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PN-ABD-295

GUATEMALA

DAIRY SECTOR REVIEW
Volume One: Text
(FINAL EDITION)

Submitted to:

Agriculture and Rural
Development Office
USAID/Guatemala

Submitted by:

National Cooperative
Business Association
Land O'Lakes, Inc.

Date submitted:

March 20, 1987

bibliography is provided in Annex 2.

The team interviewed key informants at the production, transport, processing, and marketing levels, as well as those in credit, technical assistance, and regulatory positions. A list of contacts is provided in Annex 3. This was combined with direct observation in the field--visiting farms, collection centers, and processing operations ranging from small on-farm units utilizing raw milk to mid-size cooperatives and private plants and up through the major fluid milk pasteurization and manufactured milk plants.

The team benefitted greatly from the full collaboration of the Vice-Minister for Livestoc (of the Ministry of Agriculture, Livestock, and Food) and the staff of the ministry's livestock extension service in the implementation of a sample survey covering approximately 20 percent of Guatemalan dairy producers. The survey and the subsequent computer analysis were completed under great time pressure, in just three weeks, and the results have given the present report's conclusions a significantly greater objective basis than could otherwise have been the case, owing to the dearth of up-to-date and reliable statistical information.

C. SUMMARY OF FINDINGS AND CONCLUSIONS

Three key findings characterize the Guatemalan dairy sector and are crucial to understanding and making recommendations for the industry.

(1) Domestic production is increasingly coming from dual purpose beef/milk operations and less from specialized dairy farms.

(2) The major sub-system for the distribution of milk in Guatemala is not the pasteurized sector, characterized by the large registered processing plants, but the raw milk sector, comprised of thousands of small, medium, and large producers, haulers and middlemen, and on-farm and off-farm cheese, cream, and butter manufacturing operations.

(3) Increasingly, imported powdered milk is filling domestic milk demand and displacing domestic production.

At present, the percentage of domestic marketable milk coming from the dual purpose sector is estimated at 83 percent and growing. The greatest potential for growth in production lies in the dual purpose sector, at least in the short term. Additional milk supplies currently exist, but are not now marketed owing to insufficient price incentives and deficient infrastructure.

Reliance on dual purpose production presents a risk as well as an opportunity. Much of this production takes place near the Pacific Coast on land which is suitable for intensive

agriculture. Such reliance has made the country's domestic milk supply vulnerable to further disruption. In the event that price ratios change and agricultural production becomes more attractive relative to beef or milk, dual purpose milk production could quickly dry up and thus leave the country even more dependent on imports of dairy commodities.

The raw milk market is the largest system for channeling milk in Guatemala, claiming 65 percent of volume. Raw fluid milk is the only source of milk for many Guatemalans, as a consequence of availability, cost, or personal taste. Raw milk enjoys a substantial price advantage over pasteurized milk.

Much of milk consumption in the country--approximately 50 percent of both raw and pasteurized product-- is in the form of cheese, cream, and other manufactured milk products. In particular, small and unregulated cheese plants exist throughout the country.; these are almost totally unregulated, are labor-intensive, add significant value-added, and are technically deficient in sanitation, quality control, and production methods.

The raw milk sector is a major source of nutrition, economic activity, and potential health problems, particularly among low-income rural and urban populations. Significant potential exists for increased sales, jobs, and quality. Growth in this sector will generate the greatest demand for domestic dairy production.

The existence up to January 1987 of formal price controls is a major reason for the stagnation in domestic marketable milk production and for the decreasing ability of pasteurization plants to compete with the raw milk sector for this limited supply.

Moreover, fluid pasteurized milk suffers a poor image among Guatemalan consumers. By reputation it has minimum keeping quality, excess water content, deficient fat content, and, frequently, an off-taste. The team found that handling and quality control at the pasteurizing plant level was generally good, with modern and well-maintained facilities. Technical assistance and equipment needs were generally few (exceptions are noted in the text and in the annexes).

Nevertheless, the team found that the major pasteurization plants were operating at a little less than 50 percent capacity utilization (based on reported fluid milk receipts and a single ten-hour shift). (PROLAC, the GOG-owned plant, is presently operating at a little over ten percent capacity utilization, with limited prospects for improving the situation due to competition for product from the raw milk and Salvadoran markets.)

The team found that the major reason for low-quality milk to the consumer to be the unsanitary, unrefrigerated, and overly time-consuming handling at the farm and transport levels. The milk is also commonly skimmed of cream, watered, and adulterated with

hydrogen peroxide and other substances. Particularly in the South Coast and other tropical regions, the resulting milk quickly develops an excessive bacterial count. These factors make themselves felt in the larger raw milk sector, compounded by lack of standards and absence of pasteurization and in the pasteurized sector where the major plants, desperate for product in the face of competition from the higher-paying raw milk sector, have been unable to make a price differential between high- and low-quality milk and, thus, accept nearly anything that comes through the gate.

Complicating efforts to increase the quantity and quality of domestic marketable milk is the growing volume of commercial and non-commercial powdered milk imports, which are significantly displacing local production. Three points stand out. First, a substantial market exists for powdered milk in individual tins, and this is being satisfied through increasing volume of imports. Second, an expanding volume of imported donated dairy commodities is flowing through a growing number of private and public agencies, many with no experience in administering such feeding programs. Third, at nearly every plant visited the team observed powdered milk being reconstituted and combined into fluid milk and manufactured milk products. This phenomenon appears to be increasing. Imports of commercial and donated dairy commodities have grown from 25 percent of domestic consumption to approximately 40 percent over the last two years and are projected by the team to increase to over 50 percent by 1989 unless actions are taken to interrupt the trend. Some of this powdered milk is being bought on the black market, being diverted from one or more feeding programs, as well as being commercially imported.

D. SUMMARY OF RECOMMENDATIONS

The NCBA/LOL team recommends a series of interrelated actions to increase domestic marketable milk supply, improve quality of product and efficiency of operations, and increase consumption of milk products by the Guatemalan population.

At the off-farm marketing level, these include:

o De-control prices to encourage increased marketings from dual purpose cows, more cooling of milk and improvement of quality, and reduction of the seasonal variation in production through conservation and use of forage, improved herd management, etc.

o Gradually establish and enforce quality price differentials (premiums and penalties) as an incentive to improve cooling, handling, and transportation facilities, and to pay off debts incurred in establishing these. These differentials would be implemented by agreement between the processing plants and the producer groups without GOG intervention, and should be introduced as prices advance at the end of the rainy season.

This action should be coupled with a campaign to educate producers to the individual benefits as well as societal rewards of quality improvements.

o Strengthen dairy farmer associations and enable them to increase the quality of milk handling and transport through establishing on-farm cooling systems, community collection centers, and community-controlled transportation operations. Provide credit to initiate these.

At the farm production level, these include:

o Create a dairy herd record-keeping system, such as the Dairy Herd Improvement Association program in the United States, to systematically focus on genetic improvement and better herd management.

o Increase levels of credit, technical assistance in areas of forage production and conservation, herd management, and on-farm handling, and animal health services.

o Implement measures to increase the availability of feed concentrate to increase year-round production. One measure might be the import of soybeans or other commodities under the Section 416 Sugar Quota Compensation Program.

At the processing level:

o Concentrate technical and other interventions in the raw milk processing sector. Provide technical assistance, training, and credit for working capital and equipment to the many small registered and unregistered cheese, cream, and butter manufacturers to help them improve efficiency, raise hygiene, diversify product lines, extend shelf life, and expand volume of production.

o Refrain from expanding pasteurization capacity. In fact, the GOG should consider closing PROLAC's fluid milk operations. It should buy fluid milk during the wet season, dry it, and instantize it for sale during the dry season. This might be done in collaboration with major private processors, buying their surplus production, processing it, and returning it under "private label".

At the GOG policy level relating to supply and demand:

o As recommended above, fully de-control milk prices.

o Establish as a national goal the stabilization and eventual reduction of commercially imported subsidized dairy commodities. Formally adopt a plan of action and timetable in conjunction with the private sector to achieve this objective--by increased productivity in milk production and processing.

o Establish a monitoring mechanism to quantify the commercial and non-commercial import of dairy commodities, and their use by sector, and on the basis of this information advise the GOG on dairy policies and actions to implement.

o Eventually, the GOG may want to establish an offsetting tariff on subsidized commercial dairy imports to the extent of the subsidy, as a means of assisting the domestic dairy industry.

o Alternatively or complementarily, require the labeling of reconstituted milk and place an excise tax on the product to encourage the use and consumption of domestically-produced powdered milk.

o Implement legislation to create an autonomous representational body of private and public sector agencies interested in the dairy sector, such as the proposed reform involving the Consejo Nacional de Fomento Lechero, being careful to encourage--not stifle--competition. Alternative organizations of producers, such as the Guatemalan Association of Livestock Producers, also exist and might be suitable participants.

o Gradually improve and enforce quality standards on milk and milk products--both raw and pasteurized. Do this in partnership with the private dairy industry--both producers and processors. Implement legislation and approve a budget enabling GOG agencies to enforce existing or improved sanitation and labeling standards. Train DIGESEPE and other GOG personnel as well as private processor staff in these areas. This will protect the public health and minimize the danger of epidemics and contamination.

At the consumption level:

o Establish a national dairy organization (such as the monitoring entity proposed above) to define a national dairy consumption campaign. Techniques might include school education working with the medical professions and health organizations, sales clerk education, upgrading of store displays, distribution of recipes, etc. and be financed ultimately by a check-off system at the plant. Special programs for public and private employees, or special promotions (e.g., coupons) might be considered.

o Perform market research for new milk products appealing to each identified consumer segment. Possibilities include a lactose-free UHT milk (for which equipment can be leased from a company in the United States, thereby saving on initial capital costs), as well as various fruit- and sugar-flavored drinks.

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ACRONYMS AND ABBREVIATIONS

AID	Agency for International Development
A.U.	animal units
BANDESA	Banco Nacional de Desarrollo Agricola
CLUSA	Cooperative League of the USA (now National Cooperative Business Association)
CORFINA	Corporacion Financiera Nacional
DA	Development Assistance
DIGESA	Direccion General de Servicios Agricolas
DIGESEPE	Direccion General de Servicios Pecuarios
EEC	European Economic Community
FAO	Food and Agriculture Organization
GOG	Government of Guatemala
ICAITI	Instituto Centroamericano de Investigaciones de Tecnologia Industrial
ICTA	Instituto de Ciencia y Tecnologia Agricola
IICA	Inter-American Institute for Cooperation to Agriculture
INACOP	Instituto Nacional de Cooperativas
IFAD	International Fund for Agricultural Development
INACOP	Instituto Nacional de Cooperativas
INAFOR	Instituto Nacional Forestal
INCAP	Instituto de Nutricion de Centroamerica y Panama
INLACSA	Industrias Lacteas, S.A.
INTA	Instituto Nacional de Transformacion Agraria

INTECAP	Instituto de Tecnologia y Capacitacion
LOL	Land O' Lakes, Inc.
M&E	Monitoring and Evaluation
NFDM	Non-Fat Dry Milk
NCBA	National Cooperative Business Association (formerly Cooperative League of the USA-CLUSA)
PLANDEPE	Plan Nacional de Desarrollo Pecuario
PRODELE	Programa de Desarrollo Lechero
PRODESA	Programa de Desarrollo de Salud Animal
PROGETAPS	Proyecto de Generacion y Tranferencia de Tecnologia
PROLAC	Productos Lacteos, government-owned milk processing operation
PVO	Private voluntary organization
USPADA	Unidad Sectorial de Planficacion y Desarrollo Agropecuario
VERALAC	Productos Lacteos Verapaces
XELAC	Xelaju Lacteos

MAPA DE LA REPUBLICA DE GUATEMALA PLANTAS LECHERAS

1 LOS CUBANITOS, COATEPEQUE
2 LOS CUBANITOS, RETALHULEU
3 XELAC, TOTONICAPAN
4 LA FLORA, TIQUISATE
5 PARMA, PATULUL
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12 PINULAC, SAN JOSÉ PINULA
13 LA SALUD, CHIQUIMULILLA
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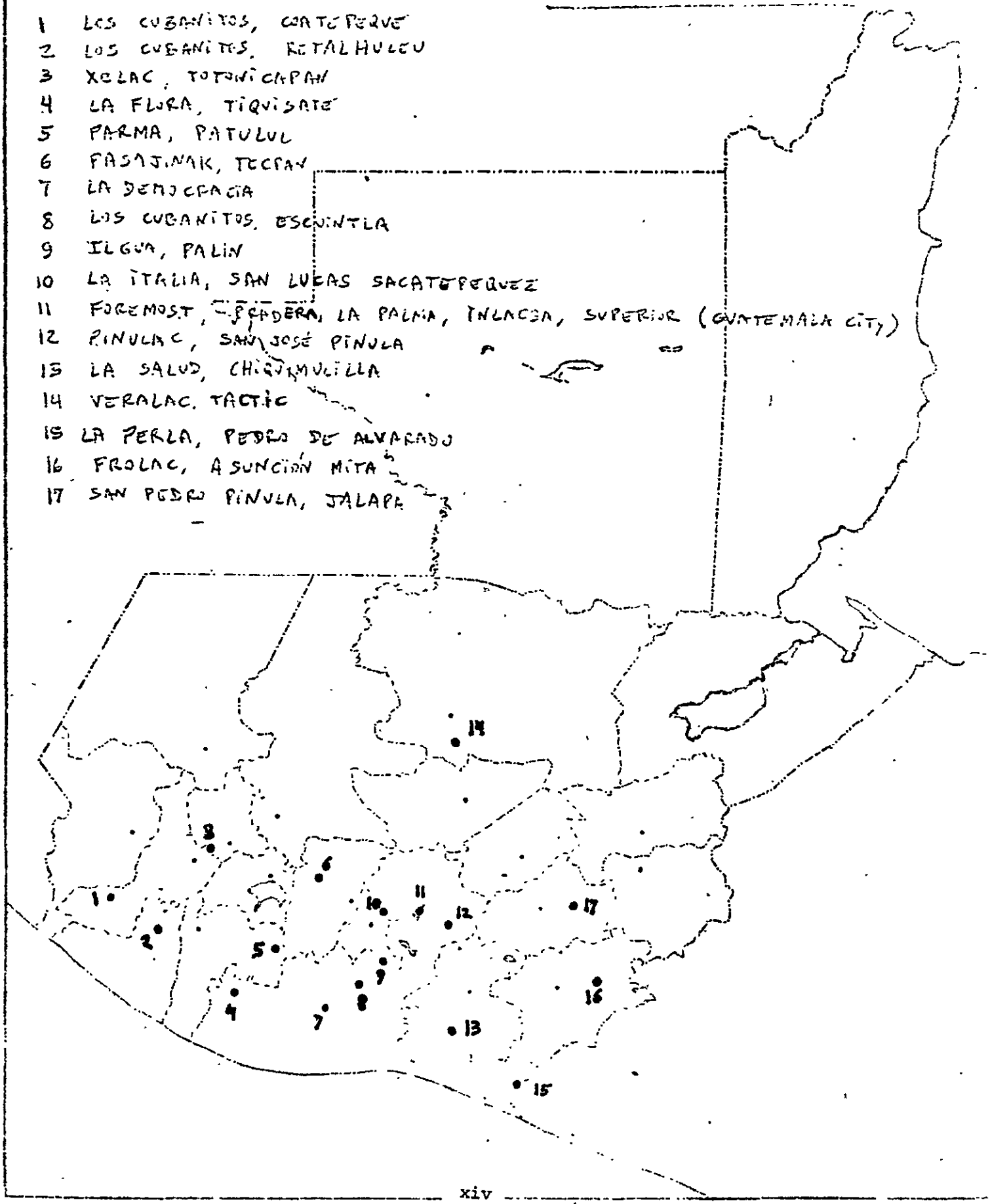

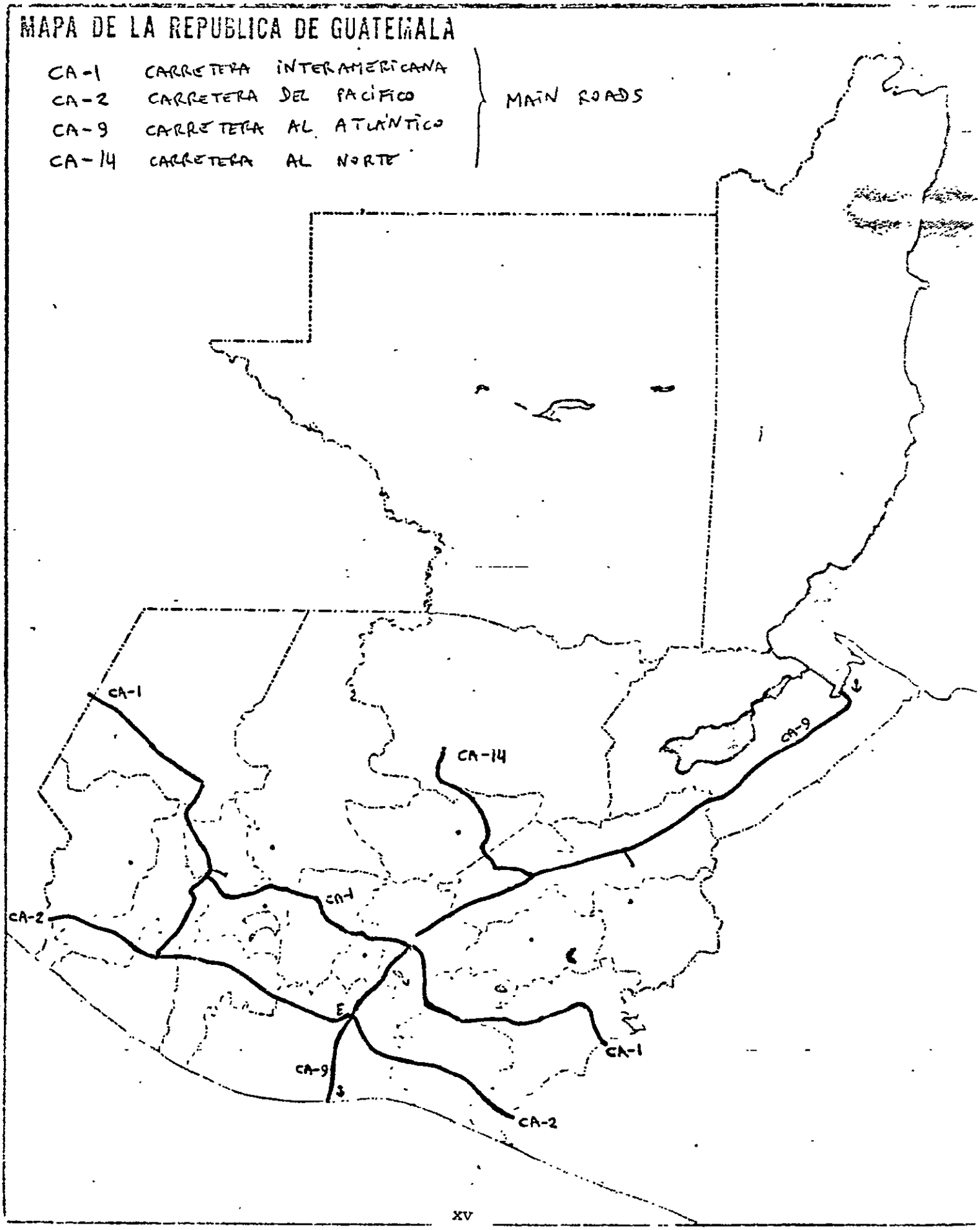
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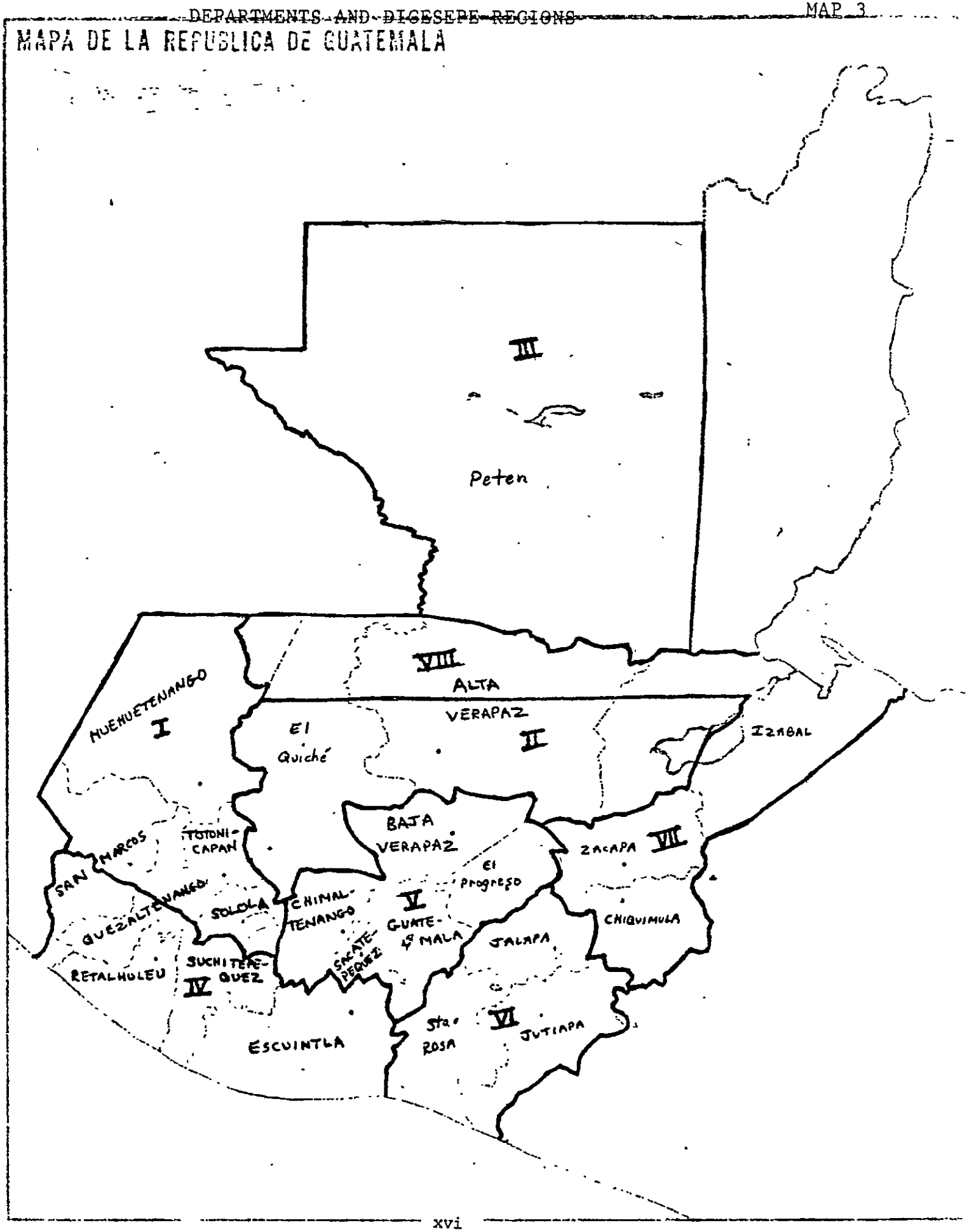
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CAPAN
QUEZALTENANGO
SOLOLA
CHIMAL-
TENANGO
SACATE-
PEQUEZ
RETALHULEU
SUCHITEPE-
QUEZ
IV
ESCUINTLA
Sta.
ROSA
VI
JUTIAPA

I. INTRODUCTION

A. Background

1. The Problem

Guatemala is a net importer of dairy products. Domestic fluid milk production has been estimated to provide only a little more than 50% of national consumption of fresh milk and milk products consumption. Imports of powdered milk and other dairy commodities doubled to over US $15 million from 1983 to 1985.

Domestic milk marketing is limited by several factors. Principal among these is the low price, which inhibits investment in technology and achieving economies of scale. Competition from imports compounds the problem. Production, moreover, is highly seasonal. Most processing plants currently appear to operate at low capacity utilization.

As a result of production and processing inefficiencies, dairy prices to consumers are high, relative to their incomes. This has been exacerbated by the 1985 devaluation and accompanying inflation, which has contributed to rapid and sharp increases in imported powdered milk prices.

The implied problem of low effective demand is compounded by lack of household refrigeration, and insufficient public awareness of milk's nutritional value.

The nutritional status of the low-income urban and rural sectors is precarious, due in part to a deficiency in protein consumption. Increased consumption of diary products could help to ameliorate this problem.

In short, at a time when Guatemala's population needs to have access to an expanded and sustainable supply of cheap protein, its dairy sector appears to be charaterized by declining efficiency, productivity, and increased dependence on imported milk products.

2. USAID/G CONCERN

Recognizing these problems, USAID/G has sought for several years to undertake an in-depth analysis of the dairy sector. The conjunction of several factors--GOG interest in dairy development, USAID/G awareness of National Cooperative Business Association (NCBA) and Land O'Lakes' (LOL) experience with commodity program-supported development in India and

- serve as a vehicle for policy dialogue of USAID/G and other donors with the GOG regarding the dairy sector.

A full scope of work is provided in Annex 1.

C. Methodology and Field Work Schedule

1. Methodology

NCBA utilized a combination of methods to accomplish this dairy sector analysis and arrive at the conclusions and recommendations continued herein.

First, the dairy sector was viewed as a partially closed system. Personnel were assigned to cover each aspect of the system and the range of external forces impinging upon it.

Second, the team set about collecting all available dairy sector information, checking and re-checking it for reliability; and comparing it against competing sources. Information was collected through:

- Interviews with key informants at the production, transport, processing, and marketing levels (a list of individuals contacted is provided in Annex 3);

- Review of existing documents (a full bibliography is included in Annex 2);

- Review of statistical sources;

- Sample survey of approximately 20 percent of producers and computer analysis (copy of the questionnaire used is included in Annex 9); and

- Direct observation at the production, transport, processing, and marketing levels. (A copy of an interview guide is attached as Annex 5) Plants visited encompass nearly the entire pasteurizing sector of the market as well as a representative portion of the unpasteurized sector.

Third, the team maintained close contact throughout the five-week study period with both USAID/G and the Ministry of Agriculture, seeking their policy and professional

Economist	Otto Samayoa (NCBA local-hire consultant)
Dairy Sector Specialist	Roberto Diaz (NCBA local-hire consultant)

During Week 1 (January 5-10), the team conducted initial consultations with USAID/G, the Vice-Minister for Livestock (Ministry of Agriculture and Livestock), DIGESEPE, USPADA, and the representative of the private dairy processors association. Field visits were initiated toward the end of the week to PROLAC; PROLAC area farmers; Quezaltenango area farmers; DIGESEPE Regional office in Quezaltenango; Highland Small Farmer Diversification Project staff; PINULAC (a small cheese factory); and retail dairy product outlets ranging from supermarkets to the Guatemala City central market. The team prepared and submitted to USAID/G a work schedule for the five-week study.

Week 2 saw the team intensify its field visits, office interviews, and document and statistical review. A survey instrument was designed and distributed to DIGESEPE personnel for implementation over the following two weeks. An office was set up and a secretary was hired. A draft outline was submitted to USAID/G. Plant and field visits to the Nueva Concepcion (coastal), Guatemala City, and Quezaltenango areas were made. The team briefed the Vice-Minister.

During Week 3, the team completed its plant and field visits and began the organization and writing of this report. Team members visited additional private plants in Guatemala City, the cooperative dairy VERALAC in Alta Verapaz, and additional producers and plants in the Guatemala and Pacific coastal region.

The team found that statistical data was sparse, frequently out of date, and on occasions unreliable. Nevertheless, a picture of the dairy sector began to emerge. The team separately briefed the Vice-Minister and USAID/G. A final outline was agreed upon. Toward the end of the week, DIGESEPE interviewers in each region completed the field survey and submitted the raw data to the team; team members initiated the coding and entry of the data into the computer. The processing plant specialist wrote his findings and recommendations, and departed the country.

In Weeks 4 and 5, the team completed a first draft and reviewed it with USAID/G. The team also had a formal meeting with the Vice-Minister. On-going interviews, data analysis, and editing, combined with USAID/G and GOG comments, resulted in a

II. THE LIVESTOCK PRODUCTION SECTOR

A. General Information at the National Level

1. Total Dairy Livestock Population Production and Trends

Milk production in Guatemala comes from two sources: dual purpose (beef/milk) animals and specialized (milk only) cattle. NCBA estimates a total 1985 Guatemalan dairy livestock population of 1,676,042 cows, the vast majority of which are dual purpose animals (See Table II-1A). In addition, approximately 477,000 head were dedicated solely to beef production. Total milk production is estimated for 1985 at 230.1 million liters.

Specialized cows, due to their higher productivity per cow and longer lactation periods, accounted for a disproportionate share of 1985 total production, relative to their miniscule numbers. NCBA estimated this share at nearly 30 percent, or 69,030,000 liters/year, compared to 70 percent and 161,070 liters/year for dual purpose cows.

Nationally, only about 15 percent of the country's cattle are being milked in any one day. This could easily be raised to 20 percent or, with some effort, to 25 percent through interventions such as increasing market demand and price; improving herd management; augmenting pasture, forage, and feed concentrate; reducing disease; and improving breeding/selection practices.

The team made these production and herd estimates by adjusting the results of the 1979 Agricultural Census, integrating them with subsequent trends and events, including legal and illegal beef exports, plant milk receipts, restocking ratios, rural violence, and foreign exchange rates. Due to the lack of firm data in several cases, the cited figures are at most "guestimates."

Increasingly, marketable milk production is originating in the dual purpose beef-dairy sector, situated in the Pacific Coast (Regions IV and VI). Producers in this region typically range from medium-sized to large. Medium-sized producers are typically land settlement beneficiaries possessing 20 or more hectares and engaged in mixed agriculture-dual purpose livestock activities. Their level of technology is generally low. On the other hand, larger producers practice a highly-technified mixed dairy-beef operation (see below).

Other significant production regions are Region I (Guatemala City and San Jose Pinula), the Quezaltenango highlands (Region V), and Coban-Tactic (Region II) serving the country's three largest urban concentrations. These regions are described

TABLE II-1

GUATEMALA
LAND USE IN PASTURE BY CLASSES 1, 2, AND 3 OF SOILS

Classes 1, 2 and 3 of soils

Region	Hectares in Pasture*	Total Hectares	Percent in Pasture by Region
1	7,600	51,300	15
2	16,550	64,300	26
3	61,240	357,300	17
4	182,120	581,000	31
5	13,620	72,300	19
6	58,610	110,100	53
7	48,620	141,800	34
8	67,610	343,900	20
TOTAL	455,970	1,722,000	27 (nationwide average)

* These are estimates of hectares cultivated and/or in rotation with pastures or associated crops/pastures.

Source: PLANDEPE, Tomo 1, 1983.

species. A notable characteristic of Graminae is an insufficient protein content, thus requiring a balanced feeding program to fulfill dairy production potential.

Even more critical a limiting factor is seasonality. The presence of a marked dry season, lasting between four and six months, and the general absence of irrigation, notably reduces milk production. The utilization of hay or silage should substantially alleviate the feed shortages during the dry season. Unfortunately, only a few herders are being trained for it (e.g., "Sistemas de Produccion para Pequenas Fincas" executed by ICTA/CATIE, Nueva Concepcion, Escuintla).

Feed concentrates, including locally available molasses, are expensive and/or scarce, and are rationed either by price or government regulations. The misuse or excess of concentrate intake on dairy implies only a rise in milk production cost due to low efficiency of feed conversion to milk (i.e., low cost-effectiveness).

[The importance of the various factors listed above, and others, can readily be quantified using the data developed in the NCBA/DIGESEPE sample survey. Due to time constraints, the team was unable to make use of this wealth of new data. However, we suggest that during the implementation of the proposed NCBA Dairy Development Project, or other dairy projects, that this information be mined to further increase understanding of the dairy sector and assist dairy initiatives.]

3. External Support to Production

a. Direccion General de Servicios Pecuarios (DIGESEPE)

DIGESEPE, an office within the Ministry of Agriculture, Livestock, and Food, is responsible for all public livestock programs in the country. These include PRODESA and the dairy-related component of PROGETAPS, described below, as well as the Consejo Nacional de Fomento Lechero. It has a staff of some 50 professionals, principally veterinarians and animal husbandry specialists. Table II-2 summarizes personnel by regions.

(1) Programa de Desarrollo de Salud Animal (PRODESA)

PRODESA is the GOG program providing technical assistance and training to livestock producers in the area of animal health. It is being implemented under $20 million in IDB financing over a five-year (1987-92) period by DIGESEPE's Animal Health Technical Office (Direccion Tecnica de Sanidad Animal). It is national in scope, concentrating in the Guatemala City area, Coban, Peten, Jutiapa, and Quezaltenango among smaller producers.

The program will seek to eliminate or control major animal health threats. By 1989, PRODESA expects to control and eventually eliminate tuberculosis, brucellosis, and rabies. In addition, the program will control external parasites (garrapotas) and internal parasites, as well as mastitis.

PRODESA has the potential to reach nearly all farmers in the country. It could encourage producers to improve milk handling through such measures as issuing health certificates to qualifying farms, and pave the way for initiating a quality payment system for milk.

(2) Proyecto de Generacion y Transferencia de Tecnologia y Produccion de Semillas (PROGETAPS)

PROGETAPS is also a five-year IDB-financed project, initiated in September 1986. It is generally focussed on seed multiplication, but with a small dairy-related pasture improvement component--a pilot model farm adopted to south coast conditions--at the Nueva Concepcion land settlement.

b. Instituto de Tecnologia y Capacitacion (INTECAP)

INTECAP provides training to public and private agencies in diverse fields, including dairy. Currently it is suffering budgetary constraints which impede effective use of personnel, materials, and institutional training experience.

c. Unidad Sectorial de Planificacion y Desarrollo Agropecuario (USPADA)

USPADA is the Ministry of Agriculture, Livestock and Food office charged with planning and coordinating the ministry's sectoral programs.

Currently, USPADA is preparing a Dairy Development Project (PRODELE). PRODELE proposes to reorganize and affect all entities operating in the dairy sector. As such, it raises several very sensitive issues. Presently, the proposed project is in draft and incomplete, with little prospect of immediate funding. As a consequence, USPADA was reluctant to share the draft with the NCBA team.

d. Credit to the Dairy Production Sector

Availability of credit appears to be a major constraint to eventual expansion and upgrading of dairying. Dairy farmers interviewed in the NCBA/DIGESEPE survey considered the lack of credit to be a major limiting factor to improving their operations. Credit to the dairy sector decreased, in both real and nominal terms, through 1985 (the latest year for which figures are available).

TABLE II-3

GUATEMALA
CREDIT TO THE LIVESTOCK SECTOR
TOTAL BANKING SECTOR
(1977-1985)

	Total Sector Livestock Credit (Q '000)	Percent of Agricultural Sector Credit
1977	15,090	17.4
1978	18,449	19.0
1979	24,300	24.7
1980	24,344	18.7
1981	23,790	14.9
1982	19,982	13.5
1983	23,294	13.8
1984	26,795	15.1
1985	36,530	22.5

SOURCE: Superintendencia de Bancos, Boletin de Estadisticas Bancarios

In addition, some ten beef producer associations exist, five of which belong to the Federacion de Ganaderos de Guatemala (FEDEGUATE). These associations traditionally have not played a role in the dairy industry. However, as lower beef prices have caused these farmers to rely more on milk income from dual purpose beef/dairy cattle, it is reasonable to expect that their representative organizations may play a more active role in dairy industry policies.

Producer marketing cooperatives are another organizational element in the dairy sector. A range of such organizations exist, from farm supply to actual processing and milk product marketing. The major actors are XELAC, a Swiss-assisted 52-member processing operation near Quezaltenango; VERALAC, a 23-member processing operation near Coban, Alta Verapaz; and the Cooperativa Central de Lecheros, a supply cooperative with roughly 180 small, medium and large producer members in the Guatemala City, Escuitla and San Jose Pinula areas. Also, significant and representative of a potential for small cooperative organization, is the Cooperativa Los Angeles, a community-based, small-member, fluid milk marketing cooperative in the Pacific Coast region near Escuintla.

These organizations and others are profiled in Annex 6.

B. Regional Characteristics*

1. Region I. (Highlands Agricultural Region: Departments of Huehuetenango, part of Quezaltenango, San Marcos, and Totonicapan)

a. Soils, Climate, Topography

Much of Region I lies in the highlands, west of Guatemala City at elevations ranging up to three thousand meters. The region receives from 1,500 to 2,000 mm. of rain per year, most of which falls during the six-month period from June through December. The higher elevations--up to 80 percent of the region--receive regular freezes during the early dry season, from December through March. The combination of cold and dry climate slow the growth of pastures and cause seasonal production variations.

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* The regional data presented is drawn from team interviews, the 1979 Agricultural Census, and the January 1987 NCBA/DIGSEPE survey. The survey results and tables are provided in Annex 9, and we encourage the reader desiring more information and analysis to consult it frequently.

TABLE II-5

GUATEMALA
LAND USE IN PASTURES BY CLASSES 4, 5, AND 6 OF SOILS
BY REGION

Region	Hectares in Pasture	Total Hectares	Percent in Pasture
1	62,700	476,000	13
2	120,500	433,800	28
3	99,990	1,217,500	8
4	185,980	287,900	65
5	47,780	290,100	17
6	185,270	257,800	72
7	146,050	210,800	69
8	39,560	300,100	13
TOTAL	887,830	3,474,000	26 (nationwide average)

* These are estimates of hectares cultivated an/or in rotation with pastures or associated crops/pastures.

Source: PLANDEPE, Tomo 1, 1983.

liters/day), and three large producers (above 500 liters/day). According to the 1987 NCBA survey, the average number of cows milking per herd was 4.8, out of a total herd size of 14.6 animals. Herds are composed entirely of dairy breed genetic stock and, as mentioned above, 55 percent of the region's livestock owners focus exclusively on milk production.

e. Producer Characteristics

The western highlands are intensively farmed by Indian small farmers who own from one-quarter to five hectares of land on which corn and wheat are cultivated. Corn has religious symbolism and is consumed as the main ingredient of the subsistence diet. Wheat is grown as a cash crop and sold to local mills. Typically, Indian small farmers devote over one-half of their land to raising wheat, less than half to raising corn and none to raising forage for livestock. However, livestock are an important part of small farmer diversified agriculture. Farmers keep livestock as part of the integrated small farming system survival strategy. These are typically chickens, goats and sheep which are pastured on steep communal highland meadows, and one or two cows.

The cows are pastured in non-arable ravines and along roadsides. Feed availability is the limiting constraint to production. In the dry season, which lasts for about six months, animals lose body weight, reproduction cycles are suspended, and milk production drops by 30-75 percent.

Milk is typically fed to a calf, and what is left over is available for family consumption. Any excess is sold door to door, or to an intermediary to be sold in nearby towns. Manure is a valued economic byproduct which is used to fertilize other crops. Dairying on this scale is seen by producers as (a) involving no costs, (b) a mechanism for saving money which can be drawn on in an emergency (i.e., sell an animal), and (c) providing free fertilizer for cash crop farming. For those who do not have access to a village market, milk is NOT seen as a cash crop. The calf and the manure are the only economic returns recognized.

