

RANGE DEVELOPMENT PROJECT IN ETHIOPIA

by

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B.S., Oklahoma State University, 1945

9984

A MASTER'S THESIS

submitted in partial fulfillment of the
requirements for the degree

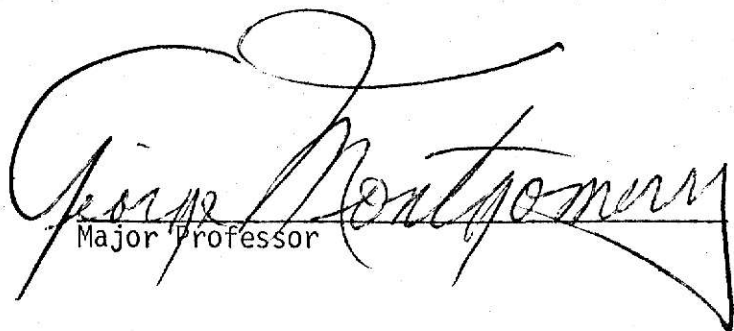
MASTER OF SCIENCE

Department of Economics

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1972

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Major Professor

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CHAPTER I

INTRODUCTION

Purpose of Study

The purpose of this report is to describe the condition of the range and cattle problems confronting the cattlemen and The Imperial Ethiopian Government, (I.E.G.); and analyze the technical study of the Ministry of Agriculture test projects, with significant emphasis on the benefit cost ratio and internal rate of return.

The Ministry of Agriculture, I.E.G. in cooperation with the Agency for International Development (AID) made a technical and economic study. Serious attention was given to the manpower and market problems also site selection and priority establishment. Emphasis was given to overall efficiency in both construction and range management.

Test projects indicated a high internal rate of return on capital that required very few technically trained personnel in relation to output. This involves simple activities well within the grasp of the people, and yielded potential benefits as increased income to cattlemen and increased foreign currency earnings. This is certainly needed if Ethiopia's future development is to be accelerated.

The basic resource, grassland, is the foundation that can lead to the development of cattle industry in Ethiopia. The quantity, quality, and costs of these resources are obviously key determinants in how much development can and will occur.

Ethiopia has substantial physical potential for the development of a productive beef industry by developing its ranges or grasslands. There are many areas with livestock populations which are large enough to provide the basic female herds required for expansion of the industry with the proper distribution and the availability of water.

General Description and Background

Ethiopia has its northern coast on the Red Sea; in the north west is Sudan; in the south Kenya and in the east Somalia. Its land area is about 555,409 square miles or about the area of Texas, Oklahoma and New Mexico.

It is a land of rugged mountains cut by deep valleys. In the center is the plateau of Abyssinia, at an average height of above 6,000 feet, gradually declining to the south to dry and sandy lowlands.

The climate is moderate in the greater part of the country because of the altitude, but it is hot and dry on the shores of the Red Sea. The elevation can be divided into three belts: Lower than 6,000 feet (dense forest and succulents). The average elevation is between 7,000 and 8,000 feet with pasture grass and general crop land. The third area is the mountain peaks and slopes.¹

The estimated population at the end of 1968 was 25 million, with a growth rate of 1.9 percent. A major part of the population lives on the plateaus. The capital, Addis Ababa, is the largest city with a population of 638,000 and elevation of 8,000 feet.¹

¹Editorial Staff of Jeune Afrique, Africa 69/70 (New York: Africana Publishing Corporation), pp. 265-266.

The official language is Amharic, but English is frequently used. Arabic is spoken by about seven million people and another dozen or so dialects are used by the people who form the other groups.

In 1931 Haile Selassie was crowned Emperor and proclaimed the first Ethiopian constitution. In 1936, Italian troops invaded the country and had control until 1941.

Agriculture and cattle raising account for 90 percent of the economy; and yet very little is known about the economic and social aspects of the rural people. Various types of changes in land tenure are anticipated in the future.

The College of Agriculture has helped in the development of two cooperatives for the farmers, popularly known as the Marketing Cooperative and the Irrigation Cooperative. The twenty-six registered members of the Irrigation Cooperative are also registered members of the Marketing Cooperative.

The land of the owners is not necessarily registered under their names. It may be under the names of their ancestors, relatives and (chiefs). This is because of the high expense of transfer of land titles and this they try to avoid.

The introduction of improved agricultural and range (livestock) practices to these people is an extremely slow process; but any advancement in technology will be accompanied by higher living conditions.²

²Demissie Gebre Michael, Land Tenure in Bate (Dire Dawa, Ethiopia: Haile Sellassie I University, 1966), pp. 2-3.

The major source of agricultural credit in Ethiopia, other than from individuals, is the Development Bank of Ethiopia. The interest rate 7 percent on the money used and a fee of 1 1/2 percent charged on the undrawn portion of the loan committed.³

Livestock production and husbandry are at present on what can be described as a primitive scale. Grazing is almost the only method of feeding practiced, and stock water is such a serious problem in almost every part of the country during dry seasons. Large areas are not used during the dry seasons due to lack of permanent water, while areas close to permanent water are heavily overgrazed. The result is that production is poor, calf losses are great over 50 percent losses at times and animal maturity slow (5-8) years.⁴

Efforts have been made by the government to control major livestock diseases, but these efforts have not been very far reaching. These include such as rinderpest, foot and mouth disease, anthrax and bovine pleuropneumonia. Animal quarantine and meat inspection regulations prior to slaughter are not properly enforced.⁴

Livestock are often trailed great distances to market with inadequate feed and water along the routes. The results are heavy losses in body weight, loss in meat quality and high death losses in moving the animals to market.

³M. E. Quenemoen, Potential Returns from Commercial Farming Systems in Three Areas of Ethiopia (Dire Dawa, Ethiopia: Haile Sellassie I University, 1968), p. 61.

⁴Dr. Frank Madden, Veterinary advisor for U.S.A.I.D. interview Feb. 4, 1970, Addis Ababa, Ethiopia.

The marketing and processing situation in Southern Ethiopia is different from Northern Ethiopia. Lack of transportation and other problems have delayed development of the southern area with the greatest livestock potential. Only one of the modern type processing plants is located in the South (Sheshammane). Studies have concluded that the nation has one of the greatest livestock producing potentials of any country in the world.⁴

It is estimated that approximately 80 million hectares (200 million acres approx.) is used for grazing.

Some of the land is grazed only by stock belonging to nomadic herds-men who pass through when weather conditions have provided water and forage. Other areas are grazed by stock belonging to semi-nomadic herds who spend part of the year in one place near permanent water, but roam during the rainy season. The balance of the grazed area belongs to permanent settlers who own livestock which forages near the home base.⁵

TABLE 1
LIVESTOCK POPULATION IN ETHIOPIA IN 1963, 1964, 1965
(in millions)

	1963	1964	1965
Cattle	25.2	25.3	25.4
Sheep and Lambs	24.0	24.6	25.9
Goats	17.9	18.1	18.0
Horses	1.3	1.3	1.4
Mules	1.3	1.3	1.4
Donkeys	3.7	3.7	3.8
Camels	.90	.90	.91

Source: Department of Economics and Statistics, Ministry of Agriculture.

⁴Ibid.

⁵Marketing and Research Department, Investment Guide to Ethiopia (Addis Ababa, Ethiopia: Addis Ababa Chamber of Commerce, 1967), pp. 20-21.

The numbers of cattle in Ethiopia are large, expansion can take place rapidly. Ethiopia is the only country of its size in Africa where cattle numbers equal or exceed the human population.⁵

Ethiopia exported live animals and canned or frozen meat valued at approximately E. \$10 million (U. S. \$4 million) in 1966. The Middle East is meat deficit, Japan is eagerly searching for products to purchase in Ethiopia, and Europe would buy if certain sanitary requirements were met.⁵

Meat imported in 1965 was approximately 379 million kilos, and exports were about 22 million kilos (1 kilo equals to 2.2 lbs.).⁵

⁵Ibid.

