

THE CHILEAN DAIRY INDUSTRY*

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The seven million people of Chile are increasing at an annual rate of 1.9 per cent. The urban population, rapidly growing, now exceeds 60 per cent of the country's total population. Rising per capita food demands accompanying the urban development, and the increase in food requirements that comes of absolute population growth, have resulted in a 2.3 per cent (1948-50) annual rise in national food requirements. Yet food production increases at a rate of only 0.9 per cent and milk production increases at a rate of 1.25 per cent annually (1936-55).

Development of a gap between growth rates of population and food production is largely a post-World War II phenomenon. For the immediate future there seems to be little likelihood that Chile will overcome a dependence upon imports to make up the deficit in such staples of Chilean agriculture as wheat, potatoes, meat, and dairy products. The dairy deficit grows in spite of two decades of governmental and private efforts to increase milk production and improve distribution.

The origins of the Chilean industry and of attitudes toward dairying, as well as the nature of the contemporary scene, have been studied with the hope of suggesting why a product deficit has developed, and whether or not the country has the capabilities to overcome the deficit. The study of this representative industry, it was hoped, would afford the writer some insight into the nature of agriculture in Chile and, perhaps, in other countries of Latin America.

HERD DEVELOPMENT

Until the 1840's there was no serious attempt to modify Chile's foundation stock, the *criollo* descendants of cattle introduced to the New World from Spain. These hardy, slow-developing, 750- to 1,000-pound cattle were better suited to tallow and hide production than to use for draft, meat, or dairy purposes. Improvement in milk and meat producing qualities was achieved after the 1840's with fine cattle imported from Northwest Europe. The introduction of select stock was accelerated in the 1870's, when hardly a vessel anchored at Valparaiso which did not discharge one or two fine

* Material for this paper was gathered during field and office interviews, and from libraries in the Ministry of Agriculture, the two universities, and the I.C.A. office in Santiago. The work was done in 1957-1958, when the author was in residence in Chile on a Fulbright Grant. Published materials used to prepare the paper include: Ministry of Agriculture, *Dirección General de Producción Agraria y Pesquera, Departamento de Economía Rural, La Agricultura en el Quinquenio 1951-1955* (Santiago; 1957). Dairy Society International, "Report to the Administrator of the Foreign Agriculture Service," U.S. Department of Agriculture, F.A.S. Proj. No. 5-15-57-Dairy 6: Republic of Chile (Washington; May 1957); George H. Day, *Dairy Products Situation and Outlook in Chile*, U.S. Department of Agriculture, Foreign Agriculture Report No. 67 (Washington; March, 1952). R. Mardones and R. B. Cox, *La Alimentación en Chile* (Santiago; 1942). Luis Correa Vergara, *Agricultura Chilena* (Santiago; 1938). The periodicals, *Panorama Económico*, *El Campesino*, and the *Boletín* of the Sociedad Nacional de Agricultura were used also. The author appreciates the suggestions which his colleagues at Stanford made while the paper was being prepared.

cattle. While a number of breeds were introduced, Durhams, or Short-horns, were preferred because they adjusted more readily to the rudimentary management practices of the period, and because when crossed with creole stock the offspring were improved meat, milk, and draft animals. The Durham blood was disseminated through the herds of central Chile so rapidly that by 1886 there were few cattle which did not show the line.

Because cattle breeders emphasized meat rather than milking qualities in developing the Chilean Shorthorn, new breeds were introduced when dairying became fashionable. After 1900 the Holstein-Friesian (*holandes* in Chile), the red and brown Prussian (*overo colorado* or *clavel alemán*), and Brown Swiss and Normandy breeds won favor.