A few modern dairy farms of more than 30 cows exist in the area. Their owners dedicate crop land to forage production, by grain- and molasses-based concentrate mixes, practice genetic improvement through artificial insemination, and sell their milk to XELAC, a dairy cooperative located near Quezaltenango.

f. Marketing

Most milk which makes its way into the commercial market in the altiplano comes from farms with from five to 100 cows. Dairies of this size are usually owned by ladinos who sell unpasteurized dairy products in nearby towns and

frozen semen imported from the United States. Heifer Project and DIGESEPE have artificial insemination training programs with farmers in principal milksheds in the region.

Small farmers would maximize the use of their forage resources by selling baby bull calves rather than raising them out for beef. This practice is not widespread because of tradition and lack of managerial thinking. However, the observed use of dairy breeds for small farmer dual purpose production means that a good genetic base exists which can be improved upon by animal selection and artificial insemination.

j. Health and Sanitation

Herd health and sanitation are deficient in Region I, as they are throughout the country. The incidence of internal parasites in cattle is high, and contaminated sources of drinking water and feed make de-parasiting the animals difficult except in confinement feeding situations. The incidence of warm climate diseases such as anaplasmosis and piroplasmosis is virtually non-existent in the cool altiplano, but brucellosis and tuberculosis is endemic in both cattle and other animal reservoirs, both domesticated and wild. A 1984 nationwide study (A.T., p. 83) shows that the incidence of brucellosis in cows was rising, being significantly higher (11.47 cases per thousand) that year than the 1974-1984 average (3.77 cases per thousand). The incidence in humans, using the same comparisons, rose from 5.01 to 6.51 cases per thousand.

Although Region I's cool ambient temperature helps conserve milk, farm hygiene is generally poor. Few producers strain the sediment from their milk and on-farm cooking equipment is rare.

Farm licensing of milk which is sold directly to consumers does occur on a limited basis, but is not being actively enforced.

k. Technical Assistance

Numerous PVOs work in the western highland, although few work directly in support of dairy production. The major ones who do are 1) Helvetas, a Swiss technical assistance agency which has a ten-year ongoing project with XELAC; 2) Heifer Project International, which has a genetic improvement program for dairy cattle in San Carlos Sija; and 3) dairy producers' associations in Huehuetenango, San Carlos Sija, and Quezaltenango (See Annex 6 for expanded discussion of regional organizations).

Perhaps the most active organization giving technical assistance to Region I dairymen is the Guatemalan Ministry of Agriculture through its livestock extension service,

- Intensive land use pressure which raises the opportunity cost of dairying;

- Limited forage in dry season;

- Inadequate supply of locally available sources of energy and protein;

- Deficient sanitation and preventative health practices;

- Lack of equipment;

- Deficient infrastructure.

Specific recommendations include:

- Lack of forage could be corrected by preservation of forage either as hay or as silage, and by making more efficient use of crop residues. The technology of making silos to assist cattle through the worst moments of forage scarcity should be disseminated.

- The Quezaltenango milk producers' association or another dairy membership organization should attempt to purchase or contract for the rights to be exclusive brewers' grain distributors for the Quezaltenango brewery. Other local feedstuff sources such as wheat middlings should be secured and incorporated into dairy supplements.

- Deficient sanitation and preventative health practices should be improved. GOG involvement in this activity, especially as it relates to tuberculosis and brucellosis testing and vaccination, would be desirable.

- Specific equipment requirements, especially on the small farms, include: milking stables, cattle watering tanks, feed mangers, water supply, silos, forage grinder/choppers, milk coolers, and other milk sanitation equipment such as sediment strainers.

- Specific infrastructure requirements include: farm access roads, bridges, and rural electrification.

Many of the solutions to these deficiencies involve providing effective technical assistance to small farmers. This is both expensive and difficult to execute. A program of technical assistance which works through a strong local membership organization, possibly XELAC or the Quezaltenango milk producers association, would be one of the most effective ways of reaching targeted beneficiary groups.

TABLE II-7

GUATEMALA
RELATIVE IMPORTANCE OF PASTURES BY CLASS OF SOILS
BY REGION

Region	Class of Soils			Total
	1 to 3	4 to 6*	7 and 8	
1	3	28	69	100
2	7	53	40	100
3	18	30	52	100
4	49	50	1	100
5	5	16	79	100
6	16	50	34	100
7	12	36	52	100
8	51	30	19	100

*More suitable for pasture.

Source: PLANDEPE, Tomo 1, 1983.

d. Production Units

Although there are hundreds of micro-producers who keep dairy cows as part of their diversified subsistence farming strategy, most milk being marketed in Region II comes from farms which produce between 10 and 500 liters per day. These are elite dairymen who practice varying degrees of dairy technology: 30-45 day pasture rotation, forage harvesting and confinement feeding, artificial insemination, record keeping, early age calf weaning, and, occasionally, on-farm milk cooling. The micro-producer practices few, if any of these management techniques. Technical assistance provided by VERALAC, a local dairy cooperative, could significantly increase milk production and quality among the small producer members.

Region II has one of the lowest daily milk production averages in the country: four liters/day in 1979 (1979 census) and just over five liters/day in 1986 (NCBA survey and Consejo membership reports). Herd sizes are large, averaging 42 cows apiece among Consejo members and 79 cows apiece among NCBA survey respondents. Consejo members reported average yearly production per lactation at 1,266 liters. Total production per lactation is significantly lower in the NCBA survey, possibly due to the inclusion of a larger number of dual purpose farms (whose cows have shorter lactation periods than specialized dairy cows--see Table II-9).

e. Producer Characteristics

Region II has four types of dairy producers: (1) large dual purpose cattlemen; (2) small dual purpose cattlemen in lowland areas, (3) small, medium and large commercial dairymen in the highlands, and (4) landless, or nearly landless micro-farmers who graze cows on communal land or rent land from neighbors as part of the subsistence farming survival strategy. About 60 percent of all producers are dual purpose. Micro and small producers are largely Indians and have low literacy levels. They often engage in dual purpose livestock husbandry, using dairy crossbred cows. These producers consume the milk on the farm and sell what excess may exist either directly to neighbors or to an intermediary. The small, medium and large producers in the highlands are typically non-Indians. They are better educated, own more and better land, and have greater capital resources. These farmers sell their milk directly to consumers wherever this option is open to them. Several market their milk through the VERALAC Cooperative (see Annex 6 for further details about VERALAC).

Large lowland farmers are primarily beef producers to whom milk is an added benefit which "helps pay the wages." Small dual purpose farmers depend more on milk income to meet their living expenses than do their larger counterparts, but they still consider the sale of beef animals to be their principal source of profit.

f. Marketing

As in Region I, most milk which enters the commercial (raw or pasteurized) market comes from larger farms, i.e., those above the micro level. Only when direct raw milk marketing opportunities do not exist do producers sell to VERALAC or to intermediaries. Most producers who market their own milk have small cottage operations where cream is removed and butter and cheese made from excess milk. All of these operate without effective health or sanitary regulation.

g. Equipment

Small farmers in Region II make extensive use of family labor and hand tools for producing milk. Many small producers milk their cows in the open air or in dirt floor shelters. Machinery and equipment are used on the medium and large farms. Most of these have cement floor milking stables with electricity. About half of the farmers surveyed in the 1987 NCBA study have tractors and feed choppers, although only 30 percent have carts. Virtually none use irrigation equipment, because dry seasons in the region are not severe.

On-farm milk cooling equipment is rare, except on the largest farms, although it is not uncommon to see a cream separator and artisan cheese-making equipment on any farm regardless of size.

h. Feed Resources

The main feed resources in Region II are natural pastures, although crop residues such as corn fooder are fed when available. Most common pastures are Kikuyu grass. According to the 1987 NCBA survey, about 2 percent of the land used for dairying is in Napier grass for cut feed. Disappointingly, only a tenth of farmers reported use of silage. The same proportion reported feeding hay. Region II farmers report using concentrate--four pounds per milking cow per day--but this is the second lowest average consumption of all farmers surveyed nationwide. None reported feeding molasses.

Stable rainfall, and hence stable forage production throughout the year, means virtually no wet/dry season milk production fluctuations.

i. Herd Genetics and Management

According to the 1987 NCBA survey, 60 percent of those dairy farmers in Region II are engaged in dual purpose milk/beef production. The survey indicates that only about 38 percent of the cows are calving regularly. The fact that dry cows outnumbered lactating cows is an indicator of serious productive inefficiency. Herds are composed primarily of crosses

in the region. They have promoted methane digestors which have been installed on several larger farms. Other institutions which have given direct help to dairy producers in the area are ICTA/CATIE which has conducted research on soil fertility-related constraints to forage production.

l. Private Organizations

The principal dairy-related private organizations which function in Region II are VERALAC, a milk producers cooperative in Tactic, in Guatemalan Jersey Breeders Association, which has members in Region II, and the Consejo Nacional de Fomento Lechero (see Annex 6 for a more complete discussion of private organizations).

m. Limiting Factors

Region II farmers surveyed in the 1987 NCBA study ranked dairying constraints in the following order:

- Lack of feed;
- Lack of credit;
- Lack of technical assistance;
- Price of milk.

In addition to these, NCBA team field visits have identified the following limiting factors to dairying in Region II:

- Poor soils which limit forage production capability;
- Inadequate source of locally produced energy and protein for the cattle ration;
- Deficient sanitation and preventative health practices;
- Lack of a strong milk producer membership organization;
- Equipment;
- Infrastructure;
- Political instability and considerations of physical safety of area residents.

3. Region III (Peten)

The NCBA team did not study Region III.

4. Region IV (Escuintla, Suchitepequez, Retalhuleu, southern San Marcos, southern Quezaltenango)

Region IV is the major milk-producing region of Guatemala, producing 27 percent of the country's total marketable milk supply, mostly from dual purpose cows, and channeling much of its production to the Guatmela City pasteurized milk market.

a. Soils, Climate, Topography, Pasture

Over 95 percent of Region IV is tropical; 68 percent classified hot (average 27.5°C) and very wet, with a marked dry season without risk of frost, and a rainy season with precipitation ranging between 1,700 and 2,000 millimeters. The rainy season lasts from May through October. Tropical crops such as sugar cane and cotton flourish in this climate.

High rainfall coupled with mountain runoff onto the relatively flat coastal plain create a high water table. As recently as 30 years ago, coastal areas were remote swampy jungles in which bananas were raised. During the early 1950s several large land colonization resettlement projects were carried out on abandoned banana land. As the jungle was cleared over the ensuing decades, the swamps dried up, and large farmers moved in to raise cattle, sugar cane, and cotton. Today, the area's agriculture is mechanized and highly productive. No longer isolated in the remote swampy jungle, the land colonization tracts around Nueva Concepcion, Los Angeles, and in other areas, on which thousands of poor small-farm families live, seem strangely out of place.

Soils are deep sand with pH levels ranging from 6.2 to 6.7. They are excellent agricultural soils on which pastures as well as a variety of crops thrive. Animal carrying capacities of 2.1 A.U. per hectare are estimated by a 1983 PLANDEPE study, although results of the 1987 NCBA survey place carrying capacity of the farms of those farmers interviewed at a higher 3.25 A.U. per hectare.

A GOG irrigation project near Catalina Mita and La Blanca has improved the productivity of approximately 3,410 hectare of cropland.

b. Land Use

Pastures occupy 31 percent of the best soils in the region (classes 1-2-3) and 65 percent of classes 4-5-6 soils which are generally considered more appropriate for pasture (PLANDEPE). According to the same study, 49 percent of all

stored as silage. Much of their milk, along with that of their large landowner neighbors, is sold to processors either directly or more commonly, through intermediaries. Few Region IV small farmers incorporate dairy technology such as pasture fertilization, forage harvesting or preservation, record keeping, early age calf weaning, or on-farm milk cooling into their management systems. Many, if not most, of the land settlement tracts along the coast lack electricity.

In contrast, many large operations in the area use machinery, migratory labor from the highlands, capital, and some of the more efficient management techniques mentioned above. Large farmers are primarily beef producers to whom milk is an added benefit which, according to several interviewees, "helps pay the wages (and buy the molasses)." Small dual purpose farmers depend more on milk income to meet their living expenses than do their larger counterparts.

As of June 1986, the Consejo Nacional de Fomento Lechero showed a total of 313 members in Region IV with an average of 81 cows each producing a total of 88,490 liters/day. (These estimates of cattle numbers may be inflated by producers who attempt to justify a larger molasses quota. However, the NCBA survey yielded an average of 78 cows per unit, a figure consistent with that of the Consejo.) Over 95 percent of Consejo members were listed as being dual purpose dairymen; 15 percent of these were large producers (over 500 liters/day), 52 percent were medium producers (100-500 liters/day), 32 percent were small producers (20-100 liters/day), and less than 1 percent were micro-producers (0-20 liters/day). (See Table II-10.)

e. Marketing

In Region IV, milk which enters the commercial market (raw or pasteurized) comes from farms of all sizes. Since direct marketing opportunities are not plentiful for farmers in the hot coastal plain, especially in absence of on-farm milk cooling equipment, most milk is sold to processors and intermediaries. Most large farmers sell directly to a processor, while small producers usually sell to an intermediary who mixes and sells the milk of many small producers to a processor. Small creameries owned either by farmers or, more often, by intermediaries dot the coast. These often skim, blend, and frequently adulterate the milk before it is sold to processors, and sell cream and butter. Many make fresh salted cheese for direct sale to consumers in urban areas. Both producers and intermediairies of all sizes operate without effective health or sanitary regulation.

f. Equipment

Small farmers in Region IV make extensive use of family labor and hand tools for producing milk. Many small producers milk their cows in the open air or in dirt floor

shelters. Hired labor, machinery, and equipment are used on medium and large farms. Many of these have cement floor milking stables. Nearly all farmers interviewed reported having access to electricity. However, sizable numbers of small farmers living on land colonization tracts in the coastal area surrounding Nueva Concepcion do not have electricity. About half the farmers surveyed have tractors, carts, and feed choppers. Most have water pumps, and a quarter have irrigation equipment. On-farm milk cooling equipment is rare except on the largest farms, although it is not uncommon to see a cream separator and artisan cheese-making equipment on farms of any size.

There is a large disparity in Region IV in regards to use of equipment and level of farming technology. This is related to disparity in farm size.

Thousands of small landholders on colonization tracts along the coast produce milk and beef commercially using minimal capital inputs. Technification of production and handling by Region IV small farmers would significantly increase the quality and, to a lesser degree, the volume of milk being marketed.

g. Feed Resources

The main feed resources in Region IV are natural pastures, principally African Star grass, Angleton, Pangola, Pensacola and Para grass. According to the 1987 NCBA survey, 12 percent of the dairy land is used to raise Napier grass cut feed for dairy cattle, withh yearly yields of 144-175 metric tons per hectare. Less than a tenth of farmers surveyed reported use of silage. The same proportion report feeding hay. A quarter reported using concentrate, and nearly half reported using molasses. Region IV farmers who use concentrate report using five pounds per milking cow per day.

Other feedstuff available for Region IV dairying include corn fodder, cottonseed production, sorghum grain, and high protein rubber tree seed.

The protracted dry season in Region IV limits forage availability and causes a wet/dry season milk production fluctuation on the magnitude of 50 percent.

h. Herd Genetics and Management

According to the 1987 NCBA survey, 84 percent of dairy farmers in Region IV engage in dual purpose milk/beef production. The survey indicated that 59 percent of the cows are calving regularly. The genetic endowment of herds belonging to farmers surveyed in Region IV is fairly evenly composed of specialized dairy purebreeds, pure Cebu and Cebu crosses, and all manner of dairy/beef, beef/beef, and dairy/dairy crosses.

especially prevalent among hundreds of small farmer land colonists around Nueva Concepcion who do not have access to electricity or much capital, but who do sell warm milk to processors directly or through intermediaries.

j. Technical Assistance

The Guatemalan Ministry of Agriculture, through its animal husbandry branch, DIGESEPE, is working actively in Region IV, especially in genetic improvement. DIGESEPE currently has eight animal health and prevention technical assistance professionals working in the region. Field interviews conducted by the NCBA team revealed concern among some farmers that preventative animal health education relevant to mastitis control should be carried out, possibly through PRODESA.

k. Private Organizations

The principal dairy-related private organizations which function in Region IV are the Los Angeles milk producers cooperative, located on the Los Angeles land settlement tract about 35 kilometers south of La Democracia, and the Guatemalan Jersey Breeders Association, and the Consejo Nacional de Fomento Lechero, both of which have members in the area (see Annex 6 for a more complete discussion of private organizations). At least one dairy-related pre-cooperative initiative also exists at the Nueva Concepcion land settlement. After visiting with the group, the NCBA team felt that the Nueva Concepcion Association shows promise, but must overcome several organizational hurdles before it will become a regional player in the dairy picture. Numerous other milk processors and buyers exist in the region, as well as a number of beef cattle breeders' associations which do not directly become involved in dairy issues. Other producer organizations or cooperatives may exist.

l. Limiting Factors

Region IV farmers surveyed in the 1987 NCBA study ranked the constraints to dairying in the following order:

- Lack of feed;
- Price of milk;
- Lack of technical assistance.

In addition to these, NCBA team field visits identified the following limiting factors in Region IV:

- High opportunity cost to forage production on land suitable for intensive cropping;
- Limited forage in dry season;

- One of the single greatest limiting factors to expansion of the Guatemalan dairy sector is lack of strong, private sector producer service organizations. There should be two types: economic service membership organizations, and membership representation organizations. Producers in Region IV, where dairying is a concentrated economic activity, would benefit significantly from establishing such organizations.

Many of the solutions to these deficiencies involve providing effective technical assistance to small farmers. This is both expensive and difficult to execute. A program of technical assistance which works through a strong producers' cooperative would be one of the most effective ways of reaching targeted beneficiary groups.

5. Region V (Guatemala, Sacatepequez, El Progreso, northern Chimaltenango, southern Baja Verapaz, Jalapa)

This region includes the specialized dairy operations of the capital area and San Jose Pinula, which have been the traditional sources of Guatmela City's milk until recently displaced by the South Coast (Region IV). Region V still provides a major share of raw milk and raw milk products directly to the urban consumer, taking advantage of proximity and temperate climate.

a. Soils, Climate, Topography, Pasture

Region V has three distinct climatic zones: 22 percent of its territory is hot; 41 percent is temperate (cool); and 36 percent is temperate (cold). These climate variations determine dairy management systems: dual purpose dairies are located in the hot humid areas and in the hot arid northern region (Motagua Valley), while specialized dairying is practiced in the temperate highlands around Guatemala City and San Jose Pinula. Precipitation ranges between 950 and 1,300 millimeters per year. The rainy season lasts from May through October, with temperature variations depending on altitude. Availability of irrigation water is a limiting factor in some desert areas. About 2,400 hectares of the region have been irrigated at government initiative. Private irrigation has been installed by several Jersey and Holstein breeders near the capital city.

b. Land Use

Region V has 72,300 hectares of high-quality soils, 19 percent of which are being pastured (see Table II-1). In addition, the region has 290,600 hectares of poorer quality soils suitable for farming or cattle-raising. Seventeen percent

produced 30 percent of the nation's milk. (NCBA calculates the 1987 distribution at 83 percent from dual purpose and 17 percent from specialized dairy, confirming a trend away from specialized dairy production.)

Region V's specialized dairymen practice varying degrees of dairy technology: 30-45 day pasture rotation, forage harvesting and confinement feeding, artificial insemination, record keeping, early age calf weaning, and occasionally on-farm milk cooling. The small producer practices few, if any, of these management techniques. Technical assistance provided by a producer membership organization to its small members could significantly increase their milk production and quality.

As of June, 1986, the Consejo Nacional de Fomento Lechero had a total of 151 members in Region V with an average of 42 cows apiece. According to the Fomento Lechero estimate, member cows produced an average of 2,951 liters per lactation. The 1987 NCBA survey, while showing an average of 21 cows per respondent, yields a similar per cow lactation average.

e. Producer Characteristics

Region V has a range of dairy producers: small and large dual purpose cattlemen in lowland areas, and small, medium, and large specialized commercial dairymen in the highlands. Small producers have low literacy levels and often engage in dual purpose livestock husbandry using dairy crossbred cows. These producers consume milk on the farm, but, because of a higher level of interaction with the commercial economy than their counterparts in Regions I and II, sell more milk directly to consumers and depend heavily on this income.

Large farmers in Region V, both specialized dairy and dual purpose, typically have non-farm professions which augment their incomes.

f. Marketing

Producers in Region V have greater access to direct consumer sales than do those of most other regions of the country, owing to proximity to Guatemala City. Most small and medium farmers, as well as a number of large producers, sell their milk directly to consumers. If consumer sales are not possible, farmers will sell to an intermediary who pays a few cents more than a processor, or who is willing to receive milk which a processor might reject for low quality. Many producers prefer selling their milk to intermediaries rather than processors because the personal relationship gives the producer a greater sense of control over his marketing link. Intermediaries often buy excess milk from producers who have been unable to sell their full volume to consumers before the milk starts to sour.

i. Herd Genetics and Management

According to the 1987 NCBA survey, 75 percent of Region V dairy farmers are engaged in dual purpose milk/beef production. The survey indicates that the number of dry cows proportional to the number of lactating cows is within the range normally expected. Herds belonging to farmers surveyed are primarily pure or crosses among specialized dairy breeds. Jersey and Holstein are the predominant breeds, and the genetic quality in the area is generally high. Breeding stock is sold from this area to other regions of the country. Artificial insemination is practiced, and reproducing indices are generally good. Conception is usually achieved at between 2.2 and 2.5 services. Heifers in the region normally reach breeding weight by 18 months.

Region V respondents rival those in Region IV for the highest number of animals per hectare. However, liters of milk produced per hectare is about three times higher among farmers surveyed in Region V than those in Region IV. This would indicate a major milk production efficiency difference between specialized and dual purpose milk production, since only 16 percent of milk producers in Region IV are specialized dairymen, as opposed to 75 percent in Region V.

j. Health and Sanitation

Because of its more temperate climate, Region V confronts fewer health-related problems than Region IV, but has more than the altiplano. The same general problems apply in Region V that are constraints throughout the country. The incidence of internal parasites in cattle is high, and contaminated sources of drinking water and feed make deparasitizing the animals difficult except in confinement feeding situations. Rigorous tick control (direct spraying of cows) is necessary to continually guard against anaplasmosis and piroplasmosis infection. Brucellosis and tuberculosis are endemic in both cattle and other animals reservoirs, both domesticated and wild. Sub-clinical mastitis is a problem which could be controlled by periodic testing with the California Mastitis Test (CMT) or the Fosomatic Cell Count which will soon be installed in PRODESA's laboratory.

Although Region V's moderately cool ambient temperature helps conserve milk, farm hygiene is generally poor. Few medium and small producers strain the sediment from their milk, and on-farm milk cooling equipment is rare.

Farm licensing of milk which is sold directly to consumers occurs on a limited basis, but is not being actively enforced.

More specific observations and recommendations include:

- Farms located near urban areas must be intensively managed. Unique marketing and organizational opportunities exist.

- Sufficient price incentive and economic stability must exist to entice specialized dairymen to reverse the trend of declining production.

- Planting higher-yield forages, and conserving forage, are necessary to maximize land use and marketing opportunities. The technology of making silos and the equipment to fill them should be disseminated. Only when forage has been removed as the limiting factor in milk production should protein and energy supplements be heavily applied to achieve maximum production.

- One of the single greatest limiting factors to expansion of the Guatemalan dairy sector is lack of strong, private sector producer service organizations and membership lobbying organizations. Producers in Region V, where dairying is a concentrated economic activity, would benefit significantly from belonging to such organizations.

- Deficient sanitation and preventative health practices should be addressed. GOG involvement in this activity would be desirable, especially as it relates to sanitary licensing of producers and processors and to tuberculosis and brucelosis testing and vaccination.

- Specific equipment deficiencies, especially on the smaller farms, include: milking stables, silos, forage grinder/choppers, milk coolers, and other milk sanitation equipment such as sediment strainers.

- Specific infrastructure deficiencies include lack of farm access roads, bridges, and rural electrification.

Many of the solutions to these deficiencies involve providing effective technical assistance to small farmers. This is both expensive and difficult to execute. A program of technical assistance which works through, and in

that roughly 40 percent of the area's herd is accounted for in this tabulation. If this were so, is would support the team's rough estimate of a small but significant decline in regional cattle numbers.

d. Production Units

According to the NCBA survey, 88 perecent of dairy farmers in the region are engaged in dual purpose production. Dual purpose farmers surveyed averaged 96 hectares in size, only 15 percent larger than those of specialized dairy producers. The survey indicates that these farms supported average herds of 47 milking and dry cows. The 1986 Consejo Nacional de Fomento Lechero membership breakdown for the region shows 180 members. None lists production of less than 20 liters/day; 22 percent indicate production levels of 20-100 liters/day; 66 percent produce from 100-500 liters/day; and 12 percent produce more than 500 liters/day. (Fomento Lechero cattle numbers and production figures may be inflated by farmers who attempt to qualify for a higher molasses subsidy quota by overstating their needs.)

Much of the region's milk is produced by medium- and large-scale farming operations. However, hundreds of small dual purpose farmers live in land settlement tracts (such as the Montufar settlement) along the coast, farming 20 hectare parcels of land which support a combination of cash crops and cattle. A 1985 IICA study (Hernandez) estimates that the Montufar settlement alone supports 8,700 head of cattle and produces 17,000 liters of milk/day. As in other coastal areas, lack of on-farm cooling equipment, electricity, and technical knowledge limit the quality of milk produced and influence seasonal variations in production.

e. Producer Characteristics

Region VI has two principal types of milk producers: small and large. Both are dual purpose operations. Small producers have low literacy levels, work with family labor, and possess little equipment. They are dependent on middlemen for marketing their products, although their proximity to the El Salvador border allows them to market their milk informally in whichever country happens to have the best price at the moment.

Large farmers typically have access to better education, more land and capital, use more machinery and hired labor, purchase better breeding stock, and often have non-farm professions which augment their incomes. During the dry season, some of these farmers ship their calves to farms in more humid parts of the country.

answering the survey in Region VI is higher than that reported in any other region surveyed. This suggests that in the absence of good forages, molasses is a chief source of energy for Region VI cattle herds.

Maintaining stable seasonal milk production in Region VI is largely a function of finding suitable energy and forage sources. Wet/dry season milk production fluctuations on the magnitude of 70 to 30 percent occur.

i. Herd Genetics and Management

As indicated above, 88 percent of dairy farmers interviewed in Region VI are engaged in dual purpose milk/beef production. The survey indicates that only about half of the cows belonging to farmers surveyed are calving regularly. The genetic composition of herds belonging to farmers surveyed in Region VI is primarily specialized dairy purebreeds and dairy/beef and dairy/dairy crosses. The better dual purpose cross, 5/8 B. taurus 3/8 B indicus, is found on large farms in the region. Lactations of 2,400-3,000 liters while simultaneously raising a calf are reported.

Genetic improvement by these farmers has been achieved by private initiative. However, the establishment of a National Dairy Herd Improvement Registry would accelerate the rate of genetic advancement.

j. Health and Sanitation

Herd health and sanitation are deficient in Region VI, as they are throughout the country, and are major limiting factors to production. The incidence of internal parasites in cattle is high, and contaminated sources of drinking water and feed make deparasitizing the animals difficult except in confinement feeding situations.

The incidence of preventative external and internal parasite control, coupled with the degree of natural tolerance of the breeds used, determines, to a large extent, production efficiency. Both brucellosis and tuberculosis are endemic in cattle and other animal reservoirs.

Warm ambient temperature coupled with poor farm hygiene severely diminishes the quality of milk leaving the farm. Few producers strain the sediment from their milk, and on-farm cooling equipment is rare.

k. Technical Assistance

DIGESEPE is working actively in Region VI. It currently has five animal health and prevention technical assistance professionals working in the region. They operate a

silos, forage grinder/choppers, milk coolers, and other milk sanitation equipment such as sediment strainers.

- Specific infrastructure deficiencies include lack of farm access roads, bridges, and rural electrification.

Many of the solutions to these deficiencies involve providing effective technical assistance to small farmers. This is both expensive and difficult to execute. A program of membership organization would be one of the most effective ways of reaching targeted beneficiaries.

7. Region VII (Zacapa, Chiquimula)

a. Soils, Climate, Topography, Pasture

No soil or climatic information was gathered on this region, and it was not visited by the NCBA team. We are aware that marked seasonal variations exist, and that the region is hot and dry.

b. Land Use

According to the 1983 PLANDEPE study, 34 percent of the region's class 1-2-3 soils are used for pasture, while 69 percent of its class 4-5-6 soils are devoted to pasture. PLANDEPE estimates the livestock carrying capacity at 0.9 A.U./hectare. However, the 1987 NCBA survey found the stocking rate to be 1.6 A.U./hectare.

c. Livestock Population Trends

The 1979 census estimates the livestock population at 20,550 milk cows producing 48,584 liters/day, a relatively small portion of the national herd and milk production.

d. Production Units

The NCBA survey indicates that 32 percent of dairymen interviewed are specialized producers. The average herd size for both dual purpose and specialized dairy among those interviewed was 47 dry and milking cows. Two percent of these herds produced less than 20 liters/day, half produced 20-100 liters/day, 45 percent produced 100-500 liters/day, and three percent produced over 500 liters/day. In contrast to the NCBA survey, Fomento Lechero's records indicate that 97 percent (or 87 of its 90 Region VII members) are dual purpose producers.

e. Producer Characteristics

No information was gathered.

i. Herd Genetics and Management

According to the 1987 NCBA survey, 68 percent of those dairy farmers interviewed in Region VII are engaged in dual purpose milk/beef production. The survey indicates that only about half of the cows are calving regularly. The genetic composition of herds is fairly evenly composed of specialized dairy purebreeds, pure Cebu and Cebu crosses, and various dairy/beef, beef/beef, and dairy/dairy crosses.

j. Health and Sanitation

Herd health and sanitation are deficient in Region VII, as they are throughout the country. The incidence of internal parasites in cattle is high, and contaminated sources of drinking water and feed make deparasitizing the animals difficult except in confinement feeding situations. Brucellosis and tuberculosis are endemic in both cattle and other animal reservoirs.

On-farm milk handling hygiene is generally poor. Few producers strain the sediment from their milk, and on-farm cooling equipment is rare.

k. Technical Assistance

DIGESEPE is working actively in Region VII. It has seven animal health and prevention technical assistance professionals working in the region. They operate a Livestock Farm Center and provide technical information to local dairymen.

l. Private Organizations

The principal dairy-related private organizations in Region VII are the Guatemalan Jersey Breeders Association, which has members in Region VII, and the Consejo Nacional de Fomento Lechero. Beef breeders' associations which do not have a direct link to dairying may exist in the area, as well as other producer organizations or cooperatives which have not been identified.

m. Limiting Factors

Region VII producers who responded to the NCBA survey ranked the limiting factors to dairying in the following order:

- Lack of feed;
- Price of milk;
- Lack of credit.

III. THE DAIRY MARKETING SYSTEM

A. The Milk Supply

The commercial marketing system in Guatemala consists of three sectors: (1) pasteurized milk and dairy products made in pasteurization plants (but not necessarily from pasteurized milk); (2) raw milk and dairy products made from raw milk; and (3) powdered milk for home reconstitution. In addition, a sizeable portion of the milk remains on the farm where produced, consumed by calves and by the farm family.

The supply to these three sectors comes from two principal sources: (1) domestic production, and (2) imports. These are discussed below, presenting the available evidence and analyzing possible trends.

The flow of milk, from farms and imported sources, through the market is shown in Figures III-1, 2, and 3.

1. Domestic Milk Production

Available statistical and impressionistic evidence strongly suggest that domestic milk production is barely growing, or stagnant. Given Guatemala's growing population, per capita domestic production is certainly dropping. The most optimistic scenario is presented in Table III-1.

Guatemala, like most countries, depends largely upon domestic milk production for its fluid milk and dairy product needs. However, imports have played an increasing role, as shown in a later section of this chapter. Data for 1986 is not available, and 1985 imports appear excessive indicating that inventories may have been carried forward for future use.

For 1984, the available supply for domestic use is estimated at 236.6 million liters, determined as follows:

Domestic milk production	226.6 million liters
- on farm use	45.0
Subtotal	181.6
+ imports	57.8
Subtotal	239.4
- exports	2.8
Available supply	236.6

FIGURE III-2

NORMAL FLOW FOR RAW MILK SECTOR GUATEMALA

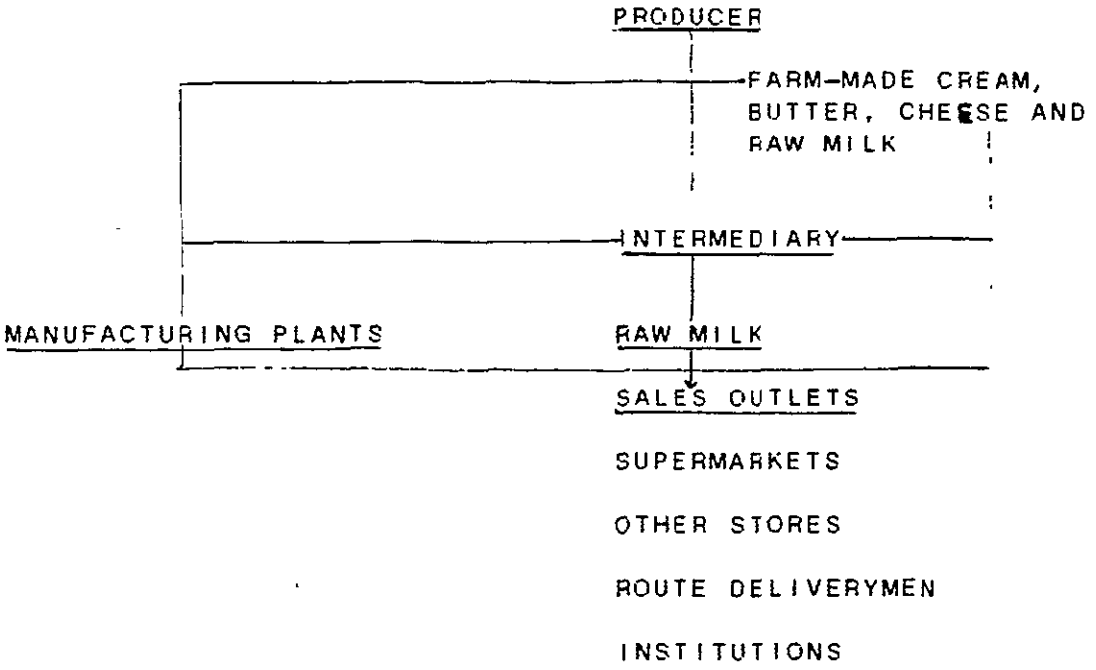

TABLE III-1

GUATEMALAN DOMESTIC MARKETABLE MILK PRODUCTION,
POPULATION AND AVAILABLE MILK PER PERSON FROM DOMESTIC SOURCES
(1970-1986)

YEAR	MILK PRODUCTION	POPULATION	AVAILABLE MILK PER PERSON FROM DOMESTIC SOURCES
1970	189.3	5.246	36.1
1971	194.1	5.393	36.0
1972	196.4	5.544	35.4
1973	197.9	5.699	34.3
1974	201.1	5.859	34.5
1975	208.0	6.023	34.4
1976	213.3	6.192	33.6
1977	213.7	6.365	32.5
1978	212.7	6.544	31.9
1979	214.9	6.727	31.3
1980	216.7	6.917	30.7
1981	218.6	7.114	30.1
1982	220.0	7.318	30.1
1983	223.3	7.527	29.7
1984	226.6	7.738	29.3
1985	230.0	7.954	28.9
1986	233.4	8.177	28.5

Sources:

(1) Milk Production (1970-1982) and Population (1970-1983), Marco Cuantitativo y Analysis del Subsector de Productos Pecuarios, SEGEPLAN/USPADA/FAO/PNUD - GUA/81/001.

(2) Team projected Milk Production (1983-1986) at annual rate of 1.5 per cent, approximately equal to the historical trend.

NOTE: The population estimates include persons on farms with milk cows. Thus the available milk per person is understated. However, reduction of the population estimates to exclude persons on farms with milk cows would not change the trend line.

TABLE III-2
GUATEMALA

AVERAGE DAILY LITERS MILK RECEIVED BY PASTEURIZING PLANTS AND AVERAGE DAILY LITERS PASTEURIZED MILK SOLD MONTHLY, AND SEASONAL VARIATIONS, 1985

	Average Daily Liters Received	Seasonal Index 1/	Average Daily Liter Sold	Seasonal Index 1/	Percent of Receipts Sold as Pasteurized Milk
January	90,884	88	69,253	90	76
February	94,372	92	72,834	95	77
March	95,469	93	64,045	84	67
April	96,381	94	74,867	96	77
May	109,444	107	80,644	105	74
June	110,983	108	82,738	108	74
July	115,571	113	84,232	110	73
August	114,353	111	86,731	113	76
September	108,605	106	82,958	108	76
October	102,361	100	76,359	100	74
November	96,935	94	73,449	96	76
December	96,083	94	70,422	92	73
Average	102,682	100	76,471	100	74

1/ Average for year = 100

SOURCE: Instituto Nacional de Estadistica (INE). Not adjusted to reflect beginning or ending inventories or milk losses.

others, while making the cost of milk prohibitive to many low-income consumers. Furthermore, the Ministry of Agriculture is not staffed or equipped to enforce a ban on raw milk. A practical alternative would be to upgrade and enforce standards until such time as a ban on raw milk becomes practical or is demanded by consumers as a reaction to an outbreak of a milk-borne disease, such as typhoid fever.

It is customary for all farmers producing milk to utilize a portion of it for household consumption and to furnish some to farm workers. Many prepare cream or butter, queso fresco, or hard cheese for household consumption, and sell their excess production. A majority sell their excess production as fluid milk. Based on historical data extrapolated to 1986, and confirmed by the DIGESEPE/NCBA survey, about 45 million liters daily are consumed on-farm, distributed to farm workers, or processed on-farm and sold locally as cream, queso fresco, or hard cheese. About five percent of national production, or 12 million liters, is consumed on-farm or among farm workers; about 15 percent, of 33 million liters, goes to the local market, and thus qualifies as flowing into the raw milk sector.

According to the DIGESEPE/NCBA survey, national average daily on-farm consumption is 5.1 liters (See Annex 9, Table 12). The DIGESEPE Region VIII shows the highest milk consumption with 10.6 liters, followed by the south-west Pacific Coastal area (Regional IV) with 6.5 liters. Region VIII, without important cities or towns, has a great number of farmers lacking access to the commercial market for milk and dairy products, leading to higher home consumption.

In other cases, isolated farmers market their entire production (in excess of on-farm needs) in the form of dairy products (See Annex 9, Table 12).

c. Competition Between the Pasteurized and Raw Milk Sectors

The DIGESEPE/NCBA survey also revealed (Annex 9, Table 13) that less than seven percent of the respondents sold directly to a pasteurization/processing plant, about 40 percent sold to an intermediary, and the remainder sold directly to the consumer. Some of the milk sold to intermediaries ultimately went to pasteurization plants. Those who sold to plants tended to be larger and medium-size producers concentrated in the South Coast and Guatemala City area.

