COSTA RICA

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PRODUCTION AND MARKETING OF BEEF IN COSTA RICA, WITH PARTICULAR REFERENCE TO PROSPECTS FOR 1970 - 1980

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INTRODUCTION

The purpose of this study was to determine and evaluate production and marketing factors important to the development of beef production in Costa Rica. The AID/CR Mission specifically requested a review of available records and interviews with appropriate informants as might be necessary to:

a) analyze beef production since 1955 on basis of growth and improvement of national herd, extraction rate, domestic and foreign marketing, average age at market weight, percentage dressing, and sex ratio slaughtered for internal and external markets;

b) forecast production outlook for 1970-1980 based on extraction possibilities, availability of credit and technical assistance, and price trends; and

c) analyze demand of foreign and domestic markets, including price elasticities and rural-urban consumption at three levels of income in response to various price levels.

In addition to the immediate objectives, set forth explicitly in the PIO/T, the study has a bearing on a decision before the Mission on whether funds provided by a recent AID loan to Costa Rica (AID 515-L-022) should be made available to small cattlemen. One factor in the decision may be the capacity of the domestic market to absorb whatever increase in production may result from such borrowings. The findings of the study should be highly pertinent to this question. Another factor is whether sufficient funds may not be available to the small cattlemen through turnover of proceeds

of previous AID loans, or through reallocations of Costa Rican resources not directly involved in the present loan agreement.

The objective of the study may also be conceived somewhat as follows: Are the production potential and the limits to demand such that prices are likely to fall so low as to impair borrowers' ability to repay?

The study was facilitated greatly, in general, by a number of circumstances which reflect most favorably on Costa Rican institutions, past economic development activities of domestic and international agencies, and the Mission's preparation for and current support of, the present study.

Abundant material was available from previous research, and from regular sources of data provided by Costa Rican agencies. There were some gaps in the available data, to be sure, so that some interpretations must be more subjective than one would wish. Nevertheless, the substantial bookshelf of studies of Costa Rica's beef industry provided a gratifying amount of useful material.

The Mission's contribution began with the clear formulation of objectives in the PIO/T, and continued through the considerable amount of staff support during the study period. Juan J. Castro assembled most of the available published information; assisted in arranging and participated in field trips and interviews; and shared the benefits of his intimate personal and professional knowledge of Costa Rica and its agriculture. Edward Schaefer, who, like myself, was a newcomer to Costa Rica, also participated in the field trips and interviews, and drafted sections of the report dealing with production developments.

Field trips were made into Guanacaste Province and the Canton of San Carlos for observation and interviews with ranchers and Government officials. These trips, plus interviews with informants in San José and study of available published material took up most of the time between November 2 and 21. The weeks of November 23 and 30 were mainly spent in analysis and preparation of a draft report. Revisions and additions were made in January.

The following sections take up production topics first, moving from a review and interpretation of trends in output and characteristics of the production system to an appraisal and projection of future production prospects. Demand is next treated in a similar manner. These sections provide information specifically requested by the Mission. The final section discusses probable price trends, and various developments and public programs, existing or prospective, related to the domestic meat supply and consumption.

PRODUCTION AND UTILIZATION 1955 - 1970

Size and Characteristics of the Herd

Costa Rica's national cattle herd grew more or less steadily at rates ranging from 5 to 6 percent annually between 1955 and 1970.

The total cattle population of Costa Rica as of April 1, 1970 was estimated to be 1,513,000 head (Table 1). Of this number, 1,354,000 were estimated to be beef cattle, approximately 89% of the total population.

TABLE 1. Cattle numbers and annual rates of change, Costa Rica, by sex and purpose, selected dates, 1950 - 1970.

Year	Date 1/	Total			Males			Females		
		Total	Meat	Milk	Total	Meat	Milk	Total	Meat	Milk
		Thousand Head								
1950	May 22	608	-	-	232 2/	-	-	376	-	-
1955	April 1	705	-	-	276 2/	-	-	429	-	-
1963	April 1	1,051	538	513	415	370 2/	45	636	168	468
1968	Nov. 1	1,393	898	495	512	473 2/	39	881	425	457
1970	April 1	1,513	1,354	159 3/	542	53	11	971	823	148
		Percent								
1950 to 1955		3.1			3.6			2.8		
1955 to 1963		5.1			5.2			5.0		
1963 to 1968		5.2			3.8			6.0		
1968 to 1970		6.0			4.2			7.1		

1/ Based on the manner in which the question was worded, and the period over which the interviews were held.

2/ Work oxen included as follows: 1950, 41,360; 1955, 40,321; 1963, 30,976; 1968, 27,500; 1970, 23,505.

3/ The 1970 inquiry asked for meat, milk and dual purpose classifications. Only meat and milk were tabulated, the results indicating that dual purpose animals were tabulated in the meat category. Previous censuses and inquiries asked only for meat and milk classifications.

4/ Annual rates take into account number of months elapsed between census or inquiry dates. Calculated from unrounded data.

Source: Encuesta Pecuaria por Muestreo - 1970. Dirección General de Estadística y Censos, Ministerio de Industria y Comercio, Sept. 1970.

The question which the 1970 survey used to get this information differed from the question used in previous surveys. The difference probably biased the result. The number of cattle kept mainly for beef in 1970, in terms comparable to previous inquiries, probably was close to 1.0 or 1.1 million, about 70 percent of the total population.

In 1968 roughly 65 percent of the cattle population was reported kept mianly for beef, and in 1963, slightly more than half. Classification is difficult, because many ranchers milk some of their lactating females as a commercial activity, even though the animals may be kept mainly for beef production. For this reason, most of the discussion which follows uses numbers of all cattle, without trying to distinguish between the dairy and beef enterprises.

Regional Specialization

Specialized dairying predominates on the upper edges of the Central Plateau, and in the higher levels of the San Carlos Valley. Guanacaste and Puntarenas provinces had 47 percent of the cattle kep for milk in 1963, and accounted for 1/5 to 1/3 of the production of cheese, butter and milk. Thus, the milk enterprise is an alternative to beef, at least to some extent. It was generally reported that dairying has been giving way to specialized beef production in recent years, and during field visits we met a number of ranchers who had closed, or were decreasing, their dairying operations. Milk prices are fixed by the Government, and had remained unchanged for several years until an increase was granted in October, 1970. Ranchers mentioned other reasons for dropping the dairy enterprise: The 7-day-a-week work schedule and difficulty in obtaining skilled labor.

Beef production takes place mainly in two geoclimatic areas, the Dry Pacific, including the provinces of Guanacaste and the northern part of Puntarenas, and the

Wet Atlantic, northeast of the mountain chain that bisects the country. In the other major region, the Central Plateau, dairying predominates.

The outstanding feature of the Dry Pacific is the prolonged dry season, from November through May. Otherwise, the region is highly favorable for cattle production. About 45 percent of the cattle population of Costa Rica was in Guanacaste and Puntarenas in 1963, but the area produced a much larger proportion than this of the cattle of export quality. Of the cattle declared for export in 1969 and 1970, 67 percent were from Guanacaste, and 16 percent from Puntarenas.

In Guanacaste, about 72 percent of the land was in farms in 1963, and 60 percent of that was in pasture. With so high a proportion of the land already in use, the principal source of further increases in beef production in this region will be increased productivity of pastures and cattle.

The San Carlos Valley, on the Atlantic side of Costa Rica, had about 8½ percent of the country's cattle in 1963, and contributed 8½ percent of the cattle declared for export in 1970. Export cattle in San Carlos in 1970 amounted to ½ of all export cattle in Costa Rica outside of Guanacaste and Puntarenas.

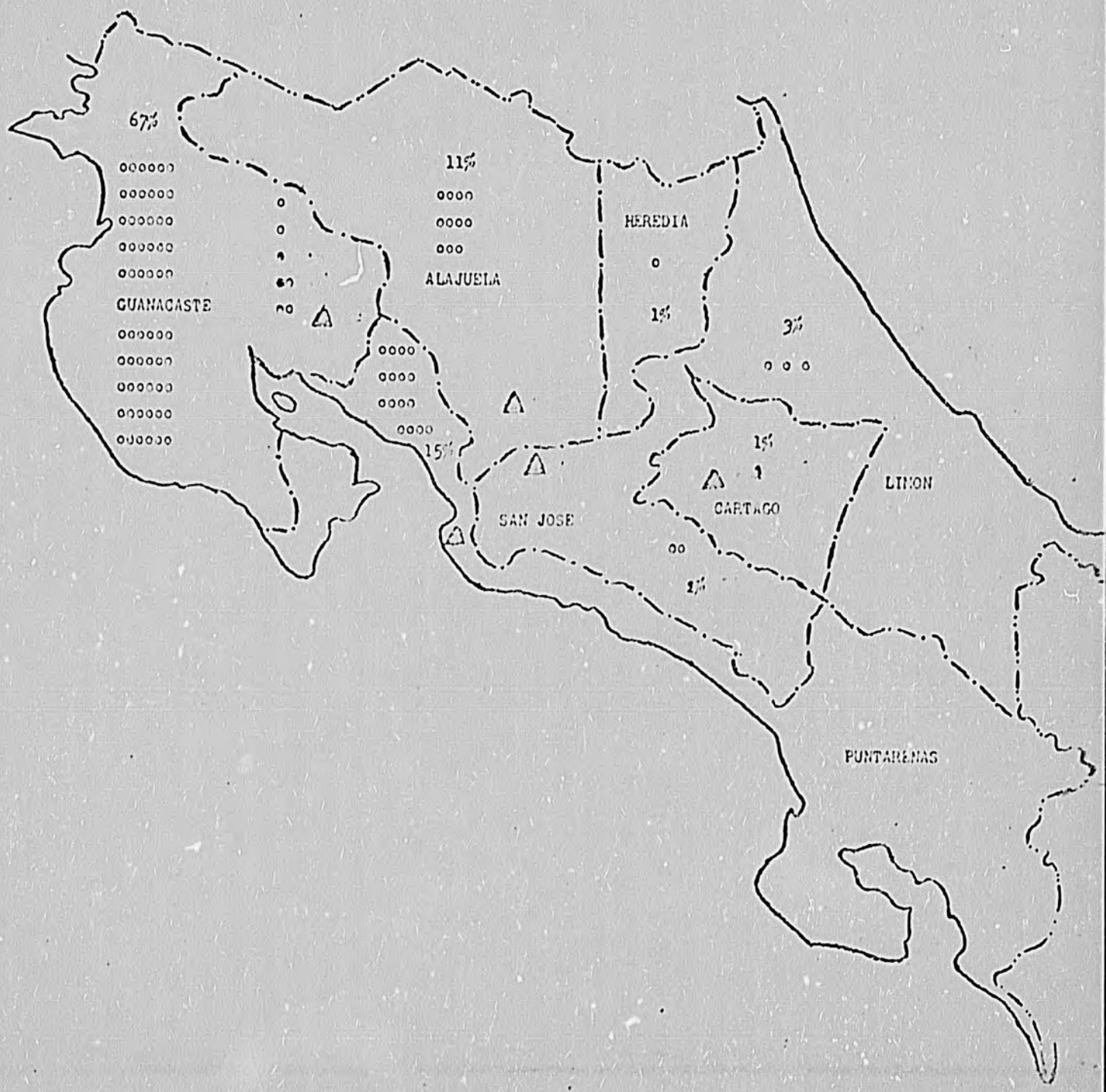
Until comparatively recently the heavy rainfall of the Atlantic region discouraged agricultural activities of any kind. Annual rainfall ranges from 120 to 160 inches, and the "dry" season is only relatively dry, with rainfall on around 10 days a month, averaging 4 or 5 inches a month. Gradually, however, ways have been developed to overcome the difficulties caused by such wet conditions, and farms are being cleared from the forests that covered the area.

Figure 1

MAPA Nº 1

CUOTA DE EXPORTACION DE GANADO VACUNO

ASIGNADA POR PROVINCIAS: 1970 - 71



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In 1963 the canton of San Carlos in the Atlantic had 57 percent of its land in farms, and 46 percent of that was in pasture. Soils and topography of the San Carlos area are such that nearly the whole area could be utilized for grazing, eventually at much higher stocking rates than would be feasible in the Dry Pacific. Thus, potential beef production in San Carlos is several times its present level.

Specialization by Size of Herd, Function and Location

Considerable specialization has developed within the beef cattle industry in Costa Rica. The resulting structure of the industry must be taken into account in projecting future production, as well as in appraising the results likely to follow from changes in public policies or programs.

Small farms, having less than 200 head of cattle per farm, had 64 percent of the cattle on April 1, 1970. The number of farms in this class was not reported, but in 1963 there were 36,360 in this category out of a total of 37,167 -- about 98 percent of all farms with cattle.

Three major functions are recognized in beef cattle production: "cría", the production of calves up to weaning age, usually 8 to 10 months; "desarrollo", growing out the animals from weaning to readiness for fattening; and "engorde", or fattening. Cría, and cría plus desarrollo, together described the specialization of 84 percent of the farms in the 1970 survey. Engorde, and engorde plus desarrollo, was found on 3 percent. Engorde is typically an operation of large ranches.

Fully integrated production -- cría, desarrollo and engorde -- was reported on 8 percent of the farms.

The tendency for smaller farms to account for most of the cría is associated with the tendency for smaller farms also to be in hilly terrain less suited to large scale patterns of cattle management. Thus, the Nicoya peninsula and southeastern Guanacaste produce stocker cattle for the fatteners whose ranches are more favorable situated. The specialization in the Dry Pacific is reinforced by the rigors of the dry season.