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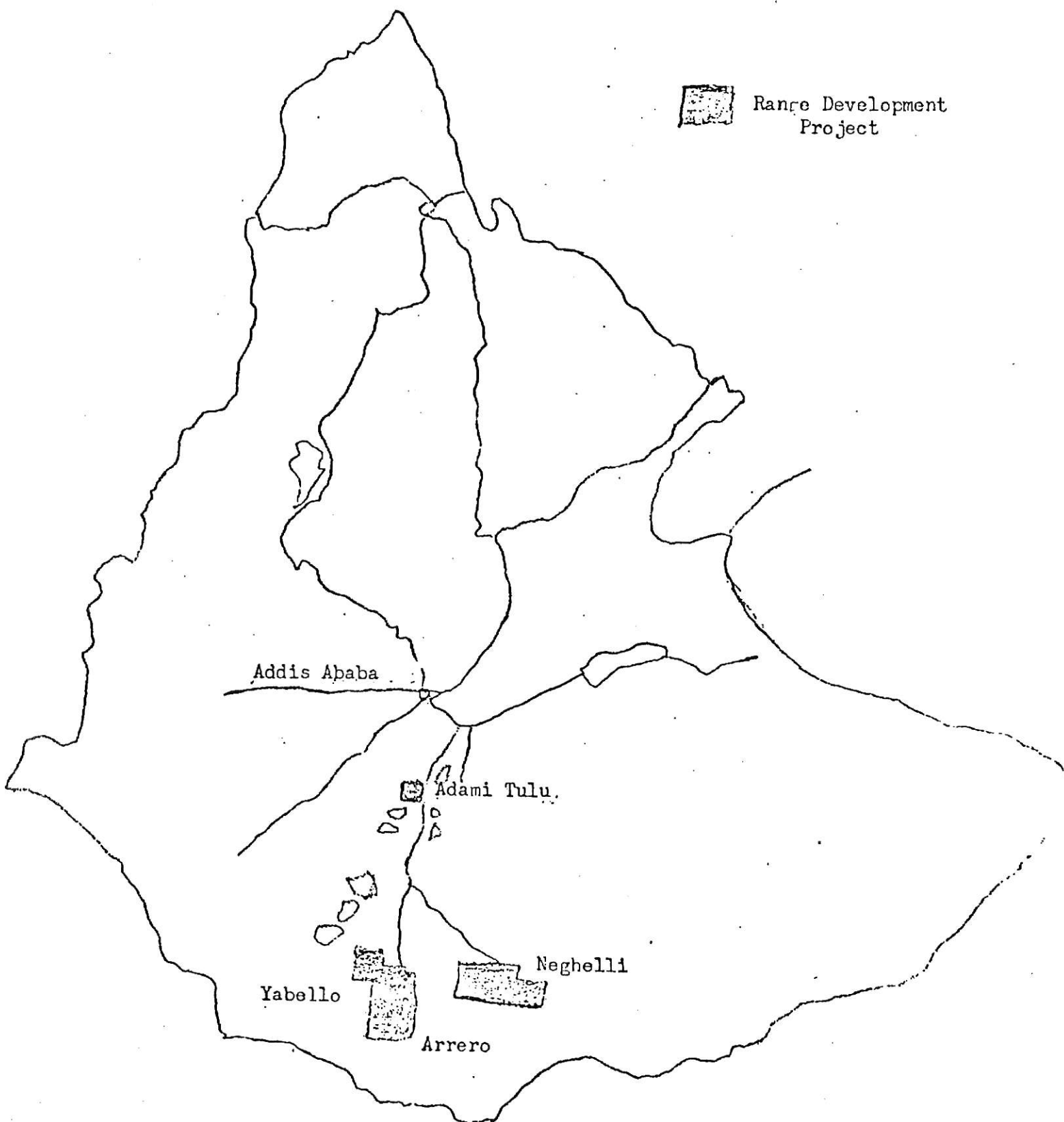
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Ethiopia Highway System
showing Sites of Range Development Project



Project Areas are not drawn to scale

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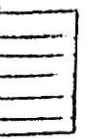
French
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Gulf of Arden

Somalia

RAINFALL ZONES

ZONE I



Below
23 inches

ZONE II

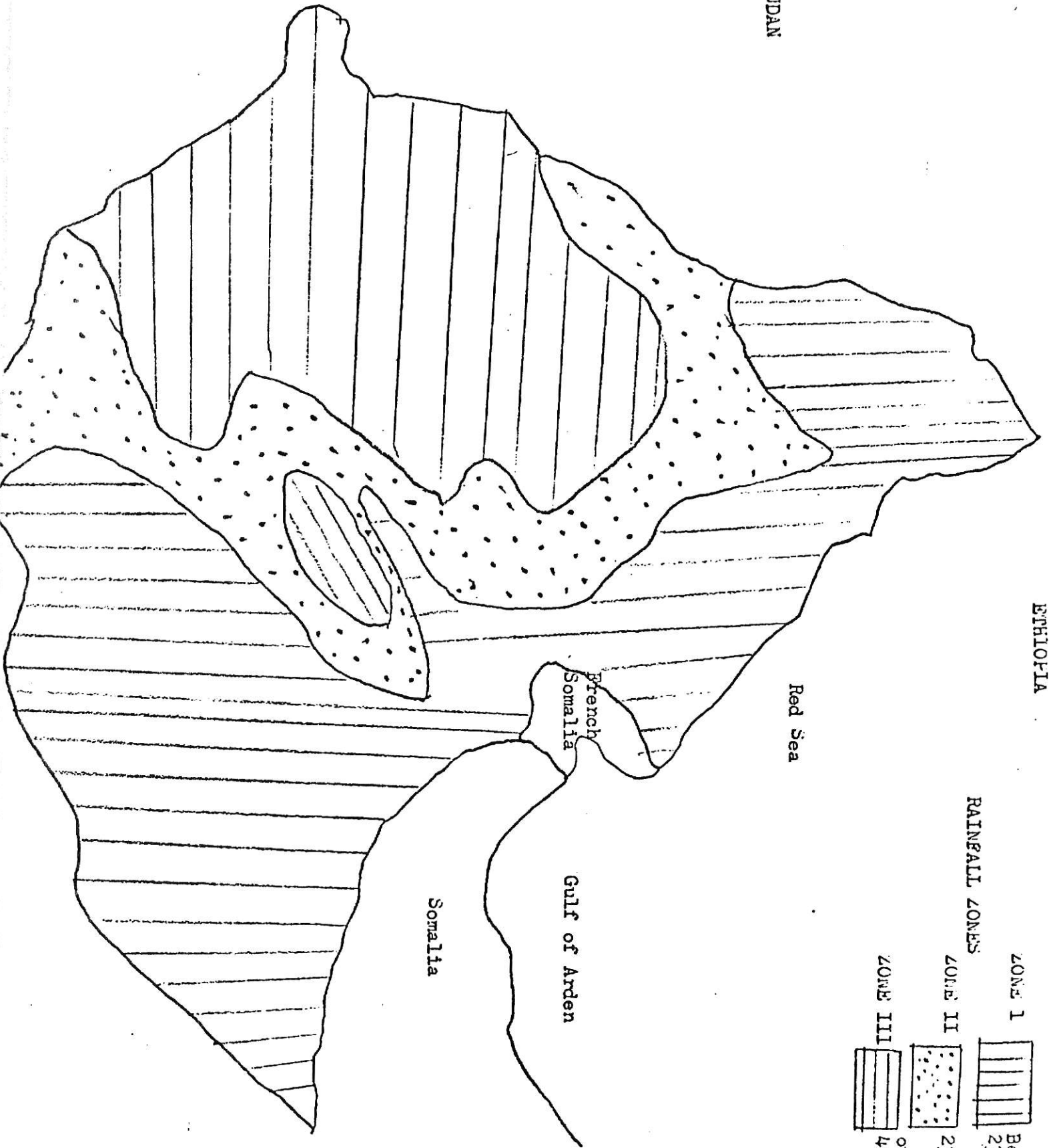


23 to 40 inches

ZONE III



over
40 inches



CHAPTER 2

THE "PILOT PROJECT"

Selection of Area

The Southern Region of Ethiopia was selected for the cattle development program in 1965. This area was selected because it had such good potential for increased livestock production. Large areas of good grazing land were grazed only a few weeks per year, due to the unavailability of stock water. Disease was taking a heavy toll, and markets were inadequate. The area was making little contribution to the economy of the country. It was believed the conditions could be changed at relatively low cost with few technicians. One aspect of the development of the Southern area was the development of a pilot project called "The Regional Livestock Development Project", and identified in AID as USAID/Ethiopia Project No. 663-11-130-112.