The most apparent restraint to selling milk to pasteurizing plants is competition for supplies from the raw milk sector of the market. Raw milk peddlers can sell milk to

payment, which they feel is best provided by the established registered plants.

d. Powdered Milk Sector

The powdered milk sector of the market is a growing one, drawing principally on imported sources. In 1984, it consisted of 25 percent of total domestically available milk supply. NCBA calculated it to be about 40 percent in 1985. It consists of both commercial and non-commercial (donated) streams, which are frequently mixed. Most powdered milk for residential use is brought into the country in tin cans. Some powdered milk, however, is produced domestically by PROLAC and packaged in ungassed bags.

Powdered whole milk at supermarkets is about 15 percent more expensive then pasteurized milk. (Powdered milk is sold for reconstitution in consumer households into liquid milk containing the normal 12.5 percent solids). However, consumers appear quite willing to pay the higher price because of its keeping quality and consistently good flavor. Moreover, they can reduce the per liter cost by converting it to milk having less than 12.5 percent solids, making it similar to low fat milk.

Powdered milk and other dairy products imported also serve as supplemental ingredients for pasteurizing and milk manufacturing plants, as well as for use in other food products. There is evidence that a growing volume of bulk imported powdered milk is being reconstituted and sold as fluid milk.

2. International Trade in Dairy Commodities

As the largest and most developed of the Central American countries, Guatemala managed for some time to withstand the economic decline experienced by other countries in the region since the mid-1970s. However, between 1979 and 1982, foreign exchange reserves fell from $717 million to zero, and the balance of payments has been negative ever since.

Guatemala is also faced with a deteriorating balance of trade in dairy products. While the imbalance is not worsened by the inflow of donated dairy products, the growing volume of both, the commercial and donated, is indicative of the underlying weakness of the domestic dairy industry.

a. Imports

The seriousness of the dairy product trade imbalance is clearly demonstrated by the sharp rise in the value

TABLE III-3

GUATEMALA
VOLUME OF COMMERCIAL IMPORTS OF MILK PRODUCTS, BY YEAR
1983- 1986
(MILK EQUIVALENT LITERS)

	1983	1984	1985	1986*
Milk	.0	.0	8.5	40.6
Cream	.0	.0	.0	.0
Liquid Buttermilk and Whey	.0	21.6	.0	.1
Condensed and Evaporated Milk	998.2	269.4	269.4	718.6
Condensed Cream	.0	.0	.0	.0
Non-fat Dry Milk	6,766.8	5,841.1	23,393.2	57,866.4
Dry Whole Milk	37,414.4	49,069.6	89,621.6	11,417.6
Dry Low-fat Milk	231.3	27.2	4,912.5	.0
Dry Buttermilk and Whey	2,487.0	2,121.5	1,308.0	1,152.0
Butter	.0	.0	.0	.0
Hard Cheese	545.0	488.0	421.0	208.0
	48,443.5	58,838.3	119,934.2	71,403.3

*Through September

Source: Departamento de Cambios, Bank of Guatemala. Volume provided in thousands of kilos. These figures then converted to milk equivalent in thousands of liters.

TABLE III-4

GUATEMALA
VOLUME OF COMMERCIAL IMPORTS OF MILK PRODUCTS BY YEAR
1983 - 1986
(THOUSANDS OF KILOS)

	1983	1984	1985	1986*
Milk	.0	.0	8.5	40.6
Cream	.4	.0	.0	30.8
Liquid Buttermilk and Whey	.0	59.6	.0	.2
Condensed and Evaporated Milk	499.1	134.7	134.7	359.3
Condensed Cream	59.1	2.6	.3	.4
Non-fat Dry Milk	587.7	507.3	2,031.7	5,025.7
Dry Whole Milk	4,676.8	6,133.7	11,202.7	1,427.2
Dry Low-fat Milk	23.8	2.8	505.5	.0
Dry Buttermilk and Whey	432.0	368.5	227.2	200.1
Butter	147.7	218.3	289.9	164.0
Hard Cheese	54.5	38.8	31.	20.8

*Through September

Source: Departamento de Cambios, Bank of Guatemala

B. The Milk Acquisition System

Farmers sell raw milk either to pasteurizing plants or directly to the raw milk market. pasteurizing Plants procure milk directly from farmers and through intermediaries. Some is collected and cooled at Reception centers en route from farm to plant.

1. Milking and Handling at Farm

a. Caracteristicas del Ordeno

Las inapropiadas condiciones de ordeno de las vacas promueven la contaminacion de la leche y su pobre calidad bacteriologica.

Usualmente se ordena con el ternero al pie, sobre un piso de tierra y estiercol, donde las patas de ambos, el ternero y la vaca, levantan polvo y lo incorporan a la leche durante el ordeno.

El ordenador carece de agua para lavarse manos, menos para lavar la ubre de las vacas, carece de ropa limpia y usa baldes de hojalata semioxidada. De este modo la leche se contamina con pelos y mas estiercol. No se ha observado presencia de moscas en la leche, pero si de garrapatas.

El ordenador no se sienta durante el ordeno sino que se apoya sobre sus talones (posicion en cuclillas). No emplea unguento mineral para suavizar los pezones, sino que permite mamar un poco al ternero, para lubricarlos con saliva. El balde va apoyado directamente al suelo, contaminandose la base con estiercol y tierra, en vez de estar sostenido entre las piernas del operador.

No se descartan los primeros chorros de leche ni se busca la presencia de grumos mastiticos. Entre atar y desatar los animales y el ordeno mismo, se necesita entre 5 y 7 minutos para extraer apenas 2.5 a 3 litros de leche al dia, en un solo ordeno.

Despues del ordeno la leche es colada y vaciada en tarros metalicos o recipientes de plastico, que se dejan al sol. Se ha encontrado numerosos tarros de hierro galvanizado, parcialmente oxidados.

b. Mejoramiento del Ordeno

Debe haber un area especial para el ordeno, techada, con piso duro, encementado o empedrado, facil de ser lavado.

If the farm is not connected to the electric grid, it could utilize a small stand-by generator to give power to a freon compressor or a conventional gasoline engine to run the freon compressor. In both cases, an economic assessment must be done in order to select the better alternative.

2. Off-Farm Marketing

Milk is sold off-farm in one of three ways: (1) direct sale to consumers; (2) sale to intermediaries who in turn either sell to consumers or to processing plants; and (3) direct sale to dairy plant.

The most common form of marketing -- over half -- is directly to the consumer (See Table 13, Annex 9). Sales to consumers are proportionately most significant in the Altiplano around Quetzaltenango and Guatemala City -- reflecting these farmers' proximity to major markets.

Next in frequency are sales to middlemen. Regions IV, VI, and VII have the highest percentage of sales to intermediaries -- 49, 45, and 59 percent, respectively -- reflecting their distance from urban markets and major processing plants.

Least common are direct sales to processing plants. Region IV (the south coast) had the highest percentage -- 13 percent -- reflecting the area's importance as the country's major milkshed and the presence of major plant collection facilities.

The milk is generally sold by verbal agreement between the producer and buyer. Contract sale is very rare, as the price to the producer varies and few producers want to commit themselves when the hope exists of a higher price. In fact, during the dry season, buyers do compete for milk and pay a higher price.

As to site of sale, 75 percent sell on-farm (See Table 14, Annex 9). This means that the buyer usually pays the cost of transport and suggests that the farmer may have limited access to market (price) news. Only one dairyman of 310 surveyed sold his milk at a processing plant; the majority sold to plant buyers and, to a lesser extent, at the plant gathering sites. This finding also suggests that sellers are not organized.

In sum, the closer to a plant or urban concentration, the more alternatives a farmer has.

A one-day survey on milk entering Guatemala City in September 1986 shows a total of 105,653 liters, 80 percent of which came from the south coast and 16 percent from San Jose Pinula. Of the south coast milk, 99 percent went to the major processing plants in the capital -- Foremost, La Prodera, La Palma, INLACSA, and Superior. On the other hand, 86 percent of the milk from San Jose Pinula went directly as raw milk to consumers and small stores (See Table III-7).

Of the total milk coming from outside the city, 83.8 percent was purchased by processors and only 16.2 percent was marketed directly as raw milk.

To this percentage of raw milk consumption must be added the milk produced within the city limits. Twenty-seven farms located in Guatemala City are registered as raw milk distributors, ten of which produce 200 or more liters daily. In all they provide between four and five percent of the market requirements. In addition there are 600 or more unlicensed farmers in the city, having four cows or less and who sell some milk to other households. The greatest quantity, however, is brought into the city by nearby farmers or by intermediaries to whom producers sell milk or dairy products.

3. Fluid Milk Transportation

La leche es sacada de la finca a las vias de acceso (main roads) empleando varios medios de transporte: a pie, con caballos o mulas, carreta de bueyes o vehiculos pequenos.

Al llegar al camino vehicular, la leche es dejada a la orilla para que sea recogida por un transportista y la lleve ya sea a una Planta Lechera o directamente al mercado de leche cruda, o bien, ser transportada directamente por el ganadero.

La Tabla 15 del Survey DIGESEPE/NCBA (Ver Anexo 9), indica el tipo de envase empleado para sacar la leche de la finca. Hay dos tipos basicos de recipientes, metalicos (llamados localmente TARROS o TAMBOS), y de plastico (denominados en el pais bajo los nombres de BURULAS o BUMBAS).

En el Altiplano Occidental y en el Oriente del pais (Regiones I, VI y VII), predomina el uso de tarros metalicos. El tarro de aluminio es el mas abundante en el Altiplano Occidental, en tanto que en el sur-oriente (Region VI) predominan los tarros de acero inoxidable y hierro galvanizado. Los recipientes de plastico son muy abundantes en el Altiplano Central (Region V) y en la costa sur (Regiones IV y VI).

TABLE III-8

GUATEMALA
MILK TRANSPORT COSTS

MILK VOLUME ROUND TRIP (Lts/Km.)	LITERS PER KILOMETER	CONSUMO DE FUEL gal.	FUEL PRICE Q.	COST OF FUEL MILK VOLUME (cents/Lts)
2500/208	12.0	12	20,40	0.8
1500/170	8.8	9	15,30	1.0
2400/300	8.0	18	30,60	1.3
600/120	5.0	6	10,20	1.7
600/136	4.4	7.5	12,75	2.0

NOTES: All the trucks have Diesel engines
The fuel price is Q. 1,70 per gallon of Diesel
The trucks run 16 to 20 Km per gal.

TABLE III-9

GUATEMALA
MILK RECEIVING STATIONS

EMPRESA	LOCALIDAD	DEPARTAMENTO	RECEPCION DIARIA*
Foremost	Escuintla	Escuintla	15,000 litros
Foremost	Nva Concepcion	Escuintla	10,500 litros
La Pradera	Maria Linda	Escuintla	9,100 litros
La Palma	Celechi	Santa Rosa	9,000 litros
La Palma	Cuyuta	Escuintla	1,300 litros

* Durante enero de 1987

Regions I and IV.)

The intermediary's charge for transportation is five or six cents per liter, depending upon distance, volume and fuel costs. There appears to be lively competition among intermediaries, which would tend to keep charges in line with costs.

Through a short survey made among haulers in the Pacific Coast of the country, the ratio volume/distance (on a round trip basis) was found to be very low, between 4 and 12 liters/kilometer. This increases the cost of transportation.

The cost of diesel fuel is between one and two centavos per liter trasported. (Milk transport is always in diesel trucks since gasoline is 70 percent more expensive than diesel.)

6. Receiving Stations

Estas instalaciones estan ubicadas entre las zonas de produccion de leche y las plantas pasteurizadoras. La leche caliente llega hacia el mediodia, y es muestreada, colada y enfriada. Al caer la tarde o en la noche, es cargada en camiones císterna y enviada a las pasteurizadoras.

El equipo de enfriamiento consiste de un intercambiador de placas con agua fria y/o agua helada. Ademas hay tanques con equipo de frio incorporado. Los bancos de hielo són generalmente de gran capacidad.

Los centros de acopio estan ubicados en la costa sur. Their technical profiles are shown in Annex 5.

Otras empresas lecheras importantes como INLACSA e ILGUA reciben toda su leche directamente de los transportistas, careciendo de camiones cisterna y de centros de enfriamiento.

7. MIlk Quality Control

a. At farm

No existe un control de calidad de la leche cruda obtenida en la finca. Las vacas con mastitis sub-clinica no son identificadas ni con la busqueda de grumos en la prueba de la taza, ni empleando el California Mastitis Test.

Durante el ordeno, la leche de vacas con mastitis es mezclada con la leche de vacas sanas. Como resultado, se ha encontrado leche cruda con mas de 10,000

Ninguna de las estaciones de recepcion de leche visitadas, tenia un buen laboratorio para el control de calidad. El equipo usual es un densimetro o pesa-leche, un aparato para la prueba del alcohol, y un acidimetro. No se determina el contenido de impurezas o sedimento por lactofiltracion.

Los analisis mas sofisticados pero igualmente necesarios, como determinacion de grasa, crioscopia, reductasa y deteccion de antibioticos, son realizados en las Plantas Lecheras, a partir de muestras tomadas en los Centros de Acopio.

La leche es aceptada si no tiene olor y sabor acido. En el caso de aguado o descremado, el productor es avisado verbalmente. Si se repite el fraude, se le advierte por escrito y si reincide, su leche es rechazada.

Sin embargo esa leche rechazada es adquirida inmediatamente por pequenas fabricas de crema y queso fresco, que trabajan sin pasteurizacion. De este modo se da el caso que los pequenos procesadores estan utilizando mas leche fresca o por lo menos un volumen similar al de las 4 plantas pasteurizadoras.

8. Pago por Calidad

Con excepcion de muy pocas empresas como PARMA y XELAC, las plantas pasteurizadoras no pagan la leche de acuerdo a su calidad. Una hacienda con sala de ordeno, programa de control de mastitis, y equipo para enfriar la leche, que vende un producto frio, de alto contenido de grasa y larga reductasa, obtiene el mismo precio por litro que la leche caliente, conservada con peroxido de hidrogeno, con menos grasa, aguada y de corta reductasa.

No hay pues incentivos en el precio de la leche, para que el ganadero este interesado en mejorar su calidad. Se debe establecer un sistema de bonificaciones y descuentos por temperatura, grasa, crioscopia, sedimentos, acidez y reductasa.

La determinacion de sedimentos en la leche no se hace en ninguna planta, y sin embargo es una prueba muy sencilla y tiene la ventaja sicologica que el ganadero puede apreciar el grado de limpieza de su leche y compararlo con el de sus vecinos.

Si se trata de leche para quesos de maduracion, es importante considerar ademas la deteccion de antibioticos (con el DELVOTEST por ejemplo) e identificacion de leches provenientes de vacas con mastitis sub-clinica (Whiteside Test).

Asuncion Mita, and two cooperatively owned plants, XELAC at Quezaltenango and VERALAC at Tactic. Other small pasteurizing plants were not visited.

The principal plants engaged exclusively in the production of manufactured dairy products are:

- Impulsora Lechera Guatemalteca (ILGUA), Palin;
- PARMA, Patulul;
- La Italia, San Lucas Sacatepequez;
- Industrias Lacteas Superior, Villa Lobos; and
- Los Cubanitos, Escuintla,

In addition, there are many smaller plants dealing principally in raw milk. One visited, PINULAC, San Jose Pinula, is an excellent example of private initiative and vision.

In addition to the above mentioned currently functioning plants, there is an unused milk plant, La Flora, at Pueblo Nuevo, Tiquisate, in the Department of Escuintla. It has equipment in good condition which could either be used in the event the plant were reopened, or sold to other plants. CORFINA is the present owner and has offered to sell La Flora to a private buyer for Q700,000.

1. The Four Major Corporate Processors

a. Foremost Dairies de Guatemala

Foremost, a wholly-owned Guatemalan corporation, is the country's largest dairy processor in of volume, and in terms of installed capacity. Previously, Foremost had been affiliated with a U.S. multinational firm, McKesson-Foremost, but was fully acquired about five years ago by local investors. Foremost de Guatemala currently pays McKesson a royalty for the use of the Foremost name and for technical assistance.

Foremost produces a wide variety of products (see Table III-10), including fluid milk, cheeses, ice cream, and novelties

It's average daily intake of fluid milk from farmers is about 31,000 liters. Its capacity utilization is the highest of all major plants. (See Table III-11 for utilization and comparison to competition). Foremost also imports powdered non-fat milk, butter and butter oil to sustain its manufacturing operations, particularly during the dry season when fluid milk is in short supply. It also buys powdered milk from PROLAC.

TABLE III-11

GUATEMALA
PASTEURIZATION PLANTS - INSTALLED CAPACITY, AVERAGE DAILY RECEIPTS FROM FARMERS, PERCENT CAPACITY UTILIZED, AND PERCENT OF RECEIPTS PASTEURIZED AND USED IN THE PRODUCTION OF MANUFACTURED DAIRY PRODUCTS
1986

Plant	Installed Capacity*	Annual Avg. Daily Receipts	Percent Utilized	PERCENT OF RECEIPTS Pasteurized Milk	% Mfgd.
Foremost Dairies	60,000	31,000	52	100	0
Ind. Lacteas	48,000	12,000	25	67	33
La Palma/ Prolacsa	20,000	17,000	85	66	34
La Pradera	64,000	25,000	39	64	36
Prolac	25,000	3,200	13	55	45
Xelac	20,000	2,000	10	60	40
Veralac	10,000	2,100	21	0	100**
La Flora	15,000	-	-	-	-
Total	262,000	92,300	38.1 percent		

* Installed capacity, liters per 10-hour day
** Plans to process and distribute pasteurized milk in near future

SOURCE: Plant visits and interviews with plant personnel

NOTE: Percentage of receipts utilized for pasteurized milk and manufactured products appear to be only that of milk received from dairy farmers. Data on use of powdered milk and butter oil not provided by the plants.

of lack of floor space for equipment and product flow. However, as far as a processing know-how and procedures go, PROLACSA'S operation appears to be adequate.

From conversations, it would appear that PROLACSA could use some assistance in new product/market analysis. Certainly it could use some help in rearranging equipment if it expands product lines or introduces new products.

c. La Pradera, S.A.

This company is located in Guatemala City and is owned mainly by family members. It is situated in the southeast side of the metropolitan area.

This facility has the largest installed capacity for pasteurization --64,000 liters/day (See Table III-12), and the lowest daily intake and capacity utilization --9,000 liters-- and 14 percentof the four major pasteurizing plants. This plant, like others, uses additional dairy ingredients to supplement the limited supply of fluid milk received from farmers. Non-fat dry milk, whole milk powder, butterfat and non-milk oils are used in making yogurts and imitation creams, and perhaps other products.

La Pradera lacks floor space for its equipment. Here again, equipment has been crowded into small areas in order to have a broader product line at the expense of some efficiency.

The pasteurizer is comparable to those in the United States. La Pradera is the only dairy observed to be classifying raw milk into three categories--A, B and C.

La Pradera penalizes low-quality raw milk. For the most part, the penalty is a small reduction of the price paid farmers.

d. Industrias Lacteas, S.A.[INLACSA]

This facility was formerly owned by the Borden Co. of Columbus, Ohio, but the facility was sold to INLACSA, a Guatemalan corporation, about five years ago. INLACSA presently pays a royalty to Borden for the use of its name and trade mark, but technical assistance is not provided.

INLACSA's fluid milk processing and packaging technology is standard and compares favorably with that of its national counterparts, as well as those in the United States.

It is located to the south of the city in a suburb in a light industrial area on a main highway.

The plant receives, on the average, 12,000 liters per day. It has an installed pasteurizer capacity of 48,000 liters per day, third in the country. About 67 percent of its daily intake from farmers is used for pasteurized fluid milk. Thus, only 17 percent of the 48,000 liter pasteurizing capacity (Table III-11) is being utilized.

A third of the 12,000 liters daily receipts from farmers, or 4,000 liters per day, is used in producing manufactured products.

INLACSA's equals that of Foremost in technical processing abilities. This may reflect not only Borden's former presence, but the skill, desire, and interest shown by the manager, who is a large stockholder.

INLACSA's processing and manufacturing equipment is of adequate size and design to perform its function. This facility has ample room to expand if desired.

This plant does not need help in the processing area. It would appear that technical help is available to it from a counterpart cheese facility in El Salvador. The plant is run by a well-qualified individual, who has travelled extensively and applies good manufacturing practices. This was most evident in the storage of dry materials.

e. Packaging

The four major private plants package pasteurized milk and dairy products in a nearly identical manner.

The only noticeable distinction is color variation. Milk is primarily sold in polyethylene 1/4, 1/2, and 1-liter pouches. Polyethylene, is the least expensive packaging material. Only one company (INLACSA) was using gallon, half gallon and quart rigid plastic containers. Two companies, PROLACSA/La Palma and Foremost, were using paperboard. However, comments were made that this imported material was becoming very expensive. (Under price controls, milk was sold at the same unit price regardless of type of packages. It remains to be seen whether this will change in the aftermath price decontrol).

As can be seen in Table III-11, all four major plants offer juices/flavored drinks. Here again, the product is primarily sold in polyethylene pouches.

highlands near Quezaltenango, Guatemala's second largest city. The cooperative also owns a dairy cow, goat, and hog farm. It has approximately 50 members at present. XELAC operates with intensive technical assistance from the Swiss PVO Helvetas. A full organizational description is provided in Annex 6.

2) Technical Description

The plant, designed and built in 1977 with an installed capacity of 20,000 liters/ten-hour day, currently processes less than 1,500 liters/day.

Approximately 60 percent of its intake goes to pasteurized milk. Forty percent goes to manufactured products, principally high-quality cheeses and yogurts (See Table III-11 for product mix).

XELAC is well-equipped with a 1,000-liter/hour pasteurizer, a 120-liter/hour homogenizer, a 1,500-liter/hour separator, cheese-making and packing equipment, and a cheese cold storage room. It has ample operating space that would accommodate expansion. It is technically possible to use the plant's equipment for juice pasteurization.

Swiss assistance to XELAC was phased out in 1981. During the next three years, volume of milk processed decreased and financial liquidity problems arose. Resuming in 1984, Swiss managerial and technical assistance has enabled XELAC to raise milk volume to its present levels and regain financial equilibrium, although the operation is still undercapitalized and more volume is required. Additional technical assistance in cheese manufacturing technology and market development would be useful.

Limited specific equipment purchases such as a new packaging machine may be needed as XELAC's marketing capability is upgraded.

c. Productos Lacteos de Asuncion Mita (PROLAC)

PROLAC, located in Asuncion Mita, Jutiapa, near the Salvadoran border, is the country's government-owned milk processing facility. Built in 1956 by UNICEF and operated through 1965 by a Dutch mission, the plant has an installed capacity of 25,000 liters/ten-hour shift. The plant produces fluid pasteurized milk and powdered whole milk (non-instant), as well as smaller quantities of fresh cheese, butter, and sweet

PROLAC can, and does, reconstitute non-fat dry milk with butter into whole milk. The team did not press the issue of whether this reconstituted product was re-dried or blended with the fluid milk sold in the pasteurized milk market. It is general knowledge among the trade that the plant does reconstitute milk for this purpose, and that other plants have used powdered milk for this same purpose during the dry season.

d. Packaging

The three plants describe above are similar to the four corporate plants in types of containers, styles and variety, since all of them compete with each other in the market and have access to the same packaging technology.

e. General Assessment

The three plants all suffer from lack of milk volume, to a greater extent than the four in Guatemala City.

The one that could use the most assistance in the plant and in marketing is VERALAC.

PROLAC, should it acquire an instantizer as currently indicated, will still face the problem of achieving economic operations. As the only instantizing operation in Guatemala, and in pursuit of the goals of stablizing milk supply and price to the benefit of the consumers, PROLAC might want to negotiate an accord with the major corporate processors to purchase their excess supplies during the rainy season, possibly producing powdered milk under "private label" contract to these firms. In return, PROLAC might consider abondoning its fluid milk operation, which is currently a money-losing proposition and completely irrelevant in terms of the GOG's objective of market and price stabilization. (This recommendation is more fully discussed in Chapter VI.)

3. Non-Fluid Milk Pasteurizing Plants

This group embraces important dairy plants, but engaged exclusively in the production of manufactured dairy products.

The team had the opportunity to visit two plants belonging to this category:

- Impulsadora Lechera Guatemalteca (ILGUA), at Palin, Departamento de Escuintla

day in the dry season and 22,000 liters daily in the rainy season. Its installed capacity is 36,000 liters/day, and, if the average daily intake is 17,000 liters, this facility is yielding 49 percent utilization.

Parma does not have collection centers or its own trucks. Rather, milk is delivered by intermediaries. Milk is sourced from the department of Suchitepequez and Escuintla. A system of payment based on fat content is maintained.

The team consider Parma the best cheese plant in the country, in terms of quality, product range, and presentation. Parma manufactures European-style cheeses including parmesan, and Dutch-type with red paraffin wrapping. All cheeses are labeled with full ingredient lists and indications of weight and/or volume.

Although a plant visit was not authorized, the team observed from the outside well-manufactured modern facilities and two 10-ton refrigerated trucks for transporting products to the Guatemala City market. The company maintains two outlets through which 94 percent of production is sold.

The company is also in the process of establishing a stable of Jersey cows near the factory, with the aim of increasing its fluid milk intake.

4. The Raw Milk Sector

Fluid milk in the raw milk sector, by definition, undergoes less industrial transformation than fluid milk in the pasteurized sector. As defined above, the raw milk sector consists of milk and farm-made dairy products, sold directly or via intermediaries to consumer households without being pasteurized. It also includes sales to small plants which manufacture cheese and cream without pasteurizing the milk.

a. Quantities Processed and Marketed

The NCBA team estimates that about two-thirds of national fluid milk production, or about 150 million liters/year, passes through the raw milk sector. This "guestimate", based on team manipulation of existing data and observations, is consistent with estimates made by the Consejo Nacional de Fomento Lechero (60-70 percent) and DIGESEPE (65 percent, based on a 1982 plant survey).

Without firm numbers, it is still very apparent that in Guatemala, as in most other Third World countries, the proportion of milk consumed in the form of cheese

wooden molds. They are usually wrapped in banana leaves and sold in the coastal region and Guatemala City, and points in between.

2) PINULAC

PINULAC is a small factory, near Guatemala City, processing 2,000 liters of raw milk into Mozzarella cheese and queso de capas, a sort of fresh cheese. Raw milk is partially skimmed to make the fresh cheese, with the cream sold as an additional product. Milk for Mozzarella cheese is processed in a 400-gallon vat, and the curd is cooked using propane burners. Ricotta is obtained from the whey. This facility is working only with fresh milk, without using other dairy or non-dairy ingredients.

c. Raw Milk Manufactured Products

Los derivados lacteos elaborados a partir de leche cruda, tanto en las fincas como en pequenas y sencillas cremerias y queserias, son los siguientes:

- CREMA ESPECIAL, a base de crema muy concentrada, con 40 a 45% de grasa lactea cuando no esta adulterada.

- CREMA ECONOMICA, a base de crema de leche adelgazada con agua, leche descremada en polvo, manteca vegetal para blanquearla y CMC (carboximetilcelulosa) como espesante. A veces se refuerza su consistencia con harina de trigo subvencionada. El consumidor busca una crema que sea barata, de color blanco y espesa.

- MANTEQUILLA DE COSTAL, a base de crema salada al 10% y colgada dentro de un costal durante varios dias, para que desuere.

- QUESO FRESCO, a base de leche semidescremada coagulada solo por accion del cuajo; la cuajada es luego salada, molida y sobada. Su color blanco y la salida de suero es normal.

- QUESO OREADO, obtenido de una manera similar a la del queso fresco pero algo mas seco, sin salida de suero.

- QUESO DE CAPAS, con la cuajada moldeada en capas; tiene mas humedad que el queso fresco.

- QUESO CREMA, elaborado con leche integra y un anadido de crema; cuajada blanda y agradable.

- QUESO SECO, obtenido por coagulacion enzimatica; la

Se visito dos mercados municipales en el centro de la ciudad para conocer los productos lacteos ofertados, sus precios y el tipo de envase, con los siguientes hallazgos:

- crema especial . . . . . Q. 4,25 a 5,00 / litro
- crema economica . . . . . Q. 1,25 a 1,55 / litro
- mantequilla de costal . . . . . Q. 1,25 el cuarto de libra
- queso fresco . . . . . Q. 1,40 a 1,60 la libra
- queso de capas . . . . . Q. 2,75 molde de 1,5 libras
- queso crema . . . . . Q. 2,50 la libra
- queso seco de Taxisco . . . . . Q. 3,00 la libra
- queso seco de Zacapa . . . . . Q. 3,75 la libra
- requeson . . . . . Q. 0,75 la media libra

f. Sanitary Concerns

Los productos lacteos elaborados con leche cruda tienen por lo general un alto contenido microbiano debido a la ausencia de refrigeracion, a las malas condiciones de transporte, al excesivo manipuleo y al hecho que no hay exigencias de calidad.

La leche cruda de los expendios ha pasado por varias manos: el ganadero, el transportista y el minorista del expendio, antes de llegar al consumidor. En ese proceso, la leche es transvasada mas de una vez, de recipientes grandes a mas pequenos, empleando muchas veces utensilios sucios y personal falto de higiene. Tambien se aprovecha para adulterarla con agua que en la mayoria de los casos proviene de fuentes no potables.

La tesis de Claudia Saravia, de Julio 1984, senala que sobre 71 muestras de leche cruda obtenidas en los mercados municipales de la capital, el 56% tenia mas de 2 millones de bacterias totales por mililitro.

Rolando Taracena, en su tesis de Noviembre 1986 sobre leche y derivados lacteos vendidos en los mercados municipales de la capital, muestra que el 64% de 55 muestras de leche cruda tenia agua; el 73% tenia mas de 200,000 estafilococos/ml.; el 66% con mas de 200,000 coliformes fecales/ml. Esto indica que la leche proviene de vacas con mastitis estafilococica, que hay adulteracion con agua sucia y que la leche se contamina con estiercol al momento del ordeno.

Asimismo, sobre 107 muestras de crema, el 39% tenia mas de 60,000 estafilococos/ml. y el 65% de las muestras exhibia mas de 10 coliformes fecales/ml. Finalmente, sobre 83 muestras de mantequilla, el 90% tenia estafilococos y el 71% mostraba mas de coli fecal/gramo.

IV. GOVERNMENT ROLE/POLICY

Government dairy policy is in a state of flux. Dairy is one of the GOG's five announced priorities. At the time of the team's visit (January 1987), the GOG was in the process of decontrolling prices. Legislation was pending in the Congress to revise the Ley de Fomento Industrial affecting import duties on imported milk products, as well as to create an independent Consejo Nacional de Fomento Lechero.

However, the constraints of the overall economic situation jeopardize present and potential efforts to address dairy sector problems. For example, the Ministry of Planning is attacking inflation, unemployment, and balance of payments deficits using macroeconomic tools which do not always lend themselves to implementing sectoral priorites.

In 1985, public debt, although low compared to most other Latin American countries, climbed to over US$2.4 billion, and foreign debt servicing will consume 20 percent of the projected 1987 budget. As a consequence, an austerity budget has been prepared which continues recent severe constraints on GOG development and overall programs, including DIGESEPE livestock extension services and work with international donors such as the Inter-American Development Bank.

A. Price Controls

Until recently, GOG regulations determined the official price of milk. Naturally, this directly affected only the formal pasteurized sector. However, prices in the raw milk market follow the lead of the formal pasteurized sector, taking advantage of the latter's broad margin between prices to farmers and prices to consumers (a consequence of the high cost of pasteurization). Raw market middlemen regularly outbid the pasteurizing plants for fluid milk and undersell the pasteurized milk retail outlets.

The presence of price controls in the formal milk market, under inflationary conditions has had many pernicious effects. If a government squeezes the margins as the GOG has done, processors and other participants in the system will find ways to maintain or expand these margins without overtly violating the formal restrictions. Among these are:

- skimming cream;
- adding water;
- substituting oil of vegetable or animal origin for butter fat in products such as cream, cheese, "economy butter", and ice cream;

funding and trained personnel. The few inspectors focus on the sector which least needs supervision -- the large pasteurizing plants in Guatemala City which themselves maintain reasonably effective quality control.

The Government of Guatemala must give this matter priority attention, both to protect public health and to stimulate the growth of the industry. Realistically, this can only be done on a gradual, step-by-step basis. At the same time that it implements existing laws it or some other entity should educate dairy farmers as to methods and procedures, so that they come to view the production of high-quality milk as in their best economic interest.

C. The Role of PROLAC

As discussed elsewhere in this report (Annex 5), PROLAC has evolved over the past thirty years as a result of subventions from donor agencies and from the GOG. It is currently operating at break-even, although utilizing only a very small share of capacity and losing about 32% of its dried milk because of faulty design of the drying facility. The latter problem is to be overcome by rebuilding the drying tower, at the same time installing an instantizing unit. These modifications are to be financed by trading in a ultra-high temperature (UHT) unit which was acquired six years ago but never installed, thus requiring very little cash outlay.

PROLAC also plans to modernize its electrical plant, purchase two pick-ups for distributing powdered milk, modernize its quality control lab and make other needed minor repairs. The installation also requires a packaging installation in order to prepare the dry milk for retail sale. The total cost of all these modifications is well beyond the income projected in sales of Section 416 Commodities (it was projected at Q700,000 prior to the devaluation, and is likely well over Q1 million as of January 1987).

PROLAC'S financial ability to independently finance these modifications is questionable, according to the entity's Profit and Loss Statement for 1985. It has debts to the Instituto Nacional de Electrificacion, to BANDESA and to Niro Atomizer which supplied the UHT unit mentioned above. These back debts total Q700,000. If the interest on them were to be deducted from PROLAC'S P&L, the entity would be shown to break-even. One reason for PROLAC'S poor financial state is its low degree of capacity utilization. This was the rationale for providing PROLAC with commodities under the 1987 Section 416 agreement. However, the team questions PROLAC'S ability to aquire additional volumes of fluid milk under current and projected conditions. Most importantly, a strong raw milk market has out-competed all processing plants for fluid milk. This is complicated in PROLAC'S case by two factors. The location near the porous Salvadorean border under the current exchange rate

discussed elsewhere, the team documented a significant downward trend in fluid milk receipts at major pasteurization plants. Control among GOG agencies or PVO's receiving commodities is, by implication, lax.

Nevertheless, a significant number of people--perhaps 500,000—are receiving powdered milk via the programs and many, according to one source, are being exposed to group lectures and one-on-one talks on instruction and hygiene, with special attention to feeding formulas that would avoid lactose intolerance.

In the long run, the impact of feeding programs on the dairy industry may be positive, but in the short run, the numbers available suggest that domestically produced milk is significantly displaced.

E. Health Monitoring

In the time available, the team was unable to develop hard data related to health problems associated with milk product consumption. The team does not know, for example, the incidence of tuberculosis, intestinal parasites, food poisoning, etc. which may be attributable to contaminated dairy products. The team doubts whether this information exists.

Certainly, given that more than half of Guatemala's fluid milk production is ultimately consumed unpasteurized, the potential for major health problems exists. More significant, however, is the fact that the lack of adequate GOG enforceable dairy standards, dairy product inspection services, and health monitoring makes the Guatemalan population vulnerable in event of a major contamination or epidemic stemming from milk-borne organisms.

V. EVALUATION AND PROJECTIONS OF DEMAND AND SUPPLY OF MILK AND MILK PRODUCTS

A. Introduction

The purpose of this analysis is to quantify the factors influencing demand and supply of milk products in Guatemala, so as to develop a means of projecting both trends under various assumptions. We recognize at the outset that economic forecasting is difficult under the best of circumstances (closed economy, stable economic behavior, a wealth of economic data); the Guatemalan case presents few advantages for the projector. The country depends on foreign trade in a few commodities; its GNP has been severely stressed in recent years by both domestic and external difficulties; economic data are few and unreliable and published with such along time lag that many phenomena which one might expect in the future may in fact already have occurred.

The principal source of data for analyzing demand is a 1981 household budget survey performed by the Instituto de Investigacion Estadistica, augmented by some 1980 data prepared by SIECA's Econometric Unit. The supply analysis relies almost entirely upon a sample survey performed in 1987 by the NCBA-LOL team with the collaboration of DIGESEPE and IICA. We do have some partial data on recent (1985) per capital consumption of milk and products from SEGEPLAN which can be used for a baseline in the projections. These are:

Fluid milk (liters)	15.09
Powdered milk (kilos)	0.57
Cheese (kilos)	1.86

The demand for milk is influenced by both income and price. There are various ways of separating the effects of one from the other; but in Guatemala econometric anaysis is difficult, since in a growing economy one would expect consumption to be positively related to income and inversely related to prices. However, real per capita income has dropped in Guatemala every year since 1979--over 14% in total. Yet, consumption per capita has risen. The real price of domestically produced fluid milk fell somewhat during the same period, which may have had some offsetting effect. However, the real price of imported milk, which now accounts for half the supply, rose very sharply with devaluation.

B. Income Effect

Basic staples (excluding animal products) account for an overwhelming portion of the diet of low-income people in Guatemala. Medium-income people do consume some animal products, although to a rather insignificant extent. Most milk products are, therefore, consumed by the upper-income strata. It would be most interesting to know how many medium-income people might become rich over the next few years, but one must work with national averages.

TABLE V-1

GUATEMALA
ESTIMATION OF DOMESTIC PRODUCTION AND CONSUMPTION OF MILK
Millions of Liters

Years	Production	Consumption	GAP (Imports & Donations)
1985	230.1	406.5	176.4
1986	232.2	421.1	188.9
1987	234.4	433.9	199.5
1988	236.6	447.2	210.6
1989	238.8	460.9	222.1
1990	241.1	475.3	234.2
1991	243.3	490.2	246.9
1992	246.4	505.7	259.3
1993	249.3	521.9	272.6
1994	252.4	538.8	286.4
1995	255.5	556.4	300.9
1996	258.6	574.7	316.1

Source: NCBA team projections.

If, on the other hand, per capita income were to increase during the next decade, total milk consumption would be about the same as that projected above, since the middle class would continue to eat meat. A more thorough study of the cross-elasticities between meat, cheese and other sources of protein foods in Guatemala would usefully complement this projection.

G. Projections of Domestic Supply

The outstanding aspect of the supply side is the shift in recent years from specialized to dual-purpose dairying. This has come about because of (1) declining beef prices in world market, including the milking of beef-type cattle breeds; and (2) the policy of the GOG to reserve molasses supplies for milk producers only. Production costs of dual-purpose dairies are low since the animals are largely fed on pasture. But producing cows form a smaller share of dual-purpose herds and the milk can be productively fed to calves instead of sold. Also, producing cows can be milked twice daily if there is an incentive to do so. Thus the supply of milk from dual-purpose herds is extremely price-elastic in the short run.

Over the past two decades, the rate of increase in milk production has slowed considerably, as shown by the following data:

	Average Annual Rate of Growth
1961-65	5.7
1971-75	4.6
1976-80	3.0
1981-85	1.9

Essentially, future expansion of dual-purpose dairying in Guatemala depends upon price incentives for the production of both milk and beef. More specifically as regards milk, the market structure does not at present favor these producers and must be made to do so.