Some interior mountainous areas with comparatively well-distributed rainfall afford more productive and longer grazing periods than such coastal areas as in the Guanacaste Province, where long dry seasons are experienced.

Ranchers who lack such moist upland pastures try to obtain pastures bordering rivers and streams which tend to flood easily thus remaining green throughout most of the dry season. Thus these cattle who have access to either the wet upland areas or river pastures can pass through the dry season with less loss of weight. A rancher lacking either type of pasture may adjust by selling part of his herd -- selling some calves at weaning age tends to serve this purpose.

The age and sex of cattle on small and large farms also shows something about specialization. Small farms had 19 steers 2 years old or over per 100 females of this age, while large farms had 63 steers per 100 females of these ages in 1970. Altogether, small farms had 77,500 steers and large farms 124,016. The proportion of cattle kept for milk is somewhat higher on small than on large farms. This accounts somewhat for the lower ratio of mature steers to mature females. It appears that small farms sell about 43 percent of their males before 2 years of age and keep about 57 percent, while large farms raise about 54 percent of their 2-year-old or older males and buy about 46 percent.

Breeding efficiency appears to be considerably higher on small farms than on large. Although small farms frequently sell young stock at less than one year of age, the ratio of animals under one year of age to mature females was 62% on small farms and only 51% on large farms.

The carrying capacity of pastures on the Atlantic side tends to be highest during the same months when Pacific slope pastures are lowest. This suggests the desirability of an interregional movement of cattle for fattening. However, there are no good highways linking the two regions, and tendencies toward such a flow are weak at present.

Technological Improvements in Beef Cattle Management and Breeding

Basic improvements in beef production techniques began in the 1920's with the importation of Brahma bulls for crossing with the native stock, and the introduction of jaragua grass from Brazil. Within the last decade a wide range of pasture crops has been introduced, including various improved grasses and some legumes. In cattle breeding, zebu blood may contribute as much as ½ to 3/4 of the genes in larger beef herds. Current genetic aims are to achieve about 1/4 from European beef breeds, amoung which Charolais is a favorite. It is difficult to find a representative criollo animal, an animal that does not show obvious characteristics of zebu or modern European breeds. An animal geneticist might lament the disappearance of a source of genes stabilized by some centuries of propagation under exposure to the Costa Rican environment.

Progressive ranchers are using a number of practices which, if widely adopted, will greatly increase the output of beef per unit of land. Breeding practices include more careful selection of breeding stock, with greater attention to earlier maturity and higher rates of gain. Increased control is being exercised over the calving period,

to optimize net effects of a number of interacting factors influencing survival of calves, growth rate and a desirable seasonal distribution of the steers reaching market size. Forage supplies are being improved by using new grasses and legumes, making hay and ensilage, fertilizing pastures (estimated at 4,900 metric tons in 1970), rotation grazing, and irrigation.

Slaughter Trends

The number of head of cattle slaughtered increased at a slightly higher annual percentage rate than the number in inventory over the period 1955 and 1970. Nevertheless, slaughter as a percentage of animals in the national herd tended to decline.

Extraction rate is a result of complex forces, and tends to fluctuate rather widely in relatively short periods. Total slaughter increased by 22,400 head in 1961-62 over the previous year, and decreased from the previous year by 9,600 head in 1959-60. Cattlemen's ability to hold cattle (drought apparently forced some liquidation in 1965-66), or willingness (Stein mentions a loan by Chase Manhattan Bank and more liberal loan criteria as factors in reduced slaughter of cows, 1959 to 1962) may be opposed by favorable or unfavorable market demand.

Reliable annual data on the size and composition of the national herd, and long time series of data on the prices received by farmers are both lacking. This seriously handicaps any effort to analyze slaughter trends statistically.

Allocation of Slaughter Between Export and Domestic Market

Export and domestic markets compete for shares of the total slaughter, but to some extent they act jointly to determine the total number of animals slaughtered. With a change in the relative strength of demand of either market, the relative shares will change. This competition is affected by the prohibitions on export of females, and on slaughter of fertile females under 8 years of age. All the females slaughtered are consumed domestically. A few hundred have been exported for breeding purposes in some years. Thus, the balance between domestic and export demand is reflected almost entirely in the percentage of males used domestically. This has been about 40 percent during the past 5 years and from 50 to 65 percent in the preceding 5 years. From 1967-68 through 1969-70 the number of males slaughtered for the domestic market remained roughly constant at 48-49,000 head. Exports rose from 70,000 head in 1967-68 to 89,000 in 1969-70. In June, 1970 CNP projected 1970-71 exports of 84,000 head, but raised export quotas to 110,000 in November. Cattlemen were asking that the quota be raised an additional 30,000 head.

Export Trends

Until 1954 Costa Rica produced less beef than was consumed. Exports of 7,000 head in 1955, 21,000 in 1958, and 44,000 in 1963 marked successive surges followed by several years of relative stability in each instance. Since 1966, however, exports have increased by 10,000 head or more each year, and seem likely to approximate

100,000 head in 1970-71.

Exports of frozen boneless beef began in 1958-59. Previously, only live animals were being exported. Peak exports of live aniamls occurred in 1956-1959, 1961-1962 and 1964-1966, with 12,000 to 20,000 animals exported on the hoof each year.

Five firms were engaged in exporting beef in 1970. Only one or two were so engaged until about 1967, and only one U.S. firm was handling Costa Rican beef until recently. With the entry of additional processing firms, other outlets were developed in the U.S. As of 1970, the following firms were dealing in Costa Rican beef exports:

Packers

Firm	Location of Plant
Planta Empacadora de Carne de Costa Rica	Barranca, Puntarenas
Cartago Beef Packing, S. A. (also known as Planta Empacadora Guanacasteca)	Colorado (near Liberia,) Guanacaste
Fenderson y Cía, S. A.	El Coco, Alajuela
Taylor & Associates	Montecillos, Alajuela 1/
PECOSA (Pecuaria Costarricense S. A.)	Montecillos, Alajuela 1/

Buyers

Harry Gurens	Pittsburgh, Pa.
Arrow Beef	Chicago, Ill.
Cunningham	Boston, Mass.
Swift and Co.	Chicago, Ill.
Teuman and Thorlow	Miami, Fla.
Packers Provision Co.	Chicago, Ill.

1/ These companies conduct their boning operations in facilities of Matadero Nacional de Montecillos.

In January, 1971, it was announced that an additional firm, Central American Meats, S. A., had plans to construct a plant which would process 6 million pounds annually for export to the United States.

Sanitary supervision of the export plants is under the Ministry of Agriculture, but inspectors of the U.S. Meat Inspection Service also see that U.S. standards are followed.

Most of the Costa Rica's beef exports go to the United States, which imported 35.3 million pounds in calendar year 1969. The principal form of export has been as boneless frozen beef, which is typically used in the U.S. for processing into sausages, etc. Most U.S. imports of this class of beef come from Australia and New Zealand, and are derived from the lower grades of live animals remaining after these countries have supplied their priority export markets for quality chilled and frozen beef. Domestic consumption in these countries, also, is said to take precedence out of the superior classes of animals. Costa Rican exports, however, are of fairly good quality steers.

In packing boned beef for export, Costa Rican packers segregate the various cuts. Loins, eye of the round, etc., may be sold in the U.S. to restaurants, etc. or through supermarkets as retail cuts. When visited in November, one exporter was observed packing bone-in primal cuts from which T-bone steaks would be prepared. Shipments of bone-in cuts had begun arriving in the U.S. in May, 1970.

A further recent development in the U.S. import trade has been the arrival of "prepared cuts" -- individually wrapped cuts, packages of stew meat, etc., possibly treated with tenderizers. Such meat enters outside the quotas established under the U.S. Meat Import Law. I have no evidence that Costa Rica has entered this field as yet. It appears that present prices of such products do not permit packers to pay producers as much for animals going into such products as for animals going into ordinary frozen beef.

Scattered shipments of Costa Rican beef have gone to outlets in the Caribbean, but no regular trade has been established.

Costa Ricans participated in the Central American Meat Trade Mission to Europe and Israel in the spring of 1970. The findings of that Mission are valid for Costa Rica. In particular, Costa Rica needs dockside storage and facilities for quickly loading large shipments of beef if it is to reduce present high transport costs to Europe.

The Domestic Supply

Domestic consumption of beef remained approximately unchanged from 1966 to 1970, averaging about 115,000 head per year. Between 1954-55 and 1961 it remained about 95,000 head per year. Slaughter for the domestic market took 112,000 head in the year ending June 30, 1970.

Domestic slaughter increased at the average rate of 2.3 percent a year, and over the entire period 1955 to 1970.
population at 3.7 percent/. As a result, per capita consumption of beef fell more or

less steadily. According to CNP, the average in 1969-70 was 15.60 kilograms per capita, including by-products of the cattle slaughtered for export. In the mid-1950's per capita consumption averaged 22 kg. per capita.

About one-half of the population of Costa Rica lives in the Central Plateau, but consumption of beef per capital is about twice as high in this area as elsewhere, hence this area consumes about two-thirds of the total beef.

Slaughtering was done in 56 mataderos as of February, 1970. The 8 largest -- all located in the Central Plateau -- accounted for 62 percent of the cattle slaughtered.

Mataderos operate on a custom basis, charging fees of up to 20 colones per head for slaughtering cattle brought to them by wholesale distributors or owners of butcher shops. Five or six wholesale distributors handle the bulk of the beef for the Central Plateau. Elsewhere, it is more common for the individual retailer to buy live cattle and have them slaughtered as needed.

Slaughtering and distribution of meat is done with relatively little regard for sanitation. The Ministry of Health has begun to be more demanding, and it was reported that 21 mataderos were closed in 1970 only 1 of which had reopened by December. The Central Plateau being well supplied with mataderos and wholesale meat distributors, the distribution system in that region could adjust relatively easily to the closing of some of the mataderos. Considerable excess capacity exists in the Matadero Nacional at Montecillos. We were told that this plant could slaughter 1,000 head per day. In November, 1970, it was handling only 200 to 300 daily. This number

included export as well as domestic supplies.

Outside of the Central Plateau, the closing of any of the mataderos could be a serious inconvenience to the people within the area served. However, with the exception of the mataderos for Limón, Puntarenas, Golfito and Liberia, the volume of slaughter in mataderos outside the Central Plateau is very small -- in February 1970, 21 mataderos slaughtered 812 head, an average of 1.6 head per working day per matadero. Populations of such remote areas may obtain meat from animals slaughtered in the field. While this is not sanctioned officially, it is not necessarily as objectionable, on sanitary grounds, as slaughter in some of the local mataderos.

PRODUCTION OUTLOOK, 1970 - 1980

Informed Costa Ricans generally expect that the national beef cattle herd will continue to grow at the 5 to 6 percent annual rate that has prevailed over the past decade. This assumption was accepted by Banco Central as the basis for estimating the size of the beef project to be financed by the World Bank.

Opinions expressed by several informed persons were that potential beef production in Costa Rica was 3 to 4 times the present level of production. Such levels would require 20 to 30 years to achieve at current growth rates.

Pastures

The physical basis for production increases lies basically in the area available for pasture, and in the productivity of the pastures. Prospects with respect to these factors differ substantially between the Dry Pacific and the Atlantic cattle areas.

The Dry Pacific includes Guanacaste and Puntarenas Provinces, and makes up all of the former and a major part of the latter. Guanacaste had 658,000 manzanas of pasture on its 1,100,000 manzanas of farmland in 1963 out of the province's total area of 1.5 million manzanas.[11] There were some 250,000 manzanas of forest and brushland. Little potential remains for expanding pasture area in this region. The principal gains will be from increased productivity -- increases in carrying capacity and decreases in the length of time it takes for an animal to reach market size.

The ratio of cattle to pasture land in Guanacaste in 1963 was 0.58 head per manzana. In our tour of Guanacaste we saw several pastures which were carrying 3 head per manzana. The latter rates require a supply of water for irrigation during the dry season, and the amount of pasture suitable for irrigation is limited. Some cattlemen, also, were putting up hay to be used during the dry season. Again, this practice is unlikely to bridge the entire nutritional gap. Assuming that 10 percent of the pasture land may be suitable for irrigation, and that hay-making performs a service equivalent to an additional 10 percent similarly improved, there would be the equivalent of a 6-fold increase on 20 percent of the area. Superior grasses and a higher proportion of legumes may add 25 to 50 percent to the productivity of possibly half of the remaining area. With these magnitudes, total carrying capacity of Guanacaste pasture would be approximately two and one half times the number carried in 1963, or about 900,000 head. Puntarenas is less promising for widespread improvements, and may no more than double its

11 One manzana equals 1.7 acres.

herd, to about 400,000.

In the Atlantic, technology of pasture and cattle management may raise carrying capacities somewhat from present levels, but considerable expansion of pasture area can take place, also. San Carlos Canton had 85,000 head on 117,000 manzanas of pasture in 1963, 0.73 head per manzana. Pasture occupied only 27 percent of the 442,000 manazanas in the whole canton. This proportion could rise to 50 percent, and with a potential carrying capacity slightly superior to that of Guanacaste, the cattle herd could reach 320,000 head.

Assuming modest increases in pasture area and carrying capacity elsewhere in Costa Rica, one projects a national herd size of 2.3 million head in 1980, as compared with 1.5 million on April 1, 1970. This works out to an annual compounded growth rate of 4.4 percent.

