighbors or relatives for herding. Major reasons given by producers is to allow those without cattle to have a source of milk and meat, minimize risks from stealing or diseases if all cattle were in one boma, provide available grazing for cattle, and reduce size of herd which is too large for a young boy or older man to manage.

When cattle are given out for herding, the caretaker is responsible

for all management decisions except the disposal of the animals. Decisions to dip or vaccinate animals is made by the herder. It would be expected that these herders might not care for the animals as well as if he had owned them outright. Herding fees are paid in terms of milk and meat from dead animals with only the hide going to the owner.

Disposal of cattle is generally a family decision except among the Masai where wives play no role in the decision-making. Even among the Sukumas, women can own cattle which have been received from dowry payments. A typical boma would have the husband as the figurehead; yet when actual disposal and investments are made, the whole family must be consulted. Efficient management can be hindered because of these customary practices. Management of cattle are directed toward fulfilling family goals which are not necessarily those of market oriented goals.

Conclusions: Commercialization of the Industry

To transform the livestock industry to a commercial enterprise, innovative goals for producers must be created. Traditional goals need to be fulfilled within the goals of market orientation where greater importance is placed on livestock as a source of cash income to increase productive efficiency of the national herd and to satisfy rising domestic and export demand for beef. What are the means for achieving these goals within the traditional sector?

1. Developing an interrelationship between the livestock producer and the factor markets.

Creating demand for factors of production whether its livestock, other agricultural enterprises, or small scale industries emphasizes the need for utilizing the livestock herd as a source of cash by producers. Increasing

the availability of veterinarian supplies whether through the extension service or private traders increases the necessary demand for cash.

2. Dissemination of livestock information to producer creates stimuli for technological change and new goal orientation.

The producer operates in an isolated world with a minimal amount of information about the industry whether it is market prices or availability of improved bulls from experimental ranches. A comprehensive extension-education program would result in increased payoffs to producers and provide a method for influencing goal innovations within the new villagization program.

3. Producer's awareness that livestock have an economic value which depreciates over time.

Encouraging the producer to cull his herd regularly to attain the highest revenue must be complemented with a market system that awards the innovative manager and penalizes the poor manager. Installation of weighbridges would be a positive step, but weighscales alone cannot bring transformation of the industry. Extension education by government veterinary staff as well as political officials must instruct producers of the practicality of culling animals when they are a certain age or weight and preferrably during various times of the year.

Formulating government policy guidelines for removing social constraints to commercialization of the traditional herd is needed in the areas of dowry payments. A government decree that marriage dowries could be paid in cash or other forms of payment besides cattle could be implemented in certain tribal areas e.g. Sukumaland where the form of payment is not dependent solely on cattle.

4. Establishment of credit unions as an institution for saving cash and a source of capital for investment within the rural community.

If producers are to adopt new goal innovations of market orientation then institutions must exist for producers to store sums of money. Distribution of cattle sales throughout the production year and not just during periods of family hardships is dependent upon a willingness by producers to hold sums of cash. This plan could first be experimented in Sukumaland where individuals already have experienced the need for cash.

5. Improvement of market facilities to encourage producers to sell livestock at the market place.

Establishing market facilities which are reliable, orderly, and fair in their operation can be an incentive to producers to participate in the organized market system. Coordination of a market news service informing producers of market days and price levels could be achieved between Tanzania Livestock Marketing Company and field veterinarian assistance. Building confidence and respectability in the commercial market system must be achieved if producers are to become market oriented.

6. Formulate pricing policies for T.L.M.C. which will account for distance from slaughter plant, season of the year, and quality of the animals.

With present construction of a slaughter plant in Shinyanga, the marketing system of cattle will be altered considerably. Prices to producers in the surrounding area would increase because of lower transportation costs. Establishing price differentials for cattle within the area based on time, distance, and quality might insure a steady stream of cattle for slaughter.

7. Clearly defined purpose for reduction of national herd and specific policies which differentiates between large and small livestock owners, and good and poor managers.

If government policy is to be effective in transformation of the industry then specific objectives for herd reduction are needed. Reducing overstocking of livestock to create surplus meat for urban consumption and export are not strong justifications for a mandatory forced offtake under present economic conditions. Such a policy will create dissincentives to producers and prove extremely costly to administer in the long run.

Presently there is no charge made for the use of land and forage by producers. As long as it is free, no effort to manage it or the grazing is likely. To improve the productivity of the herd and encourage the producer to become market orientated, a progressive tax system would allow for each type of animal to be taxed according to age, sex, and species. For example, older cows would have a higher tax than younger cows. Taxes collected primarily by the village chairman and supervised by TANU Ward Secretaries could be reinvested directly into the village itself for range improvements or for purchase of drugs for cattle supplied through a village cooperative store. The result of a progressive taxing system would also have the effect of differentiating between good and poor managers, and large and small producers which a policy of mandatory offtake does not do.