The R. L. D. Project called for development of three small pilot Range Management Units in the Southern region. Originally the first unit was to be located near Neghele; however the area became politically insecure and the initial unit was finally located near Yabelo and the second unit was near Adami Tulu and the third which was never started was to be near Awash Station, to the north of the others.

The Yabelo and Adami Tulu are located where the maximum rainfall is in the period from July to September; it is normal for the rain to fall every month. The total rainfall varies from 23 to 40 inches per year.⁶

⁶ H. P. Huffnagel, Agriculture in Ethiopia (Rome: Food and Agriculture Organization of the United Nations, 1961), p. 65, 334.

A very wide range of grasses and pasture plants may be found in this area, and the dominance of a particular species is decided by the rainfall, soil, and intensity of grazing.⁶

Development Approach

The approach used in the Regional Livestock Development Project, and which is proposed to be followed in the expansion of the project, is a step-by-step procedure in which efficient sized range managerial units are developed one at a time.

The Regional Livestock Development plan calls for an initial five year period of phased facility construction and improvement, and the introduction of improved practices for each management unit. The construction makes available feed resources and the practices and innovations introduced reduce death losses and improve and efficiency of operations. The number of cattle grazing in the area is built up to utilize the newly available feed. By the sixth year, operations (inputs and costs) are stabilized at a level which sustains the increased production.

The first step in the development of each management unit is the provision of water. Grass is normally utilized only a part of the year, if at all, in much of Ethiopia, because water is not available. By making water available, a higher proportion of the grass resource becomes immediately available for use. The first step, therefore is the provision of water in each range unit and along the route to market.

The construction and development of each unit involves two phases. During the first phase, approximately one-half of the unit, usually about

⁶Ibid.

2,072 km. (800 sq. miles or 208,800 hectares) is developed. Each half-unit requires approximately 16 dams and one well for permanent watering points, plus some eight small dams for temporary water. During the second phase the third and fourth years, the second half of the unit is developed.⁷ Each half unit should support more than 40,000 cattle. The total unit, when it is completed, will normally be expected to encompass approximately 4,100 sq. km., with final size depending upon the carrying capacity of the grass, and will involve approximately 80,000 head of cattle.

The administration of each management unit is the responsibility of a range manager permanently residing in the area. He is aided by 16 assistants when plans are fully implemented, one for each 10 x 10 mile area, (16 x 16 km.).

An animal health program is developed for each unit. Emphasis is on preventive medicine, i.e., vaccination, worming and dipping.

The entire program will be on government-owned land in order to avoid land tenure problems.

Permits will be issued on a first priority basis to the local cattle people who have traditionally grazed in each area. Since water has been scarce in the past, the number of people who will have a priority right will be few. As the stock-watering ponds are completed, many more live-stock can be grazed in the area so there will be room for an increase in both the number of cattle and people. There should be no problem of

⁷Dr. J. L. Fischer, "National Range Development Project" (unpublished Technical Plan Summary and Economic Analysis, USAID/Ethiopia, 1969), second draft., p. 8.

displacing people; in fact the project should provide the opportunity for in-migration of a modest number of people.

Investment costs are kept to a minimum. For example, very little fencing is done initially. Control of the range is by the range manager periodically checking the various watering places.

A sound grazing plan is developed for each range management unit utilizing scientific range management principles. For example, the range area near temporary water facilities is utilized during and immediately following the rainy season to permit the grasses near the permanent water facilities to rejuvenate and grow.⁸

The project is designed on a self-liquidating basis insofar as expenditures by the Imperial Ethiopian Government are concerned; therefore, each range management unit is a bankable project. Each range management unit is designed to more than repay all cash costs to IEG within a reasonable period. This is accomplished by the Ministry of Agriculture or other administrating agency charging local cattlemen who are awarded grazing permits an annual fee. The fees will cover the Government's costs for watering facilities and other services rendered. During the first few years of the project while the cattlemen are moving into the new area and building up their herds, the fees are low. As grazing on the project becomes more profitable for those who have permits, the fees increase to a very modest level.

The Situation Before RLDP Yabelo Unit: The traditional system of nomadic cattle production which existed in the Yabelo area before RLDP

⁸Ibid., p. 9.

produces an average annual take-off of 2-3%. This low take-off is much more likely due to low production, rather than to the often quoted "fact" that cattle owners will not sell their animals because of cultural tradition. A close analysis of production under nomadic conditions reveals that cattle owners are selling all of the animals available for market. If more were sold, herd depletion would result.

In the typical nomadic herd, all females are kept as replacements. Maturity is quite slow, and females first calve at about five years of age. Males require 5-8 years to reach marketable size. After reaching maturity, cows calve at an average rate of 60%. Of the calves born, 55% die from disease and starvation before they reach one year of age. Death rates are about 10% per annum thereafter.⁹

TABLE 2
COMPOSITE HERD BASED ON MATURE COWS, YABELO CONDITIONS
PRE-RLDP

<u>Females</u>		<u>Males</u>	
5 - 15 year old	100	5 - 15 year old "herd" Bull	4
4 - 5	8	7 - 8 year old	7
3 - 4	10	6 - 7	7
2 - 3	12	5 - 6	7
1 - 2	17	4 - 5	8
		3 - 4	9
		2 - 3	10
		1 - 2	16
calves	(30)*	calves	(30)*
	<u>147</u>		<u>68</u>

*Calves born during the year are not normally counted in standard breeding herd data; therefore, the 60 calves born during the year are not counted in the "Composite" herd.

⁹Ibid., p. 10.

The total animals (exclusive of calves) in the composite herd would be 215, producing seven animals per annum for market or consumption, or a 3.25% take-off.

The above analysis presents a picture of a composite herd adjusted to 100 mature cows to demonstrate why turn-off is so low. Although the 100 mature cow herd is hypothetical, the physical conditions are those existing in the Yabelo area, and the typical grazing herd found in the area would contain numbers in direct proportion to those shown. However, the composite herd picture does not show all that needs to be seen to understand the local situation.

Prior to RLDP, the average nomadic cattle owner in the Yabelo area owned about 40 animals, including both females and males. On the basis of the production schedule presented above, he had approximately 1 1/2 animals per year reaching the age of five years.¹⁰ The value of his marketable animal was approximately \$75.00 each, so his average annual income could not have exceeded \$112.50. However, the typical owner did not sell his surplus males at five years of age. Technicians have estimated that the average male animal was marketed at eight years of age. Annual income was probably something less than \$100 per year per owner.

The cattle produced are the famous Boranas of relatively good quality. Some of the original stock selected for upgrading the breed at the Adami Tulu ranch came from this area. The Borana breed is regarded as the best in Africa.

The Situation after RLDP, Yabelo Unit: The first question is "What is the carrying capacity of the unit?" The first step is an evaluation

¹⁰Ibid., p. 11.

of the range condition. If the range is not being grazed at long run sustainable capacity, then increased numbers of animals are permitted to use it; i.e., additional grazing permits are issued. The number is stabilized (no new permits issued) when the addition of more livestock would damage (or lower) the long run carrying capacity. The method involves continuous evaluation of the range condition by technicians, and a more or less continuous adjustment of numbers.