The Holstein was barely known in Chile prior to 1910, but by the 1930's crosses between it and the Chilean Durham predominated among the country's herds. Today the dominance of the Holstein-Friesian is as pronounced as was that of the Durham prior to 1920. It is the preferred breed in the full-time dairies; and cattle breeders like it because the young males are large beef animals and the heifers are in demand as dairy replacements. Reflecting the national interest in the breed is the registry record. The Holstein-Friesian comprises 69 per cent, and the brown or red Prussian variety 22 per cent of Chile's fine cattle. Argentine, European, and North American Holstein-Friesians (especially the latter) were imported on a large scale after the first World War. In recent years a buyer preference has developed for the West European Holstein. It is hardier, requires less attention, and is a superior meat-producing animal compared to the highly specialized North American milking Holstein. The European Holstein has a conformation that is similar to the early favorite, the Milking Shorthorn. It is particularly popular in the humid southern part of central Chile.

NATURE OF THE DAIRY INDUSTRY

Perhaps 25 or 30 per cent of Chile's 2,500,000 cattle are cows and heifers, and this proportion has remained fairly constant for some decades. However, the milking segment of the herd has grown from fewer than 200,000 head in the 1920's to around 475,000 to 500,000 head in the 1950's. The enlargement of the milking herd has occurred throughout central Chile, but it is in the southern lowlands where the change has been marked.

In the Central Valley and in the lowlands of the flanking Coastal Ranges and Andes are nearly 94 per cent of Chile's dairy cattle. Most herds form part of a large general farming unit in which beef, grain, row crop, and fruit or vineyard production are prevalent. The milking operation may be specifically a dairy; it may be a phase of dual-purpose herd management; or it may be a fortuitous side-line in a beef-rearing operation. These various types of dairy operations produce about 90 per cent of Chile's milk. Most of the milk processing also occurs on the farm, with only a third of the total production reaching the market through factories or pasteurizing plants.

Over 70 per cent of the cows milked are spring and summer producers only (*lechERIA de temporada*). Milking, performed in open corrals, customarily is done in the morning in the presence of the calves, which are tether-

ed while milking proceeds. Afterwards the calves are permitted to remain with the cows until early afternoon. While the procedure may benefit the young calves, the excitement, summer dust, and winter mud do not aid production or enhance the quality of the product. The seasonal milking pattern predominates from Colchagua (35° S.) southward.

Nationally the seasonality of milking results in a ratio of two or three to one between summer and winter production. The ratio is more striking in the humid south. Summer maximum milk reception at Temuco processing plants is six times the winter reception; in Osorno it is ten or twelve to one.

DAIRY REGIONS

Central Chile may be divided into three zones of dairy activity: the North Central, South Central, and Southern. The nature of dairying in the zones reflects market access and certain physical characteristics related to climate.

The North Central Zone

The North Central Zone, extending from about 32° to 35° S., is climatically what the Koeppen system would identify as BSk to Csb. A five-to-eight-month dry season and 12 to 40 inches of maximum winter precipitation are characteristic. This zone possesses about 22 per cent of the total milking herd and produces about 29 per cent of Chile's milk. Production may average about 4,000 pounds per cow per year. For the most part, operations are associated with a relatively small number of haciendas or *fundos*. Herds are comparatively well fed and cared for; they usually range in size from 100 to 300 head. Irrigated alfalfa provides the bulk of feed requirements. The regional emphasis in marketing is on fluid milk although a large quantity of cheese and whey butter is made during the summer in the more remote districts. Factory processing of butter, prodered milk, ice cream, and some cheese occurs. Perhaps 65 per cent of all milk production is received at the factories or pasteurizing plants.

The South Central Zone

In the South Central Zone, 35° to 38° S., the climate is transformed from Mediterranean Subtropical to Temperate Marine. The dry season lasts four or five months, and annual precipitation averages 40 to 60 inches. In this zone, where clover pastures predominate, 30 per cent of Chile's herd produces about 31 per cent of the country's milk. Production is estimated to average between 2,500 and 3,000 pounds per cow per year. Herds are moderate in size, averaging 50 to 110 head. The level of dairy technology is lower than it is to the north. There is fluid milk production for urban centers, especially near Concepción, but of greater importance is the amount of production for the manufacture of cheese, butter, and condensed milk. Most of the milk is processed on the farm, only 18 per cent of the total milk production passing through factories or pasteurizing plants.