Off Take Ratio

One source of increased production lies in reducing the length of time from birth to market weight. The ratio of male slaughter to male inventory has varied between 22 and 34 percent in years for which census data are available. These imply average marketing ages of 4½ down to 3 years. This could be further reduced to 2½ or 2 years, and numbers of males slaughtered could be raised to 40 to 50 percent of the males in the herd. A larger proportion of available nutrients would go for gain in weight, and less for mere maintenance.

The number of females required to sustain the 6 to 7 percent rate of growth in the female portion of the herd also represents a draft on the nutrients supply, which could be diverted more directly to beef production

when a stable national herd size has been reached.

Breeding

To fully achieve the production potential estimated here, assumes continued genetic improvement of Costa Rican cattle. Past efforts have successfully increased the size of present-day cattle as compared with the criollo, shortened the length of time to maturity and preserved or increased the criollo's tolerance to environmental conditions, parasites and diseases. However, further progress toward these goals is possible, and the additional objective of meat quality will become increasingly important. Thus, investment in improved bulls and artificial insemination facilities will contribute importantly to the objective of increased output.

In pursuit of genetic improvement, the scrupulous breeder in Costa Rica is handicapped by the law on slaughter of cows. This law, prohibiting slaughter of fertile females under 8 years of age, ensures the perpetuation of all the scrub females, except the relatively few whose deficiencies result in premature sterility. The law reflects an outmodel situation. No longer is Costa Rica's main problem that of getting enough cattle to graze the available manzanas of pasture. It already is and will be increasingly, that of obtaining the largest quantity of high quality meat from the limited supply of digestible nutrients. This means more than merely using quick-maturing bulls of desirable conformation. It means eradicating slow-growing, poorly-endowed female stock -- hopefully before they have been permitted to pass any of these characteristics along to another generation. The breeder permitted to manipulate only the male

side of a breeding program is like a fighter in the boxing ring with one arm tied. The problem to be feared is not that excessive slaughter of females will retard the growth of the national herd, but that not all growers may realize and pursue the benefits of culling females purposefully and freely.

Projected Slaughter

With combined effects of earlier slaughter, and less rapid growth in herd size, annual slaughter as percent of inventory could rise to 20 percent, as compared with the 13 to 14 percent range of recent years. With a national herd of 2.3 million head, slaughter would reach 460,000 head, as compared with 201,000 in 1970. This would mean an annual compounded growth rate of 8.6 percent.

The foregoing projections give some consideration to availability and productivity of pastures, and some improvements in management of the national herd. A simpler approach is to project past trends, although such a procedure takes no account of possible limiting conditions. With that reservation, it appears that by 1980 the total herd might number 2.3 to 2.6 million head. Slaughter would reach 320,000, remaining at 14 percent or less of the total herd, and indicating an annual compounded growth rate of 4.8 percent.

Since the projection of recent growth rates to 1980 coincides with the limits estimated on the basis of technical considerations -- pasture availability and productivity, etc. -- anyreservations one may have concerning possible limits to production do not appear serious for the next

decade. This conclusion must be qualified in one important respect, however. The improvements needed to achieve continued growth at the projected rates require sizeable investments, and whether the necessary capital will be available is a question of some importance. It is assumed, also, that ranchers are aware of the techniques to be adopted, and are willing to make the necessary investments.

Such questions were considered by the Banco Central of Costa Rica (BCCR) in its project prepared for a possible loan from the World Bank. BCCR estimated that its program would permit a typical borrower to increase output by Two-thirds (from a 600 head herd to 1,000 head) and realize 10.5 percent return on total ranch investment and 20 percent internal rate of return on the funds invested in the expansion program. A price of ¢2.40 per kilogram live weight was used in calculating these returns.

Cost of Production

We made some effort to discuss costs of production with ranchers. We did not try to obtain accounting date, or use a systematic schedule for recording cost data. Such information as we were able to obtain indicates that operating expenses absorb one-third to one-half of the gross income the remainder being income available to the ranch operator for living expenses, savings and investment. (See tables 2 and 3).

A large farm in Guanacaste (1,000 animal units) with improved technology could expect an income above operating expenses of ¢187,930. This would represent a return of 10.5 percent on an investment of ¢1,787,000. The return on the investment in improvements required

Table 2/. Costs and returns on a ranch of 1,000 animal units.

Item	Per Animal Unit 1/ Colones	Per breeding Cow Colones
Expenses		
Hired labor	35.67	76
Supplies and feed	35.69	77
Marketing	6.31	14
Taxes	3.42	7
Replacement of bulls	8.89	19
Miscellaneous	7.04	15
Interest	4.85	10
TOTAL	101.87	218
Sales	289.80	621
Net for return to capital 2/	187.93	403

1/ Animal units consist of all animals 9 months old, or older. Out of 1,000 animal units, 467 would be breeding cows. Sales would consist of 322 head per year with a total live weight of 113,183 kg. Income was figured with a price of ¢2.56 per kg.

2/ It is implied that "hired labor" includes an allowance for the operator's labor and management. Total investment of ¢1,787 per animal unit earns a return of 10.5 percent. The internal rate of return on the investment in improvements would be about 20 percent.

Source: Banco Central de Costa Rica. Proyecto para el Fomento de la Ganadería Vacuna de Carne, 1970.

Table 3. Costs and returns on a model ranch, San Carlos, Costa Rica.

Item	Total Colones	Average per Breeding Cow 1/ Colones
Expenses		
Medicines, salt and molasses	5,000	25
Marketing	3,000	15
Hired Labor	5,000	25
Maintenance of pastures 2/	18,000	90
Maintenance-general	2,000	10
Miscellaneous	1,000	5
Depreciation	5,000	25
TOTAL	39,000	195
Sales	92,000	460
Net for operator's labor management and capital	53,000	265
Allowance for operator's labor and management	12,000	60
Return on investment 3/	41,000	205

1/ Herd consists of 200 cows and 8 bulls. Output consists of calves sold at weight of 240 kg. and cull cows, for a total of 45,400 Kg. Prices used were ¢2.08 per kg. for calves and ¢1.72 for cull cows.

2/ Includes fences, herbicides and "chapia".

3/ Investment totals ¢547,150, so the rate of return on investment is 7.5 percent.

Source: Juan Antonio Aguirre. Economía, Technología y Rentabilidad de la Producción de Carne en Los Trópicos de América Central, San Carlos, Costa Rica. IICA, Pub. Misc. No. 69. Abril, 1970.

to achieve such results would be approximately 20 percent.

A typical herd of 90 animals in San Carlos, selling calves at weaning, according to Aguirre, had a remainder above operating expenses of ¢8,370. The return to capital (after allowance of ¢5,938 for operator's labor and management) was only 1.3 percent on an investment of ¢183,000. After investing ¢394,150 in improvements, net income could be ¢53,000, which, after an allowance for operator's labor and management of ¢12,000 represents an average return of 7.5 percent on toal investment, and 9.8 percent on the investment in improvements above 8.6 and 11.2 percent, respectively, if operator's labor and management stayed at ¢5,938), Aguirre's study was done in 1968, when the price of novillos for export averaged about ¢2.40 per kilogram.

On larger San Carlos ranches in breeding-fattening and fattening operations, 529 and 421 head of cattle per ranch, respectively, returns to investment were ¢58,000 and ¢43,000, respectively, or 4.7 and 5.2 percent on investment.

The small San Carlos farm, at its current productivity level obviously lacked capacity to save or invest. Using outside credit, increased productivity would raise income to a level at which substantial borrowings could be repaid even while permitting the rancher a higher level of consumption expenditures.

The question of "cost of production" arises frequently in discussions of the potential of Costa Rica's livestock industry. Costs are influenced, of course, by input-output ratios such as calving and mortality rates, and kilograms of gain produced per animal, per manzana, or per worker. On the average, however, one may deduce from rising

land prices that the average rate of return on investment in land for cattle-raising has been attractive. Investors from outside Costa Rica have been among those bidding for available land here, and many of them have been North Americans who have concluded that cattle production was more profitable in Costa Rica than in the U.S. Investment in land may be profitable purely from the standpoint of speculation, if land prices are rising. (Aguirre reported land values in San Carlos, which indicate an average compound rate of increase of more than 10 percent a year between 1948 and 1968.) And cattle raising could be undertaken as a holding operation to minimize the risk of losing the land to squatters or expropriation. But traditional techniques of cattle raising would serve this purpose. Investment in improvements to the land are being made, which imply that cattle production is profitable per se.

Assuming steady beef prices, land values likely will continue to rise until the rate of return on ranchers with superior management become normal. When this point might be reached is suggested by the rule of thumb that the value of land for grazing can be twice the value of the livestock it can carry. In other words, the value of the animals would be one-third of the total investment. BCCR found that on a group of large ranches, the value of the animals was 50 percent of the total investment. Aguirre found that in San Carlos, the ratio of value of animals to combined land plus animals was 36 percent. It will be recalled that Aguirre's farms earned at most, about 5 percent on investment, which tends to confirm the rule of thumb. Aguirre also found that the price of pasture land in San Carlos approximately doubled

between 1964 and 1968, from ¢544 to ¢1016 per manzana. If one includes a normal rate of return on investment as apart of "cost", the land values will tend to adjust so that "cost" equals market price. Rising prices of ranchland in Costa Rica indicate that this adjustment is under way. Of course, rates of return on investment may continue to vary widely from one ranch to another.

Credit Needs for the Livestock Industry

The cattle industry of Costa Rica has a growth potential of between 4 and 5 percent annually in members of cattle in inventory, and 8 to 9 percent annually in number of head slaughtered for the next decade. To achieve this potential will require substantial investments, converting land from forest to pasture, raising the carrying capacity of pastures, raising the quality of the breeding herd, and providing facilities needed to achieve higher levels of performance in other aspects of meat production.

Present (1970) total investment in the beef enterprise is probably about 2.6 billion colones, about 40 percent of which is in cattle and 60 percent in land, buildings, fences, etc.

Progressive increases in output and productivity might be achieved by raising the investment in base land slightly -- probably not more than 10 to 15 percent. Fencing investment would be required for more intensive pasture management increasing from a national average (depreciated) of about 25 colones at present (about 3 percent as much as base land value) to somewhere between 50 and 75 colones, or 6 to 9 percent of base land value. Irrigation works for 2,000 mz at possibly ¢3.500 per manzana might require ¢7 million about 0.5 percent of total

land value. Corrals, handling equipment, and similar miscellaneous might add another 2 to 5 percent.

Breeding stock will be improved to ensure offspring that will attain market weight at an early age, with a high dressing percentage of good quality meat. The value of present breeding animals has been estimated at market value of slaughter stock, but females selected to replace aged or otherwise inferior cows should be valued at substantially more than slaughter value when they reach breeding age. Cows now account for half of the investment in cattle -- the premium for superior bloodlines might be estimated at 10 percent on the present value of cows, or 5 percent on total present value of cattle. Bulls account for 3 percent of present inventory -- greater awareness of the gains to be realized from genetic improvement might result in doubling the investment per animal, or 3 percent on total present value of cattle.

If the number of animals in the national herd were to increase as projected, the total investment in cattle by 1980 (excluding quality increases discussed above) would be 50 percent higher than in 1970.

Combining the foregoing estimates, the total investment in the cattle industry by 1980 would come to about 3.6 billion colones, an annual rate of average of 3.3 percent.

The increase of 1.0 billion colones between 1970 and 1980 may be assigned to sources as follows (million colones): 1/

	1970	1980	Increase
Ranchers' equity	2,268	2,768	500
Borrowed	332	832	500
	2,600	3,600	1,000

1/ It should be emphasized that these estimates, and others elsewhere in the report assume constant prices, unless specifically mentioned.

Thus, borrowings for fixed investment of ¢40 million annually are consistent with the above estimated capital structure, and should be expected to increase by 5 to 10 percent a year.

In addition to the above credit for fixed assets, cattlemen require operating capital. As the level of technology rises, operating expenses tend to rise as a percentage of total income. Credit is needed to bear part of these expenses. One of the reasons cited for maintaining a dairy herd on some beef farms is that the steady income from milk helps to carry the operating expenses of the beef herd until steers, for example, have reached market weight. Operating capital might be borrowed at high interest, or earned by an enterprise affording steady returns, as does a milking herd, even if the latter should be relatively inefficient. Credit at reasonable rates would be preferable to either of the foregoing alternatives.

Operating expenses of the Costa Rican beef industry probably exceed ¢100 million annually. They are likely to increase as much as 10 percent a year with greater use being made of fertilizer for pasture, more fencing for rotation grazing, etc. If 20 percent of operating expenses were financed by borrowings, the demand would amount to ¢20-25 million at present.

Altogether, the cattle industry of Costa Rica could use about ¢60 million annually. About 2/3 of this would be medium to long term credit -- mostly medium term.

Data from the Encuesta Pecuario of 1970 and the Census of 1963 can be used to estimate fixed capital separately for small and large farms (dividing at 200 head of cattle). Approximately 60 percent of the investment appears to be on small farms. If this sector is to grow at a rate

comparable to that of large farms, it will have a relatively heavier credit demand. The self financing indicated above (in the table showing ranchers' equity capacity) would have originated mainly on the 1,000 or so farms that have 200 head of cattle or more. Increases in equity appear to have been from 1/5 to 1/3 of net income, overall, but it does not seem likely that small farmers can save at such rates. Hence, in terms of need, credit to the small farm should amount to perhaps 60 percent of the new investment, and to large farms, possibly 20 percent. In colones per year at present this would require about ₡30 million for small farms and ₡10 million for the large ones.