Range technicians believe the Yabelo Unit will sustain a grazing rate of more than 100,000 animal units per year after implementation of the practices, innovations and construction in the plan; however, for purposes of benefit cost analysis, an annual grazing rate of 66,100 animal unit years by 1973 was projected for it. This figure is conservative enough to provide a large margin for safety in case carrying capacity should fall short of expectations.¹¹

When the pilot management unit in the Yabelo area has reached a stage of full development, the following is expected:

1. Animals will "mature" at four years of age; therefore
 - (a) females will calve during the fourth year, and
 - (b) the average age at which animals are sold will be reduced from eight years to five years.**
2. Death losses of calves will be reduced from the present 55% to 10% and
3. Death losses for animals other than calves will be reduced to 3% annually.

**It is anticipated steers or bulls will be sold at 4 years of age; however, cull herd cows and bulls will be sold at an older age, thus achieving an average 5 year age at time of sale.¹²

¹¹Ibid., p. 17.

¹²Ibid., p. 19.

Animal health problems and their solutions involve many paradoxes. It is obvious to even the casual observer that if production is to be increased, one way to get the large numbers needed is to lower the death rates from diseases and parasites. But, to lower the death loss from disease contributes little if there is no market; reducing death rates from disease contributes little if the nutritional base is not improved; reducing death by "one shot" campaigns where there is no adequate follow-up has disappointing long-run results; the effect of vaccination programs on marketed take-off is still open to question; and vaccination and veterinary problems without good herd management apparently yield few tangible benefits. For these reasons, AID policy is one of caution, requiring that action programs in which it becomes involved be thoroughly researched and planned.¹³

The take-off from the composite herd after RLDP is approximately 20%, as contrasted to 3.25% for the composite herd "before" RLDP.

The grazing herd found in the Yabelo area prior to the project is the logical starting point from which to base step-by-step plans to reach the desired number of animals and proper distribution by age and sex. The grazing herd, rather than the ownership herd, is the breeding unit.

The three simple steps required are as follows:

1. Begin with existing grazing herds and apply the proposed practices.
2. Withhold all breeding females from market for a five year period (it is illegal to sell them anyway), and

¹³Dr. J. L. Fischer, "Development of the Beef Industry in Africa" (unpublished paper on Improving Technical and Capital Assistance With Proposed AID Policy Guidelines, The University of Arizona, 1969), p. 41.

3. Force, if necessary, the sale of the bulls, other than herd bulls, at four years of age.

The result is that by the sixth year the numbers of cattle on the Yabelo unit will be approximately doubled (which meets the plan's goal), and the age and sex distribution in the then existing herds will be very close to the ratios in the planned, stabilized, "composite" herd.

CHAPTER 3

THE NATIONAL RANGE PROJECT (NRP) (PROPOSED EXPANSION OF THE REGIONAL DEVELOPMENT PROJECT)

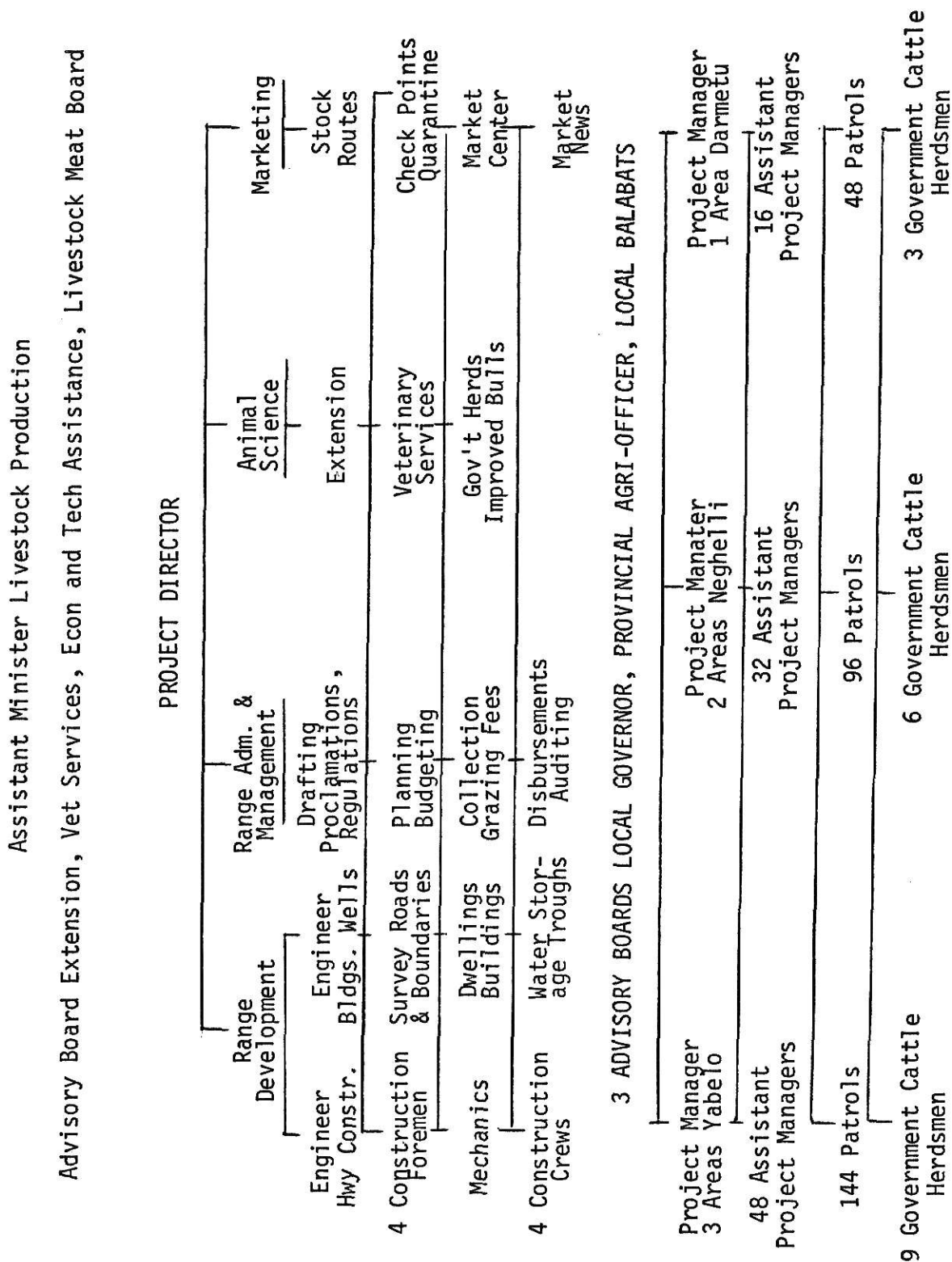
Based on the experience of the RLDP, it was proposed that the Imperial Ethiopian Government expand the Regional Livestock Project activity to include the following:

- a. Arrero - In addition to the 800 square miles for development, the second half of the managerial unit (another 800 square miles), and two other units of 1600 square miles each will be developed. The combined area of the three units will be 4800 miles.¹⁴
- b. Neghele - Two management units of 1600 square miles each will be developed.
- c. Darmetu - One larger than usual sized unit will be developed on the Darmetu Plains in Wollo Province. The first Darmetu unit will cover 2,000 square miles, and since the plains are much larger, additional units could be included in future development plans for north and eastern Ethiopia.

¹⁴Dr. J. L. Fischer, "National Range Development Project" (unpublished Technical Plan Summary and Economic Analysis, USAID/Ethiopia, 1969), second draft, p. 20.