The current world-wide glut in beef is likely to continue so long as the European Economic Community (now the largest exporter of beef) continues to subsidize intensive beef production. This has distressed producers in semi-arid zones throughout the world; however, in most cases these beef producers have no alternatives in crop production. But this is not the case with regard to many Guatemalan dual-purpose dairymen. If they do not received adequate returns from either milk or beef they can switch to cropping their land. Thus the excess capacity in dual-purpose dairying may prove elusive unless milk prices outpace returns from crops.

VI. FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

A. At the Production Level

1. Findings

o No national record-keeping system exists for breeding purposes.

o Domestic fluid milk entering the major pasteurizing plants has decreased by about 10 percent during the last three years.

o Imports of commercial and donated dairy commodities have grown from 25 percent of domestic consumption to approximately 40 percent over the last two years.

o The number of specialized dairy cows is down; a greater percentage of fluid milk for the pasteurized sector is presently coming from dual purpose cows on the Pacific Coast. Much of the dual purpose production takes place on land which is suitable for intensive agriculture.

o Additional milk supplies exist but are not now marketed, particularly in the dual purpose area.

o A marked seasonal variation exists in fluid milk production. Relatively little or no concentrate feed or improved forage or silage is used.

2. Conclusions

o Inadequate means exist at present to systematically improve genetic quality/breeding stock.

o Domestic marketable milk production is stagnating and increasingly going to the more profitable raw market and on-farm consumption. The shortfall in marketable domestic production is not a result of physical production constraints so much as of price and other market-related deficiencies.

o Imports combined with price controls in the formal market are hurting domestic milk production.

o Dual purpose production shows the most immediate potential for increasing marketable milk supply, particularly in Regions IV (South Coast), Region VI (Chiquimula), and Region III (Coban).

o Increased reliance on dual purpose production in the South Coast has made the country's domestic milk supply vulnerable to disruption. In the event that price ratios change and agricultural production becomes more attractive relative to beef or milk, dual purpose milk production could contract and thus leave the country even more dependent on imports of dairy

1. Findings

o Most marketable milk is consumed raw as either fluid milk, cheese, or cream. At most only 35 percent of the fluid milk is sold to pasteurizing plants, and the remainder goes to the raw milk market. Approximately 50 percent of fluid milk is converted into cheeses and other manufactured products to add value, lower transport costs, and extend shelf life.

o Quality of fluid milk entering the processing plants is generally poor--possessing a high bacterial count, added water and contaminants--and is the main reason for low quality of pasteurized fluid milk.

o On-farm handling and transport to plants is slow, unsanitary, and fails to cool milk.

o Strong farmer marketing associations are few.

o Prices received by the producer, especially from dual purpose herds, show a wide scatter (NCBA/DIGESEPE survey).

2. Conclusions

o Manufactured raw milk products--cheese, cream, and butter--have a strong market, generate a significant amount of value-added and jobs in the rural sector, and are a significant source of protein among low- and middle-income people.

o Volume and returns to dairy producers are insufficient to encourage investment in upgrading equipment and handling practices.

o Health and sanitary standards are not applied, nor are processing plants in a position to enforce quality standards.

o Farmers organize only where individual initiative is insufficient to address a problem and a group solution becomes apparent. In the dairy area, this occurs where groups of farmers are located further away from the market and face insufficient demand for their milk.

o Many producers are receiving distorted price signals from the market, depressing production.

3. Recommendations

o gradually establish and enforce quality price differentials (premiums and penalties) as an incentive to improve cooling, handling, and transportation facilities, and to pay debts incurred in establishing these. These differentials would be implemented by agreement between the processing plants and the

economic activity, and potential health problems, particularly among low-income rural and urban populations. Significant potential exists for increased sales, jobs, and quality. Growth in this sector will generate the greatest demand for domestic dairy production.

o Poor milk quality is a principal reason for the low quality of pasteurized fluid milk.

o Significant amounts of powdered milk are being utilized at almost every plant.

o The GOG lacks adequate information on volume of sales and purchases of powdered milk to enable it to accurately monitor dairy sector trends.

o PROLAC has no influence on national or regional prices. Approximately 10,000 liters/day from the region around the plant are crossing the border to El Salvador or going to the raw market.

3. Recommendations

o Concentrate technical and other interventions in the raw milk processing sector. Provide technical assistance, training, and credit for working capital and equipment to the many small registered and unregistered cheese and manufactured milk producers to help them improve efficiency, raise hygiene, diversify product lines, extend shelf life, and expand production.

o Refrain from expanding pasteurization capacity. In fact, the GOG should consider closing PROLAC's fluid milk operations. It should buy fluid milk during the wet season, dry the milk, and instantize the dry milk for sale during the dry season. This might be done in collaboration with private processors, buying their surplus production, processing it, and returning it under "private label".

D. Imports

1. Findings

o Imports of both commercial and non-commercial NFDM and other dairy commodities are growing.

o No entity is actively monitoring the inflows of dairy commodities and considering their impact on the domestic dairy industry.

o Processing plant purchases of fluid milk are decreasing, e.g., ten percent over 1983-1986 among four major plants. Meanwhile, sales volumes have increased in selected plants out of line with

that local production is being supplemented with imported dry milk to yield reconstituted milk and processing plants are not providing these figures.

o The raw milk market--and in particular the small and unregulated cheese and manufactured milk sector--is a major factor in the Guatemalan dairy industry.

o Lack of enforcement of standards of labeling and hygiene are a major constraint to building consumer confidence in pasteurized milk and other dairy products. They also constitute a major potential public health hazard.

3. Recommendations

o Implement measures--price de-control to permit a seasonal variation in price, increased conservation and use of forage, improved herd management, etc.--to increase dry season production.

o Perform market research for new milk products appealing to each identified sector. Possibilities include a lactose-free UHT milk for which equipment can be leased from the United States, thereby saving on initial capital costs, as well as various fruit- and sugar-flavored dairy drinks.

o Establish a national dairy organization (see below) to define a national dairy product marketing strategy and to conduct a national dairy consumption campaign. Techniques might include school education working with the medical professions and health organizations, sales clerk education, upgrading of store displays, distribution of recipes, etc. and be financed ultimately by a check-off system at the plant. Special programs for public and private employees, or special promotion (e.g., coupons) might be considered.

F. Economic Interests and Organizations in the Dairy Sector

1. Findings

o The dairy sector is composed of different and often competing interests, including specialized dairy producers, dual purpose beef/milk cattlemen, the major pasteurized milk processors, small unregistered raw milk cheese plants and creameries, haulers and other middlemen, suppliers of purchased inputs, etc. Even among producers, different interests and requirements exist, particularly between specialized and dual purpose.

o Specialized dairy producers lack a national or regional organization, although they constitute a significant section of the membership of the Consejo Nacional de Fomento Lechero and operate several cooperatives. Dual purpose cattlemen participate in the Consejo and also belong to one of ten beef producer

the private sector to achieve this objective--by increased productivity in milk production and processing.

o Establish a monitoring mechanism to oversee the commercial and non-commercial import of dairy commodities, and to advise the GOG on dairy policies and actions to implement.

o Install equipment to produce instantized powdered milk--to absorb excess production in the rainy season and use it to supplement needed production in the dry season. Consider coupling this with an import tax on foreign imported powdered milk tins, to the extent they are subsidized, to encourage the purchase of the domestic product.

o Alternatively or complementarily, require the labeling of reconstituted milk and place an excise tax on the product to encourage the use and consumption of domestically-produced powdered milk.

o Fully de-control fluid milk prices.

o Implement legislation to create an autonomous representational body of private and public sector agencies interested in the dairy sector, such as the proposed reform involving the Consejo Nacional de Fomento Lechero, being careful to encourage--not stifle--competition. Alternative organizations of producers, such as the Guatemalan Association of Livestock Producers, also exist and might be suitable participants.

o Gradually improve and enforce quality standards on milk and milk products--both raw and pasteurized. Do this in partnership with the dairy industry--both producers and processors. Implement legislation and approve a budget enabling GOG agencies to enforce existing or improved sanitation and labeling standards. Train DIGESEPE and other GOG agency personnel as well as private processor staff in these areas. This will protect the public health and minimize the danger of epidemics and contamination.

International Division

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GUATEMALA

DAIRY SECTOR REVIEW
Volume Two: Annexes

Submitted to:

Agriculture and Rural
Development Office
USAID/Guatemala

Submitted by:

National Cooperative
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Land O'Lakes, Inc.

Date submitted:

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ANNEX 1
SCOPE OF WORK

I. Background

Program Purpose and Description

1. Purpose

The purpose of the program is to raise milk production and incomes among small farmers and increase the nutritional welfare of low-income through producing milk and otner dairy products available at reasonable prices.

A further purpose of the program is to move the Government of Guatemala (GOG) from a policy of state regulation of dairy production and prices, expressed through operation of a money-losing state enterprise, to a more efficient system utilizing the market. Expected increases in production resulting from tne program, together with U.S. donated dairy products, will increase competition and stabilize the market to the advantage of both consumers and producers.

2. General Description

The program will:

Phase I

- In coordination witn tne GOG, assess tne dairy industry in Guatemala, analyzing milk production, collection, processing, and marketing in the context of competition from import of non-fat dry milk;

- Determine the volume of need and channel Food for Peace dairy commodities (non-fat dry milk, butter oil, cheese, etc.) to boost capacity utilization and assist in strengthening dairy processors and expanding domestic dairy product markets;

- Serve as a vehicle for USAID/G policy dialogue with the GOG regarding dairy pricing, imports and related policies and explore the option of privatizing a GOG-owned dairy enterprise which will likely be one of the two enterprises receiving pilot program technical assistance.

a. Evaluate the Guatemala dairy sub-sector and design a follow-on program

NCBA/LOL will evaluate the Guatemala dairy sub-sector and produce a final design for a follow-on program. This activity will take place during the first three months of the program, beginning on or about October 15, 1986.

The study and design team will arrive in a staggered sequence, beginning with the team leader/agricultural or dairy economist who will initiate work with a local-hire agricultural specialist and the Ministry of Agriculture's Planning Offices (USPADA) personnel. Specialists in production, handling, processing, marketing, and business operations, will begin in week 2. The U. S. Embassy's Agricultural Office will be invited to assign a staff member or other local dairy specialist to the team to facilitate liaison and to contribute a USDA perspective.

As a background to program efforts, the team will first develop a general study on dairy production, handling, processing, and marketing to understand the flow of dairy products. The team will then (1) determine current regional demand factors and evaluate the potential for improved products, marketing strategies, and business activities; (2) identify constraints and opportunities, especially related to government regulations and price controls, plant operations, and capacity; and (3) define, develop and purpose program activities to address constraints, especially those which could lead to the privatization of PROLAC.

It is projected that at the end of Phase I a joint agreement will have been reached among USAID/G, GOG, and NCBA/LOL on the objectives and general work plan for Phase II, particularly concerning the possible privatization of PROLAC and market regulation functions.

During the Phase I study, the team together with USAID/G will assess the feasibility of tapping two current USDA programs to (1) reduce the U.S. dairy herds ("Dairy Termination Program") and (2) dispose of used dairy plant and milking equipment. If found feasible and suitable for Guatemalan dairy development efforts during the program, NCBA/LOL could locate and arrange for export to Guatemala of (1) open or bred heifers to assist program efforts to effect genetic improvements and (2) equipment to improve production and processing efficiencies. (However, since LOL is actively involved in the export of livestock, we feel that to avoid a potential conflict of interest we should not act as the procurement agent for the livestock.) If program requirements are found to exceed the $190,000 currently budgeted, NCBA/LOL and USAID/G may

identify additional complementary resources, including local currency generated by donated commodity sales which could then be re-converted through a special agreement to be negotiated with the Central Bank.

The study team will also examine the feasibility of establishing a dairy producers' cooperative among existing producers in Nueva Concepción, reportedly an excellent dairy region and where producers already have an informal association which negotiates with buyers and meets on a regular basis. Options to be analyzed from a financial point of view include installation of cooling facilities, milk-testing equipment, and a denydration plant . Establishment of a cooperative would be a private sector alternative to current tentative GOG plans to establish a PROLAC dehydration plant in the region.

Finally, the team will identify at least two other regions (milkshed) for further evaluation, for which an in-depth processing and marketing study similar to the one for PROLAC will be done. Most likely these will include the Western Highlands near Quezaltenango around Xelac as well as the region around VERALAC, a cooperative dairy in Alta Verapáz, the highland area of San José Pinula, and existing private corporate processors.

II. Statement of Work (Phase I)

The Study Team will (1) address the general dairy situation in Guatemala, (2) finalize program design, and (3) determine the level of need for imported dairy commodities and recommend the mix of products, volumes, and delivery schedule.

The Study Team will review the proposed GOG program prepared by USPADA, and assess the proposal from the perspective of the program's potential impact on PROLAC commercial viability. In particular:

- Does the rehabilitation of PROLAC equipment at Asunción Mita and the installation of a milk dehydration plant in Nueva Concepción contribute to PROLAC's eventual commercial self-sufficiency. Under what circumstances can purchasing and converting fluid milk into powdered milk become a profitable activity.

- Are the areas targeted for technical assistance to producers appropriate for supplying milk to PROLAC, either directly in fluid form or via the proposed dehydration plant in Nueva Concepción.

- Is the proposed program organization involving ICTA, DIGESEPE, BANDESA and PROLAC under USPADA coordination appropriate. The team will verify the GOG role and budget, including salaries, transport and per diem, equipment, and credit, and indicate from where these costs will be financed.

- Is there an unfunded need for dairy equipment which could be addressed by USAID's provision of US dollars?

The Study Team will also select the two processing plants to be assisted. In this process, the Team should make initial visits to at least five plants, including PROLAC, XELAC, and VERALAC, and make provisional recommendations based not only on an analysis of plant operations but also on production potential, taking into consideration the recent trends away from milk production in the Highlands towards the Pacific coastal region.

Team responsibilities are as follows:

1. Team Leader (seven weeks)

- Assembles all past sub-sector studies and begins the process of updating them.

- Holds discussions with livestock associations, producer associations, government officials, etc., involved in the dairy/livestock sub-sector.

- Describes and evaluates government dairy sub-sector policies, goals, and plans, particularly with respect to the possible privatization of PROLAC.

- Working with USAID/G, seeks GOG commitment at policy leadership and bureaucratic levels to privatization of PROLAC and/or other dairy-related functions/roles currently exercises by GOG.

- If appropriate, develops privatization work plan, concentrating on: (1) making PROLAC attractive to potential private owners; (2) valuation of assets; and (3) working with potential equity participants.

- Determines if existing cooperative law as applied is appropriate for dairy cooperative success.

- Identifies constraints--cultural, technological, economic--to increase milk production.

- Holds discussions with livestock association (dairy) and planners.

- Evaluates producer plans based on their current situation (growth or contraction).

- Draws out producer concern re pricing, input prices, etc. Are current prices adequate given objective inputs costs?

- Describes "Dual purpose" dairy operation relative to its importance in the total dairy system, i.e., are larger dairy producers providing most milk sold to processors?

- Determines if feed prices are controlled and, if so, how and at what stages of processing.

- Determines pricing system at farm level.

- Details a training and technical assistance program for the entire dairy sub-sector strengthening activity.

- In coordination with economist/business analyst, identifies processors and their producer suppliers which would be strong candidates for pilot program operation leading to strengthening dairy producers and processors.

- Develops final report and present findings and recommendations to USAID/G.

- Drafts overall evaluation of the dairy sub-sector based on team inputs.

2. Milk Producer/Acquisition Specialist (six weeks)

- Identifies technical constraints to milk production.

- Holds discussions with feed association to determine nutrition issues.

- Describes livestock quality and needs for improving quality. Defines genetic improvement program.

- Evaluates feed milling industry's distribution system relative to servicing small dairy units.

- Drafts a final report to identify equipment, training, and technical assistance needs to strengthen producers and producer groups.

- Identifies transportation system for fluid milk.

- Defines fluid milk acquisition system for each plant.

- Evaluates fluid milk quality control from farm to plant.

3. Rural Sociologist/small Producer Specialist (four weeks)

- Assesses specific sociocultural and institutional factors in the program local and national environments influencing program operations and potential for success.

- In particular, will review within the regions selected factors such as:

  * producers characteristics;
  * appropriateness of production technologies;
  * role of milk production in the household economy;
  * ability and interest of producers to form and maintain cooperatives or similar group enterprises;
  * local competition for fluid milk and factors influencing household decisions on whether to deliver to these buyers or to a processor assisted by the program; and
  * role of women and potential program impact on women.

The rural sociologist/small producer specialist will assist the production/handling specialist in fulfilling this scope of work, particularly in the areas of determining training needs and appropriate program interventions.

4. Guatemalan Dairy Specialist (seven weeks)

- Guatemalan agricultural and dairy resource for the team.

- Arranges appointments/meetings for team members and accompanies as possible to ensure quality information collection.

- Directs/undertakes assembly of past dairy production, processing and marketing studies.

- Advises Team Leader on findings, i.e., critiques what team members are told in interviews with producers and processors and puts findings into context.

- Arranges logistics for team and advises Team Leader on recommended scheduling of field trips.

- Assists in government dairy policy evaluation.

5. Economist/Business Analyst (seven weeks)

- Acts as leader for "Team B".

- Determines what GOG policies and measures should be taken with respect to the commercial imports of powdered milk and butter oil in order to ensure success of the proposed program.

- Recommends whether these imports should be limited and gradually phased out or, if allowed, only be sold to dairy plants at prices which are equivalent to the price which plants are paying for fresh liquid milk.

- In close coordination with team leader, identifies processors and their producer suppliers which would be strong candidates for pilot program operation leading to strengthening dairy producers and processors.

- Interviews processing plant managers.

- Draws out processors' perceptions of producer price needs.

- Draws out processors' perceptions of current dairy situation and outlook.

- Evaluates price paid for input (milk) vs. price of outputs (products) permitted by GOG.

- Reviews financial and management information systems at two selected pilot plants. Examines cost controls and accounting systems. Determines technical assistance and training needs.

- Prepares a pro-forma income and expense statement for each selected pilot plant taking into account programmed costs of operations, prices, sales volumes, and supply including estimates of donated commodities purchased by the enterprise. (A local-hire financial analyst may be contracted to supplement the economist/business analyst, in case this proves necessary.)

- Reviews operational environment in consultation with technical specialists. Are milkshed potentials (number of producers) sufficient to support a financially viable processing and marketing operation? Determines minimum size criteria.

- Works closely with team leader in preparing final report and presenting findings and recommendations to USAID/G.

6. Processing Plant Specialist (four weeks)

- Inspects/visits processing plants.
- Evaluates operations, capabilities, and staffing.
- Identifies plant capacity and capacity utilization.
- Evaluates quality control procedures.
- Defines role of imported NFDM in each plant's operation.
- Evaluates equipment needs to handle increased throughput planned under pilot program.
- Develops reports for each plant describing specialist's perception of current plant viability, potential and needs for success in the future .
- Identifies individual plant and sector-wide training and technical assistance needs.

7. Marketing Specialist (four weeks)

- Defines marketing network/outlets for each processor.
- Surveys country wholesale (and government) distribution system (at least major market areas) and determines size for each product.
- Surveys processed product variety (including exports).
- Identifies brands and market shares (if possible).
- Describes purchasing behavior based on interviews with wholesalers and retailers.

- Develops reports on marketing for each processor and the national distribution system.

- Evaluates product quality, packaging and promotion.

- Examines product pricing controls and guidelines.

- Identifies training and technical assistance needs.

- Will identify and discuss conditions which hinder market development. Which of these can overcome by technical assistance and equipment under the program?

- What is the potential impact of contraband on the implementation of the pilot program, and how can any negative impact be minimized?

ANNEX 2

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ANNEX 3

LIST OF CONTACTS

1. Individuals Contacted

ANDRADE, Dr. Hector
Unidad Sectorial de Planificacion
Agropecuaria y de Alimentacion
(USPADA)
Ministerio de Agricultura, Ganaderia y Alimentacion

ALDANA Marroquin, Nery
Gerente General
Industrias Lacteas, S.A.

ASTUDES, Fernando
Large coastal beef dairy operation

BAYER, Ing. J. Joaquin
Jefe de la Division de Normalizacion
Instituto Centro Americano de Investigacion
y Tecnologia Industrial
(ICAITI)

BELTRAN Escobar, Sr. Braulio
Centro de Acopio
de Leche Fresca de PROLACSA, La Palma

BESSIERES, Andre
Helvetas Advisor
Xelalu Lacteos (XELAC)

BLANCO, Odulio
Director of INACOP

BRATTON, Robert
Consultant
Inter-American Foundation

BRESSANI, Mark (hijo)
Owner
PARMA

BORRELL, Phillipe
World Food Program

BURRETO, Cecilia, Dra.
DIGESEPE

CABRERA, Dr. Julio
Director
Sanidad Animal
DIGESEPE

CACERES, Carlos
Gerente
Cooperativa VERALAC

CALDERON, Carlos
Owner
Small creamery

CASTANEDA, Lic. Romeo
Politica Industrial
Ministerio de Economia
(Is Ministry of Economy Representative to Consejo
Nacional de Fomento Lechero, and also its Representative
to Junta Directiva of PROLAC)

CASTILLO, Dr. Juan Ricardo
Jefe
Departamento de Control de Alimentos
Direccion General de Servicios de Salud (DGSS)
Ministerio de Salud Publica y Asistencia Social

COXAJ, Valentin
Producer

DE LEON, Hector
XELAC
San Carlos Sija

DE LEON CASTELLANOS, Jorge
Dairy producer

DE PAZ, Jose Alberto
Director de Servicios Tecnicos
INACOP

DIAZ, Luis Humberto
Director Tecnico
DIGESEPE

DIEHL, John
Livestock advisor
USDA

GANDARA, Carlos
Director
Credito Pecuario
DIGESEPE

GALLARDO ARMAS, Mario
Sub Gerente de Ventas
Foremost Dairies de Guatemala, S.A.

GARCIA LOPEZ, Roberto
Dairy producer

GONZALEZ V., Lic. Zootecnista Hector Eduardo
Sub Director General de
Servicios Pecuarios

KAEHLER GARCIA, Dr. Roberto
Medico Veterinario
Direccion Tecnica de Inspeccion Sanitaria
y Control de Alimentos de Origen Animal

KIMES, Michael and Wife Vicky
CLUSA
Contractor Assigned to AID
Cooperative Advisor

LARRAONDO, Edgar
Lawyer
Asuncion Mita, Producer

LEE Silva, Hector Raul
Instituto Geografico Militar
Jefe de la Division de Cartografia

LOARCA, Alfonso
Vice-Minister for Livestock,

Ministry of Agriculture
Livestock, and Food

MALDONADO CACERES, Humberto
Asesor en Produccion Animal
Equipo de Asistencia Tecnica
USDA - AID - DIGESEPE prj.

MCFARLAND, Cecil
Project Officer
Agricultural and Rural Development Office
USAID/Guatemala

MEDRANO, Dr. Jose
Producer-Member
Consejo Nacional de Fomento Lechero

MELGAR, Julio
Dairy Farmer
Ref: Roberto Diaz Schwartz

MORALES, Aaron
Gerente
Impulsadora Lechera Guatemalteca(ILGUA)

MOTTA Gonzalez, Dr. Mario
Tesorero, Junta Directiva
Union Nacional Agropecuaria (UNAGRO)

NOE, Remberto
Produccion
Impulsadora Lechera Guatemalteca (ILGUA)

NORIEGA, Augusto y Yolanda
Owners of Cheese Plant
PINULAC

ORELLANA, Francisco
Sub-Gerente
Pasteurizadora La Palma

OTT, Mary
Mission Economist, USAID/GUATEMALA

PAIZ, Jorge
Manager
Cooperativa Los Manzaneros

PALMA, Lic. Danilo A.
Sociologo - Antropologo

PICHARDO, Arturo
Gerente General - Director
Foremost Dairies de Guatemala, S.A.

PORRAS G., Rolando
Director
Embotelladora Central, S.A. (Coca Cola)

RAMIREZ, Dr. Angel Ramiro
Asesor Tecnico por Helvetas
Cooperativa de Servicios XELAJU LACTEOS. (XELAC)

REYES, David Salazar
Dairy farmer
El Chirivisco
Nueva Concepcion Region

SOLIS,Mario
Representante de la zona Sur-Occidente
Consejo Nacional de Fomento Lechero,
Comite de Produccion de Leche

ROMERO, Gumercindo Abigail
Encargado
Centro de Acopio - Cuyuta
La Palma (PROLACSA)

SPIEGELER, Eduardo G.
Gerente General
Empresa de Productos Lacteos de Asuncion Mita
PROLAC

SANCHEZ Ralda, Gustavo
Encargado
Centro de Acopio - Escuintla
Foremost Dairies

SINGER, Enrique
Plant Manager
PROLAC

TEJADA VALENZUELA, Dr. Carlos
President, Asociacion de Criadores de Ganado Jersey
San Jose Pinula

TIMPANARO, Vicente
Owner
Ana Maria Timpanaro, Manager
Quesos La Italia

URIZAR, Ing. Hiram
IICA advisor
Proyecto PRODESA-DIGESEPE

VARGAS, Fernando
Secretario General
Unidad Sectorial de Planificacion Agropecuaria y
de Alimentacion (USPADA)

Sister Ticla Wilcomm
German nuns dairy
hog farm outside Quezaltenango

ZAGHE, Felipe
Instituto Nacional de Estadistica
(INE)

LIST OF CONTACTS

2. Dairy Association and Plants Visited

Asociacion de Criadores de Ganado Jersey
de Guatemala
San Jose Pinula
Calle Principal Km. 22
Tel. 0301791
Contact:
Dr. Carlos Telada Valenzuela, Presidente
Sr. Marco Tulio Muralles, Treasurer
Sr. Arnoldo Melgar C. Vocal
Cap. Cesar A. Davila M., Vocal
Sr. Dirk Tenglemann M.
Sr. Ernesto Alarcon R.
Sra.Ana Maria Chacon - Secretary (clerk)

Asociacion de Productores de Leche - XELAJU
Juvenicio Hernandez, President
Marcelino Sic, Afiliado
Gabriel Serrano, Afiliado
Juan C. Monterroso, Vice Presidente
Manuel Hernandez, Treasurer

Productos Lacteos La Carmelita
28 Calle 12-37 Zona 5
Tel. (Phone) 61497
Guatemala City

Productos Lacteos La Democracia
Gerente: Sr. David Solares
Produccion: Marco Antonio Ortiz Boya
La Democracia
Km 9 Carretera Siquinala, Sipacate
Departamento de Escuintla

Planta Procesadora del Pacifico
LA FLORA
km 148 Carretera a El Semillero
Tiquisate
Departamento de Escuintla

Note: Under Corfina Administrator

Foremost Dairies de Guatemala, S.A.
Arturo Pichardo, Manager
Phones 762178 762431
Guatemala City
Aguilar Batres 32-33 Zona 12
Note: former Knudsen, California

Gremial de Plantas Pasteurizadoras de Guatemala
Ruta 6, 9-21 Zona 4
Apartado Postal 214
Tel. 67069 y 67369
Cables: CAMINGUA
Telex 5402 CAMIND GU

Cooperative Los Angeles (milk producers)
Sr. Oscar Leopoldo Sosa Herrera, President
Sr. Dario Pinto, Member
Parcelamiento Los Angeles,
La Gomera, Escuintla

ILGUA (Impulsadora Lechera Guatemalteca)
Prospero Morales, Owner
Oficinas 8a Av. 12-01 Zona 12
322762 - 44561 - 84429
Planta: km 42 carretera a Escuintla, Palin
Departamento de Escuintla

INLACSA (Industrias Lacteas, S.A.) - BORDEN
Of: Calzada Roosevelt # 38-07 Zona 11
Guatemala City
312815 - 922259 - 913878
Planta: km 13 Carretera a Escuintla
Villalobos
Brand Names: La Moderna, Diadema

Pasteurizadora LA PALMA
(PROLACSA)
Sub Gerente Francisco Orellana
Prod. Manager Florencio Mazariegos
8a Calle 14-07 Zona 11
408445 - 717254 -716902

PARMA, Productos Lacteos
Mark Bressani
Planta: Finca San Jeronimo Miramar
Patulul (10 km arriba), Departamento Suchitepequez
Oficinas: 19 Calle 10-54 Zona 10
Guatemala City
370428 - 372093 - 373519 - 680277

PINULAC
Granja Avicola Coco
San Jose Pinula
Departamento de Guatemala
Phone 0301-224
Augusto Noriega Manager
Yolanda de Noriega, Assistant Manager
Km 16 Route to Cuilapa

Pasteurizadora LA PRADERA S.A.
General Manager, Ing. Carlos Ramos
Production Manager, Miss Alba Santizo
Sales Manager Eduardo Imeri
18 Calle 24-25 Zona 10
680591 - 680981 - 680191
Guatemala City

PROLAC
Enrique Singer
Jefe de Planta
Asuncion Mita, Km 148 Departamento de Jutiapa
Phones 457-391 457-383
23 av. 0-16 Zona 7
Phones 42204 - 710425
Guatemala City

Quesos La Italia
San Lucas Sacatepequez

Productos Lacteos SUPERIOR
Villalobos - Villa Nueva
Km 12.5 Carretera a Escuintla
763134 - 764693 - 491294
(next to INLACSA)

VERALAC, Cooperativa Agropecuaria de Las Verapaces
(VERAPAZ LACTEOS)
190 kms de Guatemala City Tactic Departamento de Alta Verapaz
Gerente General, Carlos Caceres
Tesorero, Dr. Luis Lemus (Jefe Regional de DIGESEPE)
Presidente Coop. Ruben Guzman
Production Jose Antonio Moino

XELAC (Cooperativa de Servicios XELAJU Lacteos)
Totonicapan
Tel. 061-2183

3. DIGESEPE Regional Directors

Licenciado
Hector Gonzales
Director de DIGESEPE

Jefatura Regional I
Dr. Jorge Efrain De Leon Regil
3a Av. 2-04 Zona 4
Quezaltenango
Tel. 061-8415

Jefatura Regional II
Dr. Luis A. Lemus
Gobernacion Departamental
Coban Alta Verapaz
tel. 051-1321

Jefatura Regional III
Dr. Francisco Barquin
2a Calle 6-80 Zona 1
Santa Elena, Peten
Tel. 0811-440

Jefatura Regional IV
Lic. Edgar Polanco
Edificio Bartolome, Local No. 19
Mazatenango, Suchitepequez
Tel. 0721-297

Jefatura Regional V
Lic. Alfredo Marroquin
Avenida Reforma 8-60 Zona 9
Tel. 317270 - 323122

Jefatura Regional VI
Dr. Luis Alberto Franco
Calle 6 de Septiembre 2-08 Zona 1
Jutiapa
Tel. 044-1305

Jefatura Regional VII

Dr. Eduardo Andres Godoy
4a Calle 15-33 Zona 1
Zacapa
Tel. 041-1042

Jefatura Regional VII
Dr. Edwin Herrera
7a Calle y 2a Avenida Lote 350 Zona 2
Bartolome de las Casas
Alta Verapaz

ANNEX 4

PRODUCTION MODEL

Sector Analysis

Factors Influencing Expansion of Production

The Production Model

For many farm products, including milk, production is a predetermined variable. The production of milk directly depends on the number of milked cows, and their productivity, both of which are influenced by economic, technical, and other considerations. Part of the observed variance in milk production can be explained by the following set of variables:

(Y): production, which is a function of technical variables (Xi); instrumental variables (Zi),and uncontrollable variables (Ui).

Technical variables (Xi): These are inputs in the productive process and may be influenced by certain policy measures through the instrumental.

Instrumental variables (Zi): These are the ones which can be used within the context of a milk policy to reach certain objectives. They include, among others: technical assistance, credit, marketing improvement & others

Non-Controllable variables (Ui): These are those which are beyond control such as weather.

On these bases, the milk production model can be specified in terms of the following equation:

$$Ay = Bx + Cz + Du$$

To simplify, this equation is of the linear type, in which A, B, C, and D are matrices of coefficients of appropriate order and (y), (x), (z), (u) are column vectors: for (y) of production, (x) technical production variables (imputs); for (z) instrumental variable; and for (u) uncontrollable variables.

In vectorial terms, we can define:

$$y = \begin{matrix} y_1 \\ y_2 \\ . \\ . \\ y_n \end{matrix} \quad x = \begin{matrix} x_1 \\ x_2 \\ . \\ . \\ x_n \end{matrix} \quad z = \begin{matrix} z_1 \\ z_2 \\ . \\ . \\ z_n \end{matrix} \quad u = \begin{matrix} u_1 \\ u_2 \\ . \\ . \\ u_n \end{matrix}$$

in which:

Technical variables

X1 = Breeding program
X2 = Reproduction
X3 = Feeding
X4 = Sanitation
X5 = Management
X6 = Machinery

Instrumental Variables (Political variables)

Z1 = Technical assistance
Z2 = Credit
Z3 = Formal education
Z4 = Training
Z5 = Marketing
Z6 = Quality

Uncontrollable variables

U1 = Altitude over sea level
U2 = Rainfall
U3 = Temperature
U4 = Winds
U5 = Property size

In empirical application, the problem lies in measuring the intensity with which the different variables influence the production of milk.

The first step is to try to isolate the uncontrollable variables, basically those which affect the weather. In this direction an effort is made to isolate the effect of climate variables by using the concept of region, i.e., by grouping units located in the same geographic area. We define two areas of geographic distribution of milk production: (1) Central Region of the Altiplano, and (2) the Costa Sur.

The effects of property size on the possible statistical bias is reduced when the observations are stratified by size: large, medium, and small producer. In this manner, the production level becomes a function of the sets of technical variables and instrumental variables, as follows:

$$(Ay)_{ij} = (Bx)_{ij} + (Cz)_{ij}$$

ANNEX 5

DESCRIPTIONS OF

INDIVIDUAL PROCESSING PLANTS

- FOREMOST
- INLACSA
- PROLACSA/La Palma
- LA PRADERA
- PROLAC
- LA DEMOCRACIA
- PARMA
- LECHERIA LAS VICTORIAS
- PINULAC
- ILGUA
- LA FLORA (closed)

TECHNICAL PROFILE
FOREMOST DAIRIES DE GUATEMALA
Guatemala City
Departamento de Guatemala

SURVEY

BRIEF HISTORY

The plant was partially US-owned by Foremost. Several years ago Foremost-Mckesson sold its interest to a group of Guatemalan business people.

Foremost Guatemala now pays Foremost US a royalty for the name use and for a diminishing amount of technical assistance.

SITE

Located in Guatemala City, with city sewer and power. The plant has its own well. Because of urban development, expansion can only occur vertically.

BUILDING

The building is crowded with process equipment because of the broad spectrum of product line.

Maintenance is typical of this type of plant.

EQUIPMENT

1. Receiving Area

Adequate storage of stainless steel tanks is available.

2. Pasteurizer

One HTST unit with a capacity of about 6,000 liters/day.

3. Homogenizer

One homogenizer as a timing pump in the HTST unit.

4. Pasteurized Storage

Adequate stainless steel tanks to hold standardized, pasteurized, homogenized whole milk.

5. Filling

Several Pre-Pak units available for liter, 1/2 liter, 1/4 liter poly pouches.

6. Storage

Adequate storage space for different product mixes needing refrigeration.

7. Butter Churn/Batch Pasteurizer

Butter churn of about 500 liters capacity made of stainless steel.

One stainless steel batch pasteurizer of about 500 liter capacity.

8. Cheese Vat

One stainless steel cheese vat of 1,000 gal capacity.

9. Novelties/Ice Cream

Several pieces of equipment for production of these items are in the plant. Because of the competitive nature of this business, and also being such a small percentage of the market, I will not comment on it.

10. Water

Plant has its own water supply.

11. Electricity

Facility has a stand-by generator.

OBSERVATIONS

A. Raw Milk

This company has a handling and testing procedure that assures them of the best milk available and permits them to know and predict shelf life.

Procedures are warned often enough before they are dropped.

This site is unique in that if only receives milk in bulk form. Therefore, this site does not have to handle containers.

Bulk milk is received from farms where it has been cooled. If the milk exceeds, 18% tetritable acidity, it is diverted to a special holding area where it is isolated and later separated. The cream is used for cultured butter and the skim milk is sold to fresh cheese manufacturers.

This company has a receiving station at Escuintla. Here it receives milk from producers where the majority can not cool their milk. Therefore, this plant cools the milk immediately prior to bulk shipment to Guatemala City.

This company also receives milk in bulk from handlers (middlemen). The company applies the same standards to the handlers and producers as it does to its own.

The company assists the producer in using hydrogen peroxide judiciously to preserve the milk.

B. Pasteurized Milk Processing

The plant uses reconstituted skim milk powder which it procures from New Zealand or other European countries, to standardize the raw milk to the legal requirement prior to pasteurization.

A unique feature in this plant is the use of a deodorizer in the pasteurization step to improve the flavor. (Stripping off flavors/odors).

The product is pasteurized using a conventional HTST unit.

C. Packaging

The pasteurized milk is placed in poly pouches of 1 liter, 1/2 liter, and 1/4 liter.

For special promotion Pure Pack containers are used in the same variety of sizes.

Some milk is packaged in hard plastic bottles.

D. Shipping Container

Standard poly crates are used to hold the pouches and other containers.

E. Ice Cream

This plant is well equipped to blend ice cream mixes and to

store the finished product.

However, because of space limitations, the plant is crowded with the filliwng and freezing of ice cream and novelties.

F. Butter

Salted butter of 82% butterfat content, is manufactured at this plant. Source of cream is sour.

The churn is less than 500 liters in capacity. The butter is sold in 1/2 lb. units.

G. Cream

Two types of cream are sold. One is sweet and it is sold in carton container containing 35% butterfat. The other is sour, sold in plastic containers of 35% buterfat.

H. Cultured Products

1. Cottage Cheese

This plant produces cottage cheese, using standard culture rotation. The product is placed in 4 and 8 oz. plastic containers.

2. Philadelphia-type Cream Cheese

This type of cultured cream is sold in 4 - 8 oz. units and is produced from cultured cream using same methodology as the cottage cheese.

I. Flavored Drinks

This plant produces a variety of flavored drinks in poly pouches.

J. Private Label

Foremost manufactures a line of fluid milk and butter for another entity. Because this information is proprietary, no further detail is provided in this report.

DISCUSSION

This company follows practices nearly parallel to those used in the United Sates.

The quality control program for raw material, processing, and monitoring shelf life of finished goods appears excellent.

The processing equipment is crowded into limited space. This commonly occurs as plant volume increases over the years.

However, a serious concern is the apparent lack of reinvesting in maintenance and up-keep. When pressed for the reason, he answer was lack of margins.

The intellectual level of the employees is high. They were experienced and with high degrees of formal education.

Since this company pays a royalty to McKesson and receives technical advice in exchange, it would be surprising if the facility and operation did not parallel those modern plants joined in the United States.

RECOMMENDATIONS

I have none from a plant technical point of view.