Whether increased credit should be made available for the cattle industry, and, if so, how it should be allocated as between small and large producers, are decisions which involve more than the demonstration of feasibility presented above.

Beef production as an alternative to other farm enterprises

Average rates of return to investment in beef production appear to be relatively low, according to available cost information. Similar data were not available for other agricultural enterprises in Costa Rica, but it is generally believed that profit rates of 10 to 20 percent may be considered normal. Several circumstances may help to make livestock production attractive. It is an extensive enterprise useful for holding land to gain from appreciation in land values. The available data may understate the profits actually realized by the cattlemen who are expanding their output. Rates of return to additional investment in technological improvements may be high even though the return to investment in land alone is low. The cattle industry has enjoyed virtually unbroken prosperity for nearly 15 years -- a stability of

earning power that contracts sharply to the year-to-year fluctuations in cotton and bananas, for example. This latter point may appeal to small producers, particularly. For them year-to-year stability of income is highly desirable. Many such producers own land that is suitable only for cattle. For them, possible higher rates of return from other enterprises are not a real alternative; the application of improved techniques to increase the income from the cattle enterprise is an opportunity for such producers.

III. DEMAND FOR COSTA RICAN BEEF

Beef consumption per capita declined more or less steadily throughout the past 15 years. This is undesirable from the standpoint of consumers' health. Furthermore, the economic well-being of cattlemen is threatened unless the trend is reversed.

Relation of Consumption to Price and Income

To appraise the future prospects in the domestic cattle market, it is necessary to know how much change in beef consumption can be expected to result from changes in beef prices and consumer incomes. Several economists have tried to measure these relationships, but the results obtained vary over a wide range.

G. Bernard of CNP estimated that each one percent increase in price accompanied a decrease of 0.889 percent in consumption. Each one percent increase in national per capital income accompanied an increase of 2.85 percent in consumption. When these results were published, 1965, per capita consumption was 18 kg. Since then, income at current prices has risen 30 percent, and the price of beef has risen 70 percent. Bernard's coefficients would have predicted a rise in consumption to about 24 kg. In fact, consumption declined further, to 15 kg.

Recently, Francisco Barea, at IICA, Turrialba, obtained preliminary elasticities of -0.17 for price and 1.56 for income. In another analysis, in which consumption was made to depend on 4 variables (price of beef, price of pork, per capita income and beef exports) Barea obtained a price elasticity of -0.1 and an income elasticity of -0.03. It

is hard to accept these results as valid for projecting future trends in beef consumption.

One small note of importance can be gleaned from the price data. The price of liver rose only 22 percent from 1964 to August, 1970, while first quality boneless cuts rose 77 percent. Liver is one of the several by-products from slaughter for export which remain in the country and are consumed domestically. The domestic supply of liver (and other viscera) therefore increased in proportion to total slaughter, about 100 percent from 1964 to 1970, while total carcass beef for domestic consumers rose only about 10 percent.

Inability to obtain reasonable and consistent estimates of relationships between consumption, price and income using available data may result from a combination of causes, partly related to limitations of statistical methods and partly to deficiencies in the data.

Per capita income follows closely the trend in prices paid by low and middle income consumers in the San José metropolitan area. When per capita income at current prices is adjusted for the change in prices paid by consumers, the change from 1956 to 1970 is only 20 percent, as compared with 59 percent in the unadjusted income series. With relatively little change in real income, the least squares estimate of its relationship to consumption may be quite unstable or indeterminate. This is one possible methodological obstacle to obtaining a dependable estimate. A similar methodological problem results from the fact that all the statistical series are highly correlated with time. Such intercorrelations are known to lessen the accuracy of least squares estimates.

Data Problems

Finally, it may be appropriate to question the adequacy of the available consumption data. One indication comes from the careful studies of INCAP. The small but carefully chosen sample included 600 families (4,065 persons). Those living in rural areas were found to consume about 40 grams per day, or about 14.6 kg. per year. The range of regional averages among the five rural regions was from 39 to 44 grams, so the 40 gram general average seems quite reliable. Urban families consumed 76 grams of meat per day, or 27 kilograms per year. Together, the results are considerably higher than the consumption of 15 - 16 kg. of beef plus 1 - 3 kg. of pork and chicken indicated by the time series data.

Another basis for questioning the reported consumption is found in the cattle inventory data. It is generally acknowledged that some cattle slaughter for domestic consumption goes unreported. These are animals slaughtered on ranches. It is assumed that they are used on the ranch, and are numerically relatively unimportant. However, census and sample survey data from 1955 to 1970 consistently show larger numbers of 1 to 2 year old females than are needed to balance the disappearance through death and slaughter of cows 2 years old and over, plus the annual increase in cow numbers. The indicated surplus of 1 - 2 year old heifers in 1970-71 will be around 48,000 head per year. Similar calculations indicate a deficit of 1 - 2 year old males of about 33,000 head for 1970-71. Over the longer period, 1963 to 1970, the surplus of heifers averaged 53,000 head annually, while males were apparently in balance within 1,000 head. It is strongly indicated that unreported slaughter may supply a much higher

proportion of the total beef supply than is generally believed. If surplus 1-2 year old females in 1970-71 find their way into export packing plants to the extent of the indicated deficit of males, these would still be 15,000 head of young females for domestic use, 11 pe cent above the CNP estimate of domestic slaughter.

On the basis of the foregoing it is recommended that a study of consumption elasticities be made using time series data adjusted for the general level of consumer prices, and that additional efforts be made to evaluate unreported slaughter.

Consejo Nacional de Producción (CNP)

The supply of beef for the domestic market is an explicit concern of Costa Rican public policy, reflected in legislation enacted in 1951. The Consejo Nacional de Producción (CNP) is responsible for administering slaughter in such a way that domestic consumption of beef is maintained. That CNP has not done so is well known. What has happened, in fact, is that cattlemen's desires for the higher prices obtainable in the export market, and the national economic goal of expanding earnings of foreign exchange, have overridden the consumption goal. As a result the domestic price of the best beef cuts rose 77 percent from 1964 to 1970, while the general consumer price index (beef included) rose only 12 percent. It has been suggested that low income consumers might be assisted to consume more beef by distribution programs designed to reach them more directly. These would involve some kind of subsidy. If it is assumed that low income families consume proportionately more liver, tripe, etc., their "beef" consumption per person may not have suffered as much as the national per capita figures imply.

It might be questioned whether CNP in fact has had any effect on domestic supplies. If more cattle had been exported, the internal price of cattle would have risen. This would have put a squeeze on exporters' trading margins. Assuming that exporters could not have gotten by with narrower margins, one must conclude that CNP has all along permitted all the exportation that could be done profitably.

During the current beef marketing year, cattlemen have persuaded CNP to permit 110,000 head to be exported, instead of the number set originally at 84,000. According to newspaper reports, further requests are in to raise the export quota to 138,000. Much of the current exports of beef are going into storage in bond in the U.S., pending the start of the new quota year. Costa Rica's 1970 quota for the U.S. was filled in late November. Added storage costs, interest on the investment in inventory, etc. will eat into exporters' profit margins, although these costs may be more or less offset by spreading fixed costs over the increased slaughter volume.

Cattle Prices

Up to the limit of the U.S. quota, the price of slaughter cattle in Costa Rica could be the U.S. price, backed off by marketing margins which include costs of slaughtering, boning, freezing and shipping from Costa Rica to the U.S. (refer to Appendix I). The derived price for cattle can be paid by slaughterers in Puntarenas and Guanacaste competing with buyers from the Central Plateau who supply the principal domestic metropolitan centers. Live cattle at Montecillos market would therefore be expected to sell at higher prices than export cattle. Available price data do not indicate this to have been the case during recent years (1966-1969), but circumstantial

evidence indicates that it may have been true. Slaughter for export ceased at Cartago in 1968 or 1969, apparently because of difficulty in competing for supplies, although the same firm continues to operate a plant near Liberia for the export market. Another firm, near Alajuela, ceased slaughtering for export in November, 1970. The owner attributed this to his decision that storage in bond was not a profitable venture, but this does not exclude the possibility that the price at which cattle were available was a factor in the decision. Two firms boning beef for export from the Montecillos slaughterhouse have continued to operate.

The export market for beef has been livened during the past year by reports that a U.S. packing company (not the one mentioned on p. 11) was considering building a packing plant in Costa Rica. If this were to happen, a further competitive element would be introduced.

Several previous competitive steps occurred in 1969-1970 with the entry of Taylor and Associates, and PECOSA into the beef export trade, concurrently with CNP relinquishing control over the sale of cattle to the exporters.

For the 1970-71 year, CNP allotted quotas to independent cattlemen directly or to cattlemen's associations, who in turn allocated them to their members. The individual cattlemen then contracted their eligible steers to exporters.

--What will happen if supplies exceed the U.S. quota plus what the domestic market will absorb at prices close to the present export level? European markets appear

chaotic, judged by the report of the Central American team that visited there in the spring of 1970. Prices of frozen boneless beef varied over a wide range, and the variety of tariffs, preferences, quotas and government trade monopolies add to the uncertainties of trade prospects.

Within the range of prices prevailing in European markets in the spring of 1970, figures of $700 to $800 per ton of compensated cuts tended to predominate (that is, for frozen cuts representing normal proportions from all parts of the carcass). This compares with U.S. prices of approximately $1,100 per ton. Buyers have been paying about ₡2.85-₡2.90 per kg. for live animals with boneless beef bringing about $1,100 a ton. Selling boneless beef at $700-$800 a ton would sustain liveweight prices of only ₡1.80 to ₡2.00 per kg.

The United States Market

Two aspects of the U.S. market for beef are important for Costa Rica. Foremost is the probable future trend of quantities that the market may take. The other concerns the U.S. demand for the various types of beef that Costa Rica may supply.

The total quantity of beef that Costa Rica sells to the U.S. is fixed under a quota system. A law passed in 1964 authorizes the President of the United States to fix quotas for imports of fresh, chilled, or frozen beef, veal, mutton and goat meats if he finds that imports threaten the domestic meat industry. Major supplying countries have voluntarily agreed to limit their exports to quantities which would not force the President to use this law. Under this voluntary program, the Secretary of Agriculture announces

the quotas, which amounted to 1,160 million pounds in 1970. Costa Rica's share was 36 million pounds.

Being voluntary, the quota system provides no explicit penalties for exceeding the alloted quantity. But if the voluntary quotas were seriously violated, more stringent compulsory quotas would be invoked under the Meat Import Act.

The demand for beef in the U.S. has risen steadily with growth of the population and increasing consumer purchasing power. The U.S. beef industry met this added demand, more or less adequately, but with a small, variable but growing gap between the quantity that would be consumed at stable prices, and the quantity actually supplied. As the gap widens, prices tend to rise and imports increase. Thus, relatively high domestic prices in the spring of 1970 caused the President to invoke compulsory quotas under the 1964 Meat Import Law, but to suspend them simultaneously "because of over-riding economic conditions." This left the voluntary quota system in effect. The overall quota was even raised slightly from the level established at the beginning of the year.

The foregoing capsule summary of the beef supply and demand situation in the U.S. indicates the difficulty of predicting accurately how much beef Costa Rica might reasonably expect to export to the U.S. over the next decade. If U.S. beef producers can continue to supply the market without rising prices, imports probably will continue under some form of restriction. In this case, imports might share proportionately in the growth of U.S. demand for beef, about 3 percent a year.

There are some reasons to doubt whether U.S. cattlemen will be able to increase their beef output this much, although land now idled under various programs for controlling production of grains and cotton would support a considerable increase in beef output. Much depends on the relative profitability of the beef enterprise. It is notable that beef production has been expanding most in areas outside the grain-growing areas.

In view of the uncertainties of the U.S. domestic beef supply, and the relative assurance of moderate growth in the import quota under existing policies, the latter seems the appropriate basis on which to project U.S. demand for Costa Rican beef.

Costa Rica may try to supply any of several quality segments of the overall market for beef in the United States. It is to Costa Rica's advantage to supply that segment that will make the best use of Costa Rican resources. That means, almost certainly, that it would not be generally be profitable to compete for a share of the market for prime and upper choice grades of beef. ~~On the other hand~~ A high proportion of export steers probably ~~meet the requirements for the "good" grade, and~~ [illegible] grade "utility". Some are or could be finished to ~~choice~~ "good" on the better Costa Rica pastures, especially if they could be brought to market weight at a younger age. "Good" Choice steers in the U.S. usually bring from $1.00 to $2.00 a hundred pounds more than utility ~~good~~ grade steers (0.58 ~~0.15~~ to 0.92 ~~0.20~~ per kilogram).

Most beef imported into the United States as frozen boneless beef is used for processing into sausage and similar products. This outlet is partly supplied by utility steers and cow beef in the US, partly by inferior cuts from higher grade carcasses, and partly by imports of cow beef from New Zealand and Australia. Utility steers ~~Commercial cows~~ in the U.S. usually sell for $5.00 to $6.00 less than "good" steers (0.72 to 0.86 per kilogram).

Costa Rican steers brought $9.00 to $10.00 less per hundred weight than ~~commercial cows~~ utility steers at Chicago during the early 1960's. Improvements in marketing and increased competition raised Costa Rican steers to within $5.00 to $6.00 per hundred weight of ~~commercial cows~~ U.S. utility steers, during the late 1960's. Integration of Costa Rican slaughtering plants with U. S. distributors specializing in the better grades of meat probably accounted for the difference. Recent announcement of plans to process "portion control" for export to the U.S. represents an additional penetration of a portion of the market which normally pays higher prices for quality live animals.