CHAPTER 4

THE NATIONAL RANGE PROJECT - GENERAL PLAN STAFF REQUIREMENTS EXPANDED RANGE DEVELOPMENT, ETHIOPIA



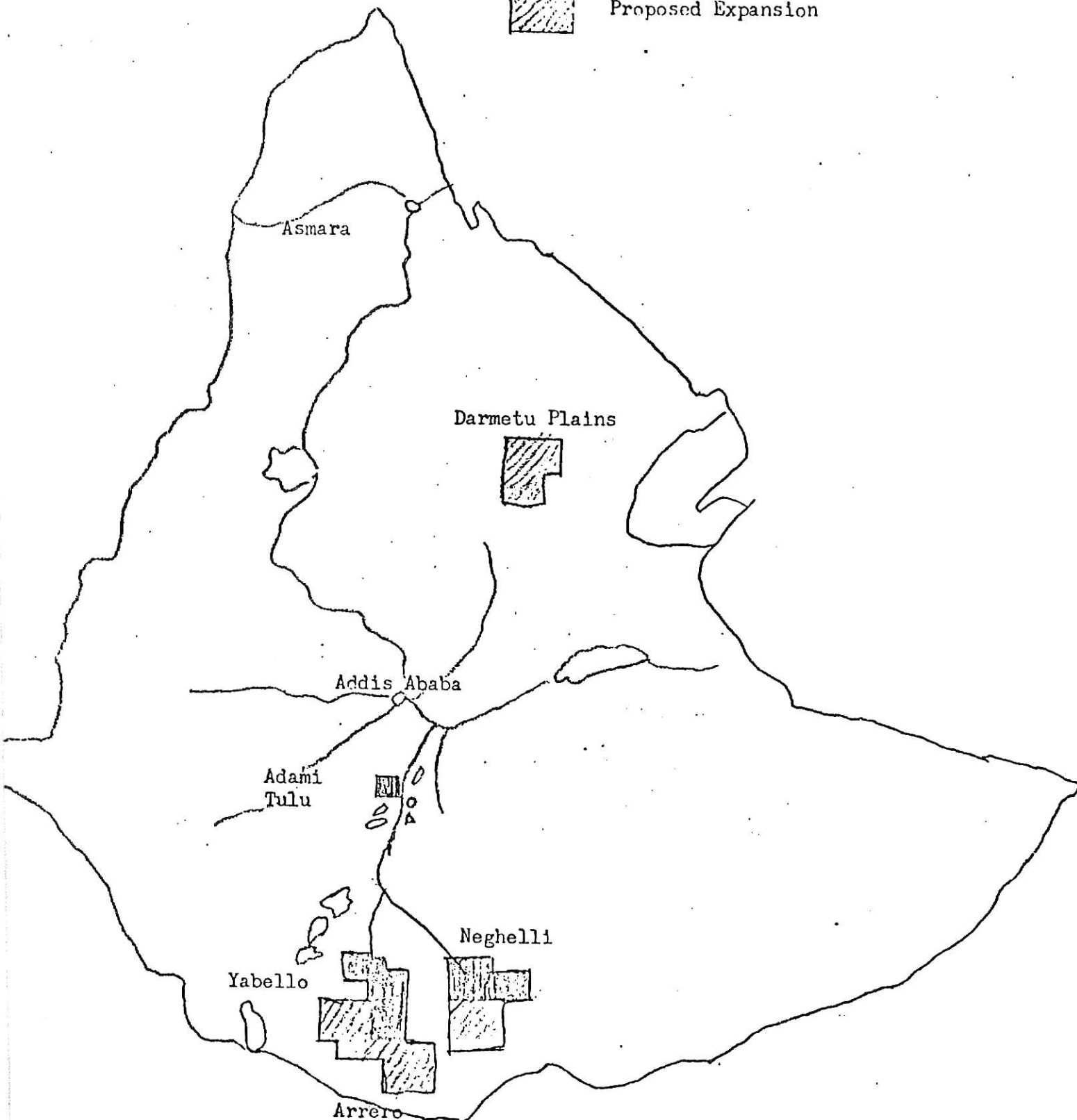


Regional Livestock
Development project

17a



Proposed Expansion



Project Areas are not drawn to scale

Each Range Management Unit will be organized under a Project Manager. Units are to be divided into sixteen ranges. Each range will have an Assistant Project Manager (16 assistant project managers for each unit). Each range is further sub-divided into four grazing areas which, based on a scientific evaluation of the range condition, will be grazed in a deferred rotational grazing pattern. (It is anticipated each grazing unit will be grazed an average of three months each year.) Each range will have three patrols who will guard the areas not being grazed against trespass grazing and fire.

Each range (16 per Range Management Unit or 100 square miles) and the Range Management Unit Headquarters must have a year round source of water. The Range Management Unit headquarters will probably rely on a well since the Unit staff will need a domestic water supply. The water source for each range will probably be a pond; however, wells will be drilled if surface water cannot be caught.

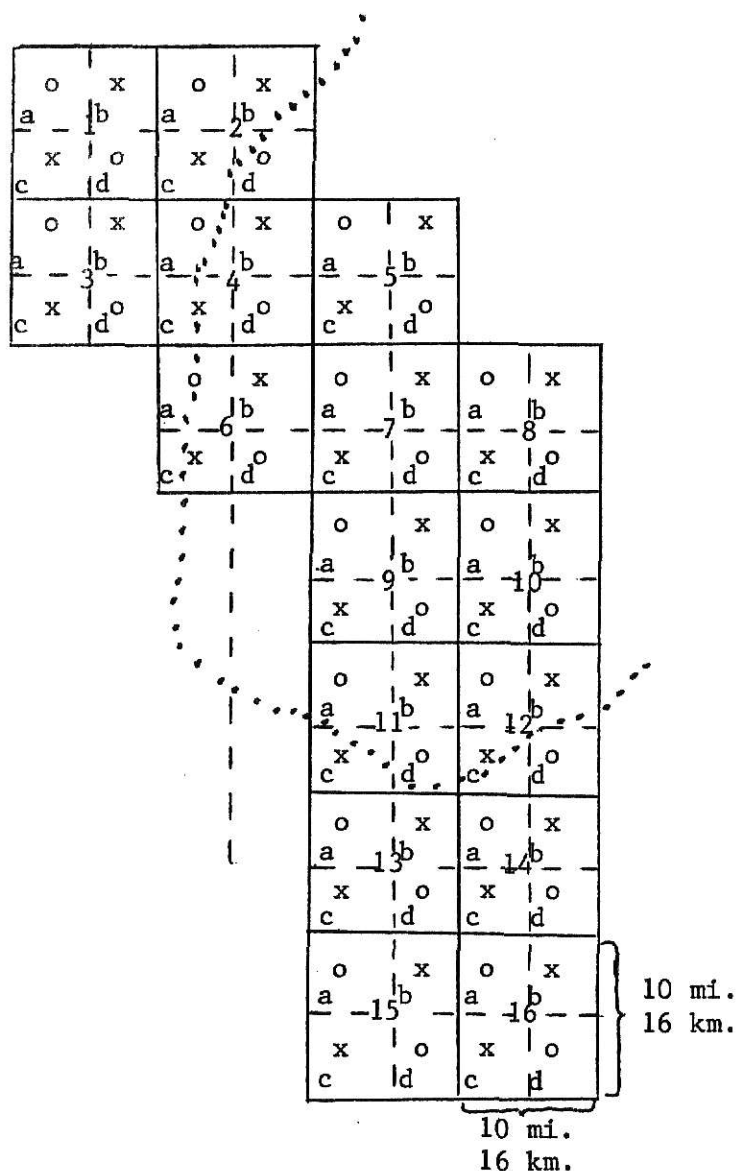
As the range management units are developed, grazing privileges (permits) will be issued first to the local people now using the areas. It is not anticipated that a reduction in livestock numbers will be required, but should there be need, the reduction will be prorated among present users. Also, any increase will be offered first on a prorated basis to the existing permittees. Grazing permits will be renewed annually on a prescribed date, with past permit holders having first priority in renewing or increasing their permits.