However, close relationship should be developed in order to receive Foremost's support in any national effort at milk production, regulation recommendations, and educational efforts.

Further frequent reports of short shelf life at retail outlets suggest further investigation of handling and processing prior to, during, and after pasteurization at the plant in order to pinpoint quality control problems and suggest solutions.

FOREMOST DIARIES OF GUATEMALA S.A.

CENTRO DE ACOPIO DE LECHE FRESCA

1. UBICACION: Escuintla, a 56 Kms de la ciudad de Guatemala, en el Departamento de Escuintla, costa del Pacifico. Encargado: Sr. Gustavo Sanchez Rada

2. EQUIPO: Tanque de recepcion de 2,250 litros
Colador de malla metalica
Dos enfriadores de placas
Tres tanques de almacenamiento para leche fria, dos de 4,500 litros y uno de 3,000 litros.

3. CAPACIDAD DE ALMACENAMIENTO: 12,000 litros

4. SERVICIOS GENERALES: Pozo de agua subterranea
Dos bancos de hielo, de 16,000 lt c/u
Conexion a la red electrica
No hay grupo electrico de emergencia

NOTAS: Este centro de acopio era una antigua queseria. Aun tiene una vieja caldera vertical que ha sido parcialmente desmantelada para arreglar la caldera que esta en la fabrica de lacteos en La Democracia.
La descremadora y el homogenizador de esta antigua queseria han sido instalados en la misma fabrica, en La Democracia.

5. RECEPCION DIARIA:

El Centro de Acopio recibe 2,900 litros de leche caliente, proveniente de ganaderias situadas entre Taxisco y Escuintla. Esta leche es transportada por tres intermediarios utilizando recipientes de plastico. El volumen sube a 4,000 litros en la epoca de lluvias.

Ademas la Foremost trabaja con cuatro camiones cisterna, dos propios y dos alquilados, para adquirir leche en la costa. Los camiones poseen un tanque de acero inoxidable con aislamiento termico, y capacidades de 1,500 a 3,000 gals.

Dos camiones cisterna recolectan leche en la costa

oriental, Departamento dé Jutiapa: 8,500 litros de leche caliente en Pedro de Alvarado y 3,600 litros de leche fria en la zona de Pasaco. Son 110 Kms de ruta principal, sin considerar entradas a las vias secundarias de acceso a las fincas.

Los dos otros camiones cisterna acarrean 3,000 litros de leche del Parcelamiento Nueva Concepcion, y 7,500 litros de La Gomera, ambos en el departamento de Escuintla.

6. TRANSPORTE DE LA LECHE:

Se realiza una vez al dia, entre las 7 am y el mediodia. El transportista mide la densidad de la leche de cada proveedor antes de ser aceptada, para detectar adicion de agua

Cuando la leche recogida esta caliente, se le agrega peroxido de hidrogeno para que aguante 4 a 5 horas de transporte a 25 - 30 grados C.

Una vez en el centro de acopio, la leche es enfriada y almacenada hasta las cinco de la tarde en que es despachada a la fabrica en la ciudad de Guatemala.

FECHA DE LA VISITA: Enero 28, 1987

INLACSA
(Borden)
Industrias Lacteas, S.A.
Sr. Enrique Porras

SURVEY

BRIEF HISTORY:

This was the first pasteurization plant in Guatemala City

Procured by Industrias Lacteas, S. A. after original owners had financial problems.

Industrias Lacteas owns a plant in El Salvador (Diadema), and other business in Guatemala

SITE:

Located on the main highway leading into the city. It has land available for expansion. It has its own well with no stand-by electrical generator in case of power failure

BUILDING:

1. Receiving Area:

All milk was received in barrels. One tank available to dump the milk into prior to clarification and standardization.

2 Storage:

Planthas capacity to store 40,000 literse in well-kept stainless tanks.

3. Pasteurization:

Milk is pasteurized using a triple tube heater vs. standard plate/frame press type.

4 Homogenizer:

Several were on hand. One was used as a timing pump for TST unit. The other was for creams and ince cream mixes.

5. Processors:

Plant has four processing kettles with a capacity of 200 - 500 gal. for making flavored drinks, ice cream, and pasteurized cream

6 Juice Pasteurizer:

Plant is using a standard plate/frame HTST unit for juice and flavored drink pasteurization.

7. Butter Churn:

One 500-liter butter churn for production of sweet cream butter

8. Vats:

Three cheese vats were in evidence Two for cheddar with a capacity of 20,000 lbs. and asmaller one of 3,000 lbs. for fresh-type cheese

9. Press:

One hydraulic press for cheese forms used in cheddar manufacturing

10. Milk Filling:

Plant has a Pure-Pak unit sitting idle because of high cost of packaging

Two Pre-Pak were in evidence for filling poly pouches

11. Boilers:

Plant had three boilers to satisfy its needs.

12. Ice Builders:

One large unit was seen that permitted enough ice to be generated to be used as chilled water to cook product.

OBSERVATIONS

A Raw Milk:

Milk is received in barrels. Eighty percent has been colled at the farm, but many producers use high levels of hydrogen peroxide as a preservative They receive 10,000 liters/day during dry season, and 14,000 liters/day during rainy season Eighty percent is for the fluid market.

B Processing:

Themilk is standardized and pasteurized using a homogenier as the timing pump, and a tripe tube heater for pasteurizer.

C Packaging:

Two Pre Paks are used for 1/8, 1/4, 1/2, and 1 liter sizes.

A Pure Pak is sitting idle because of high carton cost

Plant also fills plastic bottles in 1/8, 1/4, 1/2, and 1 gallon sizes.

D Cultured Products:

This facility produces cultured creams, cheese, and is packaged in 1/2 and 1/4 lb. laminated foil, as well as 25 lb. bulk

E Ice Cream:

This plant blends and pasteurizes ice cream mixes which it cools and ships to its other site for whipping and freezing.

The other site also markes novelties.

F Butter:

Plant produces swewet cream butter, and it is packaged in 1/4 and 1/2 lb. laminated wax paper.

G. Cheese:

Here, versatility seems to reign.

Cheddar is produced for converting it into processed chesse,

and it is also sold in 25 lb. cubes.

The plant also produces fresh cheese to match farm fresh and other competition.

It also produces a light acid cheese which they call hard, and it is dry, so it crumbles easy when it is squeezed.

H Distribution:

The company distributes its products all over the geographical area of Guatemala, where there are paved roads. It also distributes them to all major metro areas.

DISCUSSION

This company is diversified, as Foremost.

Not surprisingly, theyhave high technical expertise as a result of using the name Borden, which they pay a royalty for, and who was the previous owner.

The quality of raw milk has probably slipped, because of competition They no longer use penalties for out of specification material

The process equipment was well maintained, orderly placed for effectiveness, and plentyof room for expansion.

It would appear that this is probably one of the better managed, if not the best, that I surveyed.

What was the most pleasant surprise, was the placing of raw ingredients away from walls to reduce rodent contamination.

It is clearly evident that Sr Enrique Porras has established good business goals backed by technical expertise in processir

RECOMMENDATIONS

I can only recommend that close contact be kept with this individual. He appears to have an excellent handle on all the facets of the dairy business in Guatemala as well as in El Salvador.

PROLACSA (Corp. name)

LA PALMA (Trade name)

Guatemala City

Dr. Francisco Orellana

Departamento de Guatemala

SURVEY

SITE:

Located in a residential area of the metro area on paved streets. As a result, it is land locked, which is a detriment to expansion. It procures city services. Because of it's site, it causes minor traffic problems.

BUILDING:

It is inadequate for equipment and process flow. It is obvious that equipment has been crowded into areas as market opportunities presented itself.

EQUIPMENT:

A. Separator:

One separator to standardize milk and to generate cream and skim for other products.

B. Pasteurizer:

This plant has two units, one is capable of 1,500 liters per hour, the other is capable of 3,000 liters per hour

C Homogenizer.

The plant uses the homogenizer as the timing pump for its HTST units. However, this plant only does single stage homogenizations vs. double which is the preferred method

D Holding Tnaks:

Plant had several holding tanks of stainless steel The volume of these tanks exceeded 20,000 liters

E Fillers

The plant uses three PVC Pak fillers for the poly pouches of milk and flavored juices

F Cheese Vats

Plant had three vats Two were about 1,000 lbs capacity and the third one was about 30,000 lbs

G Process Kettle:

A unit of 75 liters was available with heavy duty agitation to produce processed Cheddar cheese

H Cheese Grinder:

A common Hobart beef grinder was available for grinding cheese for processing

I Cheese Press:

This plant produces Cheddar cheese in 20 lb blocks. It has a double hydraulic press for the block.

Also eight manual presses were there but not being used. These presses were for the round Cheddar molds.

J. Butter Churn

One 1,000 liter stainless steel churn for production of sweet cream butter.

K. Generator

Plant had a stand-by generator for power interruption.

L. Boilers

Plant had sufficient boiler capacity. It had two units, one as back-up.

M. Ice Builders

Plant had two units available to produce chilled water.

OBSERVATIONS

A. Receiving.

The Plant receives its milk in bulk from two receiving stations. One is located in San Jose Escuintla, the other, at Chiquimulilla. No can or barrels are received in the city. The

volume per day in the dry season is 14,000 liters, and 20,000 liters in the rainy season

There are no penalties for off grade (out of specification) milk

Plant has capacity to store 20,000 liters per day

B Processing:

Milk is separated prior to pasteurization. The cream is used for cream cheese, and sweet cream butter. The milk is pasteurized in the normal HTST unit with homogenization

C Packaging

The milk as well as chocolate and flavored drinks, are packaged in poly pouches in 1/4, 1/2, and 1 liter sizes

D Cream Cheese:

Cream cheese is produced to orders. No uniques to the process became evident in the visit. Product is packaged in 4 and 8 onz. laminated foil, and then in paper board boxes

E Butter:

Butter is produced from sweet cream. It is packaged in 8 onz sizes with aluminum over waxed paper overwrap

F Sweet Cream.

Sweet cream is sold in poly pouches of 1/8 to 1 liter sizes It is also sold in 8 onz hard plastic units.

G Fresh Cheese.

Milk is separated to 1% and pasteurized for producing fresh curd cheese Salt is added to the curd before fine grinding the curd. Curd is placed in molds having a weight of 1 1/2 lbs , stored overnight for forming and then double poly wrapped the next day for shipment to markets.

H. Process Cheese·

AGED cheddar is ground and melted with the addition of other ingredients The processed cheese is placed in poly lined forms of 5 lb. net weight The product is sold as such as well as in individual slices

DISCUSSION

Here again, this plant is crowded with equipment. It may have to go vertically if it cares to expand

The standards at the receiving station for the raw milk are not as strict as some of its competitors

The equipment and building show poor maintenance. Again,

this is a result of poor margins in the fluid sector.

The processing of fresh fluid milk for pasteurization is typical of its competition

The plant has an excellent business plan as to processing and marketing of milk and its by-products

This plant could use some assistance in analyzing efficient product flows and needed space requirements for the future.

They have a disire to expand product lines.

RECOMMENDATIONS

It should be determined what assistance they might desire as how to streamline their production to make it more efficient

Also, the feasibility of going into other market segments and products should be offered to them.

LA PALMA (PROLACSA)

CENTRO DE ACOPIO DE LECHE FRESCA

1. UBICACION: CELECHI, Km 120 carretera a El Salvador, despues del desvio a Chiquimulilla.
Departamento de Santa Rosa, Costa Sur-Oriente
Encargado: Sr. Braulio Beltran Escobar

2 EQUIPO:
- Balanza (no se usa)
- Tanque de 360 litros (recepci'on y colado)
- Enfriador de placas (agua de pozo y agua helada)
- Tanques con equipo de enfriamiento (4 x 1,000 gal y 1 x 300 gal)

3. CAPACIDAD DE ALMACENAMIENTO: 4,300 galones (16,270 litros)

4. SERVICIOS GENERALES:
- Pozo de 20 varas de profundidad, con agua de sabor normal
- Banco de hielo (freon)
- Grupo electrogeno de emergencia (42,5 Kw)
- Red electrica (INDE)

5. RECEPCION DIARIA: De 7:30 AM hasta el mediodia, se reciben 9,000 litros de leche en epoca seca y 14,000 litros en le estacion lluviosa.
Hay 68 proveedores con 25 a 600 litros de leche cada uno.
Proveedor mas cercano: 5 Kms.
Proveedor mas lejano: 45 Kms.

6. PRECIOS DE LA LECHE:
Precio de compra, leche en finca: Q 0.47/lt.
Pago al Transportista: Q 0.04/lt.
Costo en el centro de acopio: Q 0.51/lt.

7. RECOLECCION DE LA LECHE: La leche es recogida en cilindros de plastico de 130 litros de capacidad, llamados bumbas. La colecta y transporte de leche es realizada por intermediarios ajenos a PROLACSA.

Toda la leche es recolectada caliente: para que su acidez no aumente, el camionero le agrega peroxido de hidrogeno a la dosis de

30 ml/100 litros.

8. MUESTREO Y ANALISIS:

- Agitacion de la leche para toma de muestras.
- Muestreo en bolsitas: 20 ml de cada bumba (las bolsitas con numero de identificacion son enviadas a la fabrica en una caja con hielo para analisis de agua, grasa, acidez y reductasa).
- Analisis de color, olor y sabor (diario)
- Determinacion de la acidez (diario); la leche es rechazada si tiene mas de 0.16% de acido lactico.
- Densidad (diario); debe estar entre 1.025 y 1.027 a 32 deg C.
- Grasa (semanal); minimo 3.5%
- Reductasa (semanal).

9. ENFRIAMIENTO Y DESPACHO:

- La cantidad de leche en cada bumba se mide con una varilla metalica, en litros. No se expresa en Kilos.
- La leche es colada con una tela blanca y luego es bombeada a traves del enfriador de placas, para ser vertida en los tanques de enfriamiento.
- Se bombea al camion cisterna de PROLACSA a las 3 a.m. y la leche llega a las 6 a.m. a la fabrica.

10. COMENTARIOS:

- Se utiliza una solucion concentrada de peroxido de higrogeno al 50%; la dosis de 30 ml/100 lts. de leche esta dentro de los limites legales prescritos por la FAO. El fabricante es ELECTRO-QUIMICA, MEJICANA, S.A.
- La leche puede ser rechazada por acidez, densidad o grasa, pero no hay bonificacion en el pago de la misma por larga reductasa o grasa superior a 3.5%.
- En la tela del colador se observo pelos, paja, tierra y estiercol, en gran cantidad: realizando la prueba de sedimentos (impurezas), se podria detectar las leches mas sucias y avisar a los productores para que mejoren la higiene en el ordeno.

11. RECOMENDACIONES:

- Se debe establecer un sistema de pago de leche que tenga en cuenta el tenor graso, las impurezas y la reductasa,

con bonificaciones y castigos en el precio base.

La leche conservada con peroxido de hidrogeno, que se destina al consumo como leche pasteurizada, debe ser tratada previamente con CATALASA, de acuerdo a las recomendaciones de la Oficina Mundial de la Salud (OMS).

FECHA DE LA VISITA: 21 DE ENERO DE 1987.

LA PALMA (PROLACSA)

CENTRO DE ACOPIO DE LECHE FRESCA

1. UBICACION: CUYUTA, Km 83 carretera Guatemala - Puerto San Jose, Departamento de Escuintla, a 26 Kms al sur de Escuintla.
Encargado: Sr. Gumercindo Abigail Romero

2. EQUIPO: Tanque de 100 galones para recepcion y colado
Enfriador de placas (solo agua helada)
Tanques con equipo de enfriamiento incorporado, de 400 galones y 1,000 galones.

3. CAPACIDAD DE ALMACENAMIENTO: 1,400 galones (5,300 litros)

4. SERVICIOS GENERALES: Pozo de agua subterranea ubicado dentro del edificio, con tanque hidroneumatico.
Banco de hielo de 1,500 litros de capacidad
Conexion a la red electrica INDE.
No hay grupo electrogeno de emergencia

5. RECEPCION DIARIA: Solo en las mananas, de 7.30 a 10.30 am
Se recibe diariamiento 1,300 litros de leche (epoca seca) pudiendo alcanzar hasta 4,000 litros en la estacion de lluvias.

Hay ocho proveedores del Parcelamiento Cuyuta, 15 Kms al sur del Centro de Acopio, que aportan alrededor de 800 litros en total. Esta leche llega caliente, conservada con peroxido de hidrogeno a la dosis de 20 ml para 100 litros de leche.

El parcelamiento Cuyuta produce alrededor de 20,000 litros de leche al dia en la epoca seca y 35,000 en la estacion lluviosa. El resto de la leche es comprada por ILGUA, Los Cubanitos y la FOREMOST.

La finca El Cobano, 7 Kms al norte del Centro de Acopio, envia 500 litros de leche en una camioneta; esta cantidad representa el 40 % del volumen total recepcionado.

6. PRECIO DE LA LECHE:

Compra de leche en finca:	Q. 0.47/litro
Pago al transportista:	Q. 0.03/litro
Costo en el centro de acopio:	Q. 0.50/litro

7. TRANSPORTE DE LECHE: No hay camion cisterna para recolectar la leche. Hay un transportista que recoge la leche del parcelamiento Cuyuta utilizando bumbas de 60 litros de capacidad.

El camion lleva un numero de bumbas igual al numero de proveedores para que no se mezclen los diferentes lotes de leche.

Se vierte peroxido de hidrogeno en las bumbas vacias, antes de echar la leche en ellas. De este modo se logra una buena mezcla de ambos liquidos y una proteccion contra el desarrollo bacteriano desde el inicio del transporte de la leche.

8. MUESTREO Y ANALISIS: Diariamente se mide la densidad y se aprecia el olor de la leche en cada lote. Si la densidad es inferior a 1,025 gramos/litro se avisa al productor y si reincide la leche es rechazada. Luego se agita para detectar el olor; si la leche tiene un olor acido se hace la prueba del alcohol y si coagula, es rechazada.

Muestreo individual en bolsitas de plastico, que son enviadas a la Planta en una hielera para analisis de grasa, acidez, crioscopia y reductasa. Esto se hace dos o tres veces por semana. PROLACSA exige 3.5 % de grasa en la leche.

Finalmente se mide el volumen de leche en cada bumba empleando una varilla.

9. ENFRIAMIENTO Y DESPACHO: La leche es colada a traves de una tela blanca y es luego bombeada al enfriador de placas. Dicho

enfriador es de gran capacidad y solo trabaja con agua helada. La leche no es enfriada previamente con agua de pozo, lo cual representa un desperdicio de energia.

La leche fria es almacenada y conservada a baja temperatura en los tanques, durante 48 horas. Se despacha en bumbas, cada dos dias, a las 5 am.

FECHA DE LA VISITA: Enero 28, 1987

LA PRADERA
Sr Carlos Ramos
Guatemala City
Departamento de Guatemala

SURVEY

BRIEF HISTORY:

Because of time constraints, unable to gather much information. However, I can say this is a corporation.

SITE:

Located in a small industrial type area of Guatemala City. The plant is limited in ability to expand because of land availability. The plant is on paved roads, and easily accessible. It has its own water supply and a stand-by generator in case of municipal power failure.

BUILDING:

It is inadequate for the product line. However, it is of sound construction.

It is evident that margins are short or there is a lack of interest in doing some minor repairs to the structure.

EQUIPMENT:

1. Receiving Area:

This plant has a workable can washer. It appeared to have been functioning the day we visited.

The plant receives milk in barrels, also. The milk is classified, separated and cooled immediately on its way to holding tanks.

2. Storage:

One silo tank of 20,000 liter capacity.

Two horizontal tanks with capacities of 8,000 liters each.

3. Pasteurizer:

One HTST unit with a capacity of 5,000 liters per hour.

4. Homogenizer:

One homogenizer used as a timing pump in the HTST system.

5. Packaging:

Two Pre-Pak machines for filling poly pouches in 1, 1 1/2, and 1/4 liter sizes.

6. Surge Tank:

One, 200 gal. surge tank to act as buffer between HTST and Pre-Pak units.

7. Processor:

Several processors available for use in ice cream manufacturing.

8. Vat:

One coil vat used in ice cream mixing.

9. Blender:

One blender used for reconstituting powdered milk.

10. Butter Churn:

A butter churn of 1,000 liters was available for producing sweet cream butter in 1 lb. packages.

11. Ice Builder:

Plant has three ice builders to insure sufficient chilled water for HTST.

12. Cheese Vat:

Unable to identify equipment quantity or volume because of lack of time.

Suposedly, fresh cheese is produced in an area not adjacent to the pasteurizing section of plant.

13. Ice Cream:

Did not identify equipment because of lack of time.

14. Boilers:

Two boilers were in evidence for steam generation.

15. Generator:

A stand-by unit is available for power outages.

OBSERVATIONS

A. Raw Milk:

About 50% of the milk comes from a receiving station, 20 Km. from Escuintla.

They have a better than average method of classifying milk. It is graded daily and it falls into class A, B, or C.

Penalties are imposed for inferior quality.

Plant can hold over 10,000 liters.

Plant procures raw milk from other sources, if it is short of supply.

Raw supply does not vary more than 20% between seasons. The volume received per day is 20,000 liters in dry season, and 25,000 liters per day in rainy season.

B. Processing:

The flow is typical from raw through pasteurizer to packaging.

C. Packaging:

Nothing unusual occurs here. Product is placed in poly pouches which are collected in plastic cartons and stored then in cooler for shipment.

D. Distribution:

Product is sold entirely in the city of Guatemala; 20% is sold to supermarkets, with another 40% to stores directly. The balance is sold to intermediaries for retail routes in the residential areas.

E. Yogurt:

This plant puts up some small quantities of yogurt, under Dr. Gaymont's label. The yogurt is packaged in 8 oz. cups.

F. Sweet Cream:

Sweet cream is sold in poly pouches of 1/2 and 1 liter sizes.

G. Ice Cream:

This product is produced in adequate type of processor. However, ingredient flow is very disorganized The packaging room is very crowded to be efficient. It is very apparent that this plant needs reorganization to lower cost, especially in the ice cream area.

H. Cheese:

Only "Fresh" cheese is produced.

DISCUSSION

This facility has a good program of classifying milk.

There is adequate handling and processing equipment to insure a wholesome product on the shelf.

The plant itself, because of the desire to produce ice cream, has really constrained itself in efficient equipment lay-out for product flow.

RECOMMENDATION

The plant personnel should request assistance in re-streaming production. However, with the low margins, restreaming may not be practical from an economic stand point.

LA PRADERA

CENTRO DE ACOPIO DE LECHE FRESCA

1. UBICACION: Puente Maria Linda, Km. 85 Carretera a El Salvador
   Departamento de Escuintla, Costa Sur-Oriente
   Encargado: Sr. Rigoberto Orozco

2. EQUIPO:
   - Tanque de recepci'on, sin balanza
   - Enfriador de placas (de gran tamano)
   - Tanques con equipo de enfriamiento (4 x 300 gal y 2 x 600 gal)
   - Tanques de almacenamiento: 2 x 1,000 gal

3. CAPACIDAD DE ALMACENAMIENTO: 4,400 galones (16,650 litros)

4. SERVICIOS GENERALES:
   - Pozo de agua subterr'anea
   - 2 bancos de hielo
   - Grupo electrogeno de emergencia
   - Red electrica (INDE)

5. RECEPCION
   Solo en las mananas
   Se recibieron 9,085 litros de leche caliente proveniente de 67 proveedores
   El mayor proveedor tuvo 693 litros y el menor, 12 litros de leche
   La leche llego en seis camiones o lotes, repartidos de la siguiente manera: 3,023 litros, 1,684 lt, 1,475 lt, 1,200 lt, 952 lt y 751 lt.
   En epoca de lluvia, la recepci'on sube hasta 14,000 litros diarios.

FECHA DE LA VISITA: 21 DE ENERO DE 1987.

PROLAC
Asuncion Mita
Departamento de Jutiapa
S.E. area of Guatemala near El Salvador

SURVEY

BRIEF HISTORY

Plant was built in 1956 by UNICEF. It was operated by the Dutch. In 1965, the plant was turned over to a co-op. However, after two months the GOG took it over. During the next five years the plant had assistance from FAO.

In 1976 the plant reached its highest level of intake at 21,000 liters per day.

Today, it is receiving 1,400 liters per day in the dry season.

SITE

Located outside of Asuncion Mita, away from the population center, on an unpaved road. The road in the city portion is also unpaved for a section.

It has adequate water from two mountain ponds. Supposedly, the water is potable.

The sewage is discharged to a dry creek bed.

There is no rail available.

There is sufficient land available for expansion if ever needed.

BUILDING

The building is an excellent shape considering it is 30 years old.

The space is adequate. The equipment is not squeezed into a small area.

It has, on the site, a second building for maintenance, an employee locker room, work room, etc.

Within the building, there are two rooms that are refrigerated to store bulk butter and printed butter, as well as packaged

milk.

There is a power house area as well as an office area attached to the main processing plant. Both are in good condition, needing some painting and minor repairs.

EQUIPMENT

1. Receiving Area:

Next to the laboratory, the milk is received. In this room there is a can washer but is not workable, because of missing parts. Supposedly, the parts are not available because of age of the equipment.

The milk is received in cans (50 l.) and in plastic barrels (50 l.). It is the responsibility of the producer to wash his container.

The milk is dumped through a coarse stainless steel screen on its way to the weighing tank.

After weighing the milk it is filtered again on its way to a clarifier cooler, and temporary storage.

2. Storage:

Two - 10,000 liter stainless, agitated tanks.

3. Separators:

Two. One in use, other used as stand-by when cleaning the first.

4. Pasteurizer:

HTST with 15 sec. hold at 72-76 deg C using a homogenizer as the timing pump at 3,000 liters per hour.

5. Standarization:

Two - 10,000 liter stainless, agitated tanks to standarize the milk prior to pasteurizing.

6. Surge Tank:

One - Stainless Steel - approximately 1,000 gal. tank to hold milk prior to packaging.

7. Packaging:

One unit for poly pouches, sizes filled are 1/8, 1/4,

1/2, and one liter.

8. Cases:

Plastic cases are used to deliver the pouches to the reseller.

9. Transportation:

One van that has refrigeration.

10. Evaporator:

One stainless steel double effect with thermal vapor recompression. The capacity is 1,5000 liters per hour of milk imput.

11. Dryer:

A stainless steel tall form dryer is being used. The product is being atomized with a Dutch manufactured atomizer wheel.

The inlet air is heated to 180 deg. C using steam in radiators as heat source.

Product is pushed via brooms to exhaust outlet where product and air are separated in stainless steel cyclones.

Product is collected in a stainless steel hopper from which it is discharged into an ambient air stream where it is conveyed to another air/product separator. The product is then sifted and packaged in 50 lb units. The dryer operates in series with the evaporator.

12. Butter Churn:

One stainless steel butter churn of 1,000 liters capacity of cream.

Butter Printer:

One printer that prints 1/4 and 1/2 lb. units, using waxed aluminium foil.

13. Cheese Vat:

One stainless vat holding 1,600 liters of milk.

14. Ice Builders:

Two ice builders that freeze water into ice that is later used to cool milk via heat transfer using chilled water.

15. Generator:

One stand-by electric generator with a capacity of 520 KW using a diesel engine. Unit kicks in 20 seconds after power failure.

Failures in supplied power are frequent in rainy season because of lighting strikes.

Unit can carry entire plant.

16. Boilers:

Two fire tube boilers using No. 6 fuel oil. Either boiler can carry entire load.

OBSERVATIONS

A. Raw Milk:

Because of the limited number of suppliers (12), the milk is tested daily for Total Solids by using a lactometer. It is evaluated visually and organileptially. The quality is also verified by alcohol test for curd precipitation.

Approximately, every seven days the milk is tested for Fat, Reductase, and Titratable Acidity.

Members whose milk falls below 3,5% butter fat, are warned and then dropped if they continue shipping low fat milk.

Reductase must last 40 mins. minimum and most fall out at 2 - 2 1/2 hours.

Titratable acidity must fall in range of 15 - 17%.

Specific gravity must be 1,028 - 1,032.

Hydrigen Peroxide is used at the farm level to preserve milk because of lack of electricity.

B. Processing:

It is evident that the Dutch did an excellent job of training these people in processing techniques, and house keeping. I can not see any serious defficiencies.

C. Packaging of Powder:

This is done manually. The 400 gm., 1,600 gm., 1 lb., 2

lb., and 5 lb. units are poly packages.

Product of 2,000 gms. in poly is also inserted into Paper Board. Skim milk is also available in 5 lb. and 50 lb. units.

D. Sweet Cream:

Sweet milk is sold in 1 and 1/2 liter pouches as well as aluminium cans of 30, 40, and 50 liters for commercial use.

E. Cheese:

Fresh curd from pasteurized skimmed milk is made to order, two to the three times per week. It is sold in hard poly 1 1/2 units inserted into soft poly pouches. The curd is milled very fine before packaging.

The shelf life is 5 - 7 days under refrigeration.

F. Utilization:

Under utilized because of lack of raw material. By US standars this plant can handle 90,000 liters per day. 60,000 liters as fluid milk, and 30,000 liters for powdered milk.

Fluid side can process 3,000 liters per hr x 20 hrs and evaporator can take 1,500 liters x 20 hrs.

G. Finished Product:

a. Fluid milk pasteurized is clean and fresh tasting.

b. Butter (Sweet Cream) good flavor.

c. Cheese is really fresh casein. Unpalatable to me, but, otherwise clean tasting as casein should be.

d. Powdered Whole Milk reconstituted with difficulty, which is normal with this type of dryer. Flavor and color excellent. Settling is typical for this type of product.

H. Yield:

I am concerned about the yield of powdered milk. Assuming the 1,500 liter per hour is correct, then a theoretical yield of 441 lbs. per hour should be packaged. However, they are packaging only 330 lbs. per hour. This is a 68% yield which is difficult for me to believe. Normal yields exceed 95%. Therefore,

assuming the data is correct and assuming the loss does not occur before the dryer, the loss must occur in the product/air separator

Again, if these numbers are correct, this problem can be overcome by installing a bag house after the cyclones in order to pick up the residual powder.

If this is done, a larger exhaust fan may be needed because of the bag house restriction on air flow.

DISCUSSION

This plant is GOG managed. It has adequate equipment for its needs. The equipment and building have been well maintained over the 30 years of its existence.

The plant needs volume to reduce fixed costs and become more efficient. The design was for 25,000 liters per day. In the flush (rainy season), it is receiving only 4,000 liters per day. This plant by US standards, has a capacity of 90,000 liters per day.

Because of the age of the equipment, it is probably too costly to retrofit the dryer to make instantized whole milk.

However, an agglomerator could be purchased and installed for "Instant Non-Fat". However, a building addition would be required PROLAC would then have to find a market for the excess cream.

It would need to be determined if the market could absorb the excess cream in the form of sweet or sour cream, butter or ice cream mix.

The GOG should use this plant as a true test of milk processing cost. They also should force PROLAC to procure donated products at milk equivalent cost, if the product is to be traded at the retail level, in order not to give PROLAC an economic advantage over privates.

If the GOG desires to donate dairy products to the needy, it should solicite bids from the private sector of PROLAC to convert donated product to a usable product. By having a processing plant of its own, it then should be able to judge if the bids offered are reasonable or not.

It costs dollars to reprocess donated products. These dollars must come from somewhere.

If the privates do not submit legitimate bids then the GOG at least gave them the opportunity and they should not complain then of the resulting consequences.

PROLAC has sufficient equipment time and expertise to reconstitute donated products (butter/non-fat) to fluid. Or, reconstitute it into cream and/or powdered whole milk, leaving their fluid available for fresh fluid.

As stated in more detail earlier, an apparent product loss of 32% is intolerable in the dryer.

PROLAC should investigate the matter.

If the loss is more than 5% it should retrofit the dryer by installing a bag house after the cyclones.

If the day arrives when the volume is near capacity, it may be advantageous to send the laboratory manager to the States or elsewhere for additional training. The present individual has only 1 1/2 years experience in adequate but antiquated procedures.

The GOG should hire an unbiased outside firm to establish standard cost at PROLAC.

By using standard cost, the plant's productivity can be easily measured and the standard can be changed easily when fixed and operating cost change due to inflation or capital expansion.

By establishing standard cost at the plant, the GOG can project unit cost variations as a function of volume.

RECOMMENDATIONS FOR PROLAC

GOG should do everything possible to increase milk volume to the plant.

There is basically no major obstacles in equipment to overcome as the plant was designed. Some minor monies are needed for repairs that come about naturally.

PROLAC should determine true yields for powder. If more than 5% a bag house should be installed after the air/product separator. It can easily determine pay back by the volume of product, and value of product.

GOG should establish Standard Operating Cost and use them to their advantage.

GOG should use PROLAC as a measuring tool for true manufacturing cost.

PRODUCTOS LACTEOS LA DEMOCRACIA

1. UBICACION

La Democracia, km. 9 carretera Siquinala - Sipacate, Departamento de Escuintla.

Gerente: Sr. David Solares
Produccion: Sr. Marco Antonio Ortiz Boya

2. EDIFICACIONES

La fabrica esta ubicada dentro del pueblo La Democracia, rodeada de un alto muro; hay un patio de recepcion y despacho, oficina, sala de tratamiento de la leche y sala de fabricacion de quesos. La construccion es vieja y antihigienica. Hay una camara fria de 36 metros cubicos.

3. EQUIPO

3.1 Equipo de Procesamiento:

- Tanques de enfriamiento: 2 x 2,000 lt. y 1 x 1,500 lt.
- Tanques de almacenamiento: 1 x 2,400 lt. y 1 x 4,000 lt.
- Tanques para crema: 2 x 900 lt.
- Homogenizador de de 500 gal./hora
- Descremadora de 1,500 lt./hora
- Enfriador de cortina, agua helada y freon
- No hay pasteurizador
- Tinas queseras: 2 x 2,200 lt.

3.2 Servicios Generales:

- Caldera de vapor de 1,000 lb./hora
- Banco de hielo de 4,500 litros de capacidad
- Pozo de agua
- No hay grupo electrogeno, solo conexion al INDE.

4. ADQUISICION DE LECHE

La Democracia procesa diariamente alrededor de 8,000 litros de leche en epoca lluvias. Parte de la leche recibida proviene de Foremost Dairies, debido a una relacion contractual. El dia de la visita hubo una recepcion total de 8,620 litros de los cuales 5,255 lts. de leche fria (61%) venian de Foremost y 3,365 lts. de trece proveedores. Dentro de este grupo, 1,064 lts. eran leche enfriada y el resto, leche caliente, conservada con peroxido de hidrogeno. El mayor proveedor de leche es la cooperativa Los Angeles, con 1,700 lt. diarios.

La leche fresca es recolectada en fincas situadas en La Gomera y en el parcelamiento Los Angeles. No se pudo obtener mas detalles sobre esa cooperativa. La cantidad de leche aportada por los otros doce proveedores varia entre 30 litros y 750 litros al dia. Hay un camion cisterna de 2,400 litros de capacidad para recoger la leche.

Aparte de leche habia en la fabrica doce barriles de 55 galones conteniendo manteca vegetal, tres barriles con grasa anhidra de leche y alrededor de veinte bolsas de leche descremada en polvo.

5. CONTROL DE CALIDAD

No se hace ningun tipo de analisis a excepcion del control de olor y sabor. La leche de los trece proveedores es muestreada y enviada a Foremost Dairies para los controles de grasa, acidez y crioscopia.

6. PRODUCTOS PROCESADOS

No se produce leche pasteurizada.

Los productos elaborados son:
- crema pura de 35% grasa
- crema comercial, mezclada con leche
- queso fresco, en moldes cuadrados, utilizando 25% de leche entera y 75% de leche descremada
- queso seco, tipo Taxisco, solo en epoca de lluvia

En cuanto al queso fresco, se trabaja diariamente cuatro tanques con 2,200 lts. de leche cada uno, o sea 8,800 litros. De cada tanque se obtiene 220 moldes de queso, cuyo peso es de 2 lbs. aproximadamente.

7. DISTRIBUCION Y COMERCIALIZACION

La crema es enviada a Guatemala City en bolsitas de a litro llenadas a mano, o a granel en bumbas de 130 litros.

El queso fresco es mandado dentro de sus moldes de madera, despues de endurecerse una noche en camara fria. No se empaqueta previamente.

Los precios al mayorista son los siguientes:

- crema pura:	Q.4.60 el litro
- crema comercial:	Q.1.28 el litro
- queso fresco (queso super)	Q.1.88/molde de 2 lbs.

Ademas, se vende el suero para alimentacion de cerdos, a Q.0.01 el galon.

8. COMENTARIOS

La existencia de una descremadora de 1,500 lt/hora sugiere que gran parte de la leche recibida es descremada. Dicha crema no es pasteurizada en la fabrica, al no existir un pasteurizador.

Se observo un circulo cerrado con mangueras entre el tanque de crema, el homogenizador y el enfriador de cortina. Ello puede indicar la inclusion de leche reconstituida y grasa vegetal o lactea en la crema. Esta hipotesis podria explicar el bajo precio de venta de la crema comercial. Ademas llama la atencion la presencia de un homogenizador en una planta que no hace leche de consumo.

El queso de color muy blanco, podria estar elaborado con leche descremada, leche en polvo y grasa vegetal.

PRODUCTOS LACTEOS PARMA

1. UBICACION

Finca San Jeronimo Miramar, aproximadamente a 10 km. de Patulul, en direccion a San Lucas Toliman, subiendo por el rio Madre Vieja, en el Municipio de Patulul, Departamento de Suchitepequez.

Distancia de la capital: 136 km., via Escuintla. Ing. Mark Bressani; Gerente General.

Ubicada a 808 metros de altura (2,500 ft.), la finca San Jeronimo Miramar cultiva cafe en las laderas del volcan Atitlan y cana de azucar en el fondo del valle. Tiene electricidad propia por medio de una turbina tipo Pelton. Hace 25 anos se empezo la fabricacion de quesos y hace dos anos se instalo un pequeno establo de vacas Jersey.

2. EDIFICACIONES

La fabrica tiene un edificio de techo plano con seis chimeneas en forma de codo que se orientan de acuerdo a la direccion del viento, para inyectar aire fresco dentro de las salas de fabricacion.

Ademas, hay dos construcciones independientes, con techo metalico a dos aguas, que albergan camaras de maduracion de queso. Tambien hay una caseta de ventas al borde de la carretera, junto a una gasolinera.

3. EQUIPO

No fue permitido visitar las instalaciones aun cuando pudimos dialogar con el Ing. Mark Bressani, Gerente General y el Sr. Juan Vicente Leal Garcia, Jefe de Planta.

4. ADQUISICION DE LECHE

Parma trabaja con 13,000 litros de leche fresca al dia, en la epoca seca y 22,000 litros por dia en la epoca lluviosa. Recibe leche caliente de 515 proveedores de los cuales 200 le abastecen con el 50%. No recibe leche enfriada.

No tienen transporte propio para la leche fresca; sino a traves de intermediarios que poseen camiones y burulas (cilindros de plastico de 125 lts. de capacidad). Los intermediarios recogen leche caliente en un area comprendida entre la playa y 4,800 pies de altitud, abarcando los departamentos de Suchitepequez y

Escuintla. La distancia mas lejana de recoleccion es aproximadamente de 85 km.