The "portion control" operation is motivated partly by past exemption of meats of this type from the quota system. Honduras and Nicaragua initiated such operations during 1969. It is doubtful, however, whether a rising tide of beef imports in this form could fail to be felt in U. S. markets, impelling cattlemen there to seek to bring it under quota, also. Hence, as long as the U. S. import quota system prevails, the principal advantage of portion control will be to tap a higher-priced stratum of the U. S. market. Whether this benefit accrues to Costa Rican cattlemen will depend on the internal competitive situation, discussed later on in the section on prospective production, utilization and prices.

Other Export Markets

Costa Rica exported beef to one or another of 12 countries over the past 7 years. Puerto Rico was by far the leading market, after the United States, taking from 0.8 to 4.5 million pounds a year over the period 1964-1969. Small amounts have gone to 7 countries in the Caribbean and nearby Central and South American countries. Sporadic shipments were made to France, Greenland and Switzerland. These shipment demonstrate that Costa Rican exporters have been aware, at least, of some outside

market possibilities. The pattern of past exports also demonstrates that occasional market opportunities may arise which may be exploited profitably, even though a regular trade to a particular country may not result. Consideration needs to be given to establishing a continuous flow of market information so such opportunities may not go unnoticed.

Announcement that the Federation of Cattlemen's Associations has appointed a committee to search for new markets is a step in this direction. Likewise, Costa Rican participation in the group of Central Americans that surveyed European markets should help toward maintaining an awareness of market opportunities. This is primarily a responsibility of meat packers and cattlemen -- persons sufficiently informed as to the technical and commercial details of meat marketing to be able to negotiate directly with possible buyers. It might be suggested, however, that Costa Rican consulates might be helpful in maintaining the flow of market intelligence during the periods between visits by members of the industry.

Domestic Demand

Various aspects of the domestic demand for beef are discussed at several points in this report: in the sections on domestic supply, relation of consumption to price and income, probable variation in per capita consumption between 1970 and 1980, and non-price and marketing cost factors in domestic demand.

The principal fact is that consumption has declined, which is a statistical fact, and that it was almost certainly due to rising prices. Or, it might be better to say that the rising trend in exports drew supplies away from domestic consumers, who were forced to pay higher prices as they competed for the dwindling residual supply. Statistical analysis of the time series data, however, fails to provide consistent estimates of either price/consumption or income/consumption relationships data which are either plausible or significant statistically.

Cattlemen Canadians speak of a 10 million head surplus of export cattle in the 1970-71 marketing year. If these have to be disposed of on the domestic market, they would probably reverse the trend in domestic consumption, and stabilize the trend of domestic retail prices.

There is an acute policy conflict between the objective of maximizing export earnings and that of stabilization of internal prices. A trustworthy estimate of the relation between consumer incomes and levels of per capita beef consumption would contribute importantly to the rational resolution of this conflict. It is possible to achieve a considerably better estimate of the income elasticity of demand than is now available, using data on quantities of beef consumed by people at different income levels.

Using income elasticities thus derived, one might construct a time series (say, for 1955-1970) showing changes in consumption levels that

would have been expected from changes in income alone. The residuals between such a synthetic series and the actual consumption data would then provide an estimate of price elasticity of demand.

With good estimates of price and income elasticity beef policy formulation could be put on a more methodical basis than it can be at present.

UTILIZATION AND PRICES, 1980

Consumption per capita constant, price effects on supply disregarded

It has been shown that annual slaughter of 460,000 head is quite feasible by 1980, given sufficient investment in measures for expanding production. If the U. S. quota increases at the rate of 3 percent a year, and if domestic per capita consumption remains constant, there would be a surplus of 185,000 head at average 1968-70 prices of novillos for domestic consumption. This "first approximation" to a projection compares with the 1968 - 1970 situation as follows:

	1967/68 - 69/70	1980
	1,000 head	1,000 head
Total Slaughter	193	460
U. S. quota	79	111
Domestic consumption	114	164
Other exports	--	185

The other exports, it may be assumed, would net about ¢1.80 to ¢2.00 per Kg. live weight, as mentioned above. Under unrestricted competition, this is the level to which average returns would fall, more or less by degrees, over the period between 1970 and 1980. But a progressive decline in prices would invalidate all of the foregoing projection (except the size of the U. S. quota, which has its own uncertainties).

Effect of Price on Supply

With respect to supply, and examination of the various elements of that projection as described on Pages 15 to 17, above, suggests that

slaughter by 1980 might be as low as 240,000 head if the ¢2.00 price were to happen early in the 1970's. Since this would be less than projected US exports and domestic consumption as stated, above, it may be concluded that prices over the 1970-1980 period are likely to average above ¢2.00. But this does not preclude the possibility that production will have expanded so much by, say, 1975, that the last half of the decade would be dominated by the necessity for exporting to other markets, and that the ¢2.00 price would then prevail.

Probable Variation in Per Capita Consumption

The assumption that per capita consumption will remain constant and that total domestic consumption will rise in step with population is unrealistic. Both price and income trends will be at work. Here, we are confronted by the precarious nature of the available estimates of price and income elasticity.

Live cattle prices of ¢240 a kg. have been associated with beef prices (posta de primera) of ¢3.60 a lb., which ¢2.00 live weight prices went with a retail price of about ¢2.90. The various measures of price elasticity available indicate that at ¢2.90, per capita consumption would range from 15.8 to 18.3 kg., as compared with the average of about 15.5 kg. at ¢3.60. Since even the highest estimate of price elasticity accounts for less than 3 kg. additional consumption over this range of prices, price seems likely to be a relatively small factor in the consumption projection. It would account for, at most, 30,000 head by 1980.

BCCR projects income per capita of ¢3,314 by 1975, compared with an estimated ¢2,791 in 1970. This rate of increase continued to 1980 would raise income to ¢3,910, 40 percent above the 1970 level. With the available estimates of income elasticity, the additional per capita consumption

by 1980 ranges from practically zero to 17.7 kg. With the latter figure, domestic needs would be about 350,000 head, which would fully absorb the supply remaining after filling the projected U.S. quota.

Considering the uncertainty about the income elasticity of demand, the scant hope for extracting a reliable estimate from existing time series data, and the extremely large influence that income could have if it were to rise by 40 per cent in the next decade, it would seem highly useful to make a household survey of beef consumption to determine income elasticity from data on quantities consumed by persons at different income levels at the present time.

Even if a firm estimate of income elasticity is obtained, there is need for a more careful projection of per capita income to 1980. BCCR's projection to 1975 may have been nothing more than a projection of the rate of change between the 1969 and estimated (partly forecast) 1970 per capita income at current prices. Thus, it may seriously overstate the probable rate of change in real income. On the other hand, income projected on the basis of a careful analysis of growth prospects by sectors across the entire economy might show that higher rates of growth may be possible.

MARKETING

Non-Price and Marketing Cost Factors affecting Consumption

Most Costa Ricans consume less animal protein than is recommended by nutrition authorities. Since Costa Rica has a comparative advantage in beef production, it would seem desirable to promote increased beef consumption.

Limits to consumption set by low purchasing power can only be raised by reducing prices or raising incomes. But there is reason to believe

that beef consumption is lower than it needs to be, even withn these limits. Consumption of beef would be higher if consumers had supplies ~~became available, they could be used to satisfy increased demand arising from~~ better knowledge of nutrition, easy and continuous access to beef of improved quality and a wider variety of cuts and methods of preparing beef in the home.

Education to provide better knowledge of nutrition may yield substantial long run gains. It would promote increased consumption among families which may not be spending as wisely as they might at present income and price levels, and it would assure a more rapid consumption response to future changes in prices and incomes.

It seems likely that some Costa Rican families use less beef than they might because the present system of distribution does not keep beef widely and continuously available. Especially in small towns and rural areas, the butcher is unlikely to have beef available all day every day. This is a major disadvantage of a system which only handles "hot beef". In the more densely populated areas, however, the hot beef system is quite consistent with high beef consumption.. Argentina has one of the world's highest rates of beef consumption, almost entirely on a hot beef basis. However, refrigeration permits chilling and aging beef and maintaining stocks of a wider variety of cuts of beef in retail stores. Many Costa Rican consumers presently discriminate against chilled beef, displaying the universal human characteristic of tending to prefer that to which they have become accustomed. Thus, one would expect an acceptance of chilled beef to develope slowly, and perhaps mainly among higher income families, attracted by the continuous availability of a greater variety of special cuts and more dependable quality.

Some benefits may come from greater attention to sanitation in the distribution of beef. Exposure of meat to flies, dust and other sources of contamination reinforces consumers' instinctive prejudice against ground beef. Since fresh ground beef is an efficient low cost means of utilizing low grade beef, more care in sanitation would promote a more efficient utilization of the available supply of beef. On the other hand, more rigid standards of care may entail costs which cannot be offset by savings. Since such costs would have to be passed on to the consumer, it would be injurious to low income consumers to impose standards not clearly essential for avoiding grave health risks.

Progressive meat retailers in San José have introduced methods of preparing, storing and displaying beef in a manner comparable to the finest to be found anywhere in the world. These retailers tend to serve middle- and high-income families. It is to be expected that retailers serving lower income families will tend to emulate the more advance practices, particularly those practices which offer competitive advantages and thus serve as a means of gaining economies of scale. Benefits of such an evolution, like benefits from consumer education, are likely to develope only in the long run. Furthermore, they are likely to depend partly on the level of wages in retail trade. Yet, it would be sound policy to encourage any tendencies that retailers and meat distributors may show toward such an evolution. In particular, public investment in slaughtering and marketing facilities should allow for flexibility, so that the facilities themselves do not freeze meat distribution in obsolete pattern.

National Beef Marketing Pool

The preceding discussion assumed that competion amoung cattle buyers

would be unrestricted. The proposed Oficina de Carne might undertake a pooling operation which would capture for growers the higher returns available from exports to the U.S., and which might also maintain prices of cattle for domestic consumption on a par with prices for export to the U.S., as they have been in the past. If we return to the first approximation of supply and utilization, we see that 60 percent of the supply would be at the ¢2.40 price, and 40 percent at ¢2.00, and cattlemen would receive an average of ¢2.24. The trend of prices over the decade would decline much less sharply than under unregulated competition. If the Costa Rican consumer were given the full benefit of the lower price for the European market the average price for cattle would be about ¢2.10.

A price of ¢2.24 averaged over the period 1970 to 1980 would result in annual slaughter of about 385,000 head, interpolating between the supplies projected with prices of ¢2.00 and ¢2.40.

How the National Beef Marketing Pool Might Operate

The proposed Meat Board (Oficina de Carne, Oficina Ganadería Nacional) might be authorized to be the intermediary purchaser of all cattle sold for slaughter in Costa Rica. Actually, all trading between slaughterers and their suppliers would continue as as at present.

Prices would be negotiated between suppliers and slaughterers, either on seasonal contracts as is presently done with cattle for export to the United States, or on individual lots as is presently done on the Montecillos market. Slaughterers would be required to report all purchases to the Board.

The Board would accept the negotiated price as its buying price. It would resell to the slaughterer automatically at the same price for some markets, or at a higher price for other markets, such as exports to the United States.

The slaughterer would pay the negotiated price directly to the supplier. In the case of cattle sold by the Board at a higher price, the slaughterer would pay to the Board the difference between the negotiated price and the Board's price.

Periodically, sellers of live cattle would present their sales invoices to the Board. The latter would calculate an average payment rate, dividing the total of all payments it has received by the total live weight of sales to slaughterers. Each seller would receive a payment based on the rate thus calculated and the total live weight of cattle he had sold to slaughterers.

Not all sellers are producers. Furthermore, producers may perform any of three functions, singly or in any combination: breeding, raising (or growing), and fattening (or finishing). In some cases, even the fattener may not deal directly with the slaughterer, but sell to an intermedia The breeder may be 3 or more transactions removed from the final deal between the "supplier" and the slaughterer. It might be feared that the "supplier" would pocket the full amount of the Board's payment. In fact, the competitive forces which establish prices at intermediate transactions will reflect the expected Board payment just as efficiently as they reflect ultimate selling prices at present. The fact that many cattlemen already deal directly with slaughterers, and that others have the option of doing so whenever they judge it to be to their advantage, will put pressure on intermediaries of all types to offer as good a return as the customer could get in a direct transaction.

The Board would probably want to fix its selling price by negotiating seasonal contracts with slaughterers, similar to those now being negotiated between slaughterers and cattlemen for export cattle. The contract would specify a schedule of prices based on the U. S. price,[1/] but not less than any price negotiated separately and directly between supplier and slaughterer. Alternatively, the Board could solicit weekly bids for export quota, allocating the available supply to the highest bidders. The procedure chosen should ensure the highest price that will be consistent with

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1/ The price of Australian-New Zealand frozen imported cow meat F.O.B. U.S. port of entry, as published in the National Provisioner Daily Market and News Service -- "The Yellow Sheet."

filling the U. S. quota. Too low a price would let packers or U. S. buyers make excessive profits at the producers' expense.

The Board would have a delicate decision to make about slaughter for domestic consumption. At present, domestic slaughterers have to pay about the same price as exporters. (In the marketing year 1969-70 the average price for export was ¢2.42 per kg., and novillos for domestic consumption brought ¢2.31, 95% of the export price). With a multiple price plan, the Board would have to decide whether the domestic price should be equated to the U. S. market or to alternative lower-priced export markets. The latter choice would be the easiest to administer, but it would give a lower level of returns to producers.