Assistant Managers will be assigned to each of the 16 grazing units. The Assistant Manager will be responsible for carrying out the rotational

grazing program, checking on trespass livestock, and implementing the herd improvement program with livestock owners through an Extension type educational program.¹⁵

¹⁵Ibid., p. 23.

GENERAL PLAN - RANGE MANAGEMENT UNIT



x = Permanent water

o = Temporary water

1, 2, 3, 4, etc. = Range or grazing = 100 sq. miles each

a, b, c, d, etc. = Rotation pastures, for seasonal use = 25 sq. miles each

..... = Stock trails to market

———— = Range unit graded boundary road, providing access and fire protection

----- = Pasture unit boundary trails

A headquarters within each range (100 sq. miles) will provide a veterinary check station, dipping vat for insect control, administrative and fire control center.

Fees

An animal unit year (AUY) will be the basis for grazing fees. An animal unit year is defined as one mature cow grazing for one year, or the equivalent.

Animal Unit Years

Cattle:

One cow 4 years old or older with or without calf	= 1.00	Animal Years
One bull 4 years old or older	= 1.25	" "
One male or female, 1 to 2 years old	= 0.5	" "
One male or female, 2 to 3 years old	= 0.75	" "
One male or female, 3 to 4 years old	= 0.9	" "

Goats or Sheep:

One animal	= 0.2	Animal Years
------------	-------	--------------

Camels:

Mature male	= 2.0	Animal Years
Mature female	= 1.8	" "
4 year old animal	= 1.0	" "
3 year old animal	= 0.75	" "
2 year old animal	= 0.6	" "
1 year old animal	= 0.5	" "

Horses:

Mature animal	= 1.25	Animal Years
3 year old animal	= 1.0	" "
2 year old animal	= 0.8	" "
1 year old animal	= 0.5	" "

Recommended charges are as follows:

1st Year	- \$0.25 per animal unit year
2nd Year	- \$0.50 per animal unit year
3rd Year	- \$1.00 per animal unit year
4th Year	- \$2.00 per animal unit year

Animal Unit Years (cont.)

5th Year	- \$3.00 per animal unit year
6th Year	- \$4.00 per animal unit year
7th Year	- \$5.00 per animal unit year
8th Year	- \$6.00 per animal unit year
9th Year	- \$7.00 per animal unit year ¹⁶

Fees will not be viewed as a fixed amount which will be forever unchanged. If the proposed fee schedule proves to be higher than required to cover IEG's costs, which project technicians believe will be the case, then fees may be reduced.

Range Development and Construction

Phase 1 concentrates on the construction of water facilities and roads needed for operation of one-half of the unit, and provides the resources needed to begin stabilizing the operations of the people and cattle already in the area. (The half unit, upon completion, will provide water and grass for approximately 40,000 head of cattle, the number currently being grazed six months per year in each unit's area). The intention is to provide for the cattle and people already in the area during the first two years.

Phase 2 involves the construction of the headquarters and base camp near the center of the unit at a permanent water site; the explanation of the program to the people; securing their cooperation; the determination of who is entitled to permits and their issuance; initiation of the veterinary program; and the introduction of all other improved practices in the plan.

¹⁶Ibid., p. 25.

Phase 3 provides the additional water and grass resource base needed for expanding herd sizes and the number of cattle to that required for efficient operation of the unit.

Phase 4, the 5th year, provides for implementing all aspects of the plan. By the sixth year all benefits projected recur annually. After the fifth year, the only costs are those recurring other costs required for stable operations.¹⁷

Animal Health and Improvement

Much of the agricultural wealth of Ethiopia is vested in livestock, and many breeds of domesticated animals well adapted to their natural environments are to be found throughout the country. Unfortunately, malnutrition, undernutrition, faulty animal breeding methods, unsatisfactory animal management and in particular, the ravages of infectious diseases and parasitic infestations cause underproduction, poor quality, wastages and heavy losses.

Not only do these losses and wastages represent a serious problem for large numbers of people whose welfare depends on livestock farming, but they also adversely affect the country's economy. It has been argued that, despite these shortcomings, the livestock population is sufficient to meet the country's needs in terms of meat, skins and wool and even to provide for a higher standard of human nutrition than at present exists. Nonetheless, there can be no doubt that Ethiopia's economy would benefit greatly from an increased export of animals, animal products and by-products. Indeed, these things may well represent one of the most important

¹⁷Ibid., pp. 27-28.

sources of revenue. The potential is large. By improving the quality of livestock, by developing sound marketing systems and, in particular, by controlling the diseases of animals, Ethiopia's position as an exporter of these commodities could be greatly strengthened. The need to develop effective control measures is obvious and urgent.

It is difficult to assess the amount of losses due to disease. A figure of seven percent has been quoted in FAO Report No. 497 to the Government of Ethiopia. This is probably a very conservative estimate.¹⁸

The Arrero and Neghele areas are currently grazed by cattle of the Borana breed. Research and experience has demonstrated that the better Boranas gain weight, finish out and reproduce at rates which compare favorably with the standard exogenous breeds. They have the advantage of being more resistant to local diseases and parasites. Therefore, no effort need be made to introduce a new breed of cattle. What is needed for herd improvement is already in the country.

The cattle in the Darmetu area are smaller and substantive benefits may be obtained by introducing a new Borana bloodline into the area through sires from the southern area.

The ministry of agriculture has developed an excellent foundation herd of Borana cattle at the Adama Tulu Ranch. Bulls from this ranch are supposedly for distribution to local cattle owners; however, the acceptance of these bulls by local cattle owners has been disappointing. Local cattle owners often do not believe the improved bull can survive under the prevailing conditions. Although this is probably not the case,

¹⁸H. P. Huffnagel, Agriculture in Ethiopia (Rome: Food and Agriculture Organization of the United Nations, 1961), pp. 352-353.

neither will the improved bulls do much good unless the environment is changed. Expected results will not be achieved until the level of nutrition of the local cattle is raised to a level which will permit a response to improved blood lines.¹⁹

Accurate estimates of cattle numbers are hard to obtain, as cattle are on the move with nomadic groups and also some farmers have been reluctant to have their cattle counted.²⁰

Most cattle are of the humped Zebu type. They have low meat and milk yields; this stems from disease but the major cause was uneconomic herding practices, such as accumulation of cattle beyond good marketing age and lacking of water, over grazing takes place. It is estimated about 25 percent of all cattle are used for draft purposes. The responsibility for improvement of domestic stock falls under the Ministry of Agriculture. Efforts have focused on the use of improved bulls and artificial insemination.

Figures for production of cow milk in the late sixties show a wide range from 700,000 to 2 million metric tons annually. Most of the milk not consumed fresh was made into ghee (a clarified form of butter) or into various cheese-like products.

In the mid-1960's, production of pasturized milk had reached 3,200 tons. Most processing was confined to the areas around Addis Ababa and Asmara.²¹

¹⁹Dr. J. L. Fischer, "National Range Development Project" (unpublished Technical Plan Summary and Economic Analysis, USAID/Ethiopia, 1969), second draft, p. 29.

²⁰Irving Kaplan and others, Area Handbook for Ethiopia. Research and Writing completed Aug. 31, 1970 (Published 1971: Library of Congress Catalog Card No. 79-609351), pp. 360, 368, 369.

²¹Ibid., p. 369

Marketing

Negotiations between Imperial Ethiopian Government and a firm which had international marketing contacts was nearing completion in 1969. The firm would export live animals, operate a modern feed yard, and reactivate the modern processing plant located near Sheshamane. The firm's plans call for exporting meat from approximately 100,000 animals per year within the next five years. The firm would lease an adequate amount of land to provide the quarantine areas needed; to produce the calves and/or feeders required for efficient operation of the slaughter plant.²²

Within the actual project areas, several activities of the Livestock and Meat Board will provide services critical to the realization of the project objectives. This will include as the first step improving the existing routes and the development of new routes where necessary. Major routes will be provided with watering points, either wells or dams, at about one day's travel (25 km.) intervals. Veterinary check points and rest areas will also be provided along the major routes at 100 km. (approximate) intervals. The availability of these facilities will encourage orderly and continuous, rather than seasonal movement of livestock to market by local owners and herders. The cost of trail development and watering facilities within the project area is budgeted as a project cost.