The Southern Zone

Between 38° and 42° S. lies a region of extensive dairying where about 42 per cent of the country's milk cattle produce 33 per cent of the milk. In this Temperate Marine area (Cfb) precipitation, usually well distributed through the year, ranges between an average of 60 and 117

inches. It supports pastures, which usually are unimproved, and an ever-green forest where stock find winter browsc. Some milking herds exceed 1,000 head, but the average operation involves 60 to 70 cows. Perhaps an average annual 2,000 lbs. of milk is produced per cow. This is the principal source area for cheese and butter. Condensed milk and powdered milk are manufactured also. Total factory reception of milk would amount to about 35 per cent of production. As in the South Central Zone, cheese and butter are made largely on the farm.

PRODUCTIVITY

As the Chilean herd is essentially dual-purpose, the low productivity may be expected. The national annual average production per cow is variously estimated at 2,800 to 3,853 pounds. (The U.S. average is about 6,150 lbs.) The low level of productivity is largely thought to be surmountable through changes in management attitudes and practices. There is widespread neglect or ignorance of disease control, nutrition, housing and handling methods, the adoption of which would be relatively inexpensive and remunerative. The deficiencies of management are revealed in a calf birth rate which does not exceed 65 per cent nationally. Locally the calving rate may be as little as 25 per cent, and for the south as a whole it may be only 40 per cent.

The annual losses in dead stock, lost milk production, and from sterility attributable to disease is hard to calculate. However, the national level of brucellosis and tuberculosis infection is about 37 per cent each. Mastitis affects approximately 15 per cent of the cows. Foot and mouth disease is prevalent, but there have been no serious outbreaks since 1947.

Progressive operators, with the aid of dairy cooperatives, and the larger milk processing companies attempt to control the infectious diseases; and stringent culling may be practised. However, the average operator is not concerned with such matters. Some view disease and disease-caused death among livestock as natural phenomena which, like frost and drought, are inevitable. A few owners consider livestock illness to be a windfall source of low value meat which can be distributed to employees. The government has subsidized disease testing programs, but its agents neither may require inspection nor quarantine, nor compel the owner to treat, sell, or destroy diseased stock.

Feed deficiency in winter is a general problem. Malnutrition and starvation are recurrent in the south, where forage production is dependent entirely upon the elements. A few operators maintain adequate pasture area, but the provision of stored and supplemental feed is uncommon. The latest serious feed shortage in the south occurred in October, 1957, when an estimated 10 per cent of the cattle died. Mortality rates of 6 to 8 per cent may be expected during dry years, but a 2 per cent mortality rate is regarded as normal for deaths from all causes.

The potential carrying capacity of much Chilean land is not being realized.* Pastures remain unimproved or non-irrigated in many areas

* The carrying capacity of land is estimated at 0.07 units per acre for unimproved pasture; 0.20 units for irrigated unimproved pasture; 0.26 units for dry-land improved pasture; and 0.9 units for irrigated improved pasture.

where upgrading can be done. The carrying capacity can be increased, too, by barn feeding (soiling). An illustration of the correctable deficiencies in land use is provided in a recent survey of 213 advanced operations in the Santiago milkshed. Slightly over 10 per cent of the collective arable land was in natural pasture, supporting less than 0.2 beef livestock units per acre. Improved and irrigated under the best of local management the land was capable of supporting 1 head per acre.

The feeding of supplements is uncommon. Stock housing and feed storage facilities are modestly developed. In South Central and South Chile only 10 per cent of the operations have barns of any sort.

The year-round dairy operators in the north tend to develop enough stall capacity to stable each milking cow. However, there are operators who prefer to corral milk during the summer; still others have milking performed in corrals the year around. The year-around operators generally milk twice a day, but some reduce winter milking to once a day. Hand milking predominates. Operators who purchase machines often discover that it is difficult to use them because of the unavailability of replacement parts.