All slaughterers would have to register with the Board and report their purchases of live cattle. The Board would need these reports for calculating the rate of payment to suppliers. Some small slaughterers might be exempted, say, those slaughtering less than 10 head per month. The Board could refuse to pay suppliers of non-reporting plants, but the suppliers might refuse to sell to such plants. Hence, the exempted slaughterers might be given the option of registering and reporting voluntarily. Registration requirements might have to be more stringent if the Board's price for domestic uses were higher than the lowest export outlet.

Some slaughterers may purchase cattle by the head, rather than by weight. As an alternative to compelling all cattle to be weighed -- a

requirement which might be inconvenient or costly to small or isolated slaughterers -- the Board might adopt a schedule of arbitrary weights for cattle of a given age and sex sold to small slaughterers. Another alternative would be to divide the slaughterer's payment by an arbitrary price, and consider the result to be live weight for purposes of the Board's payment.

How Prices May Affect Returns to Investment

Financial data published by Aguirre and by BCCR can be used to estimate the effect of a fall in prices to ¢2.00. Aguirre's farms obtained rates of return on investment ranging from 8.2 percent in the highest profit groups to negative in the lowest. Adjusting value of sales downward in the ratio of 2.00:2.40, rates of return drop to less than 4 percent for the two highest profit groups, and to less than 1 percent for the remaining groups. Aguirre budgeted production improvements for an average criador (cow-calf operation) earning 1 percent on his original operation. After investment in improvements, the average return rose to 7.5 percent. Now, adjusting value of sales downward as before, the rate of return would be only 4.7 percent.

The BCCR budget was figured with prices of ¢2.56 and ¢2.40. The Bank decided that the latter price, permitting a return of 9.5 percent, would just enable the borrower to carry and pay off the proposed loan.

At ¢2.00, the rate of return falls to 7.0 percent, and the borrower would earn less than 7% on his equity after paying 8 percent or more on his borrowing ~~be insolvent.~~ The Bank report omits financial data for a rancher not borrowing or making the improvements, but the manner in which the cash flow was budgeted for the loan suggests an original rate of return around 6 to 8 percent, which would drop to 5 to 7 percent at ¢2.00 per kg. for cattle.

The effect of price on rate of return depends on the ratio of operating costs to gross income. On the San Carlos farms studied by Aguirre, operating costs were roughly 60 to 90 percent of gross income, while the BCCR budgets show operating costs approximately 35 percent of gross income. The BCCR data may represent the Guanacaste area, and the results of conditions in the Dry Pacific as compared with the Atlantic region.

In summary, the prospects for production and markets indicate a likelihood that supply of Costa Rican beef will run ahead of demand during the next decade; that exporters of Costa Rican beef to the United States (or U. S. importers of such beef) are likely to realize windfall profits amounting to possibly ¢.40 per kg. liveweight of cattle for export to the U. S., unless Costa Rica developes arrangements for capturing this margin for its cattlemen; that without such arrangements cattle prices may drop to ¢2.00 or less within the next 5 years.

The principal projections discussed above are summarized in the following table: Using available price and income elasticities from the 3 different studies mentioned in preceding pages of this report.

A. Consumption projections, if cattle prices were ¢2.00 and ¢2.10/kg. respectively.	Live weight price, ¢ per Kg. 1/					
	2.00			2.10		
	Per capita consumption, kg.					
	2/ 15.8	3/ 18.3	4/ 36.0	2/ 15.75	3/ 17.7	4/ 35.4
	- - - - 1,000 head - - - -					
Projected Total slaughter	-	240	-	-	320	-
U.S. quota (Assumed Constant)	-	111	-	-	111	-
Projected Changes in Domestic consumption with different per-capital consumption levels	167	193	381	167	187	375
Other exports	-38	-64	-252	42	22	-166
B. Consumption projections, if cattle prices were ¢2.24 and ¢2.40/kg. respectively.	Live weight price, ¢ per kg. 1/					
	2.24			2.40		
	Per capita consumption, Kg.					
	2/ 15.7	3/ 17.2	4/ 34.9	2/ 15.5	3/ 15.5	4/ 33.2
Projected Total slaughter	-	385	-	-	460	-
U.S. quota (assumed constant)	-	111	-	-	111	-
Projected change in Domestic consumption with different per capita consumption Levels	166	182	369	164	164	351
Other exports	108	92	-95	42	22	-166

1/ The live weight prices given correspond to retail beef prices, posta de res de primera, San José metropolitan area, of ¢2.90, 3.04, 3.16 and 3.60 per pound, respectively.

2/ Corresponds to price elasticity (E_p) of - 0.1 and income elasticity (Ei) of 0.03, taking per capita consumption to be 15.5kg. with retail price of ¢3.60 per pound.

3/ Ditto, except Ep = -0.9 and Ei = 0.03

4/ Ditto, except Ep = -0.9 and Ei = 2.85

VII. THE ROLE OF THE SMALL CATTLEMAN

The small cattleman plays a vital role in Costa Rica's cattle industry. It was mentioned above that herds of 200 head or less contained 64 percent of the cattle in 1970, and that smaller farms had a higher percentage of the nation's breeding herd than of its total herd, and that breeding efficiency was higher on smaller forms. Thus, the comparative handful of farms that finish steers for the export market will be sharply limited by lack of stocker and feeder cattle, unless the carrying capacity of small farms is increased in step with that of the large farms.

The proposed World Bank loan contemplates the increase of carrying capacity on large farms will provide the finishing operations that go with an increase of 247,000 head in the national herd, plus that proportion of the breeding already done on large farms. The rest of the expansion of the breeding herd would be financed on small and medium size farms.

The argument for including small cattle farms is partly social, and partly economic deduction from what I think may be true of certain differences in operating characteristics between small and large farms.

The social argument rests on considerations of distribution of income. Small farms (if by small we include all herds of less than 200 cattle) accounted for 98 percent of the livestock farms in 1970. In 1963, the proportion of herds of less than 200 cows was the same as in 1970, 22 percent were between 21 and 200, and 76 percent were less than 20. (The number of

cattle in each group was not reported). It would seem quite discriminatory to exclude so large a group from access to resources needed for growth, even if their incomes were already comparable to those of the other 2 percent.

Technology and Capability for Self Financing

The economic argument, for which the empirical base is scanty, has two main parts. First, the state of technology appears to be further behind on small farms than on large farms. Most of the improved practices do not involve substantial economics of scale beyond a herd size of, say, 20 cows, hence they are feasible for small farms. Second, the large farms are more nearly capable of financing growth out of their own resources than are small farms.

A number of lesser arguments can be made. Small farms are more nearly capable of providing reasonable incomes to their operators if their land resource is used intensively. This means that non-farm capital inputs must be higher. Again, this requires an outside source of capital, since small farms generate savings much more slowly than large farms.

One hears the argument against financing small farms, that there is no long run hope of their earning adequate incomes, that urban employment pays better, and that development assistance only postpones the inevitable abandonment of such farms and their consolidation into larger units. Careful study should be able to appraise this argument. There certainly must

be a farm size below which a desirable level of living cannot be sustained over the long run. However, much depends on the size of the farm, the demand for labor in the urban market, and on the farmer's level of skill. Small farmers lacking requisite skills for urban employment may generally be able to learn new farming practices more easily than they can learn a wholly new occupation.

Marketing Needs

The small cattleman needs an efficient marketing system to ensure that he will receive full value for his produce. There are two main problems confronting him in Costa Rica: assembling large enough lots of cattle, reasonably uniform as to age and condition, at a given time and place to attract large buyers; and ensuring competition among buyers.

The assembly function is now performed by small buyers who scour the countryside keeping posted on what farmers will have animals ready for sale by any given date, or hoping to be at hand if a farmer decides to sell one or more animals on the spur of the moment. Some cattle fatteners may try to assemble cattle directly from breeders, especially from the larger breeding herds. Local butchers, also, provide an outlet for some animals from small farms. It is not practical for most small farmers to ship their cattle to the central market at Montecillos.

It would seem desirable to establish cooperative livestock marketing associations to serve small cattlemen. A number of functions have been suggested for such associations, but the principal service would be to

establish and operate an auction center where small cattlemen could sell, and where fatteners and other cattle buyers might find it easier and more economical to fill their needs. Numbers of cattle would be assembled, classified into lots as uniform as possible with respect to age, sex, weight and breed, and sold at auction. Market news -- information about supply, demand and price -- would be readily available as an outcome of such an operation. Growers would realize better prices than with present methods of sale, and buyers would find that they could assemble supplies of cattle of desired quality more cheaply than at present, all costs considered. Santa Cruz or Nicoya seem likely sites for such auction markets. Others might be located in southern Puntarenas, and near Ciudad Quesada.

Before attempting to establish such an association it would be well to make a study to determine the supply of cattle likely to be available within a practicable radius, the seasonal flow of animals of various types, and the competition offered by existing marketing agencies. Any similar efforts in the past should be reviewed, also, to determine possible factors in their success or failure.

A cooperative marketing association would provide an additional channel through which new or improved techniques of production could be brought to the attention of small cattlemen. It might also perform a credit function, making loans to small cattlemen out of funds made available

for the purpose by the National Banking System. Local officials of the Banco Nacional in Nicoya suggested such a service. It should be determined whether, in fact, the cooperative could perform a credit service as efficiently as the existing banks and Juntas Rurales.

SUMMARY

Purpose of the Beef Cattle Study: To determine and evaluate production and marketing factors important to the development of beef production with reference to the Government of Costa Rica's request that A.I.D. provide additional funds for loans to small cattle producers.

Cattle Production Increasing Rapidly:

The cattle population of Costa Rica was estimated to be 1,513,000 head as of April 1, 1970. This represents an increase of about 6 percent per year since the last previous survey in 1968. The average rate of increase in the national herd ranged between 5 and 6 percent annually, during intervals between successive censuses and surveys since 1955.

Specialization of Production

Small cattle fincas, having less than 200 head, made up 98 percent of all farms keeping cattle, and owned over 64 percent of the country's cattle as of April 1, 1970. Small cattlemen tend to sell calves at weaning age, 8 to 10 months, providing feeder stock for cattlemen who specialize in fattening. Yet, steers 2 years old and over on small fincas make up 40 percent of the total steers of this age. Contrary to popular opinion, small fincas are not less efficient than large ones in all respects. In breeding efficiency, a very important factor, small fincas' calving percentage appears to average 62 percent, as compared with 51 percent on large fincas.

Technological Improvements

Some technological improvements in cattle production are already widespread, and others are being successfully used by progressive

cattlemen. Zebu blood, introduced to Costa Rica over 40 years ago, is present in almost all herds -- to the extent of 3/4 or more in a large proportion.

Most existing pastures are planted to varieties introduced from outside. Jaragua grass predominates, but other superior species are being used. Intensive practices such as fertilization, rotation grazing and hay- and silage-making are being used increasingly. Stocking rates of 3 head per manzana are not uncommon, although the national average is less than 0.6 head per manzana.

Production Costs

Average returns to investment in beef production appear to be in the range of 5 to 10 percent, at 1969-1970 prices. Costs per unit of output may decline with improving technology, raising average rates of return somewhat -- marginal rates of return on investment in some of the more profitable practices may be as high as 20 percent . Price declines would reduce the average rate of return to the range of 3 to 5 percent, at most.

Production Outlook, 1970 - 1980

Technological and biological factors suggest a potential of 2.3 million head for the national herd by 1980. Together with increased offtake rates made possible, also, by technological progress, annual slaughter might reach 460,000 head, as compared with 200,000 estimated for 1970.

Credit Needs

Cattlemen appear likely to be able to finance about 1/2 of the investment needed to achieve full growth potential of the cattle enter-

million a year at present, and increasing 5 to 10 percent a year. Credit needs are substantially greater on small than on large fincas because the potential for self financing is less. Thus, about 3/4 percent of the credit needs originate in the small farm sector (200 head or less).

Demand

Present supplies are divided between the domestic market (55 percent of the total) and exports to the United States. Export demand has grown insistently. As a result, local retail beef prices rose much faster than retail prices of other consumer goods, and faster than average personal incomes.

Future responses of domestic consumption to prices and income cannot be projected with any degree of confidence because statistical analysis of available data for Costa Rica fails to give stable, plausible and statistically significant estimates of the effects of income and price on consumption under Costa Rican conditions. A survey of current income/consumption relationships in a sample of Costa Rican households would yield a direct estimate of income elasticity of demand, and could be used indirectly to obtain an improved estimate of price elasticity from available time series.

The U. S. market for beef will continue to be important to Costa Rica, although quotas are likely to grow too slowly to absorb production fully. Some opportunity exists to move Costa Rican beef into higher-priced strata of the U. S. market. Foreign market prospects appear chaotic. A considerable effort might succeed in moving substantial quantities of Costa Rican beef, but past experience suggests that such trade may shift widely among countries, and, at best, yield substantially

lower returns than are obtained from sales to the United States.

Prospective Utilization and Prices

Subject to considerable uncertainly about demand, especially from domestic consumers, Costa Rican cattle prices seem likely to decline over the next decade. By the middle of the decade measures may need to be taken to retain for Costa Rica the full benefit of exports to the United States. A marketing pool operated by the proposed Meat Board could solve this problem.