The Livestock and Meat Board will establish local markets and regulate sales practices wherever there is a need. Other L&MB activities that will contribute to successful project implementation are: (1) training

²²Fischer, "National Range Development Project", p. 30.

cattle producers in the preparation of improved hides and skins; (2) providing marketing information and a price reporting service for livestock; (3) the introduction of small regional packing and slaughtering plants; (4) the establishment of acceptable standards and grades for both livestock and dressed meat; (5) increasing and updating a national meat inspection system; and (6) encouraging the packing plant slaughter of sheep and goats.

National and international activities of the Livestock and Meat Board will also have a direct bearing on the National Range Project. These would include: (1) increasing the utilization of livestock and meat by-products; (2) developing larger export markets for livestock products; (3) improving the efficiency of slaughtering and processing, and (4) increasing domestic consumption of meat products.²³

²³Ibid., p. 32.

CHAPTER 5

ECONOMIC ANALYSIS

In computing the benefit cost ratio, an interest rate must be selected to discount both the benefits and costs to a common time base since they are not evenly distributed over the period of the analysis. Both benefits and costs are discounted to present worth, i.e., value today, or sometimes called "year 0". The interest rate selected for the analysis is 7% which is based on long-term development bonds and interest costs to IEG if borrowed funds were to be used. Arguments can be presented both for and against any rate. Since the government is the prime investor, a rate was selected which would more than cover the government's cost of capital.

Benefits

The analysis in the preceding section of this report has pointed out that the project is expected to affect livestock production through increased carrying capacity, earlier age of maturity, and reduced death losses. These factors provide for an increase in production of beef, and increased milk production over and above that used by calves.

One very important anticipated effect is settlement of the Borena people and the education of Borena children. Since income can be correlated with education, benefits may be calculated. The educational effect would not be expected to happen until about the 10th year, assuming

an average of seven years of education per child. Benefits would stabilize in about the 18th year if the educational levels remain constant.

Although educational and social benefits will be a welcome bonus over and above those occurring in the marketplace.²⁴

Livestock water development will also serve wild life, and the control of burning will reduce death losses due to fire. This will give an increase in wild life numbers which should be harvested annually to prevent overpopulation. This could provide a valuable source of revenue through tourism and hunting fees. Although there definitely is a potential for income from wild life and recreation, no benefits from this potential source are included in this study.

The benefits of soil and moisture conservation are so closely related to other affects of the management practices that they cannot be separated. On-site benefits, particularly in water quality, are known to occur. Water quality improves the general public health. The quality of downstream irrigation water should be improved by the project, floods should occur less frequently, and stream bank erosion should be lessened. No dollar values are allocated to any of the benefits.

The greatest benefit from the project is the increased take-off of saleable beef animals. Before the project, the three areas were selling approximately seven thousand animals per year worth less than \$700,000. After full implementation of the project, the annual number of cattle sold should increase to almost 70,000, and sales should rise to more than 4.7 million, and increase to approximately 4 million dollars.

²⁴Ibid., pp. 33-34.

Saleable milk is expected to increase by more than \$200,000 per year by the 6th year; thereafter, annual saleable products should be stabilized at an increase of \$4.2 million dollars.²⁵

Many benefits can be derived from the National Range Project. The economic gains certainly are the most important; but education and increasing employment will be an asset to the economy of Ethiopia. Hopes were high for the assistance it could give to the agricultural graduates of Haile Selassie University, College of Agriculture at Alemaya.

The basic physical resources needed to develop the beef industry in Ethiopia is available and potential, if the problems can be solved. One of the main obstacles has been the lack of any organized extension service to reach the farmers and livestock men.²⁶

Benefit/Cost Ratio

Benefit-cost analysis is a method of estimating the economic return on proposed public expenditures, as capital expenditures. It can involve making an inclusive list of social costs and benefits, attaching money values to these items, and choosing an interest rate for discounting future benefits.

A dollar of output next year is not the same as a dollar of output this year. The expected stream of future benefits must be discounted back to the present to determine the true return on cost.

²⁵Ibid., p. 34.

²⁶Interview with Dr. Melak Mengesha, Dean of Haile Selassie University, College of Agriculture, Feb. 9, 1970, Addis Ababa, Ethiopia.

The benefit-cost calculations can never be precise. One reason is the difficulty of valuing non-pecuniary costs and benefits. The economic return resulting from the Range Development Project is based primarily on the physical responses.

TABLE 3
NATIONAL RANGE PROJECT, INCREASED VALUE OF LIVESTOCK ON PROJECT AREAS
(between first and sixth years)

	Actual	Discounted Value Pres. Worth
Arrero	\$ 6,937,800	\$ 5,703,198
Neghele	4,625,200	3,802,132
Darmetu	1,362,520	1,168,970
TOTAL	\$12,925,520	\$10,674,237

All monetary amounts are based on Ethiopian values. One U. S. dollar is equivalent to two dollars and fifty cents in Ethiopian currency.

The total Present Worth of the three Range Projects is based on between first and sixth years. This is basing the first year on zero and factoring each year's increase on actual value. The factor percentage comes from table E-14 @ 7 percent uniform series (Principles of Engineering Economy). Factor times actual value will give you present worth for each years increase value.²⁷

²⁷Eugene L. Grant and W. Grant Ireson, Principles of Engineering Economy (New York, N.Y., The Ronald Press Company, 1970), p. 608.

The greatest benefit from the project is the increased take-off of saleable beef animals. Before the project, the three areas were selling approximately seven thousand animals per year worth less than \$700,000.

TABLE 4

NATIONAL RANGE PROJECT, VALUE OF INCREASED SALEABLE PRODUCT, 50 YEARS
(Beef & Milk)

Arrero	Neghele	Darmetu	TOTAL
\$102,892,440	\$68,571,336	\$25,861,460	\$197,325,236

TABLE 5

NATIONAL RANGE PROJECT, PRESENT WORTH OF ALL BENEFITS, 50 YEARS

Arrero	Neghele	Darmetu	TOTAL
\$29,737,525	\$19,860,621	\$7,609,468	\$57,177,614

Figures taken on 50 year annual level of increase production times 50-year factor (uniform series E 14 @ 7 percent compound interest; Principles of Engineering Economy), minus or deduct 1-5 years of factor times annual increase, plus present worth of increase production 1-5 years, plus present worth of increase value of animals on project areas 1-5 years, gives total of each areas for the above Table 5 after completion of 5 years.²⁸

²⁸Ibid., p. 608.

TABLE 6
NATIONAL RANGE PROJECT, DIRECT COSTS, 50 YEARS

	Actual
Arrero	\$48,457,642
Neghele	31,075,420
Darmetu	16,360,180
TOTAL	\$95,893,242

TABLE 7
NATIONAL RANGE PROJECT, PRESENT WORTH OF ALL COSTS, 50, YEARS

	Arrero	Neghele	Darmetu	TOTAL
Direct Costs	\$15,028,956	\$9,835,261	\$5,032,468	\$29,896,685
Animal Health	1,550,700	1,033,800	516,900	3,101,400
Contract Development Team	617,298	411,532	205,766	1,234,596
USAID Tech. Assist. & Tng.	522,108	348,072	174,036	1,044,216
	\$17,719,062	\$11,628,665	\$5,929,170	\$35,276,897

Direct cost from Table 7 consists of permanent staff, maintenance, and operational use uniform series factor. Construction and Development cost use single payment factor. Equipment and Machinery costs are calculated for the life of the project. The year during which each expenditure is anticipated and the costs totaled and discounted to present worth.

TABLE 8
NATIONAL RANGE PROJECT, DISCOUNTED COSTS AND BENEFITS

Benefits, Present Worth	\$57,177,614
Costs, Present Worth	35,276,897

Factors used for Costs are stated above. Benefits use single payment factor.