El pago de la leche es cada 15 dias. Los ganaderos reciben Q.0.44 por litro de leche caliente recogida en finca, en tanto que Parma paga Q.0.49 al transportista por litro de leche puesto en la planta. El ganadero mas importante envia 700 lts. y el mas pequeno, alrededor de 10 litros al dia.

Aun cuando las ventas no aumenten en la epoca de lluvia, Parma recibe toda la leche y hace queso Parmesano con los excedentes de invierno, alrededor de 180 ton. de queso.

5. CONTROL DE CALIDAD

La leche caliente recibida es analizada para determinar contenido de grasa, acidez, solidos no grasos y prueba organoleptica. No se hace crioscopia, ni reductasa, ni sedimentos.

Generalmente, la grasa varia entre 3.4% y 3.6% y se castiga contenidos inferiores a 3.4% con descuetos de medio centavo por decimo de porcentaje, despues de la primera advertencia.

La acidez maxima permitida es 0.18% en acido lactico y el contenido minimo de solidos no grasos debe ser 8.85%.

6. PRODUCTOS PROCESADOS

Toda la leche es enfriada y almacenada en tanques cuya capacidad total suma 23,000 litros. Hay dos pasteurizadores, de 3,000 y 8,000 litros/hora y descremadoras Westfalia.

No se elabora leche pasteurizada sino solamente derivados lacteos: yogurt natural, crema dulce al 40% de grasa, crema dulce al 32% de grasa, crema acida al 18% de grasa, mantequilla. La crema acida es fermentada con cultivos lacticos y posee algo de leche en polvo descremada, pero no tiene carboximetil celulosa. El yogurt carece de gelificantes, es del tipo SET y su vida util es de 4 semanas.

Ademas, se producen quesos naturales y procesados. Entre los quesos naturales hay Mozzarella tipo String, Mozzarella rallado para pizzerias, Provolone ahumado, Pecorino, Cheddar, Jack, Edam, Gouda, Swiss (Emmental), Parmesano y queso fresco envuelto en hojas de banano; tambien queso crema al 25% de grasa con eneldo, chile jalapeno, cebolla, ajo o tocino. Hay ademas quesos procesados del tipo blando para untar, del tipo duro para cortar y pasta de queso tipo Cheez Whiz.

No se elaboran helados excepto pequenos volumenes del tipo Soft Ice en la misma fabrica, para consumo local.

7. DISTRIBUCION Y COMERCIALIZACION

Parma posee dos camiones refrigerados que llevan el 94% de su produccion a la ciudad de Guatemala. Tiene dos locales de venta en la capital, desde donde despacha al interior del pais por medio de transportistas particulares, en vehiculos no refrigerados. Supermercados y restaurantes constituyen el 65% de sus ventas en la capital.

8. COMENTARIOS

Parma es la mejor fabrica de quesos en Guatemala, con una capacidad instalada para trabajar de 36,000 litros de leche al dia.

Posee instalaciones modernas y una gran variedad de productos, con envases de alta calidad aunque importados de El Salvador, Mexico y USA. Su produccion esta orientada al consumidor de alto poder adquisitivo.

LECHERIA LAS VICTORIAS

1. UBICACION

En la finca Valparaiso, a 7 kms. de Tactic, en la carretera a la hidroelectrica de Agua Blanca y represa de Pueblo Viejo, Municipio de Santa Cruz Verapaz, Departamento de Alta Verapaz.

2. EDIFICACIONES

Posee una sala de ordeno con capacidad para cuatro vacas, un cuarto de enfriamiento y procesamiento de leche y una camara fria de seis mts. cubicos.

3. EQUIPO

- 4 ordenadoras portatiles
- tuberia y bomba de vacio
- cortina enfriadora, a base de freon, para llenar seis tambos de 40 lts. a la vez
- descremadora de 350 lts./hora
- envasadora de leche, manual
- termoselladora manual

4. ADQUISICION DE LECHE

Hay 79 vacas en ordeno que dan 600 litros de leche con dos ordenos diarios (7.6 lt/vaca/dia). Los animales poseen mucha sangre Jersey.

Se emplea unguento para pezones con desinfectante y luego del ordeno se sellan los pezones con iodoforos. La leche recolectada en blades cerrados, es enfriada inmediatamente en el cuarto contiguo.

5. CONTROL DE CALIDAD

No se realiza ningun analisis sobre esa leche, pues se trabaja unicamente en la leche del propio establo.

6. PRODUCTOS PROCESADOS

Leche cruda: despues de enfirarla a 4 deg. C en la cortina de freon, la leche cruda es medida en litros y envasada manualmente en bolsas plasticas impresas a todo color.

Crema: se descreman 100 litros de leche y se envasa la cre resultante en bolsas de 500 cc.

Queso crema: a partir de leche no descremada y crema.

7. DISTRIBUCION Y COMERCIALIZACION

Lecheria Las Victorias posee una tienda en Coban, (35,000 hab.) a 24 km. de distancia, donde vende sus productos a los siguientes precios:

- leche cruda en bolsa, a Q.0.65 el litro
- crema en bolsa, a Q.1.40 el vaso de 250 ml
- queso crema, a Q.1.10 la media libra

8. COMENTARIOS

Esta pequena lecheria es un buen ejemplo de tecnologia intermedia, tanto por su ordeno semi-automatico, como por el enfriamiento de la leche utilizando una pequena cortina de freon.

La disponibilidad de agua fria (12 - 15 grados C) en el valle de Tactic permitiria pre-enfriar la leche y crema de una manera barata y sencilla, utilizando sistemas de cortinas.

FECHA DE LA VISITA: 19 DE ENERO DE 1987.

PINULAC
San Jose Pinula
Sr. Augusto Noriega
Departamento de Guatemala

SURVEY

BRIEF HISTORY:

Plant has developed over the last three years from 50 liters/day to present 2,000 liters in dry season and 3,500 liters in rainy season. All milk is converted into cheese.

It is private owned and managed by Sra. Noriega.

SITE:

Outside of population center, on unpaved road.

BUILDING:

It is of a concrete structure in an area of 12 ft. x 20 ft. It has an 8 ft. x 10 ft. office and two cheese aging rooms. The building is in good condition. A new cheese aging room is under construction along with a room for a HTST unit.

EQUIPMENT:

1. Separator:

   Two, each with a capacity of about 400 liters per hour. The separator is stainless stel, belt driven, using a 1/1 HP electric motor.

2. Cheese Vat:

   One stainless steel 400 gal. vat (7,500 liters).

3. Propane Burners:

   Several burners where available to provide heat to cook the curd in aluminum kettles of 3-4 gal. capacity.

4. Molds:

   Many were available for different cheeses, and all were of

hard plastic for the mozzarella.

The molds for Riccotta and layered cheese are made of wood.

5. Packaging:

All product was shipped in poly bags.

OBSERVATIONS

A. Raw Milk:

Raw Milk was received from 30 producers. 50% of the milk was purchased from a middle man. The milk is received warm and mannually filtered through a cloth. About 25% of the milk is cooled at the farm.

The milk comes from Jersey, Holstein, and Brown Swiss. No chemicals were used for any preservative.

The milk is tested for acidity (range 18-22), Butter Fat and Total Solids as well as organilleptically.

B. Processing:

50% of the milk is used for Mozzarella. The other is used for fresh "Layered" cheese and Gouda.

Some sweet and sour cream is sold. This is left over from separation.

C. Packaging:

All product shipped in poly liners.

D. Sales:

60% to supermarkets, the other 40% to commercial. He has two fulltime sales people and two employees that work in the supermarkets giving out samples.

E. Utilization:

100% to cheese.

NOTE: The milk is cooled at the farm, is held overnight in their cooler for next day start-up.

DISCUSSION

Here is a plant that started out with 50 liters/day, three years ago, and has expanded to 3,500 liters/day.

It is managed by the wife with 32 full time employees. Part of the requirements in order to work there, are a full physical paid for by the owners and the employees must attend night school to learn to read and write, also paid for by the owners.

The only experience these people have at cheese making is self taught by hands on experience. They did their own R & D work themselves using some books and some help from Marshall Labs in culture rotation.

These owners specifically asked for technical assistance and education. They desire someone to work in the plant to teach and fine tune the process.

RECOMMENDATIONS

In this case, two recommendations are obvious.

One is to obtain someone willing to live and work in the plant for a period of time to teach the employees as well as the owners. This individual would need to put the processing procedures into a written document then, so it can referenced.

The second recommendation, is to send the owner to the States preferably to a small factory but not necessarily, or to a University for short course/courses for some formal education.

IMPULSORA LECHERA GUATEMALTECA S.A. (ILGUA)

1. UBICACION:

ILGUA se encuentra en el Km. 42 de la carretera Guatemala - Escuintla, en la localidad de Palin, Departamento de Escuintla, a 1,100 metros de altitud.

2. EDIFICACIONES:

La fabrica esta en un terreno de 3 Has. al borde de la carretera. Hay un criadero de cerdos en la parte de atras. El edificio tiene alrededor de veinte anos y alberga oficinas, laboratorio, sala de proceso, camaras frias, sala de empaque y servicios generales.

3. EQUIPO:

No se pudo ingresar a la sala de proceso pero se nos permitio ver parte del equipo desde el laboratorio. No obstante fue imposible verificar personalmente el tamano y capacidad del pasteurizador, homgenizadores y descremadoras.

Lo mas caracteristico de esta fabrica es la presencia de un actinizador para el tratamiento de la leche cruda.

RECEPCION:
Tanques de leche cruda: 2 de 5,000 litros

PASTEURIZACION:
Actinizador de 10,000 litros/hora
Descremadoras: 3 de 5,000 litros/hora

HOMOGENIZACION:
Un homogenizador para queso crema, de 1,500 lt/h
Dos homogenizadores para crema, de 2,500 y 5,000 lt/h.

MANTEQUILLA:
Batidora de madera para 300 litros de crema.

QUESERIA:
Paila quesera de 3,500 litros, con agitadores
Tinas queseras: 8 de 1,500 litros cada una
Moledora para queso procesado
Marmita de 100 litros para queso procesado.

EMPAQUE:
Termoformadora de doce moldes por golpe
Termoselladora al vacio

CAMARAS FRIAS:
Tres cuartos climatizados para guardar queso fresco, crema y mantequilla.
Una camara de maduracion para el queso Cheddar

AGUA:
Conexion a la red de agua potable y tanque subterraneo de almacenamiento de 55 metros cubicos.
No hay pozo de agua.

VAPOR:
Caldera horizontal de 80 HP
Dos calderas verticales de 40 HP cada una

AGUA HELADA:
Dos bancos de hielo de 9,000 litros cada uno

ELECTRICIDAD:
No hay grupo de emergencia. Conexion a la red del INDE

4. ADQUISICION DE LECHE:

ILGUA no tiene centros de acopio por lo que toda la leche recibida es caliente. Se conserva durante su transporte con 30 mililitros de solucion concentrada al 35 % de peroxido de hidrogeno por cada cien litros de leche (0.03 %). Se recepciona entre las 11 am y la 1 pm. todos los dias.

En la epoca seca llegan alrededor de 18,000 litros de leche al dia, pero en epoca de lluvias la recepcion sube a casi 30,000 litros diarios. Los transportistas son empleados de la empresa y manejan camiones de ILGUA, que acarrean la leche en recipientes plasticos de 130 litros de capacidad. No hay

camiones cisterna.

Las zonas de recoleccion son seis:

a) Pozo del Llano, Casas Viejas y Pedro de Alvarado, en el departamento de Jutiapa, cerca de la frontera con El Salvador, a 120 Kms de distancia de la fabrica. Esta ruta colecta 3,000 lts.

b) Tierra Colorada, Taxisco, en el Departamento de Santa Rosa, a 80 Kms de la Planta, con 1,300 litros de leche.

c) Iztapa, Puerto San Jose, Otacingo, en el Departamento de Escuintla, a 70 Kms de distancia, con 1,600 litros.

d) La Gomera, en el Departamento de Escuintla, a 70 Kms de Palin, con 2,000 litros de leche.

e) Sipacate, en el Departamento de Escuintla, a 90 Kms de la fabrica, con 3,000 litros.

f) Nueva Concepcion, en el Departamento de Escuintla, a 110 Km de distancia, con 7,000 litros.

La leche fresca es pagada a Q. 0.45 el litro, recogido en la finca, o a Q. 0.50 el litro puesta en Planta.

5. CONTROL DE CALIDAD:

La leche es muestreada y analizada en grasa, densidad y acidez. La grasa debe estar encima de 3.6 %, rechazandose si no llega a 3 % La acidez maxima permitida es 0.20 % Leches con mayor acidez se destinan a la fabricacion de queso Mozzarella, pero se advierte al proveedor para que corrija esta anormalidad. La densidad debe estar entre 1.028 y 1.032 gramos/litro. La reductasa dura menos de media hora pero no se toma en cuenta para el rechazo o aceptacion de la leche.

6. PRODUCTOS PROCESADOS:

Toda la leche es actinizada y transformada en derivados lacteos. Se emplea catalasa para eliminar el peroxido residual, en la leche destinada a la fabricacion de queso Cheddar y de queso crema, para que no haya inhibicion de los fermentos lacticos. El resto de la leche no es tratada con catalasa debido a su alto costo.

QUESOS:

Del total de leche ingresada, 3,000 litros se destinan a queso Cheddar, la misma cantidad para queso de capas y 300 litros para queso Mozzarella. El 70 % del queso Cheddar sirve como materia prima para el queso procesado. El resto de la leche se estandariz

a 1.2 % de grasa, para hacer queso fresco y queso seco Con el suero de queseria se hace Ricotta y luego se envia a los cerdos.

CREMA:

Parte de la crema obtenida se emplea para el queso crema. El resto se vende como crema especial y crema comercial. La crema comercial es una mezcla cuidadosamente homogenizada de crema de leche, leche descremada en polvo, agua y manteca vegetal; la manteca vegetal, de color blanco, impide que el producto se ponga amarillo; se le agrega carboximetilcelulosa para que sea mas espesa.

MANTEQUILLA:

Tambien se prepara mantequilla lavada y mantequilla de costal. La mantequilla de costal se hace a partir de crema cruda y 10 % de sal, mezcla que se deja colgando dentro de un costal, a la temperatura ambiente, por veinte dias. La acidificacion resultante, controlada por el alto contenido de sal, coagula la proteina de la crema y expulsa el suero, obteniendose la mantequilla. Normalmente se vende en pequenas porciones, envueltas en hojas secas de maiz.

7 DISTRIBUCION Y COMERCIALIZACION:

ILGUA tiene un deposito de ventas en la ciudad de Guatemala, desde donde distribuye su produccion. Los precios de venta son los siguientes:

- crema especial	Q. 4.80 bolsa de un litro
- crema comercial	Q. 1.45 bolsa de un litro
- queso fresco super	Q. 1.70 molde de media libra
- queso de capas	Q. 2.60 molde de dos libras
- queso duro tipo Taxisco	Q. 11.50 el molde
- queso procesado	Q. 3.05 la libra
- queso crema	Q. 2.60 la libra
- queso Cheddar	Q. 4.00 la libra
- mantequilla lavada	Q. 4.75 la libra
- mantequilla de costal	Q. 3.00 la libra

LA FLORA

Pueblo Nuevo, Tiquisate

Departamento de Escuintla

SURVEY

BRIEF HISTORY:

Plant built by a propietor with a losan from a bank. It was designed for 15,000 liters/day or 30,000 liters per day by US standards Plant is now closed and for sale. Bank holds mortgage

SITE:

Outside of a population center, on a main road.

BUILDING:

It is built adequately with brick and has not deteriorated even-though it is not being used

There are on site new cheese aging rooms or coolers. These have not been completed.

EQUIPMENT:

1. Coolers:

There are four, 10 ft X 20 ft X 8 ft freon cooled storage cabinets

2. Butter Churn:

One stainless steel butter churn of about 1,000 liters capacity.

3. Plate Coolers:

Two plate coolers. One used on raw milk. The sother is used for a processed product Both use well water followed by chilled water.

4. Separator

One atmospheric separator evidently seized for 2,000 liters per hour.

5. Pateurizer:

One HTST. Unable to determine capacity.

6. Storage Tanks·

Two 4,000 gal stainless steel and one 1,000 gal stainless steel.

7. Processors.

Two 700 gal. processors It appears one was used to make blends and the other to store product

8. Homogenizer:

One homogenizer used between the two processors.

9. Cheese Vat

One cheese vat. Apparent capacity 7,000 liters.

10. Drain Table:

One stainless steel cheewse curd drain table.

11. Kettle:

One - 100 liter steam jacketed with heavy duty agitator for process cheese production

12. Boiler:

One boiler capable of producing 1,725 lbs of steam per hour, complete with water softener and chemical addition.

13. Generators:

One stand-by electric generator capable of producing 105 KW>

14 Well.

One well on site with pressure tank to supply boiler and process plant with water requirements.

DISCUSSION/RECOMMENDATIONS

This plant should be sold to some producer after a point in time when milk praoduction increases enough to fill up the existing plants.

It could be sold sooner if a product line could be introduced that would generate profits. Unfortunately, I dont know what that would be at this time.

d

QUESTIONNAIRE FOR DAIRY PLANT VISITS

Name of Plant _____ Location _____

Type organization: Coop. __ Govt.__ Multinational __ Pvt. Local__

1. Supplied by ____ producers, of which ___ (no.) provide 50%.

2. Receipts per day (liters) Dry season ____Rainy season ____

3. Through receiving stations Dry season ___Rainy seas. _____

4. km. from plant from which milk is received Farthest ___
Nearest ___.

5. Samples tested for:	YES	NO	Price Affected by Results	YES	NO
butterfat	__	__		__	__
acidity	__	__		__	__
sediment	__	__		__	__
water	__	__		__	__
bacteria (reductase)	__	__		__	__
total solids	__	__		__	__

6. Outlets for excess milk: _____, _____,
_____.

7. Sources of supplemental supplies:
Milk _____
Cream _____
Dried whole milk _____
NFDM _____
Butter _____
Butter oil _____
Other milk products _____

8. Holding capacity (liters/day) _____

9. Percent sales as:	DRY SEASON	RAINY SEASON
Fluid milk	___	___
Manufactured products	___	___

10. Capacity of pasteurizer per hour (liters) ___

11. Products processed	CONTAINER TYPE	CONTAINER SIZE(ES)
Fluid milk	_____	_____
	_____	_____
	_____	_____
Cultured milk (type)___	_____	_____
___	_____	_____
___	_____	_____
___	_____	_____
Ice cream	_____	_____
	_____	_____
	_____	_____

Sour cream _____ _____
_____ _____

Dried Milk (type) _____ _____ _____
_____ _____ _____

Cheeses(type) _____ _____ _____
_____ _____ _____

11. Marketing

Outlets	% OF GROSS SALES
Supermarkets	___
Other stores	___
Direct to households	___
Institutions	___
Other	___

Distribution areas (fluid products)

_____	___
_____	___
_____	___

Methods of distribution

_____	___
_____	___

Private label YES ___ NO ___.

Who are your major competitors? _____

12. What are major hindrances to market expansion?

_____

13. What are you doing to expand marketing?

_____

Newspapers __ TV __ Point of sale __ Coupons __ Free samples ___

14. Annual advertising budget (Quetzales) _____

15. Which items in product line are the most profitable?

_____

_____

QUESTIONNAIRE ON MILK TRANSPORTATION (for milk haulers)

1. Volume collected: Dry season _____ Rainy season _____

2. Supplied by _____ farmers, at _____

3. Smallest producer _____ Biggest producer _____

4. Farthest distance of milk collection (Kms) _____

5. Ratio Volume of milk / round trip distance (lt/Km) _____

6. Time of first pick up _____ Time of milk delivery _____

7. Do you own the truck ? _____ Does the Dairy own it ? _____

8. Truck load capacity _____ Is milk cooled ? _____

9. How much hydrogen peroxyde is used ? _____

10. Is the milk tested for solids ? _____ and alcohol test ? ____

11. Type of container used to haul the milk:

- S.S. tank (specify capacity) _____
- Plastic (amount + individual volume) _____
- Metallic drums or cans (amount + volume) _____

12. Price paid to the farmers (Q./lt) _____ by whom ? _____

13. Price received by the hauler (Q./lt) _____

ANNEX 6

COOPERATIVES AND FARMER ASSOCIATIONS

I. Representational/Lobbying Organizations

- Milk Producers Emergency Committee
- Consejo de Fomento Lechero

II. Cooperative Processing-Plants

- XELAC
- VERALAC
- Los Angeles Milk Producers Cooperative

III. Member Service Organizations

IV. Breed Improvement Associations

ANNEX 6

PROFILE OF PRINCIPAL DAIRY PRODUCER REPRESENTATIVE ORGANIZATIONS

There are four principal types of dairy producer organizations in Guatemala: representational lobbying and pressure groups; producer marketing cooperatives; member service organizations; and breed improvement associations.

I. REPRESENTATIONAL/LOBBYING ORGANIZATIONS

There are two main political lobbying organizations. The "Comite de Emergencia de los Productores de Leche," more informally known as the "Committee of Three," is a pressure group initiated by producers. The Consejo Nacional de Fomento Lechero is a membership organization but attached to the Ministry of Agriculture. It participates in the legislation and implementation of government dairy policy.

A. MILK PRODUCERS EMERGENCY COMMITTEE

The Milk Producers Emergency Committee, or "Committee of Three," founded by Miguel Angel Duran, is an ad-hoc committee of three milk producers who began meeting in 1972 to discuss the production cost inflation crisis. The "Committee of Three" applies pressure on the government by proposing specific solutions to an ad-hoc general assembly of milk producers which is convoked by radio and newspaper advertisements, telephone, and telegraph. The proposed solutions are debated, modified, and ratified by the assembled producers at large, who then meet with government officials and bring pressure to bear through the mass media.

When the Emergency Committee first functioned in 1972, it achieved the enactment of the Ley de Fomento Lechero which establishes price stabilizing quotas for certain energy and protein feed ingredients essential to the dairy diet.

In recent years the emergency committee has met both in response to specific crises, and to promote political initiatives favorable to the dairy sector. These include:

- March 1985: In response to a crisis caused by imporation of 6,000 tons of powdered milk, much of which was entering the black market and depressing prices:

- May 1985: To pressure the Ministry of Agriculture to appoint a producer as President of the Consejo Nacional de Fomento Lechero;

- January 1986: To protest an illegal exportation of molasses which was authorized the by Ministry of Economy;

- August 1986: To pressure the GOG to remove price controls on fluid milk.

The secretary of the Milk Producers Emergency Committee at the current time is also the President of the Consejo Nacional de Fomento Lechero.

B. CONSEJO NACIONAL DE FOMENTO LECHERO

The Consejo Nacional de Fomento Lechero is a marriage of producer/processor/government interests. It was created by the 1973 Ley de Fomento Lechero, a law which authorizes various tax exemptions for dairy producers and processors. The purpose of Consejo Nacional de Fomento Lechero is to both represent and regulate the dairy industry. The council studies and advises the government on milk price reform limitations and petitions for tax exoneration.

The council is composed of 10 members. These include representatives from the following sectors:

1	Processor
3	Producers
1	Feed manufacturer
2	Ministry of Agriculture
1	Ministry of Economy
1	Ministry of Public Finance
1	Ministry of Health

At the present time, the producers have four voices on the council due to the fact that one of the government's representatives, the council's president, happens to be a producer.

As of JUne 1986, the council had 824 producer members. 2% ofd these are micro farmers, 54% medium farmers, and 12% are large farmers. These joined to gain access to molasses and cotton seed quotas which can be purchased at subsidized prices on the authority of the council.

Although the council appears to try to monitor the quota system in an evenhanded manner, only a minority of dairy are members of the organization. Producers who are not council members purchase commodities at non-subsidized prices directly from the mills.

The council has proposed legislation to become autonomous of government control. It sees this as being a major step in becoming a strong representative of the dairy sector. The council expects a resolution of the legislation by May 1987.

II. PRODUCER MARKETING COOPERATIVES

Limitations of time have made it difficult to ascertain the extent of dairy-related cooperatives. According to INACOP, of the 550 active cooperatives in Guatemala, only three are directly engaged in marketing or processing member milk. Each of these is a regional cooperative located at a distance from Guatemala City and with little potential to become a major player in the dairy industry at the national level. In addition, a larger, undetermined number of general agricultural cooperatives provide services (i.e. credit or sale of supplies) to their members, some of whom produce or market dairy products. A few groups, including most notably the Cooperativa Central de Lecheros, have proposed, but been unable to implement, milk marketing projects.

A. The three cooperatives most directly involved in dairy production or marketing are XELAC, VERALAC, and Cooperativa Los Angeles. These are described in detail at the end of this Annex.

B. COOPERATIVES PERIPHERALLY RELATED TO DAIRY MARKETING OR PRODUCTION:

1. The Cooperativa Central de Lecheros, formed in the mid-1960s, is one of the oldest dairy related cooperatives. It has roughly 180 members who are small, medium, and large farmers in and around the Guatemala, Escuintla, and San Jose Pinula areas. During the 1970s, the cooperative was an active bulk purchaser of supplies which were retailed to its members at reasonable prices. Its members used the cooperative to leverage representation both in the Consejo Nacional de Fomento Lechero, and the Federacion de Ganaderos, a beef lobbying and marketing organization.

Between 1979-82, ambitious cooperative leaders, encouraged by aggressive machinery suppliers,

pursued funding for a 6 to 8 million dollar 100,000 liter per day producer-owned milk processing plant and feed mill complex. The cooperative's directors abandoned the plan after deciding that the feasibility study prepared by the equipment manufacturer was biased. The project was to have been financed by the equipment supplier, based on a loan guarantee from the Banco de Guatemala.

Shortly after the termination of the processing plant initiative, the coop's manager embezzled about Q.50,000 of the coop's funds. The cooperative was seriously decapitalized by this episode and its ensuing legal costs. Today, the organization still sells supplies to members, but has lost its vitality. It is laden with non-active members who are kept on the roles to add political weight, when electing represetatives to other institutions, but who do not actively support the organization as an economic entity.

2. Cooperativa o Asociacion de Lecheros de San Pedro Pinula, Jalapa: This group was not contacted, but is reported to be as follows:

- Small: 30-40 members, quite united; about 10 years old;
- 10-15 cows each;
- 1,200 - 1,500 liters/farm/day;
- use concentrate, irrigation;
- no common marketing;
- produce farm cheese only;
- purchase molasses, cottonseed meal in bulk

3. Other cooperatives with dairy farmers among their members but with little reputed direct dairy involvement at the present time:

- CARSVO (Cooperativa Regional de Servicios Varios de Oriente);

- CASVACHI (Cooperativa Agricola y de Servicios Varios de Chiquimula): A 103-member tomato grower/marketing cooperative with 10 producers who sell raw milk to the Chiquimula market;

- Cooperativa Agricola Gualan, Zacapa: Reportedly did a pre-feasibility study for a production

or marketing project seven or more years ago.

III. MEMBER SERVICE ORGANIZATIONS

To our knowledge, non-cooperative member service organizations exist in Quezaltenango, Huehuetenango, Asuncion Mita, and San Carlos Sija. Others may exist but have not been identified.

A. ASOCIACION DE PRODUCTORES DE LECHE DE QUEZALTENANGO

The Quezaltenango milk producers association is the strongest and most active of the dairy associations. It is a non-profit association of medium and large producers, most of whom sell their milk to the Xelaju raw milk market.

The group's 32 members (26 active) are dairymen with significant educational, capital, and land resources. They united three years ago to purchase molasses and production supplies collectively and to serve as a lobbying instrument whose goal is to make their dairying enterprises more efficient and lucrative.

The group is in the process of formalizing its legal status. It hopes to eventually receive and market member raw milk collectively and to manufacture feed. Association members feel that producing raw milk for direct sale to clients is profitable, and most hope to continue increasing their production and herd sizes. None is interested in seriously selling milk to Xelac as long as the consumer raw milk market is undersupplied and Xelac cannot meet the raw market's benchmark price.

B. HUEHUETENANGO/SAN CARLOS SIJA

A dairy producers association exists in Huehuetenango, but conflicting reports from two area producers cast uncertainty on the degree of its current activity.

A producer interviewed in San Carlos Sija reports the existence of a 12-member, three-year-old producer association. It works with assistance from Heifer Project and DIGESEPE in providing artificial insemination services to member dairy herds. Members are small farmers who milk 5-10 cows. All but two village producers make fresh farm cheese which is marketed in Quezaltenango. Two send fluid milk to Xelac. The producer interviewed feels that because of its distance from a major population center, a satellite receiving station located in San Carlos Sija would collect roughly

500 liters of milk per day for sale to Xelac.

C. OTHERS

Limited time did not permit data collection about other dairy producer associations. The NCBA team is reasonably confident that further investigation within DIGESEPE regional offices will uncover others.

IV. BREED IMPROVEMENT ASSOCIATIONS

The only dairy-related breed improvement association the team is aware of is the Guatemala Jersey Breeders Association. It is located in San Jose Pinula, and has 80 active members owning 2,000 head of registered Jersey cows. The association has members located nationwide, especially in Quezaltenango and Coban.

The organization's sole purpose is to promote the expansion and perfection of the Jersey breed and to promote Jersey milk. The organization is made up of small, medium, and large ladino producers, most of whom produce less than 750 liters per farm per day. Its leaders are visionary, articulate, well educated people, some of whom, apart from the Jersey Association, are promoting the idea of forming a separate producer-owned milk marketing cooperative.

One member of the association plans to open a private dairy production processing apprenticeship program for sixth grade graduate rural youth in conjunction with his model dairy near San Jose Pinula.

The Jersey Association is visionary, articulate, and is promoting cattle which are efficient and well adapted to the third world environment. Consequently, the Jersey Association has the potential to assume an increasingly important role in Guatemala's dairy industry development over the next decade.

V. BEEF INDUSTRY ASSOCIATIONS

Since beef cows are supplying an increasing percentage of Guatemala's milk, it is appropriate to mention the existence of the beef associations. There are at least ten. Roughly half of these are grouped together in the Federacion de Ganaderos de Guatemala (FEDEGUATE), while five are non-federation members. These associations are regional in nature. They promote the commercialization of beef and breeding animals by organizing regional livestock expositions, lobbying, and engaging in beef

marketing to the domestic and export markets.

The beef associations have not traditionally played a role in the dairy industry. Lowered dollar value of beef exports in the mid-1980s, however, has caused beef farmers to rely more heavily upon the income earned by selling milk from Cebu/Brown Swiss or Holstein crossbred cows. To the extent that beef producers depend on dairy income to make their operations profitable, it is reasonable to expect that their established organizations may play a more active role in dairy industry politics.

XELAC MILK PRODUCERS COOPERATIVE

ORGANIZATIONAL PROFILE

1. LOCATION:

Xelaju Lacteos (XELAC) is located on the Western Highlands, 189.5 Kms from Guatemala City, near the town of Quezaltenango (Xelaju) between the towns of San Cristobal Totonicapan and Salcaja, Department of Totonicapan, at 2,300 meters elevation.

2. ROADS:

XELAC lies on the highland valley floor outside Quezaltenango, but receives milk from mountainous as well as lowland areas. It is accessed by a narrow, patched paved road which connects the plant with its milkshed. Some all-weather non-paved roads exist in mountainous areas, but difficulty in transport of milk from isolated small farms to these feeder roads limits XELAC's potential penetration in the remote highlands.

3. MILKSHED:

XELAC receives milk from 53 producers located in the area circumscribed by the towns of Retalhuleu, San Marcos, Huehuetenango, Mazatenango, Coatepeque and Tecpan (Chimaltenango). Inability to purchase sufficient milk is XELAC's most serious limiting factor. XELAC has an installed processing capacity of 20,000 liters per 10 hour day. Its 1987 dry season milk receipts are about 1,500 liters per day. This rises to about 2,000 liters per day in wet season.

4. ORGANIZATIONAL BACKGROUND:

XELAC is a member-owned cooperative established in the mid-1970's with the help of Helvetas, a Swiss technical assistance organization which currently supports various small projects in Guatemala. The Cooperative's goals are to increase member incomes by providing milk marketing and technical assistance services to members, and a source of clean dairy products to consumers

XELAC also operates a model farm. It produces 12

liters per cow per day from 20 Jerseys. These are fed white clover, rye grass, alfalfa, wheat straw, and molasses silage. In addition, the cooperative raises goats for sale to small producers, and makes goat cheese. Whey from the cheese plant is mixed with beet pulp, wheat by-products, and brewers grain, and fed to hogs.

By 1982, Helvetas judged that the Cooperative was strong enough to stand alone, and withdrew its technical assistance personnel. Between 1982 and 1984, the Cooperative suffered economic and milk suply problems. Producer confidence in the business was undermined when milk payments were delayed. These problems led to financial losses in 1984, with subsequent decapitalization of the business. In that year, Helvetas resumed technical assistance to XELAC. It named a professional manager and underwrote some administrative expenses. By 1985, the Cooperative was able to break even,s but undercapitalization and lack of producer confidence in the business remain as major obstacles.

5. MEMBERSHIP:

XELAC is owned by 70 members, 52 of whom are actively selling milk through the Cooperative. Many of these are ladinos; others are indigenous. Only a small % of XELAC's producers farm more than 10 hectares of land. Although no recent issue has forced the situation, those close to the Cooperative feel that in certain types of crises, the Cooperative's members would divide along ethnic lines.

6. PROCESSING ACTIVITIES:

XELAC receives and processes member and non-member milk. 90 % of its present production is sold as pasteurized fluid milk in Quezaltenango, and the rest is processed into cream, butter, and yogurt. While the sale of dairy derivatives is highly profitable, the sale of fluid milk is not. XELAC sells fluid milk for three reasons:

1. It feels a moral obligation to provide a source of clean milk to area residents;

2. It does not have the financial capital to maintain

large cheese inventories; and

3. It wants to keep the fluid market door open, so that excess production can be more easily dealt with during the rainy season peaks.

7. FINANCIAL SITUATION:

1986 Total Sales _____
Fluid milk sales _____
Cheese sales _____

Member equity _____
Indebtedness _____ Status _____
(paid up or default)
1986 Operating (Profit-Loss) _____

Although XELAC is undercapitalized, it is not heavily in debt. It negotiates short-term credit through the Banco Industrial which the Cooperative feels is more agile and responsive than BANDESA.

8. INTERNAL MANAGEMENT: STRUCTURE AND STYLE:

XELAC's maximum authority is its general assembly of members which meets at least once a year. The General Assembly elects a _____ member Administrative Council, Vigilance Committee, and _____ (other) Committee. The Administrative Council meets _____ times per month and supervises the activities of a general manager which it hires. Since Helvetas was influential in organizing the Cooperative, it, in pratice, has played a strong advisory role in the managerial selection process.

9. INSTITUTIONAL RELATIONSHIPS:

XELAC's most important relationship is its longstanding commitment from Helvetas. Helvetas in turn has signed a letter of understanding with Guatemala's Vice-Minister of Agriculture. DIGESEPE/AID small farmer technical assistance parallels and complements XELAC's producer education activities. In January of 1987, XELAC formalized an agreement to give one day a week technical and administrative assistance to the Veralac Milk Producers Cooperative in Alta Verapaz. XELAC has an interest in exploring the possibility of joint collaboration in some form

with the Santa Lucia vegetable growers cooperative in Solola to purchase or manufacture cattle feed with Sta. Lucia's feed mill equipment. The equipment is currently inactive and heavily mortgaged to BANDESA.

TECHNICAL PROFILE

1. INSTALACIONES:

- Planta lechera: sala de recepcion y pasteurizacion de leche, camara fria, sala de quesos, laboratorio. Ademas hay un sotano con cuatro camaras para maduracion de queso Sbrinz, Gruyere, Tilsit y Camembert.
- Oficinas Administrativas
- Casas para el personal administrativo
- Camara caliente para maduracion del queso suizo
- Establo lechero con 30 vacas Holstein
- Criadero de cerdos Landrace y Chestershire
- Establo de 12 cabras Nubia y Saanen

Hay ademas un Laboratorio de Suelos que sin pertenecer a la cooperativa, esta dentro del terreno de la misma.

2. EQUIPO

La maquinaria es mayormente europea (Suiza, Austria, Francia, Alemania, Italia), pero algunas bombas y tanques son de USA.

2.1 RECEPCION

Balanza pesa-leche para 100 Kgs.
Colador y balde de vaciado
Lavadora de tarros, a pedal
Tanque enfriador de leche cruda, 1,150 litros
Tanque de leche cruda, 800 litros

2.2 PASTEURIZACION:

Pasteurizador HTST de 1,000 litros/hora
Descremadora de 1,500 litros/hora
Bombas centrifugas: 4 de 1,500 litros/hora

2.3 HOMOGENIZACION:

Homogenizador de una etapa, 120 litros/hora
No se usa en leche pasteurizada
Solo se emplea en elaboracion de queso crema

2.4 LECHE PASTEURIZADA:

Tanques de leche pasteurizada: 2 de 650 litros

Envasadora de leche en pouches, de 1,200/hora

2.5 CREMA Y MANTEQUILLA:

Tanque de pasteurizacion de crema, de 150 litros
Envasadora de crema, a pedal
Batidora-amasadora de mantequilla para 120 litros de crema (capacidad de trabajo).

2.6 QUESERIA:

Paila redonda de cobre, de 1,250 litros
Paila rectangular de acero inox, de 650 litros
Prensa de once palancas de madera, con pesas de cemento.
Moldes de aluminio, plastico y madera de pino
Cortador-fundidor de 30 Kgs. para queso procesado

2.7 AGUA:

Agua de pozo, tibia de 30 - 35 C, calentada por energia geotermica

2.8 VAPOR:

Caldera de 25 HP, dentro de la sala de quesos

2.9 AGUA HELADA:

Banco de hielo de 6,700 litros

2.10 ELECTRICIDAD:

Grupo electrogeno de emergencia, 66 KVA

3. ADQUISICION DE LECHE:

3.1 LECHE DEL ALTIPLANO (HIGHLANDS MILK)

La Planta recibe 1,200 lts. de leche al dia, proveniente de los departamentos de Quezaltenango y Totonicapan, en un radio de 40 Kms. Toda la leche llega caliente, entre 20 - 28 deg. C habiendo dos recepciones al dia. El proveedor mas grande trae 250 lts. y el mas pequeno apenas 2 lts. al dia; el mas lejano se encuentra en San Carlos Sija. No hay centros de acopio de leche fresca.

Se paga la leche cada quince dias. Los proveedores que son miembros de la Cooperativa reciben un precio base de Q 0.42 por litro puesto en Planta, en tanto que los no asociados reciben

Q 0.37/litro. No hay descuentos en el precio de la leche recibida, con el proposito de crear un capital de inversion en la Cooperativa.

La leche es transportada de diversas maneras:

- en pequenos tambos de hojalata, cargados en la espalda y asegurados con una cinta de cuero a la frente (mecapal); son pequenos, de no mas de 15 a 20 litros, y de boca angosta;

- en tinajas de arcilla o de plastico, sobre la cabeza de la persona;

- en tambos de plastico con tapa rosca, acarreados con bicicleta;

- en tambos de hierro estanado o de aluminio, de 40 a 50 litros, en camionetas de transportistas.