For the most part, the maintenance of milk handling equipment is modest. Regulatory requirements governing equipment or general sanitation on the farm are not enforced; health service officials fear that 90 per cent of the milk supply might be excluded from the market if the laws were enforced. Even processing plant officials hesitate to impose regulations on raw milk suppliers because the latter may be influential, or because the trade may be lost to a less particular competitor.

MILK AVAILABILITY

The per capita availability of milk and dairy products is difficult to determine with assurance, but it is rising. It probably did not average above 90 pounds annually in the 1930's. In the 1940's it may have been 135 to 185 pounds per year; in 1951-55, according to government estimates, 252 pounds represented per capita availability of dairy products produced in Chile. Prior to World War II, Chile exported dairy products, but the rise in domestic consumption has resulted in a net import since 1946-50. The flow of imports rose to 6.9 per cent of national production in 1954, and 15.5 per cent of production in 1955.

An annual per capita total availability of about 260 pounds of dairy products hardly suggests a true picture of regional or group consumption. Urban areas and the numerically small upper and middle classes are the chief consumers of dairy products. Metropolitan Santiago, where one-fifth of the Chileans live, is the major market. Its cheese and butter supply area includes all of central Chile, and fluid milk is drawn from as far south as Talca. The expansion of the Santiago milkshed has been rapid in recent years.

In 1935 a pasteurization law resulted in the adoption of the use of trucks to carry milk into Santiago. Producers contracted with carriers to deliver to the processors; the processors assumed responsibility for retail delivery. Eliminated were the independent street retailers whose carts formerly carried the raw milk into the city. There is fair evidence that they sold a

lot of irrigation water as well. The pasteurizing law was salutary; for the first time a measure had been adopted that protected the consumer.

As late as 1953, 96 per cent of Santiago's fluid milk supply came from within the province, but by 1957 the province provided only 54 per cent. The change reflected an extension of the milkshed to the Aconcagua Valley, on the north; and, more important, southward to Rancagua, San Fernando, and Talca (150 miles). Although the supply area has expanded it should be noted that beyond a radius of 35 miles the existence of a city milkshed is largely a winter phenomenon. From April to September the peripheral districts make up the city's milk shortage. In the summer, when production is high and when many consumers are out of town, dairy districts near Santiago are able to meet the city's requirements.

RECENT GOVERNMENT POLICY

Government dairy policy is confronted with the dilemma of satisfying consumer and producer demands in an economy-blighting inflation. Uncertainty about milk pricing policy has discouraged producers and distributors from developing long-range expansion or improvement programs. Milk price controls are rigid, so there are no compensations to producers for rising production costs. Reflecting dairy industry dissatisfaction were a 14 per cent production decline between 1949 and 1950, an 11 per cent drop between 1952 and 1953, and a 2.1 per cent drop between 1955 and 1956. Imported products are used to keep consumers satisfied with prices, but the competition often turns Chilean operators to meat or wheat production.

Official concern over milk scarcity led to the institution of a dairy industry development program in 1948. The program facilitates the formation of producers' cooperatives and provides funds for farm improvement loans and production and management research. The dairy development law further commits the government to a program of processing plant construction. It is the latter activity which finds warmest support among officials.

CONCLUSION

If the dairy industry were to receive uniformly attractive compensation for enterprise over all of central Chile, the industry might soon become the most important farm activity in the country. Today dairy products represent about 12 per cent by value of all farm production; wheat and beef represent only a little over 15 per cent each of total farm production. The advances in dairy output seem most promising for the Temperate Marine south of central Chile. There, feeding on 40 per cent of the country's arable land (most of it unimproved pasture or browse), is 42 per cent of the Chilean dairy herd. With improved pasture and stock management, and an increase of productivity from the present 2,000 pounds of milk per cow per annum upward to the 3,000-pound national average, this zone would begin to realize its potential as the country's chief dairy region. Eventually it will develop into the foremost dairy region, but there is little evidence that present industry growth rates will alter much. A substantial cash incentive, faith in government policy, and adequate roads are lacking. The gap between production and consumption rates is going to require significant dairy imports for years to come.