TABLE 9
BENEFIT/COST RATIO

Arrero	Neghele	Darmetu	TOTAL
1.56/1.00	1.71/1.00	1.28/1.00	1.62/1.00

Internal Rate of Return

Internal rate of return involves deducting total annual costs, from the total benefits, dividing by the project life, and computing the rate of return, the annual net income represents on the initial investment.

Construction costs, the development team, the contract team, USAID Technical assistance and participant training are viewed as "development costs". These costs total \$7,164,992; however, in contrast to the usual case where construction or development costs occur in a single block before income begins, in this project the development costs accrue over the first five years of the project life. Two analyses are presented, one summarized in Table 10, uses actual development costs, and the

second in Table 11 uses development costs discounted to the year 0.²⁹ They must be discounted to 0 year value to be realistic. The present worth is \$6,341,940. Development costs are summarized below:

Development Team	\$ 304,800	\$ 251,795
Construction	4,202,192	3,811,331
Contract Team	1,425,000	1,234,595
USAID	937,500	818,812
Participant Training	<u>295,500</u>	<u>225,407</u>
TOTAL	\$7,164,992	\$6,341,940

Annual Costs are as follows:

Total Project Costs	\$108,918,702 divided by 50 years
Average Annual Costs	\$ 2,178,374

Annual Benefits are as follows:

Total Increased	\$210,250,756 divided by 50 years
Annual Benefits	\$ 4,205,015

Net Annual Benefits:

Average Annual Benefits	\$ 4,205,015
less	
Average Annual Costs	<u>\$ 2,178,374</u>
Net Annual Benefit:	\$ 2,026,641

TABLE 10
INTERNAL RATE OF RETURN

Development Costs	Net Annual Benefit	Internal Rate of Return
\$7,164,992	\$2-026,641	28 - 29%

²⁹Dr. J. L. Fischer, "National Range Development Project" (unpublished Technical Plan Summary and Economic Analysis, USAID/Ethiopia, 1969), second draft, p. 67.

TABLE 11
INTERNAL RATES OF RETURN BASED ON DEVELOPMENT COSTS
DISCOUNTED TO YEAR 0 @ 7 PERCENT

Discounted Development Costs	Net Annual Benefit	Internal Rate of Return
\$6,341,940	\$2,026,641	31 - 32%

CHAPTER 6

SUMMARY

The 25 million plus head of cattle in Ethiopia is one of the nation's most promising resources for development; all areas are not equally suitable to development.

A better short run potential is to be found in the vast grazing areas with abundant indigenous forage grasses which could, with relatively inexpensive changes provide feed for many more cattle than are currently being produced; and since the numbers of cattle already in Ethiopia are large, expansion can take place rapidly.

The Regional Livestock Development plan has been continuously adjusted to take into account new knowledge and experience. The original plan called for heavy reliance upon wells as a stockwater source. Experience showed that the nomadic people had difficulty maintaining the wells. It was found that stockponds met the needs of the nomadic cattlemen very satisfactorily, with the added advantage of being cheaper.

The entire program will be on government owned property in order to avoid land tenure problems. The key to making improvement in range management lies in control of grazing so that proper utilization is made of the range resources.

The organizational structure of the project takes note of the social characteristics of the local people, and operates within the framework of values consistent with those they hold.

The project was designed on a self-liquidating basis insofar as expenditures by the Imperial Ethiopian Government are concerned, each range management unit is a bankable project. Success in the implementation of any project depends upon the practicality of the methods by which the people involved can achieve their goals.

Based on the experience of the RLDP, it was proposed that the IEG expand the Regional Livestock project activity to include 10,000 sq. miles (6,400,000 acres).

The development and operational programs for each range management unit involve an initial five year stage. By the sixth year operations on the unit should be stabilized and annual costs should be constant. Since the program involves investment in long term, permanent resource development and a stabilized input and cost structure to maintain production indefinitely, the normal 50 year period is used as the basis for both cost calculations and benefits.

The general NRP plan for the animal health program calls for the Ministry of Agriculture Veterinary Department to do all vaccinating, worming and dipping for the first four to five years after a new area is developed. During this period, the local people will be trained to do their own work and area supervisors will be available.

The economic return resulting from the NRDP is based primarily on the physical responses outlined in the report. These include livestock and milk production, social and educational, wildlife habitat and recreations, soil and moisture conservation, forestry and political and national security.

It should be noted that increases in take-off and income for each area are phased into the analysis on the basis of calendar years.

CHAPTER 7

CONCLUSION

Ethiopia has the potential of being one of the greatest live-stock producing countries in the world. However, the marketing and processing situation needs to be improved. Lack of transportation and other problems have delayed their growth. The two greatest factors that have delayed their progress have been technical training and capital. With the assistance of USAID and FAO plus other outside donors, development should prove successful. There is a dire need for better training of their own people for continuing a progressive operation. Too often people assume that if a program is made available, production would automatically respond.

There are no reasons why the past problems cannot be solved now that they can be identified. Ethiopian technicians with the right kind of know-how and interested in the development of the cattle industry should have no problem. With good management the feeding of cattle would develop more export demand. It adds value to the fixed product very rapidly, and generally increases the price received. It takes a long time to increase the number of cows of breeding age, and the number of calves born. On the other hand, finishing to existing animals can begin almost immediately in some areas.

Finishing does not need to depend completely on grain. Low cost year round grazing on intensive pastures can replace much of the usual grain required.

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RANGE DEVELOPMENT PROJECT IN ETHIOPIA

by

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AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Economics

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1972

ABSTRACT

The development of the livestock industry is very important from the nation's interest, such as earning foreign exchange and increasing the tax base. However, the impact the development would have on the people is of greater importance. People are the recipients of the benefits of development, but they are also one of the basic resources in the development equation. Their system of land use and stock raising has evolved centuries, under conditions over which the livestock producer has had little or no control. The nomad lacks education, technical skills and finances, but he has "cow sense" and a highly productive range livestock industry can be built upon the nomadic and semi-nomadic cattleman.

The government's major source of income from the project is from the collection of grazing fees. A second source will be from sales of animals from the government-owned herds operated at Adami Tulu to provide improved bulls and breeding stock.

Net income from the government herds should amount to \$5,000 (estimated) annually by the 5th or 6th year. The herds would be producing a net \$30,000 annually from their six units when in full operation, this would total \$1,500,000 during the 50 year life of the project. This income is a "bonus" for IEG since it is not considered in the IEG financial analysis of the project.

The project plan specifically calls for priority to be given to the people already in the area when new permits are available. The current

cattle owners will be encouraged to increase the size of their herds. Although the current owners own an average of 40, herds of 100 cows are readily attainable without any capital or breeding stock being brought into the area from the outside.

A typical 100 cow herd under full implementation of the plan should yield a take off of 39 head per year at an average value of \$70 per head plus \$150 for milk, giving the owner a gross income of \$2,880.

All costs for the owner are covered in the project plan and will be paid through the per animal unit year grazing fee. For purposes of calculation, the highest fee rates are used, i.e., \$7.00 per AU. If an owner has 257 mature animals in his herd, his annual costs would come to \$1,619 would give the cattle owner a net annual income of \$1,261. This may be compared to an income at present of \$100 or less.

The above analysis assumes the cattle owner will follow the recommended increase of his herd size. There is, of course, not guaranteed that owners will increase their holdings. If the ownership herd should remain at 40 head rather than the 100 cows anticipated, benefits would still be great. Net annual income from a 40 cow herd should be approximately \$517, or an increase of 400% above current income.

Risk and uncertainty are a normal part of the production and marketing process. Risk and uncertainty are inherent in any economy, and various organizational structures can cope with the problems they pose. The entrepreneur takes risks and provides management in return for anticipated profits. A proper perspective will lead to action when potential benefits, in relation to costs (including risks), justify it.