Durante la epoca de lluvias, la planta procesa alrededor de 2,800 lts. de leche al dia. La produccion de leche en el altiplano ha mermado considerablemente en este verano debido a una epoca de lluvias corta y a fuertes heladas; ambos factores han contribuido a la falta de pastos.

3.2 LECHE DE LA COSTA (LOWLANDS MILK)

Antes del 15 de diciembre de 1986, XELAC procesaba 1,200 litros adicionales de leche traidos por un intermediario desde los departamentos de Suchitepequez y de Escuintla (del Parcelamiento Nueva concepcion). Se dejo de comprar esta leche por haber un exceso de queso en las camaras de maduracion, y por el alto costo del flete. El transportista demoraba tres horas en recorrer los 170 Kms de ruta, por lo que agregaba peroxido de hidrogeno a la leche caliente, empleando 10 mililitros por cada cien litros de leche (0.01%).

Dicho intermediario era pagado Q 0.54 por litro de leche puesta en Planta y el productor de la costa recibia Q 0.39 por litro entregado. La leche era transportada en barriles metalicos de 55 galones.

Para reemplazar esta perdida, XELAC piensa comprar en el futuro

leche del Parcelamiento La Maquina, departamento de Suchitepequez y de Coatepeque, departamento de Quezaltenango, zonas mas cercanas a la Planta. Tambien se espera reunir alrededor de 500 litros de leche en San Pedro Sacatepequez, departamento de San Marcos.

4. CONTROL DE CALIDAD:

4.1 ANALISIS:

Al momento de la recepcion se muestrea la leche de cada proveedor y se analiza lo siguiente:

ACIDEZ:	0.20% es el valor maximo aceptado (9 SH)
DENSIDAD:	entre 1.025 y 1.029 a 20 - 28 C.
REDUCTASA:	dos horas es el tiempo minimo.
GRASA:	se busca un valor minimo de 3.6%; se determina quincenalmente sobre muestras compuestas conservadas con bicromato de potasio.
WHITESIDE TEST:	debe ser negativo; si es positivo se examina las vacas del proveedor con CMT.

Los analisis de acidez y densidad se hacen todos los dias, para detectar leches viejas y/o aguadas. La reductasa y el test de Whiteside se hacen una vez por semana.

4.2 BONIFICACIONES

El precio base de la leche es bonificado por elevado contenido graso, por larga reductasa y por ausencia de mastitis. Por cada decimo de grasa encima de 3.6% se agrega un centavo de Quetzal al precio por litro, hasta un maximo de cinco centavos.

Si la reductasa esta entre 3 y 4 horas hay una bonificacion adicional de un centavo/litro. Si la reductasa dura mas de 5 horas, se aumenta dos centavos por litro de leche.

La leche proveniente de vacas sin mastitis (Whiteside

negativo), recibe un centavo adicional por litro de leche.

4.3 DESCUENTOS

Por otro lado, el precio base puede ser castigado por leche de corta redu tasa, mastitica, acida, con poca grasa y/o con agua.

Si la reductasa dura apenas dos horas, se rebaja un centavo por litro. Si la reductasa es menor de dos horas, se descuenta dos centavos/litro.

Un resultado positivo en la Prueba de Whiteside significa un centavo menos. Si la acidez esta entre 8 y 9 SH (de 0.18% a 0.20% de acido lactico), se rebaja un centavo por cada litro. Si la leche tiene mas de 0.20%, la leche es rechazada.

Se descuenta un centavo por cada 1% de aguado. La intensidad del aguado es estimada con formulas que usan la densidad y el contenido graso de la leche en discusion. No hay crioscopio en el laboratorio.

5. PRODUCTOS PROCESADOS:

Debido a la poca disponibilidad de leche en la zona durante la epoca seca, toda la leche recibida se esta procesando como leche pasteurizada, yogurt, crema y mantequilla. No se esta haciendo ninguna clase de quesos por el momento.

- LECHE PASTEURIZADA:

La leche recibida en la tarde es enfriada en el intercambiador de placas y se bombea a un tanque con unidad de enfriamieto, donde permanece toda la noche.

A la manana siguiente esta leche cruda y fria es mezclada con leche fresca, en el mismo tanque. La mezcla es llevada al pasteurizador para su tratamiento termico y estandarizacion a 2.8% de grasa. A partir de un tanque de alimentacion, la leche pasteurizada es embolsada en pouches de 946 ml. y puesta en cajas plasticas dentro de la camara fria.

- CREMA DULCE:

La crema resultante es pasteurizada a 85 deg. C, enfriada y envasada en recipientes de plastico de 250 y 500 cc.

- MANTEQUILLA;

Parte de la crema pasteurizada es dejada en tarros durante siete a ocho dias en la camara fria para su acidificacion. Cuando la crema tiene 0,67 a 0,78 % de acidez, es batida para obtener mantequilla. Esta es vendida con y sin sal, en bloques de 225 grs.

- QUESOS:

Hay una gran variedad de quesos, aunque no se hacen todos en la misma epoca: queso fresco, queso crema, quark, Mozzarella, Xelaquito (pasta blanda, como el Reblochon), Camembert, Tilsit, Gouda, Gruyere, Emmental, queso rallado tipo Parmesano y queso fundidof para untar.

- YOGURT:

No se hace con leche fluida sino con suero de mantequilla y leche descremada en polvo. Esta mezcla es pasteurizada a 85 C en el pasteurizador de crema, enfriada a 45 C e inoculada con 1% de cultivo (Joghurt #709, Wiesby Lab.). Se elabora en cuatro sabores: natural, fresa, pina y naranja. Los recipientes de plastico empleados para su venta son de 236 y 340 cc. de capacidad.

6. DISTRIBUCION Y COMERCIALIZACION

XELAC posee una caseta de ventas en la Planta lechera y una tienda en Quezaltenango, donde de vende el 20% de la produccion, siendo la leche repartida casa por casa. El 80% restante es enviado a la ciudad de Guatemala y puntos intermedios como Atitlan y Antigua.

La cooperativa no tiene camion propio, por lo que manda la mercaderia en transporte publico, viajando de noche para evitar el calor. Hay un solo represetntante en la capital, EXCEL,S.A., que atiende mayormente a supermercados.

Las ventas de XELAC se reparten de la siguiente manera:

- LECHE: 60% de la produccion, venta local en Quezaltenango y Totonicapan.

- QUESOS MADURADOS: 25% de la produccion, venta en la ciudad de Guatemala.

- CREMA, MANTEQUILLA, YOGURT Y QUESOS FRESCOS: 15% de la produccion, venta local aunque se envia mantequilla a granel a la ciudad de Guatemala

La leche pasteurizada se vende en pouches impresos a dos colores. El yogurt, la crema y el queso crema se venden en recipientes de plastico con etiquetas adhesivas. Los quesos se expenden en porciones de media libra y de una libra, en bolsas plasticas o envolturas de papel.

Los precios de venta en Planta son los siguientes:

- leche pasteurizada, 946 cc. (1/4 gal)	Q. 0.65
- yogurt natural y frutado, 8 onzas	Q. 0.50
- yogurt frutado 12 onzas	Q. 0.75
- crema dulce, 236 cc (1 cup)	Q. 1.15
- crema dulce, 473 cc (1 pint)	Q. 2.25
- mantequilla, 8 onzas (1/2 libra)	Q. 2.25
- queso fresco, 1 libra	Q. 1.90
- queso quark, 12 onzas (3/4 libra)	Q. 1.10
- queso crema, 8 onzas (1/2 libra)	Q. 1.60
- queso crema, 4 onzas (1/4 libra)	Q. 0.90
- queso Camembert, molde de 12 onzas	Q. 2.25
- queso Mozzarella, molde de 1 libra	Q. 2.90
- queso Xelaquito, molde de 12 onzas	Q. 2.00
- queso Tilsit, media libra	Q. 2.90
- queso Gruyere, porcion de media libra	Q. 2.90
- queso Emmental (Swiss), 8 onz.	Q. 2,90
- queso Sbrinz, 16 onzas (1 lb.)	Q. 6,50
- queso fundido, 16 onzas (1 lb.)	Q. 3.00

7. COMENTARIOS Y RECOMENDACIONES

7.1 PERSONAL

La Planta dispone de personal bien adiesrado y

entusiasta con su trabajo. No se ve la necesidad de un adiestramiento adicional para nuevos derivados lacteos, pues el espectro de produccion es ya considerablemente ancho.

7.2 ESCUELA QUESERA

XELAC tiene adecuada maquinaria para elaboracion de quesos, que no se usa tiempo completo por el bajo volumen de leche trabajada. Podria pensarse en emplear estas instalaciones para una Escuela de Queseria, donde se prepararian tecnicos lecheros teorico-practicos.

7.3 QUESO CAMEMBERT

Hay mucha contaminacion de hongos extranos, que impiden la normal maduracion de este queso. El unico modo de evitar esto, es madurar el lqueso en un lugar aparte, lejos de los otros tipos de queso, y crear un adecuado ambiente microbiano mediante siembra de esporas de Penicillium candidum en la leche, el queso recien moldeado, en la salmuera y en la camara de maduracion. Esta situacion debe solucionarse si se desea competir con el Camembert de PROLACSA en la ciudad de Guatemala. Asimismo, el queso debe ir dentro de una caja de carton para evitar su apachamiento.

7.4 COMERCIALIZACION

Aparentemente hay problemas de comercializacion en quesos madurados. XELAC esta en una zona de fuerte poblacion campesina, cuyo habito de consumo no incluye ese tipo de queso, por lo que la venta local sera siempre muy reducida. El gran mercado de la ciudad de Guatemala, debe poder absorber su produccion ya que la calidad es optima, la presentacion es adecuada y no hay excesiva competencia. XELAC necesita un sistema de ventas mas dinamico en la capital, con algo de propaganda y representantes en las zonas residenciales, donde vive la poblacion de mayor nivel economico.

FECHA DE LA VISITA: Enero 1987

VERALAC MILK PRODUCERS COOPERATIVE

ORGANIZATIONAL PROFILE

1. LOCATION:

Cooperativa Agropecuaria de las Verapaces or Verapaz Lacteos (VERALAC) is located in Tactic, department of Alta Verapaz, 180 Km. from Guatemala City. Tactic is 1,460 meters above sea level, 30 Km. from Coban. Weather conditions are suitable for dairy cattle, with 85 % relative humidity, between 12 and 25 deg C. and 2,000 mm of annual rain fall. It is situated in a unique environment where there is green grass all the year because of 150 rainy days throughout that period.

The highway connecting the cooperative with nearby towns and Guatemala City is paved and in excellent condition. However, local acces roads leading to producer farms are a limiting factor to increased milk receipt by the processing plant.

2. INSTITUTIONAL BACKGROUND

During 1977 and 1978, milk producers from Salama (Baja Verapaz) united with producers in Tactic (Alta Verapaz) to form a 100-member cooperative which would build and operate a milk pasteurizing and processing plant, sell feed and veterinary supplies, and provide technical services to members.

With the support of General Romeo Lucas Garcia, a native of the area who was at the time President of Guatemala, BANDESA undertook a feasibility study which estimated that the plant would receive 5,000 liters of milk per day from the surrounding area. A Q. 450,000 loan with a grace period of three years on principal payment was approved. At the time the Quetzal was at par with the US dollar.

The plant became operational in 1982, processing 600 liters per day. From the outset it was plagued by technical problems resulting from improper installation of equipment, particularly the pasteurizer, and lack of milk. The plant has never received more than 2,400 liters per day, which is

substantially below the 3,000 liters per day breakeven point which directors report to be the amount required to service the cooperative debt. In January 1987, VERALAC was receiving about 2,000 liters a day. Its directors consider this to be breakeven for operating costs.

Co-op members feel that the BANDESA feasibility study overestimated the co-op's milk receiving potential. Also, early membership in the cooperative was inflated by the presence of non-producers who expected that joining the co-op would make them elegible for credit. Of the original 100 members, only 40 % were producers.

In 1985, the cooperative fought and won a legal action against the company which had misinstalled its equipment. The equipment was eventually reinstalled, and the cooperative was reimbursed Q. 20,000 in damages. This was paid directly to BANDESA. Although the cooperative has not been able to pay either interest or principal, the bank accepted the Q. 20,000 as evidence of intent to pay, and has been lenient in its collection policy. VERALAC's financial obligation currently stand at roughly Q. 125,000 owed in interest, plus Q. 450,000 owed on principal.

3. RURAL VIOLENCE

The large amount of guerrilla/army violence which occurred in the area between 1980 and 1984 sharply diminished the cooperative's ability to collect milk. Part of the cooperative's difficulties were rooted in its ethnic makeup relative to that of the region. Although about 80 % of the area's population is indigenous, 93 % of VERALAC's producers are ladinos, and 66 % own more than 10 hectares of land. During the violence several of the cooperative's producers, and a large number of their sons, were murdered. Others simply abandoned their farms and fled the area. These are slowly returning after 1986.

As a result of low throughout, technical problems, and inexperienced management, the cooperative faced a liquidity crisis in 1984 which caused it to delay its milk payments by up to eight weeks. Many members abandoned the cooperative at this time and shaken confidence continues to limit the business' milk receiving capability. Membership bottomed out at nine active individuals

From 1985 onward, the cooperative has consolidated.

Non-active members were expelled, half of its 16 employees were released, and a new manager was hired The administrative council now meets weekly, and is actively seeking technical, marketing, financial, and administrative assistance to make the cooperative solvent. As of January 1987, 23 members and 22 non-members are supplying milk to the plant

TECHNICAL PROFILE

1. EDIFICACIONES

La Planta Lechera esta sobre un terreno de una hectarea aproximadamente. Consta de un edificio que alberga la zona de recepcion de leche, sala de pasteurizacion, sala de queseria, laboratorio, camara fria, cuarto de salmuera, almacen y oficinas. Ademas hay otra construccion para los servicios generales.

2. EQUIPO

La mayor parte del equipo data de 1980 y es de procedencia sueca, con excepcion del homogenizador, de la paila quesera y de la envasadora de leche.

2.1 RECEPCION:

Balanza pesa-leche, capacidad 250 Kgs.
Tanque de vaciado, 600 litros
Lavadora manual de tarros, agua y vapor
Filtro de disco en la tuberia de leche
Bomba centrifuga de 2,500 litros/hora
Enfriador de placas, 2,500 litros/hora
Tanque aislado para leche cruda, 10,000 litros

2.2 PASTEURIZACION

Tanque de balance, 50 litros
Descremadora de 1,000 litros/hora
Pasteurizador HTST de 1,000 litros/hora
Equipo de regulacion de vapor
2 bombas centrifugas de 2,500 litros/hora

2.3 HOMOGENIZACION:

Homogenizador y bomba positiva

2.4 LECHE PASTEURIZADA:

Bomba centrifuga de 5,000 litros/hora
Tanque de alimentacion de 2,000 litros
Bomba positivia de 2,100 litros hora
Envasadora de leche en pouches, 2,000/hora
Camara fria de dos puertas y 65 metros cubicos

2 5 QUESERIA:

Paila quesera de 3,000 litros con agitador
Incubador de fermentos, pare 46 litros

2.6 AGUA:

Agua de manantial canalizada por tuberia de dos pulgadas y filtro desarenador (15 C)

2.7 VAPOR:

Caldera de vapor de 10HP, ablandador de agua.

2.8 agua helada:

Banco de hielo de 5,000 litros

2.9 ELECTRICIDAD:

No hay grupo electrogeno de emergencia
Red electrica del INDE, con transformadores

3. ADQUISICION DE LECHE

VERALAC ha estado recibiendo 2,000 litros de leche al dia en epoca seca (Enero a Mayo) y 2,300 litros en la estacion de lluvia (Junio a Diciembre). Ver Hoja No. 3. El 80% se recibe en la manana y el 20% en la tarde. El dia de la visita se recibieron 1,948 litros.

Debido a las heladas que indican el inicio de la epoca seca se han quemado las zacateras y ha bajado la produccion de leche.

No obstante, los pastos permanecen verdes a causa de las lloviznas de la tarde y neblina de la noche, en contraste con Salama en Baja Verapaz (940 mts.) donde el pasto se seca y las vacas dejan de producir leche en esta epoca.

La Cooperativa recibe leche caliente de 45 proveedores de los cuales solamente 23 son socios; ellos aportan el 70% del total. La leche llega en tarros de hierro estanado. Alrededor de 500 litros son transportados desde Santa Cruz Verapaz, a 15 kms. de Tactic con una camioneta de la Cooperativa.

Hay ademas un intermediario que recoge 700 lts. de leche en la zona de Purulha, a 14 Km. de Tactic. El transportista recibe Q.0.01 por litro de parte del ganadero y Q.0.02 por litro de parte de la planta lechera para cubrir sus gastos de transporte. VERALAC paga Q.0.45 por litro de leche puesto en planta.

En el Valle de Tactic, se producen 2,000 litros mas de leche que son adquiridos por queserias rudimentarias para descremar y hacer queso fresco (Ver Hoja 4).

4. CONTROL DE CALIDAD:

La leche es analizada al momento de la recepcion por olor, sabor, densidad y prueba del alcohol, cada dia. El analisis de grasa se hace solo esporadicamente pues al haber mucho ganado Jersey en el valle, el contenido de grasa esta por encima de 3.5%

No hay deducciones ni bonificaciones en el pago de la leche por contenido graso y/o reductasa.

5. PRODUCTOS PROCESADOS:

La planta no elabora leche pasteurizada, solamente crema, queso fresco y queso crema, a partir de leche cruda y sin cultivos lacticos. En la epoca de lluvias se hace algo de queso seco para absorber el aumento de leche en la recepcion. Hay siete personas trabajando al mando de un perito agronomo.

5.1 QUESO FRESCO

Sobre 1,600 litros de leche recibidos en la manana, 1,320 son descremados y mezclados con 280 litros de leche entera, para estandarizar a 1.5% de grasa y hacer el queso fresco.Con

1475 litros de leche estandarizada se elaboran 260 quesos de 1 5 lbs. cada uno (700 grs.) de forma cuadrada y envueltos en polypapel. El suero de leche entera es vendido a Q 0,20 el gal. y el suero de leche descremada a Q 0,10 el gal. para alimentacion de terneros y cerdos. No se hace Ricotta con el suero.

5.2 CREMA

Se obtiene, ademas, 125 litros de crema al 41% de grasa, que es envasada manualmente en bolsitas plasticas de 250, 500 y 1,000 cc.

5,3 QUESO CREMA

Con los 400 litros de leche entera de la tarde, se hace queso crema. En ambas fabricaciones queseras, la cuajada es molida, salada y sobada antes del moldeo. Se emplea 1 Kg. de sal para 80 quesos (56 Kgs).

6. DISTRIBUCION Y COMERCIALIZACION

El 70% de la produccion de crema y queso fresco es vendido en las ciudades de Coban (35,000 habitantes) y Carcha (55,000 habitantes). La Venta se realiza a traves de vendedores particulares que obtienen 6% de comision. VERALAC no tiene transporte propio para el producto terminado ni un deposito de ventas.

El 30% restante es vendido en la misma planta de Tactic a las "queserias de canasto", mujeres que llevan el queso fresco y crema a las fincas de cafe en Chamelco y de cardamomo en gran demanda por estos productos entre los trabajadores y la produccion no alcanza.

Los fines de semana, se vende queso y crema en la planta a turistas que llegan de la capital. Los precios de venta al publico son los siguientes:

- queso fresco semi-descremado Q.2.00 por 1 1/2 lb
- queso crema Q.1.80 por 8 onzas
- crema Q.1.20 por vaso de 250 cc.
- crema Q.4.50 por litro
- mantequilla Q.5.20 por una libra

VERALAC ha embolsado leche pasteurizada y ha hecho un ensayo de ventas en San Cristobal Verapaz, con buenos resultados. La Cooperativa desea producir leche pasteurizada en bolsas de medio litro y de un litro, que podria ser vendida en Coban y Carcha a Q.0.70 el litro.

El unico competidor es Lecheria Las Victorias que vende leche cruda enfriada y embolsada. A Coban solo llegan helados de Foremost, queso crema de La Pradera y queso procesado de La Palma.

7. COMENTARIOS:

VERALAC posee un equipo neuvo para pasteurizar, estandarizar y embolsar leche fluida,pero no lo usa por falta de leche y porque no hay un tecnico bien entrenado.

Casi no hay piezas de repuesto en el almacen.

HELVETAS ha ofrecido visitarlos una vez por semana para darles asistencia tecnica, pero solo les ensenaran a fabricar quesos distintos a los que se hacen en XELAC, por temor a una competencia. Entre ambas cooperativas lecheras hay 370 kms de carretera de montana, lo que significa 5 a 6 horas de viaje. Ello podria dificultar la periodicidad de las visitas. Hay un ofrecimiento concreto para elaborar queso Andino en Veralac.

Hay buena voluntad y entusiasmo entre los miembros de la Directiva de la Cooperativa, pero hace falta un tecnico quesero bien preparado. Prueba de esto es que hay 120 moldes de Queso Seco, de 10 libras cada uno, con acaros, rajaduras y olor desagradable, que ya no sirven ni para fundicion.

La Cooperativa VERALAC ofrece a sus socios precios especiales en medicinas veterinarias y en melaza. Ademas hay un sistema de descuentos en el pago de la leche de cada socio-productor para amortizar prestamos otorgados a ellos por BANDESA.

8. RECOMENDACIONES:

8.1 AGUA PARA ENFRIAMIENTO

La region de Tactic posee agua muy fria, de 12 C a las 7 am. y 16 C a las 4 pm. Ello puede aprovecharse para enfriar la leche recien ordenada, si el ganadero construye una poza para sumergir los tarros de leche caliente en el agua fria. La Planta debe pagar un precio especial por la leche enfriada.

8.2 ENTRENAMIENTO DEL PERSONAL

Hay un Perito Agronomo, el Sr. Jose Moino, que ha seguido el Curso de Lecheria de la FAO en Chile; sin embargo, requiere mayor entrenamiento en el uso del equipo de pasteurizacion y en la preparacion de fermentos lacticos. Ademas, todo el personal de la planta debe ser instruido en normas de microbiologia y tecnologia lechera.

8.3 PRODUCTOS DE MAYOR CONSERVACION

VERALAC debe trabajar exclusivamente con leche pasteurizada en la produccion de queso fresco y queso crema. Al mismo tiempo, debe empezar a elaborar queso Andino para venta en la region y quesos semiduros del tipo Gouda, Danbo y Edam para venta en Guatemala City Se debe estudiar la factibilidad de producir yogurt utilizando frutas de la zona o zonas aledanas (expansion del mercado).

8.4 ADQUISICION DE EQUIPO

Si bien los moldes y prensas para los nuevos tipos de queso pueden ser construidos con madera del lugar, es preciso reemplazar el tanque de 600, para pasteurizar crema, que esta deteriorado. Para disponer de una mayor flexibilidad en la fabricacion de queso, es conveniente adquirir una segunda paila quesera, de 600 litros de capacidad.

8.5 CAMARA FRIA

La camara fria debe ser dividia en dos partes aisladas, aprovechando que posee dos puertas y dos equipos de frio independientes, para tener una zona para guardar leche, crema y queso fresco, y otra para quesos de maduracion.

FECHA DE LA VISITA: Enero 19, 1987

HOJA 2

DATOS CLIMATOLOGICOS (Alrededores de Tactic)

PURULHA:

A 14 Kms al sur-este de Tactic, a 1,050 metros de altitud.
precipitacion pluvial: 2,030 mm anuales
dias de lluvia: 146 al ano
pricipitacion pluvial en julio: 384 mm (23 dias)
precipitacion pluvial en febrero: 37 mm (5 dias)

SANTA CRUZ VERAPAZ:

A 15 Km al nor-oeste de Tactic, a 1,046 metros de altitud.
precipitacion pluvial: 1,893 mm anuales
dias de lluvia: 156 al ano
temperaturas en julio: 12 - 25 deg. C
temperaturas en enero: 10 - 22 deg. C

COBAN:

A 31 Km al norte de Tactic, a 1,317 metros de altitud.
precipitacion pluvial: 2,112 mm anuales
dias de lluvia: 209 al ano
temperaturas en julio: 14 - 27 deg. C
temperaturas en enero: 9 - 23 deg. C

Fuente: Estudio de las Posibilidades para la Explotacion de Ganado Lechero de pura raza europea en la region de Coban, Alta Verapaz y municipios cercanos", Joaquin Almengor, Guatemala 1971.

HOJA 3

MONTHLY MILK RECEPTION IN VERALAC

Month	1982	1983	1984	1985	1986
Jan	33,773	50,331	29,399	44,879	33,752
Feb	33,658	46,522	20,557	42,088	34,787
Mar	37,259	49,506	29,301	44,467	40,492
Apr	42,433	56,776	35,181	47,127	50,371
May	47,132	71,954	40,105	52,484	54,700
Jun	55,130	62,841	45,023	55,316	62,498
Jul	58,902	59,519	47,762	51.278	65,845
Aug	53,875	50,814	54,847	44,923	67,484
Sep	45,303	48,270	39,492	35,950	62,950
Oct	47.375	50,397	43.013	34,797	64,667
Nov	43,686	48,914	46,361	32,885	61,964
Dec	49,723	42,730	48,698	33,063	66,059
Total	548,249	638,574	479,739	519,256	565,569
x dia	1,502	1,750	1,314	1,423	1,823

Fuente: VERALAC, Sr. Carlos Caceres, Gerente, enero 1987

HOJA 4

PRODUCCION DE LECHE Y FORMA DE CONSUMO

(Encuesta en 64 Fincas Lecheras, Dic. 1970)

MUNICIPIOS	LECHE	LECHE FLUIDA	QUESO Y CREMA
Purulha	213 lt.	40 lt.	173 lt.
Tactic	1,250 lt.	152 lt.	1,093 lt.
San Cristobal	130 lt.	70 lt.	60 lt.
Santa Cruz	120 lt.	120 lt.	0
Coban	1,107 lt.	977 lt.	130 lt.
Chamelco	122 lt.	24 lt.	98 lt.
Carcha	264 lt.	91 lt.	173 lt.
Totales:	3,206 lt.	1,479 lt.	1,727 lt.
	(100 %)	(46 %)	(54 %)

Numero de Fincas con dos ordenos/dia: 14 (22%)
Numero de vacas en ordeno: 709
Produccion promedio/vaca/dia: 4.5 lts.

Fuente: "Estudio de las Posibilidades para la Explotacion de Ganado Lechero de pura raza europea en la region de Coban, Alta Verapaz y municipios cercanos". Joaquin Almengor, Guatemala 1971.

VERALAC

TECHNICAL PROFILE (1)

--Richard Janita

BUILDING

Building constructed of block and is in excellent shape. However, it appears to be overdesigned in useable floor space since a lot of unused space was available.

EQUIPMENT

1. Receiving Area:

   a) The plant had an excellent scale system for weighing milk. The scale tank had a stainless steel coarse screen to catch large sediment.

   b) This plant had a manual pedal step can washer which was being used. It's better than nothing, but detergents are required from time to time.

   c) An in-line fine sediment remover was in the line from the receiving tank to the holding tank.

2. Storage:

   Plant has capacity to store 10,000 liters of milk.

3. Plate/Frame Cooler:

   Plant has a plate/frame chilled water cooler to cool milk prior to storage.

4. Separator:

   Plant has a 1,000 liter per hour milk separator.

RAW MILK

The milk is processed from members and non-members. It's quality is typical of other plants in Guatemala. Since it's basically a cheese plant, the acidity level accepted is slightly higher than that of a pasteurization plant.

Plant receives 1,200 liters per day now, increasing to 2,300 liters per day in rainy season, from 45 suppliers with a 50/50 breakdown between member and non-member.

Processing

The HTST unit has been overhauled to work. The homogenizer needs extensive work if it is to be placed in the system. The Pre-Pak machine has been overhauled.

They hope to produce pasteurized milk in the next several months.

Cheese

They produce three types of cheeses:

1) Queso Fresco - Partially skimmed made with raw milk, shelf life of 5 days.

2) Queso Crema - Sweet cream set with rennet using raw cream.

3) Queso Seco - A special cheese using raw milk and attempted to age it. This was a research effort on their part.

Distribution

All cheeses are sold in the Tactic area. About 70% is sold in the Coban - Carcha area and 30% in Tactic.

Fresh Cream

Some of the cream that is skimmed from the milk for cheese is sold in hand tied poly bags. It is raw and it is kept under refrigeration.

5. Pasteurization:

Plant has a 1,000 liters per hour HTST or 10,000 liter per day capacity.

6. Homogenizer:

Plant has a homogenizer three times larger in capacity than the HTST unit.

7. Packaging:

Plant has a single Pre-Pak machine.

8. Coolers:

Plant has two wlak-in coolers. One for cheese, other for

fresh milk.

9. Cheese Vat:

Plant has one cheese vat of 5,000 liter capacity.

10. Boiler:

Plant has one boiler adequate for its needs.

11. Ice Builder:

The ice builder has not been sufficiently put to test, but appears adequate.

CONCLUSIONS

The plant's original investment appears to be out of line for the type of equipment and the amount of equipment that is in the plant.

The plant's method of cheese production is adequae for the style of cheeses.

The introduction of pasteurized milk should help VERALAC financially.

The plant does not do butterfat, sediment, or reductase test for quality checks, and should do so as soon as technically able.

ORGANIZATIONAL DESCRIPTION

COOPERATIVA DE PRODUCTORES DE LECHE LOS ANGELES

1. LOCATION

The Los Angeles milk producer's cooperative is located on the Los Angeles land settlement about 35 km south of La Democracia, Escuintla province, six km inland from the coast.

The area is flat and hot. It is dry six months of the year and floods at the end of rainy season. 11,000 liters of milk per day is currently produced within a 30 km radius of Los Angeles.

2. MEMBERSHIP

The cooperative has 25 active member milk producers and purchases milk from 30 non-members. Members own 20-hectarea parcels of land. They raise corn and produce beef and milk from dual purpose Brown Swiss/Cebu cross cattle. Members produce an average of 40 liters of milk per day, per farm in a dry season. In January 1987 the cooperative was selling approximately 1,700 liters of milk per day to a major corporate processor.

Non-members live outside the Los Angeles settlement. They have smaller farms and produce an average of about 20 liters of milk per farm per day. Most members have up to a sixth grade education. Several may be functionally illiterate.

3. Institutional Background

The cooperative was founded in 1965 as a vehicle for funneling agricultural credit to its members. In 1969, the group was pushed into marketing milk when its private milk handler abandoned the route. The cooperative collected enough capital among its members to purchase a seven-ton truck. Since 1969, the cooperative has consistently purchased milk from members and resold it to various processors. Members report that on three occasions processors or private buyers have cheated the group for a total of Q12,000. The losses were covered through short-term borrowing from private individuals. The cooperative has traded trucks four times in 18 years and now uses a ten-ton Hino to haul milk, cattle, and freight for local residents. The cooperative used members' capital and dealer financing to purchase a wheel tractor, plow and disc-harrow which are used to do custom tillage for local farmers during the planting season.

Cooperativa Los Angeles charges competitive rates for its services, and has managed to accumulate a savings cushion of several thousand quetzales to cover emergency maintenance or to use as working capital to purchase more milk from producers.

4. Internal Management, Structure and Style

The cooperative is governed by a General Assembly of members which meets at least once a year. A five member administrative council oversees cooperative affairs when the General Assembly is not in session.

The administrative council hires a milk buyer/driver who manages the daily affairs of the business under the supervision of the administrative council.

The cooperative hires an accountant in Escuintla to prepare its financial statements.

The cooperative has the support of a few dedicated community residents. Without their patronage, it is doubtful that the organization would have survived the financial blows it suffered earlier in its history.

5. Projects

Although Cooperativa Los Angeles owns no buildings, it owns land on which it hopes to build a milk receiving and cooling station, or a small processing plant. In 1983 INTECAP and INACOP held training sessions and supported the group in designing a project to build the facility. The initiative ended for lack of financing

The cooperative then dialogued with Xelac about the possibility of sending milk to Quetzaltenango, but decided, after further analysis, that the freight expense and the risk of mechanical failure in transport outweighed prospective benefits.

The cooperative is now selling its milk to Foremost. It feels that Foremost would pay a higher price if the milk could be cooled before delivery. The cooperative does not have access to electricity.

6. Observations

1. Land in the area is suitable for mechanized production of more valuable crops than milk. However, the small size of parcelero farms encourages the raising of small numbers of cattle on each parcel as part of a diversified survival strategy.

The milk from these cows currently provides a substantial portion of the family income.

2. The group has demonstrated staying power and seems to have capable, honest leaders.

3. Milk production in the area is significant.

4. Local cooling of raw milk would substantially improve its quality and value for commercial processing.

5. Lack of financing to build infrastructure and acquire energy to cool the product appears to be the group's chief limiting factor.

FEEDING PROGRAMS

1. Organizations

In Guatemala, there are currently more than 200 separate programs involving some form of food assistance. Some of these programs are financed solely by national funds, or more commonly, with international public and private assistance. In Guatemala City alone, for example, the Comite Nacional de Reconstruccion (CNR) distributes food to 40 agencies, about equally divided in number between private and public. In addition, there are at least a dozen agencies in the city which distribute some food but which do not receive it from CNR. Some of the forty, e.g., CARITAS, receive food from both CNR and other sources. Under these circumstances, it would be a Herculean task even to provide a summary description of feeding programs throughout the country; control and coordination is simply out of the question.

A 1983-84 study of 15 of these programs by the Central American Institute of Nutrition (INCAP) revealed that three were involved in maternal-infant feeding, one in school feeding, eight in food-for-work, one in food-for-training, one in emergency/natural disaster, and one in displaced-by-violence (exclusive of the activities of the UN High Commission for Refugees, which was not studied). There are doubtless other programs distributing food for welfare, emergency/economic problem and refugee situations. Also, this sample does not fully account for agencies which operate programs in more than one of these areas.

The principal implementing institutions studied by INCAP include the Ministry of Public Health and Social Welfare, CARITAS, CNR, Student Welfare Office (Ministry of Education), the National Forestry Institute, the National Institute for Agrarian Transformation, the Agricultural Planning Unit -- USPADA, and the Directory for Agriculture -- DIGESA (Ministry of Agriculture, Livestock and Forestry), the Office of Regional Planning -- DIGESA (Ministry of Planning), Community Development Executive Office (Presidency) and the Environmental Sanitation Unit -- SADERCO (Ministry of Public Works). There is of course a host of other implementing agencies, both public and private, which were not covered by this study of only fifteen programs.

As to the source of funding in 1984 of the fifteen programs, the World Food Program accounted for $11.9 million (22.4 MT of food), AID, $5.3 million (20.0 MT of food), $1.0 million of GOG funding (probably an understatement if the CNR data on public agencies distributing food were to account for the cost to these agencies of distributing the food and extrapolate it to the country as a whole). At this time, there is likely to be some municipal funding of these projects as well. The INCAP study provides no data whatever on private local and foreign funding of these feeding programs in Guatemala.

The INCAP study identified major constraints to effective use of food assistance at two levels, the national level and the individual program level. "At the national level, a lack of global information, weak overall planning, strategy formulation and coordination. . . . At the level of individual programs, inadequate institutional capacity of executing agencies and poor design, targetting, management and evaluation reduce program effectiveness."

2. Types and Quantities of Products Distributed

At present, food aid is provided principally by the World Food Program (WFP) and the U.S. Agency for International Development (AID). Minor amounts are provided by the Governments of Germany and Canada. The Government of Guatemala has a school lunch program which is operated with national funds and incorporates some locally-produced, internationally-donated and commercially imported food products, including dried milk, cheese and butter. There are doubtless many other programs which operate in a similar way. Some of these foods are purchased directly by the Ministry of Education and some are provided through CRN. WFP provides powdered milk as well as corn, wheat flour, legumes, meat/fish, vegetable oil, minestrone soup and oats. AID (as of Fiscal Year 1987) provides NFDM, as well as soy-fortified bulgur wheat, yellow corn, cornmeal, vegetable oil and wheat flour. Both AID and WFP allow the implementing agencies to monetize (sell in the market) various shares of these commodities in order to cover local costs of projects. Also, the different donor agencies have different fiscal years; in addition, some of them measure the commodities as shipments from the donating country and others, as donations to the receiving agencies in Guatemala.

Thus to measure the total volume of milk products made available in Guatemala through feeding programs in any given year would be almost impossible. We do have data on dried milk provided by WFP and AID for 1984-85 (for AID, this includes donations only to CARE and CARITAS; also AID operates on a fiscal year which runs from October to September). These are (in metric tons):

	WFP	AID	TOTAL
1984	1466	3898	5364
1985	2080	4517	6597.
1986	2500*	**	**

* est. from nine-month data
** no data available

3. Outlook

There is no firm basis for projecting future uses of dairy products for feeding programs in Guatemala. However, we expect the use of dairy products in these programs to grow very

significantly over the next year or two. As for AID, it provided 10,000 tons of NFDM for distribution to needy persons in FY 1983 and 1984, via a totally new window (Title 416), to twenty agencies other than CARE and CARITAS. AID's FY 1987 agreement added twenty more agencies and an additional 3055 tons of NFDM. Also, PROLAC has a mandate to provide low-cost dairy products to marginal populations, and if given the means to do so would doubtless exercise this mandate to some extent.

Thus the activities of agencies sponsoring feeding programs in Guatemala probably will also probably expand, with an accompanying increase in their use of dried milk. Donations of NFDM to Guatemala by WFP were exactly zero in 1983. By 1986 these donations had expanded to 2500 tons. For the period 1988-1991 (that of Guatemala's National Plan for Economic and Social Reorganization) WFP is programming 3500 tons of dried milk per year. Thus total international donations of dried milk are likely to double in 1988 from the 1985 figure. Whether this level can be sustained depends on the future availability of surplus dairy products in the industrialized countries.

4. Economic Implications of Feeding Programs for Product Demand

Since there is no satisfactory way to quantify the use of milk products in feeding programs, or to know by whom or to whom these products are destined, one should be extremely cautious in estimating the future consequences of them. CARE stated that in the AID fiscal year 1985 it was feeding 224,000 people in its maternal-child care (MCH) programs; 16,500, in other child feeding; and 8,600, in food-for-work (FFW) programs. CARITAS was feeding 63,900 in MCH, 3,600 in other child feeding, and 12,000 in FFW. Double these numbers (or multiply by ten, depending on one's estimate as to the number of of agencies, programs and people served) in order to allow for the activities of other implementing agencies and it is obvious that quite a few people are consuming milk products via the feeding programs. According to CRN, a significant number of them are being exposed to group lectures and one-on-one talks on nutrition and hygiene, with special attention to feeding formulas that would avoid lactose intolerance.

Thus one would suppose that in principle the impact of feeding programs on the dairy industry would be positive, at least in the long run. In the near future, however, the numbers available suggest that sales of unpasteurized milk might suffer to some degree.