Recommendations

1. Economic conditions in the Costa Rican beef industry are likely to weaken in the next decade, as compared with past experience. Probable causes are discussed in this report. The outlook suggests the need for continued vigilance on the part of the Costa Rican cattle industry, to perceive, analyze, and respond properly to developments as they occur. To be forewarned is to be forearmed.

2. Increased amounts of credit will be needed to permit the cattle industry to develope its full potential. Despite the outlook for some decline in prices, loans to borrowers for well conceived development projects should prove to be sound loans.

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~~Beef Production and Marketing Report~~
Interview List

During the course of this Beef Production and Marketing Report, the following people were interviewed by Dr. Louis Herrmann, (USDA retired) on contract with the AID mission, Costa Rica, and Juan Castro and Edward Schaefer, Ag-Economists and perminent employees of USAID/Costa Rica.

USDA

Norman Kallemeyn, Agricultural Attaché
Rodolfo Murillo, Asst. Agricultural Attaché Office

Ministry of Agriculture - Ministerio de Agricultura y Ganadería (MAG)

Fernando Batalla Esquivel, Minister
Ing. Alvaro Muñoz Quesada, Head Livestock Dept. (Director de Ganadería (MAG)
Dr. José Luis Solano Astúa, Head Animal Health Dept., (Depto. de Sanidad Animal)
Ing. Edgar Rey, Animal Nutricionist
Ing. Alberto Carrillo Chavarría, Livestock Research

National Production Council - Consejo Nacional de Producción (CNP)

Ing. José Enrique Aguilar
Ing. Gregorio Muñoz (Meat Marketing Mission to Europe)
Ing. Rudy Venegas, Head Planning and Economic Studies Section

1. PUBLIC SECTOR

Anglo Bank - Banco Anglo Costarricense

Ing. Claudio Volio, Manager

Central Bank - Banco Central de C.R. (BCCR)

Ing. Romilio Rodríguez, Head World Bank Credit Group (Programa de Crédito Agropecuario BIRF).

Inter-American Institute of Agricultural Sciences (IICA)

Dr. Juan Antonio Aguirre, Agricultural Economist

Montecillos Slaughterhouse Coop

Mr. Ramírez, Administrator

II. PRIVATE SECTOR

A. Producers - Large Scale

Mr. Carlos Ml. Rojas - Bremen
Mr. Orlando Rojas - Atirro
Mr. John Hull - S. Carlos
Mr. Juan Bonilla - La Culebra (Trade Mission to Europe)
Mr. Tomás Batalla - CNP
Mr. Manuel Peralta - Altamira - S. Carlos
Mr. Ronald Lett - Sarapiquí
Mr. David Steward - Mojica
Mr. Hagenauer - Mojica
Mr. [illegible] - Atlanta
Mr. Wayne [illegible] - San José

B. Packers

Ing. Romano Orlich - PECOSA
Mr. Tomás Batalla - Henderson Ltda.
Mr. Carlos Urcuyo - Barranca
Mr. Manuel E. Clare - Cartago Beef
Dr. Miguel A. Rodríguez - Cartago Beef

C. Associations

Ing. Adrián Arias - Federation of Cattlemen

D. Retail Trade

Mr. Alvaro Batalla, Cinta Azúl, Super-Carnes

E. Others

Lic. Eduardo Lizano - Marketing Survey
Francisco Rodríguez - Liberia Extension Agent
Ing. Victor [illegible] Liberia, Director of Agricultural Extension
Ing. [illegible] Castro San Carlos, Director of Agricultural Extension

APPENDIX I

Prices of Meat in San José, C.R. 1966-1970

		Posta de res de primera	Carne y hueso de res	Hígado de res	Chuleta de cerdo
		¢ por libra			
1966-	J	2.824	0.955	2.618	3.018
	F	2.823	0.954	2.616	3.108
	M	2.823	0.954	2.624	3.088
	A	2.835	0.954	2.687	3.096
	M	2.850	0.954	2.656	3.110
	J	2.850	0.954	2.667	3.076
	J	2.877	0.952	2.696	3.054
	A	2.880	0.952	2.701	3.041
	S	2.850	0.952	2.696	3.063
	O	2.850	0.952	2.696	3.063
	N	2.877	0.952	2.658	3.092
	D	2.856	0.952	2.650	3.102
1966 yearly average		2.850	0.953	2.664	3.078
1967-	J	2.870	0.952	2.621	3.205
	F	2.867	0.952	2.625	3.201
	M	2.867	0.952	2.629	3.196
	A	2.896	0.952	2.670	3.237
	M	2.965	0.952	2.692	3.267
	J	3.013	0.952	2.725	3.233
	J	3.056	0.971	2.739	3.341
	A	3.031	0.971	2.746	3.452
	S	3.031	0.971	2.738	3.541
	O	3.010	0.971	2.713	3.535
	N	3.018	0.975	2.701	3.535
	D	3.018	0.971	2.696	3.530
1967 yearly average		2.978	0.962	2.692	3.356
1968	J				
	F	3.10	0.98	2.72	3.59
	M				
	A	3.20	1.00	2.75	3.65
	M				
	J	3.50	1.00	2.85	3.85
	J				
	A	3.50	1.10	2.85	3.95
	S				
	O	3.55	1.10	2.75	4.05
	N				
	D	3.55	1.15	2.75	4.10
1968 yearly average		3.40	1.05	2.78	3.86

		Posta de res de primera	Carne y hueso de res	Hígado de res	Chuleta de cerdo
		¢ por libra			
1969-	J				
	F	3.65	1.15	2.75	4.10
	M				
	A	3.75	1.20	2.70	4.10
	M				
	J	3.85	1.20	2.70	4.10
	J				
	A	3.90	1.25	2.70	4.15
	S				
	O	3.90	1.25	2.75	4.10
	N				
	D	3.90	1.25	2.75	4.20
1969 yearly average		3.82	1.22	2.72	4.12
1970-	J				
	F	4.10	1.30	2.70	4.20
	M				
	A	4.30	1.35	2.70	4.20
	M				
	J	4.35	1.35	2.75	4.25
	J				
	A	4.35	1.35	3.00	4.30
	S	[illegible]	[illegible]	2.79	[illegible]
	O	4.35	1.35	2.85	4.35
	N				
	D				

Source: "Indices de Precios al por menor". Dirección General de Estadísticas y Censos. Ministerio de Industria y Comercio. Bimonthly

Appendix II

The National Provisioner, Daily Market & News Service. "The Yellow Sheet" "Hoja Amarilla" Chicago, Ill.

Prices of Australian-N.Z. Frozen Imported Cow Meat, 90% Vis. In., F.O.B. Port of Entry (30 days). Selected dates, 1968-1970.

1968		$/lb.
Jan.		46½-47
Feb.	15	46-46 3/4
Mar.		46-48
Apr.		47½-48½
May		48½-49½
Jun.	14	49½-51
July		49½-50
Aug.		49-50½
Sept.	16	52-53
Oct.	15	52-54
Nov.	15	49½-50
Dec.		N.A.
1969		
Jan.		49½-50
Feb.		49-50
Mar.	14	50¼-51¼
Apr.		52¾-53
May	15	55 3/4-57
June	16	59½-60
July	15	58½-59
Aug.	15	63-63½
Sept.	15	60- "
Oct.	15	56- "
Nov.	14	55-55½
Dec.	15	55-55½
1970		
Jan.	15	58-59
Feb.	16	60-61
Mar.	16	60½-61½
Apr.	15	62-62½
May	15	60 3/4-61½
Jun.	15	59-59½
Jul.	15	58-59
Aug.	15	55½-56
Sept.	15	57½-58
Oct.	15	58-59½
Nov.	16	57¼-57½
Dec.	15	59-59½

Appendix II

Using available data on price and income elasticities we tried to project what the demand for beef would be at 4 price levels.

Price, live wt. C/Kg	2.40	2.24	2.10	2.00
Retail price, Posta de primera	3.60	3.16	3.04	2.90
Consumption per capita 1970	15.5 Kg.			
Per capita consumption at 3 different price elasticities obtained from 3 studies				
Pe= -0.1		15.7 Kg	15.75 Kg.	15.8 Kg
-0.17		--	--	16.0 Kg
-0.9		17.2 Kg	17.7 Kg.	18.3 Kg

Income elasticity for beef

Income 1970 = C 2,791 1980 projected income of C 3,910

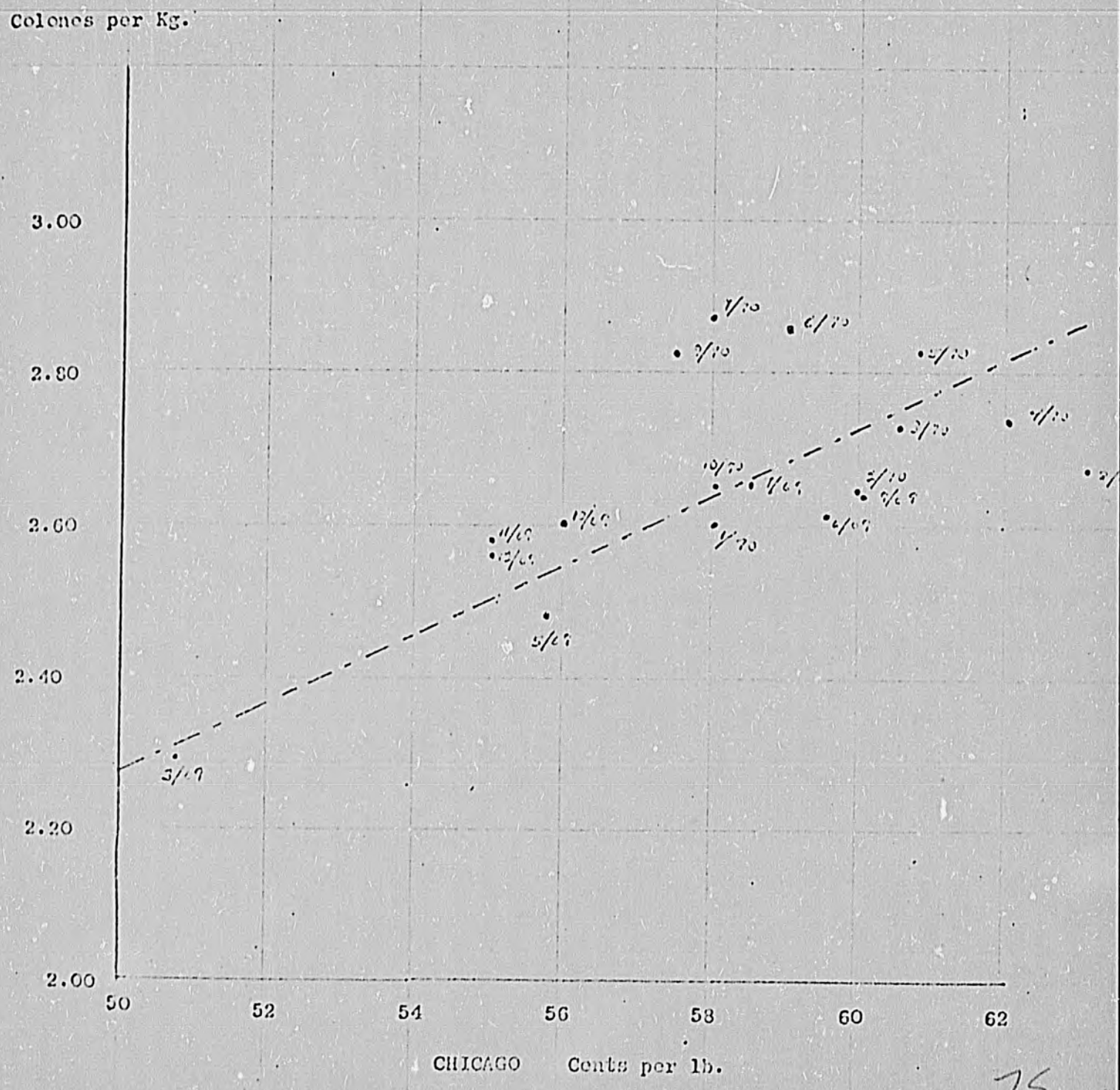
% 1980/1970 = 140

			% increase	Kg increase above 15.5	Projected/capita consumption
Income elasticities from 3 different studies	Ie =	.03	.1	0.05	15.5 Kg.
		1.56	62.5	9.7 Kg increase	25.2 Kg.
		2.85.	114.0	17.7 Kg increase	32.2 Kg.

Figure 2

APPENDIX-I

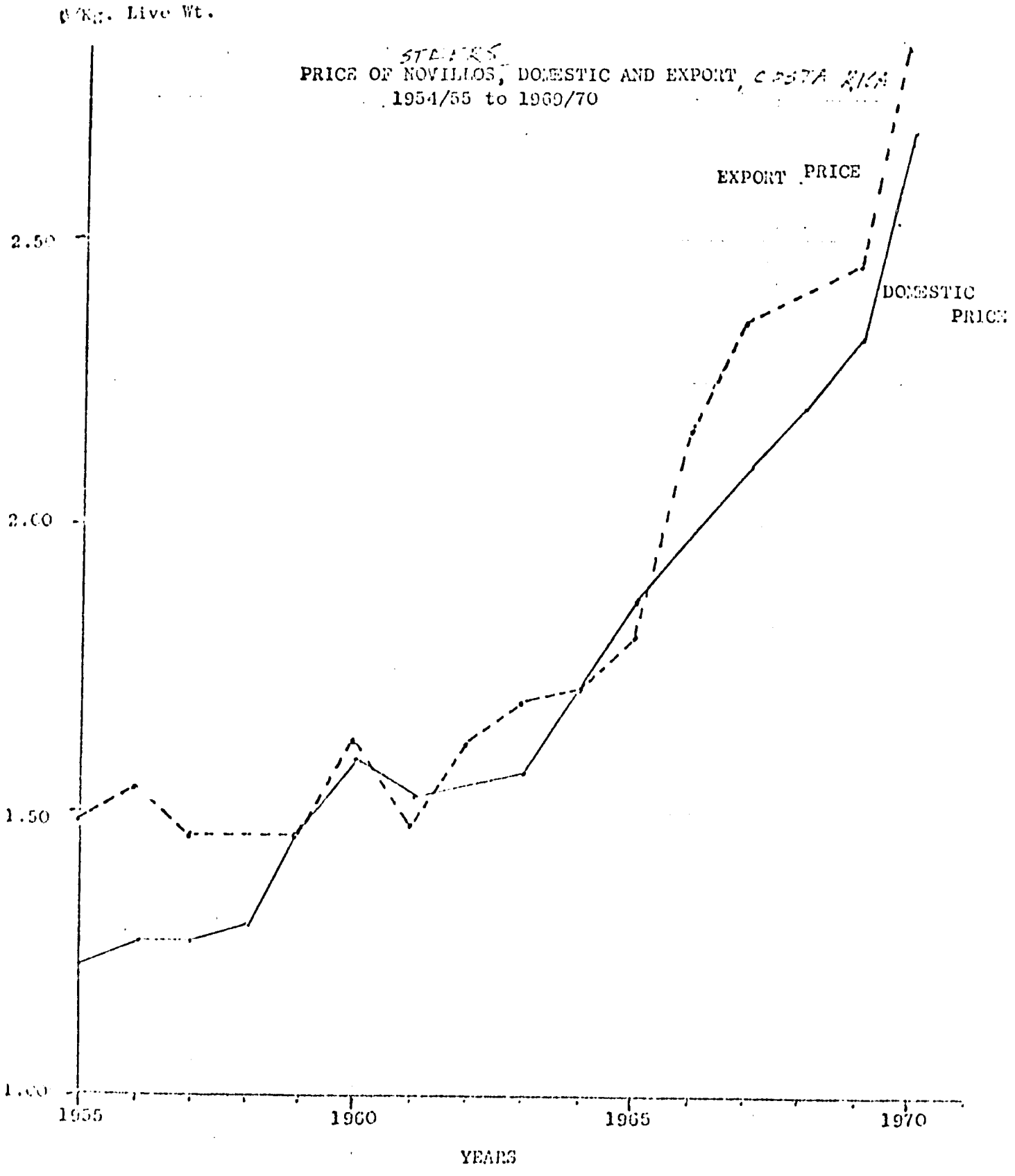
PRICE OF FROZEN BEEF, ~~AT~~ United States* CHICAGO* AND NOVILLOS AT MONTECILLOS 1969-70



75

* Chicago "Yellow Sheet" price for Australian-New Zealand frozen boneless cow beef at port of entry. Chicago price is for the 15th of the month or nearest trading day, and Montecillas for the following Monday. Low of range at Chicago

Figure 3


C/Kg. Live Wt.
PRICE OF NOVILLOS, DOMESTIC AND EXPORT, COSTA RICA
1954/55 to 1969/70
EXPORT PRICE
DOMESTIC PRICE
2.50
2.00
1.50
1.00
1955
1960
1965
1970
YEARS

APPENDIX III

Basic Supply Projection

Assuming varied head capacity/ manzana based upon different types of pasture, (natural, irrigated, hay, and improved grasses) we are trying to determine what will be the projected increase in carrying capacity/ manzana in different regions of Costa Rica at 2 price levels.

Appendix II (Price elasticity of supply)

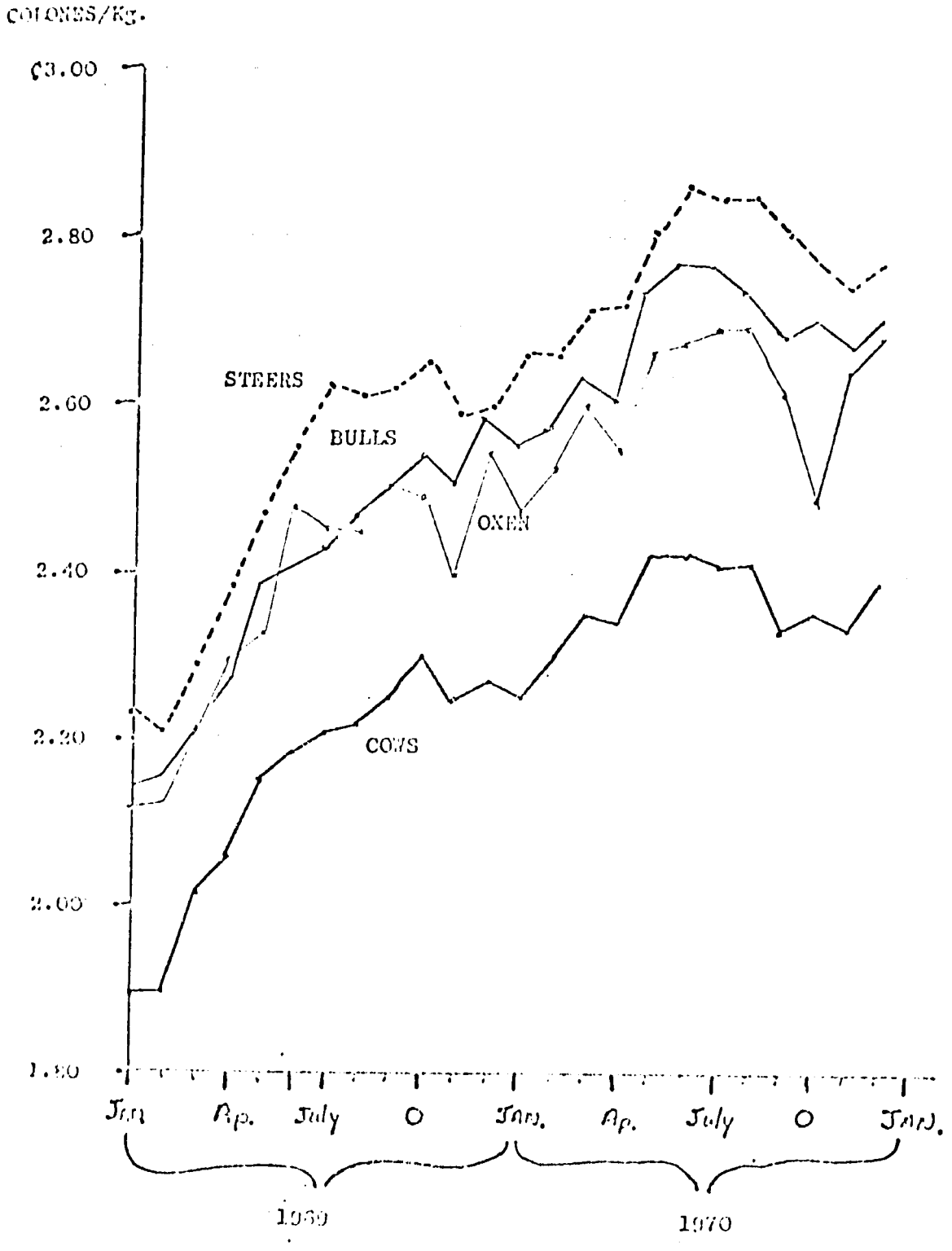
Total Herd projections assuming two different Price Levels and two rates of investment to improve ~~the~~ carrying capacity and efficiency of pasture utilization of a.

PROVINCE	LAND NOW IN PASTURE (1000)mz.	IMPROVEMENTS	ASSUMING PRICE ¢2.40/Kg live wt. # of cattle	ASSUMING PRICE ¢2.00/Kg live wt. # of cattle
GUANACASTE	658	irrigation	70,000mz.[1] x 3 hd/mz. = 210,000	20,000mz. x 3 hd/mz. = 60,000
		hay	70,000mz. x 3 hd/mz. = 210,000	20,000mz. x 3 hd/mz. = 60,000
		natural & improved grasses	560,000mz. x .9 hd/mz. = 500,000	660,000mz. x .65 hd/mz. = 430,000
Total projected cattle in Guanacaste			700,000mz. x 1.31 hd/mz. = 920,000	700,000mz. x.785 hd/mz. = 550,000
PUNTARENAS	LAND NOW IN PASTURE 294,271mz.	Technology & pasture improvement	400,000mz. x 1 hd/mz. = 400,000	320,000mz. x .75 hd/mz. = 240,000
SAN CARLOS	LAND NOW IN PASTURE 117,000mz.	Technology & pasture rotation	221,000mz. x 1.45 hd/mz. = 320,000	170,000mz. x 1.10 hd/mz. = 187,000
OTHER	LAND IN PASTURE 556,000mz.		700,000mz. x .95 hd/mz. = 600,000	640,000mz. x .85 hd/mz. = 540,000
PROJECTED NATIONAL HERD			2,300,000	1,517,000
NUMBER OF HEAD SLAUGHTERED AT TWO PRICE LEVELS			20% 460,000	16% 240,000

Figure 6

CATTLE PRICES, MONTECILLOS MARKET

1969-1970



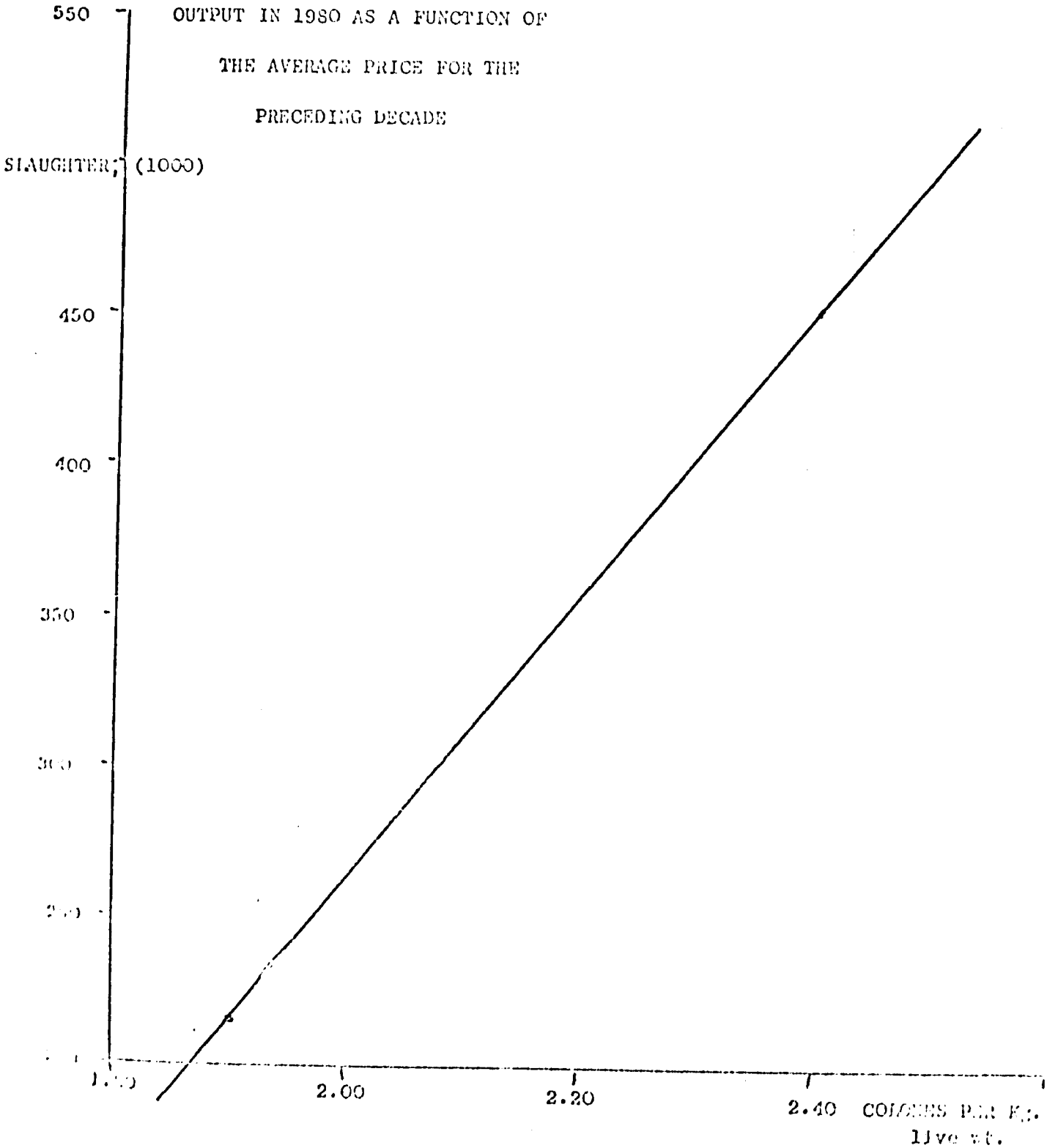
PRICE BY MONTHS

Figure 5

APPENDIX II

BEEF SUPPLY FUNCTION FOR COSTA RICA

OUTPUT IN 1980 AS A FUNCTION OF

THE AVERAGE PRICE FOR THE

PRECEDING DECADE