STANDARDS

I. Sanitary standards

A. Sanitary standards at the producer level

Regulations Concerning Milk Production and Sale, Direction of Agriculture, 1936)

1. Does not require milk producers to be registered.
2. Requires milking area with concrete floor, sewers, roof, isolation quarters for diseased animals, potable water, separate manure storage, separate milk handling area. Also provides for tests for various infectious diseases of the animals (e.g., tuberculosis) and for medical certification of persons milking or handling milk.
3. Establishes rather loose standards for raw milk (e.g., no "foreign substances", less than 2 million bacteria of all types per ml).

B. Sanitary standards at point of sale

1. These preceded standards for processing (same Regulations as above)
2. Requires registration of sellers or distributors of milk
3. Requires milk sold to meet above standards for producers
4. Requires milk to be kept in a "fresh" or refrigerated area, at the discretion of sanitary authorities
5. Provides loose standards for containers (i.e., they must be "appropriate")
6. Provides loose standards for transport vehicles (e.g., they must be covered and used exclusively for transporting milk)

C. Standards for pasteurization plants

Standards for Operation of Plants for Pasteurizing Milk and Milk Products, Ministry of Agriculture, 1956

1. Provides that the plant must be registered; for this purpose it must furnish health certificates for all employees, regulations for testing raw milk and products, sanitary licences of all producers and suppliers (The latter requirement has apparently been introduced prior to 1956. Presumably, the producers must comply with the requirements specified above.) 2. Provides for supervision of the plant by a veterinarian
3. Prohibits all containers with the exception of one-liter glass bottles
4. Provides that the seal state date and hour of pasteurization and state "not to be consumed more than 24 hours after this date"
5. Provides that temperature of pasteurized milk be maintained at 10° C until point of sale
6. Specifies time and temperature and requires that records from recording thermometer be submitted bi-weekly
7. Provides loose standards of identity (density, acidity, fat, total solids -- these have been superseded)
8. Specifies minimum bacterial count: 200,000 colonies per ml.

D. Revised sanitary standards

Sanitary Standards for Milk, Ministry of Agriculture, 1974

This regulation provides standards for classes "A" and "B" raw milk and classes "A", "B" and "C" pasteurized, homogenized, standardized milk, as follows:

	Raw Milk		Pasteurized Homogenized Milk		
	"A"	"B"	"A"	"B"	"C"
Bacterial count(000/ml)	200	200	30	75	100
Density (max.)	1.033	1.033	1.033	1.033	1.033
Titratable acidity (%)	15-18	15-20	18	18	19
Reductase (hours)	5	4	--	--	--
Total solids (%)	11.5	5	11.5	11.5	8.5
Milk fat (%)	3.2	0.5	3.0	2.8	0.5

This standard also prohibits pathogenic microorganisms, colostrum and sediments. It applies to producers, pasteurizers, points of sale and plants producing cheese, cream and butter and and requires registration of establishments which retail, store or distribute these products.

II. Standards of Identity

Mandatory standards of identity are issued by the Guatemalan Commission on Standards (COGUANOR - Ministry of Economy). Six of these were issued for dairy products in 1976 -- for raw milk, pasteurized milk (whether or not homogenized), for milk in powder (whole, partially skim and non-fat) condensed (unsweetened) milk, condensed (sweetened) milk, and butter. There is also a standard for margarine which embraces all mixes. Finally, a separate standard has been approved for methods of analysis of dairy products. These standards are prepared by the Central American Institute for Industrial Research (ICAITI) which has also prepared standards for ice cream and soft cheeses. The latter have not yet been approved by Industry Committees established for their study and by COGUANOR.

The COGUANOR standards should be considered the final word on standards of identity, since they are approved by both an Industry Committee composed of substantially all producers and by interested Government agencies. They specify the following:

	Raw Milk	Pasteurized Milk	Milk Powder*		
			(W)	(PS)	(NFDM
Milk Fat	3.5	3.0	26	1.5-26	
1.5 Moisture (%)	--	--	4		5
Total solids (%)	12	11.5	--	--	--
Acidity (lactic acid)	0.18	0.18	1.5	1.5-2	2
Protein	3	3	25	25	33
Ash	0.80	0.80	7	7-9	9
Reductase (hours)					
For direct consumption	6.5	--	--	--	--
For pasteurization	4.0	--	--	--	--
Phosphatase (mu g/cc)	--	1	--	--	--
Bacterial Count (000/ml)	1000	200	--	--	--
Sediment (mg.)	2.0	none	--	--	--
Freezing point (-°C)	0.530	0.530	--	--	--
Solubility Index (ml)	--	--	1	1-1.25	1.25

* W = whole milk powder, PS = partially skim, NFDM = nonfat

	Condensed Unsweetened	Condensed Sweetened	Butter
Milk Fat (%)	6	8	80
Proteins (%)	6.5	--	--
Milk Solids (%)	25	28	--
Acidity (Lactic Acid)	0.4	0.4	2*
Microorganisms (000/ml)	neg.	5	0.8
Sugar	--	45	--
Water	--	--	16
Salt (NaCl)	--	--	4

*Oleic acid

Standards for bacterial count of raw milk are very loose -- there would almost certainly be an off-flavor after only a few hours even if they were observed. Standards for the first group of milk products include maximum tolerances for thirty insecticides, fungicides and herbicides but do not extend to radioactivity or stray substances from containers, etc. They also specify sampling and testing procedures. Each contains a section on containers (quite general) and labelling (specific description of the product, net contents, date of packaging, name and address of producer and instructions for storage). Standards for the latter three products contain a section on food additives.

III. Registration of food products

All new products must be registered with the Ministry of Health, with a statement of the ingredients. In practice, manufacturers are allowed to send the formulation, with a sample, to the Ministry's laboratory (LUCAM) once each five years. LUCAM simply verifies that the formulation is as stated but imposes no labelling requirements on the manufacturer. Sanitary control of animal products was transferred in 1983 to the Ministry of

Agriculture and Livestock which created a Department of Inspection and Sanitary Control. The latter drafted a regulation which has never been approved. Thus sanitary inspection at the level of dairyman, middleman, transporter, processor, wholesale or retail is nonexistent.

IV. Economic implications of standards

A. Facilitating trade among the six members of the Central American Common Market

This objective has been actively pursued since 1960 when the CACM was established. As explained above, ICAITI has appropriately taken the lead in developing standards for all six countries. At present, none of these countries impose import restrictions on milk products originating in the other five, although they do require that the product be 100% of origin within the CACM. In view of the high proportion of products manufactured from reconstituted (or partially reconstituted) products, this no doubt represents a potential barrier to trade. Xelac cooperative does not reconstitute the milk used in its cheese and sells it free of import restrictions in neighboring countries.

B. Increasing sales within Guatemala of milk products

The existing health standards, if enforced, would allay consumer concerns regarding the possibility of contracting disease from raw, pasteurized and powdered milk. But the standards for fluid milk do not mention off-flavors (e.g., wild garlic) nor do they establish time and temperature for pasteurization which could also affect flavor by imparting a cooked or burned flavor which some consumers might find disagreeable.

Moreover, as indicated above, enforcement of standards for raw milk is, at best, haphazard in Guatemala. DIGESEPE's Division of Sanitary Inspection and Control of Foods of Animal Origin which since 1983 has been responsible for this function has at this time no enforcement powers whatever. Its staff of six people is deployed entirely on processors in or near Guatemala City. The Division has accumulated voluminous statistics on violations which it appears unable to prevent.

The absence of standards of identity for fresh and cured cheeses, cream, butter and ice cream is extremely unfortunate from the point of view of expanding milk sales and also deprives consumers of the nutritional benefits of consuming milk products. Milk solids can freely be substituted in these products by other substances in Guatemala. "Ice cream", "Iced milk", "Sherbet" and "Bellywash" (i.e., artificially flavored, sweetened water) can all be called helados with no further indication on the label.

ANNEX 9

SUMMARY OF NCBA/DIGESEPE PRODUCTION SURVEY

- o Methodology
- o Results
- o Selected Tables

ANNEX 9

THE SURVEY

DESIGN OF THE SURVEY

The design of the survey was based on a sample, taken from a universe of total cattle number in dairy and dual purpose farms by agricultural regions, according to the "Censo Nacional Agropecuario 1979." An appropriate methodology was defined for simple random sampling based on the probability that the average of the main varaible is located within certain limits defined in the normal curse. The variable selected was number of animals by farm, defined by (X). In order to use this procedure, it is necessary to have a standard deviation of the cattle population between farms. Data was obtained from the final report of the "Programa de Desarrollo Ganadero" carried out by BIRF in 1978.

The first step was to decide the error to be tolerated on the estimate. According with time and available resources, it was decided to tolerate an error (L) of 5%. Assuming a 5% risk that the error will exceed (L), at reliable limits of 95% calculated on the sample average. A sample size of 296 was obtained.

Stratification of the sample was integrated by eight (8) regions. The size of the sample in each region was defined by the proportional distribution method (United Nations, 1972) which takes into account the numbers of cattle in the population.

The observations were selected in each region by random procedure. The framework of the survey was the farms registered in theDireccion General de Servicios Pecuarios (DIGESEPE), selected by means of a list system.

Sampling was national in scope, with geographic regional criteria. These constitute the current regionalization of the Ministry of Agriculture, based on an operational criteria, since it considers the magnitude and location of factors which affect the different research and extension services. This regional framework does not necessarilycoincide with the political administrative division, but can easily be limited at

the municipal level.

Analysis of the different regions allows to conclude that there are considerable differences within each region concerned with physiography, temperature, altitude and rainfall factors: as far as social and economic characteristics.

CONDUCT OF THE SURVEY:

The survey was conducted by DIGESEPE Technical Assistance Department personnel during the period January 13 to 23. The number of observations obtained was 291, which represent 97 percent of the number of observations of the survey design.

PREPARATION OF QUESTIONNAIRE AND TESTING

The survey's questionnaire was reviewed, and the observations made by the personnel of the milk project of Instituto Interamericano de Ciencias Agricolas (IICA) were incorporated. A general meeting with Directores Regionales of DIGESEPE was held on January 12.

SAMPLE SIZE DETERMINATION

Based on the probability that the average of the main variable is located within certain limits, defined in the normal curve, there is a 95% probability that the average of the variable X is located between the limits of 1.96 s/ n and U + 1.96 s/ n, assuming an approximate normal distribution This gives the equation:

$$1.96\ S/\ n = L$$

which is resolved in (n) size of the sample.

$$U = 1.96\ s\ /L$$

Where:

U = Size of the sample
S = Standard deviation
L = Admissible error

N = 1.96 (60)2/(5)2 = 282

N = 282

VARIABLES CONSIDERED IN THE SURVEY

Column Number	Unit	Description
A		Region
B		Sub-region
C		County
D	Years	Producers experience
E		Class of production
F		Total farm area
G	Heads	Milking cows inventory
H	Heads	Dry cows inventory
I	Heads	Heifers + 2 years
J	Heads	Heifers 1-2 years
K	Heads	Bull calves
L	Heads	Calves (male)
M	Heads	Calves (female)
N	Heads	Bulls
O	Heads	Steers
P	Heads	Total inventory
Q		Stable, pasture-stable, pasture
R		Reproduction system
S	Units	Tractor
T	Units	Cart
U	Units	Water Pump
V	Units	Feed chopper
W	Units	Irrigation equipment
X		Electricity availability
Y		Race of herd
Z		Total area for pasture
AA		Total area under irrigation
AB		Area improved pasture
AC		Area natural pasture
AD		Area cutting forage
AE		Type pasture grass
AF		Type pasture forage
AG	Heads	Adult deaths
AH	Heads	Calves death
AI	Liters	Milk production per day during dry season

AJ	Liters	Milk production per day during rainy season
AK	Number	Daily milking
AL		Production register
AM	Pounds	Concentrate, calves
AN	Gallons	Molasses, calves
AO	Pounds	Forage, calves
AP		Silage, calves
AQ		Hay (dry), calves
AR		Forage (green), calves
AS		Powdered milk, calves
AT	Pounds	Concentrate, cows
AU	Gallons	Molasses, cows
AV	Pounds	Forage, cows
AW		Silage, cows
AX		Hay, dry, cows
AY		Forage, green, cows
AZ		Powdered milk, cows
BA	Liters	Home milk consumption
BB	Liters	Daily sales of milk
BC	Pounds	Daily sales of cheese and butter
BD		Direct sales to consumer
BE		Sales to middlemen
BF		Sales to pasteurizing plant
BG		Name of pasteurizing plant
BH		Milk chilled
BI	Heads	Sales of cattle
BJ		Milk sales, site
BK	Centavos	Milk price
BL		Type of package for transport
BM		Feed, a resitrictive factor
BN		Credit, a restrictive factor
BO		Diseases, a restrictive factor
BP		Marketing, a restrictive factor
BQ		Technical assistance, a restrictive factor
BR		Price of milk a restrictive factor
BS		Access to farm, a restrictive factor
BT		Land tenure, a restrictive factor
BU		Input prices
BV		Molasses scarcity

INTERPRETATION OF SAMPLE SURVEY

1. Major Conclusions (Table 19)

The survey revealed a broad range of differences between specialized and dual-purpose dairying in Guatemala, including land use, herd composition and management, feed practices and systems of marketing. These differences are easily noted in the regional averages (Regions I and V -- specialized -- vs. the rest of the country for dual purpose). All of this leads to two different sets of opportunities and constraints on expansion of milk production.

The data also show sharp differences in productivity among regions, based on both availability of resources and -- more significantly -- management systems. This shows up clearly in the productivity differences between Region IV and the other parts of the country where dual purpose systems are also practiced. Factors contributing to these differences were shown to be control of reproduction, feeding, pasture improvement and use of equipment. With regard to land use, there is much scope for improving pasture, especially in areas with specialized production.

Seasonality of production is greater in areas of specialized production, despite somewhat more intensive use of feeds by specialized producers. Low rates of irrigation, silage and pasture improvement are associated with wide seasonal swings in production, as well as with low overall productivity.

Other indexes of productivity is proportion of cows in production and calving percents. These indexes are more than twice as high in areas of specialized production than in the other regions; great scope for improvement obviously exists.

Turning to consumption and sales, the survey reveals great deficiencies at every stage of the marketing system. Prices received by producers show a wide scatter. Many producers are obviously receiving distorted price signals from the market, with serious consequences for incentives. Processing plants play a minor role in the marketing system and deal for the most part with larger producers. Thus, for the dual-purpose producers in particular, marketing interventions must precede production interventions for there to be any real consequences.

2. Specialized or dual-purpose dairies and productivity of each (Tables 1, 11 and 4)

Roughly one-third (30.9%) of the responses were from specialized dairies. This ratio varied from 76% in Region V (Guatemala City) to 16% in Region IV (South Coast). In the former region, production was 7.2 liters/cow in the dry season, whereas production per cow in the latter was 4.4 liters. (In the rainy season, production increases by 41% in Region V, whereas on

the South Coast, production increases by 31%). The lowest productivity was noted in Region VIII (1.6 liters per cow in the dry season and scarcely more in the rainy season).

Production per farm was significantly higher than the national average in Region IV. Regions I and V were below and above the average, respectively. A more significant measure of productivity can be obtained by dividing total production by land used for dairy. For the dry season, these are (liters/hectare):

Region I	7.28
Region II	1.12
Region III	0.50
Region IV	3.40
Region V	10.30
Region VI	0.82
Region VII	1.20
Region VIII	0.38.

Evidently, the specialised dairies make more efficient use of land. However, productivity by this measure in Region IV is many times higher than in other regions where dual-purpose dairy farms predominate, indicating a great potential for raising productivity.

3. Land use (Table 4)

Average farm size varies greatly from region to region. In Region I, the average farm was only 5.6 Ha. In Region III, this average was 419 Ha. Land used for dairy accounted for 81% of total area in Region I, whereas in Regions III and V, this ratio was one-third or less. About three-fifths of pasture is improved. This finding should be compared to data for the year 1978, when only 20% of pasture, nation-wide, was found to be improved. In region I, only 10% is improved, whereas three-quarters of the pasture in Region IV is improved. Only 5.3% of the area is under irrigation; Region IV predominating in this regard. Three percent of area is employed for cut forage. Evidently, pasture improvement expanded greatly in recent years but still has considerable margin for increase.

4. Herd Composition (Table 3)

Average size of total herd varies from 14 and 41 in areas with specialized production, to nearly 200 in Region IV. Animals per Ha. varies from 3.9 - 3.3 in Regions IV and V to as low as 1.1 in other regions. The high numbers registered in Region V are a consequence of intensive production.

One important variable in this regard is the number of cows in production in relation to total herd population. The regions with specialized production (I and V) have very much higher ratios (70-80%) than the others which are as low as 30% in Region III. On the South Coast (Region IV) only 58% of cows are in production.

Calving ratios are a second important variable. These do not vary greatly from region to region (excepting Region V where apparently the male calves have been sold). Calving ratios in Region IV are notably high, indicating efficient herd management.

5. Availability of farm equipment (Table 5)

On-farm availibility of electricity among the surveyed dairy farms is very high. In Region IV, virtually all farms had electricity. In region I, four out of five had electricity. Tractors and carts also are widely available. About half of the farms in Region, I, IV and V have tractors and carts. Feed choppers are distributed in about the same pattern. As for irrigation equipment, ownership is widely scattered among regions. Only 8% of dairy farms have irrigation equipment.

6. Breed of herds (Table 6)

The most common breed is "cross", varying from region to region. In Regions I and V, the European breeds (Holstein, Brown Swiss and Jersey) are commonly found. Jersey is found more on the highlands. As for the dual-purpose animals, in Region IV, the cross most commonly found are Zebu-Brown Swiss and Zebu-"cross". Other crosses (Zebu-Brown-Holstein) were also reported. Whole herds of purebred animals are extremely rare.

7. Feeding Practices (Tables 7, 8, 9, and 10)

The data are divided between dairymen who feed and those who do not feed. Virtually none feed from silage, even in Region VI, which because of severe seasonal fluctuations in rainfall, truly require silage. Few farmers feed hay; as for cut forage, dairymen who use it are as numerous as those who do not, in Regions I and V; however elsewhere cut forage is not commonly fed.

Feeding of concentrates to cows in production is the predominant practice in Regions I and V and is done to a lesser extent throughout the country. Nation-wide, dairymen who do not feed concentrates only slightly exceeds those who do. It is more common in Regions IV and VI to feed molasses and cut forage. These regional differences tend to cancel each other: cut forage use is as common as not whereas nearly two-thirds of dairymen do not use molasses.

There are striking inter-regional differences in the quantities fed. Daily feed use in Regions I and V is 11.3 and 7.4 lbs. of concentrates, and 37.1 and 34.8 lbs. of cut forage, respectively. In Region IV, on the other hand, only 5 lbs. of concentrates are fed. (These data refer only to dairymen who use these products and are not overall regional averages.)

Data on feeding calves and heifers show a similar distribution, although lesser amounts are fed than to cows in production. It is of interest, in this connection, that not one of the dairymen surveyed appeared to use a milk replacer for calves. No milk powder whatever was fed.

8. Consumption and sales (Table 12)

Home consumption of milk averages 5.1 liters per farm, varying from 2.7 liters in Region I to 10.8 in Region VIII. The lower figure is accounted for by income levels, access to markets and ethnic differences, among other factors. Comparing these data with those for production shows that home consumption accounts for over five percent of production in the dry season and about four percent in the rainy season. (Milk consumed by laborers is probably included in home consumption.)

Sales of cheese and butter also vary widely by regions, in response to many of the factors listed above. Below-average sales were reported in the more-accessible Regions. Data on sales of cream were not reported because of the difficulty of obtaining standard units. Evidently, around 10% of milk production is sold in the form of these products.

9. Marketing (Tables 13, 14 and 15)

The most common form of marketing (over half) is direct to consumer, followed by middleman. Direct sales to processing plants are rather rare, concentrated in Region IV. Small dairymen are more likely to sell to small processing plants than to the large ones which pasteurize and sell in the fluid milk market. The few cases of sales to the latter group were large dairies. However, specialized dairymen obviously prefer to sell directly if they have access to a market.

As to site of sale, three-quarters sell on-farm. This means that the buyer usually pays the cost of transport and suggests that the farmer may not have much access to market news. Only one dairyman sold his milk at a processing plant. Gathering sites were popular in Region VII; but only two such sales were reported in Region IV. This is another indicator that the market is not organized on the seller side.

No dairyman reported chilling his milk prior to sale, despite a high incidence of on-farm availability of electricity.

A wide variety of packaging was reported for transporting the milk. The commonest types were plastic drums (26%), plastic and others (42%), galvanized iron (21%) and aluminum (19%) -- because of multiple answers, the totals sum to more than 100%. No regional pattern was observed in transport packaging.

10. Pricing from the sellers' point of view (Tables 16 and 17)

Sharp differences were observed in prices reported by dairymen. Standard deviations about the mean were extremely high, both within and among regions. As might be expected, prices are higher in Regions I and V where specialized dairies sell directly to nearby customers. The average in Region IV was 10 centavos per liter lower and the results showed much less scatter. Presumably, these producers sell at more standardized prices to middlemen or to large processors.

Price is related to site of sale. Dairymen who sell on-farm to middlemen receive 40-45 centavos. Dairymen who sell at processing plants receive about 50 centavos. Dairymen who sell directly to consumers receive 57-58 centavos, approximately. The latter were reported only for Regions I and IV.

10. Constraints on expansion of production (Table 18)

This question permits multiple answers. Availability of feed was the overwhelming answer, reported by three-fourths of respondents. This answer may be somewhat ambiguous since respondents in Regions I and V probably referred to purchased inputs such as concentrates and molasses. On the other hand, the response in other regions may have been directed more specifically to the seasonality of natural feed, especially in Regions IV, VI and VII.

The next common response was the low price of milk, especially felt in Regions IV and V. In Region I, dairymen expressed less concern about the price of milk. This significant regional pattern is clearly related to access to markets.

Access to credit was mentioned frequently in Regions I and V but much less so in Region IV. This reflects the need for a stable cash flow in specialized dairy farms in order to purchase inputs and meet other requirements.

Technical assistance was also frequently mentioned, frequently in connection with silage techniques. This was most common in Regions IV, V, VI and VII.

Marketing was mentioned in Regions IV and VI and less so in regions with specialized dairies.

Table 1
NUMBER OF FARM IN SPECIALIZED AND DUAL PURPOSE

REGION	Specialized	Dual purpose	Total
I	16	13	29
II	4	6	10
III	2	9	11
IV	16	81	97
V	28	9	37
VI	7	50	57
VII	13	27	40
VIII	4	6	10
TOTAL	90	201	291

Table 2
AVERAGE FARM SIZE BY REGION
Hectares

REGION	Specialized	Dual purpose	Total	AVG total
I	6.0	2.6	5.6	8.7
II	74.5	293.0	205.6	165.2
III	419.0	260.9	419.0	0.0
IV	100.2	122.0	118.3	227.3
V	30.6	43.4	33.2	46.4
VI	83.5	96.4	94.8	135.9
VII	47.0	124.5	99.4	133.5
VIII	47.2	163.0	125.2	188.9

TABLE 3

INVENTORY OF CATTLE PER FARM

REGIONS	I	II	III	IV	V	VI	VII	VIII	TOTAL
Milking cows	4.8	36.7	22.2	45.6	14.6	22.7	26.7	22.1	195.4
Dry cows	1.4	42.3	50.9	33.1	6.8	22.5	20.4	5.3	182.7
Heifers + 2 yr.	1.9	21.7	21.0	23.8	5.1	16.7	16.3	29.4	135.9
Heifers 1-2 yr.	1.2	23.0	18.4	19.2	4.7	13.9	11.3	13.4	[illegible]
Bull calves + 1 yr.	0.4	12.1	5.9	20.6	0.9	4.7	7.5	7.5	59.6
Calves (M)	1.7	10.9	17.7	23.7	3.1	11.2	13.2	9.9	91.4
Calves (F)	1.7	19.8	15.1	22.3	5.1	11.1	13.4	13.0	101.5
Bulls	0.8	3.8	2.5	3.4	1.1	2.1	2.0	3.0	18.7
Steers	0.7	2.0	0.0	1.0	0.1	1.5	0.9	0.1	6.3
Total	14.6	172.3	153.7	192.7	41.5	106.4	111.7	103.7	896.6

TABLE 4
LAND USE BY DAIRY FARMS (MANZANAS)

REGION	PASTURE	IRRIGATED	IMPROVED PASTURE	NATURAL PASTURE	CUT FORAGE	LAND USE FOR DAIRY	TOTAL AREA
I	6.2	0.3	0.6	5.4	0.8	6.8	
II	170.8	0.0	99.2	67.2	4.6	163.8	294.0
III	199.9	0.0	138.5	60.9	1.0	199.4	599.2
IV	109.3	11.5	48.8	18.2	9.0	76.0	169.2
V	14.5	7.2	3.0	9.7	3.0	15.7	47.5
VI	109.6	7.6	26.5	74.5	2.5	103.5	135.5
VII	93.0	14.9	51.6	44.2	1.8	97.6	142.1
VIII	139.8	0.0	100.5	35.8	0.2	136.5	179.1

Table 5
FARM EQUIPMENT AVAILABLE

REGION	tractor	cart	water pump	feed chopper	irrigation equipment	electricity
I						
with	16	12	7	7	10	24
without	13	17	22	22	19	
II						
with	5	3	2	5	1	8
without	5	7	8	5	9	2
III						
with	1	2	7	4	1	5
without	10	9	4	7	10	6
IV						
with	53	52	67	53	24	96
without	44	45	30	44	73	1
V						
with	11	17	13	12	8	21
without	26	20	24	25	29	16
VI						
with	12	30	28	28	12	33
without	45	27	29	29	45	24
VII						
with	13	18	18	20	11	22
without	27	22	22	20	29	18
VIII						
with	3	2	4	2	0	6
without	7	8	6	8	10	4

Table 6
BREED OF DAIRY HERD

REGION	I	II	III	IV	V	VI	VII	VIII
1 Zebu		2		2			2	
2 Brown Swiss			2	14		1	2	
3 Barroso							2	
4 Criollo				10	1	6		
5 Holstein	9			3	17			
6 jersey	3	1		1	2			
7 Cross	2		2	13	11	22	15	
8 Holstein & Jersey	3			1	9	1		
9 Holstein,Jersey&Cross	1				2	1	1	
10 Holstein & Cross	7	1		1	10	7	3	
11 Jersey & Cross	3				3			
12 Zebu,Brown Swiss & Cross		2	2	16	12	12	4	4
13 Holstein & Brown Swiss		1	1	8	1	1		
14 Brown Swiss & Cross		1	2	7		2	8	2
15 Zebu &Cross		1	2	12		4	4	3
16 Zebu,Brown Sw.,Holstein				7			1	1
17 Brown Sw.,Holstein, Jersey.				1		1		

Table 7
TYPE OF FEED : CALVES AND HEIFERS

	SILAGE		HAY		FORAGE	
	FEED	NO	FEED	NO	FEED	NO
REGION						
I	2	27	15	12	14	13
II	1	9	1	9	2	8
III	0	11	0	11	3	9
IV	7	90	7	90	55	42
V	6	36	7	30	26	11
VI	2	55	0	57	29	28
VII	0	40	1	39	11	29
VIII	4	6	0	10	0	10

Table 8

TYPE OF FEED : COWS IN PRODUCTION

REGION	Silage Feed	Silage no	Hay Feed	Hay no	Forage Fee	Forage no
I	3	26	11	18	14	15
II	1	9	1	9	3	7
III	0	11	0	11	4	7
IV	7	90	6	91	60	37
V	6	31	6	31	24	13
VI	4	53	1	56	38	19
VII	0	40	3	37	22	18
VIII	0	10	0	10	3	7

Table 9
DAILY FEED USE BY FARM: COWS IN PRODUCTION

REGION	Concentrate (lbs)	Molasses (gal)	Forage (lbs)
I	11.3	na	7.1
II	4	na	7
III	4	na	19
IV	5	0.5	31
V	7.4	0.3	34.8
VI	4.9	0.6	34.8
VII	5.1	0.2	26.8
VIII	2	na	35.5

TABLE 10
TYPE OF SUPLEMENTARY FEED: COWS IN PRODUCTION

REGION	CONCENTRATES FEED	CONCENTRATES NO	MELASSES FEED	MELASSES NO	FORAGE FEED	FORAGE NO
I	28	1	7	21	24	5
II	4	5	0	9	2	7
III	1	12	2	12	3	12
IV	20	77	47	50	38	59
V	32	5	12	25	20	17
VI	29	28	29	28	36	21
VII	18	22	19	21	18	22
VIII	1	9	0	10	4	6
TOTAL	133	159	116	176	145	149
%	45.5	54.5	39.7	60.3	49.3	50.7

TABLE 11

MILK PRODUCTION PER DAY PER PRODUCING COW*
(LITERS)

REGION	TOTAL DRY SEASON	TOTAL RAINY SEASON	PRODUCING COWS	PROD./COW DRY SEASON	PROD./COW RAINY SEASON
I	34.6	49.0	4.8	7.2	10.2
II	142.3	149.4	36.7	3.9	4.1
III	69.0	128.0	22.2	3.1	5.8
IV	200.5	265.5	45.6	4.4	5.8
V	108.7	144.2	14.6	7.4	9.9
VI	60.2	113.4	22.7	2.7	5.0
VII	81.6	127.9	26.7	3.1	4.8
VIII	36.0	44.8	22.1	1.6	2.0

* Excludes milk fed to calves

TABLE 12

DAILY HOME CONSUMPTION AND SALES OF MILK, CHEESE AND BUTTER, BY FARM (AVERAGE)

REGION	HOME CONSUMPTION	SALES	
	MILK (LITERS)	MILK (LITERS)	CHEESE + BUTTER (LBS)
I	2.7	26.9	0.9
II	4	148.3	19.6
III	2.4	49	10.2
IV	6.5	179.2	0.9
V	5.3	83.8	5
VI	4	54.7	1.8
VII	5	63.5	4.5
VIII	10.6	31.2	8.1
TOTAL	5.1	79.5	6.3

Table 13
FORM OF SALE OF MILK

	Direct to Consumer	To middleman	To processing plant	Total
REGION				
I	27	6	1	34
II	5	2	0	7
III	7	5	0	12
IV	38	49	13	100
V	29	11	2	42
VI	29	26	3	58
VII	17	26	2	45
VIII	10	2	0	12
Total	162	127	21	310

Table 14
SITE OF SALE OF MILK
Number of farms

REGION	Farm	Processing plant	Gathering site	Home of consumer	Own store	Farm and gathering site	No answer
I	19		2	1			4
II	1		1		2		2
III	3		7	1			
IV	71		2	1			4
V	15	1	6	2	1	1	9
VI	44		2	1			4
VII	24		15		2		1
VIII	10						
TOTAL	187	1	35	6	5	1	25

Table 15
TYPE OF PACKAGE FOR MILK TRANSPORT

REGION	I	II	III	IV	V	VI	VII	VIII
Plastic drums	3		2	24	11	15	7	6
Galvanized iron	1		3	23	6	14	9	2
Stainless steel			1	3	2	15	8	1
Aluminium	14		1	14	8	6	8	
Tinplate							2	
Glass	2		1	1	3			
Other	3		1		1			
Plastic & other	1		2	29	3	2	4	1
Aluminium & other	4			1				
Galvanized iron & other	1			1	2	5	2	
Plastic bag								

TABLE 16
MEAN MILK PRICE AND STANDARD DESVIATION OF MILK PRICE BY TYPE OF SELLER
(CENTS/LITER)

REGION	SPECIALIZED		DUAL PURPOSE		ALL PRODUCERS	
	X	@	X	@	X	@
I	55.5	12.1	48.3	10.3	54.8	12.1
II	44.5	22.3	NA	NA	44.5	22.3
III	50.0	0.0	38.0	10.5	41.0	10.4
IV	44.4	7.0	43.8	8.8	43.9	8.5
V	55.6	10.3	51.1	7.7	54.6	10.0
VI	47.4	8.2	47.9	8.4	47.9	8.4
VII	45.5	13.2	50.5	10.5	48.9	12.6
VIII	52.5	13.6	57.0	11.5	55.0	12.9

Table 17

PRICE OF MILK ACCORDING TO SITE OF SALE

REGION	FARM	PROCESSING PLANT	GATTERING SITE	HOME OF CONSUMER	OWN STORE	FARM GAT. AND POINT
I	55.2		52.5	58.7		
II						
III	50.1		30.1			
IV	44.4	46.6	43.1			37.35
V	57.3	50.1	55.1	57.3	50.8	
VI	46.6	50.1	53.2			
VII	41.5		48.2			42.1
VIII	55.1					

Table 18

RESTRICTIVE FACTORS ON MILK PRODUCTION
Number of responses

	I	II	III	IV	V	VI	VII	VIII	TOTAL
Feed	25	5	4	81	26	37	33	6	217
Credit	21	5	8	13	11	30	13	4	105
Deseases	5	1	0	12	5	7	0	3	33
Marketing	2	5	3	12	4	13	6	2	47
Technical assistence	5	3	4	26	4	12	9	0	63
Price of milk	17	5	1	48	12	28	16	2	129
Access to farm	2	2	0	9	3	8	2	2	28
Land tenure	5	0	0	4	1	8	2	0	20
Input prices	6	0	0	7	0	6	2	0	21
Molasses availability	0	0	0	0	0	0	1	0	1

Table 19
INDICES OF AVERAGE PRODUCTION PARAMETERS

REGION	I	II	III	IV	V	VI	VII	VIII
Factor								
% of cost in production		77.00	46.00	30.00	57.90	69.00	50.00	56.00
Calving %	54.80	37.90	44.00	58.90	38.00	49.55	54.20	na
Animals/Ha	1.42	1.36	1.10	3.29	3.90	1.50	1.60	1.10
Liters/Ha	7.28	1.12	0.50	3.40	10.30	0.82	1.20	0.38
Ratio: total area/land used for dairy	1.19	1.79	3.00	2.22	3.02	1.30	1.45	1.31
Improved pasture %	8.80	60.50	69.40	64.20	19.10	25.60	53.80	na
Natural Pasture %	91.20	39.50	30.60	35.80	80.90	74.40	46.20	na

MINISTERIO DE AGRICULTURA, GANADERIA Y ALIMENTACION
Dirección General de Servicios Pecuarios
"DIGESEPE"

PROYECTO DE DESARROLLO LECHERO

Formulario para Encuesta

A. INFORMACION GENERAL

Encuestador _____ Boleta No. _____

Región _____ Municipio _____

Fecha de la Encuesta _____

Años de producción de leche _____

B. MANEJO

01 Orientación de la producción:

Especializada ____ Doble propósito _____

02 Area total de la finca: _____ manzanas

03 Composición del Hato:

Categoría	No.
Vacas en producción	____
Vacas horras	____
Novillas + 2 años	____
Novillas 1-2 años	____
Terneros	____
Terneras	____
Toros	____
Bueyes	____
Total	____

04 Sistema de explotación

Estabulado ___ Semiestabulado ___ Pastoreo _____

05 Sistéma de reproducción

Natural ____ Dirigida _____ Artificial _____

06 Maquinaria y Equipo

Tractor ____

Carreta ____

Bomba de agua ____

Molino Picadora ____

07 Composición racial del hato

	Si	No
Cebú	____	____
Pardo suizo	____	____
Cebú + Pardo suizo	____	____
Barroso	____	____
Criollo	____	____
Holstein	____	____
Jersey	____	____
Cebú & Holstein	____	____

08 Sistema de pastoreo:

Area total dedicada a pastereo ____ manzanas

En pasto mejorado _____ manzanas

En pasto natural _____ manzanas

09 Cultivos y pastos_____ manzanas

10 Especie de pasto existente

Para pastoreo	Manzanas	Para corte	Manzanas
Corner	____	Napier nativo	____
Rusi	____	Napier Costa Rica	____
Estrella	____	Caña de azúcar	____
Pangola	____	Caña uva	____
Alicia	____	Sorgo	___
Angliton	____	Alfalfa	____
Bermuda	____	Maíz	____
Zacatón	____		

11 Mortalidad

Número de animales adultos muertos en el último año _____

Número de terneros muertos en el último año _____

C. PRODUCCION

12 Producción total de leche diaria:

En verano _____ litros

En invierno _____ litros

13 Número de ordeños al día: Uno _____
Dos _____

14 Lleva registros de producción: Sí ____ No. ____

15 Alimentación diaria novilla (unidad)

Concentrados _____ libras

Forraje _____ libras

Tipo de forraje: Silaje _____

Heno _____

Pasto de corte _____

Leche en polvo _____

16 Alimentación diaria vaca en producción:

Concentrado _____ libras

Forraje _____ libras

Tipo de forraje: Silo _____

Heno _____

Pasto de corte _____

Guatera _____

F. CONSUMO Y VENTA DE LECHE

17 Consumo diario de leche por la familia _____ litros

18 Venta diaria de leche _____ litros

19 Producción de Queso ------- libras

20 Producción de Mantequilla _____ libras

21 A quien vende los productos:

	Si	No
Directamente al consumidor	____	____
Intermediario	____	____
Planta pasteurizadora	____	____

Nombre de planta pasteurizadora (empresa) _____

_____

22 La leche se vende:

Fría ____ Sin enfriamiento _____

G. COMERCIALIZACION

23 Lugar de venta de la leche:

Puesta en finca ____

Puesta en planta procesadora ____

Puesta en centro de acopio ____

24 Qué precio recibe actualmente por el litro de leche:

_____ centavos

25 Qué tipo de envase utiliza para transportar la leche:

Tambos plásticos _____

Hierro galvanizado _____

Acero inoxidable _____

Aluminio _____

Hojalata _____

Otros _____

COMENTARIOS

26 Cuáles son los factores restrictivos para incrementar su producción de leche:

	Si	No
Alimentación	_____	_____
Crédito	_____	_____
Enfermedades del ganado	_____	_____
Mercado	_____	_____
Asistencia técnica	_____	_____
Precio de la leche	_____	_____

27 **Comentarios adicionales:**

_____

_____

_____

1.87/OSU/sam

CONVERSION OF IMPORTED DAIRY PRODUCTS INTO WHOLE MILK EQUIVALENT

Assumptions:

Whole milk 3.5% butter fat (bf), 9.0% solids not fat, or 12.5% total solids
Skim milk 9.0% total solids
Liquid buttermilk and liquid whey 4.5% total solids
Cream 30% butterfat, 4.5% solids not fat, or 34.5% total solids
Condensed and evaporated milk 25% milk solids

CONVERSION OF 1986 IMPORTS (in thousands)	Product Kilos	Milk Liters
Milk	40.6	40.6
Cream	30.8	-
30.8 x .5 = 15.4K bf, div. by .035 = 440.0 30.8 x .045 = 1.386, div. by .09 = 15.4 454.4		
The milk equivalent of the cream is not being counted in the calculation, since the total bf 15.4 + the 131.2 bf in butter imports (total 146.6) is less than the 1,954.4 butterfat represented in the conversion of nonfat dry milk imports.		
Liquid buttermilk and liquid whey 0.2 x .045, div. by .125 = 0.1	.2	.1
Condensed and evaporated milk 359.3 x .25, div. by .125 = 718.6	359.3	718.6
Condensed cream Excluded for same reason as stated above. Volume of little consequence in rounded numbers.	.4	-
Non fat dry milk 5,025 div. by .09, div by .965 = 57,866.4	5,025.7	57,866.4