

DAIRY DEVELOPMENT IN ARGENTINA



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Recommended Citation

FAO. 2011. *Dairy development in Argentina*, by O.R. Cappellini. Rome.

Keywords

Production systems, Dairy value chain, Dairy institutions, Product safety, Livelihoods, Employment

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Contents

Acronyms	iii
Preface	v
1. OVERVIEW OF THE DAIRY INDUSTRY	1
Milk production	1
Milk processing industry	4
Dairy trade	5
2. DAIRY VALUE CHAIN	6
Primary production	6
The processing industry	9
Domestic market	11
Dairy consumption:	13
3. EMPLOYMENT IN THE DAIRY SECTOR	15
Direct employment	15
Indirect employment	15
4. SAFETY OF MILK AND DAIRY PRODUCTS	16
Legal context	16
5. DAIRY PRODUCTION AND THE ENVIROMENT	18
Present situation	18
Livestock diversity	21
6. DAIRY INSTITUTIONS AND DAIRY DEVELOPMENT PROGRAMMES	22
Dairy organizations	22
Dairy development programmes (ddps)	25
7. THE ROLE OF THE DAIRY INDUSTRY IN ECONOMIC DEVELOPMENT	26
Economic impact	26
Poverty alleviation	27
8. CONCLUSIONS	30
References	33
Annexes	
1: Annual Dairy Production and Consumption	35
2: Regional Distribution of Dairy Farms	36
3: Major Elements in the Dairy Value Chain	37
4: Major Dairy Companies	38
5: Milk Production Cost Models	39
6: Milk Production Costs – Major Components	40

TABLES

1: Dairy production parameters, 2008	1
2: Main dairy regions	2
3: National dairy herd (thousand head)	3
4: Main parameters of the average dairy farm	3
5: Distribution of dairy farms according to their daily output	3
6: Fluid milk production, 2008	4
7: Processed dairy products, 2008	4
8: Production parameter differences among dairy regions	7
9: Average milk production costs	8
10: Average milk quality, December 2008	9
11: Fluid milk production data, 2008	10
12: Cheese production data, 2008	11
13: Milk powder production, 2008	11
14: Other dairy products, 2009	12
15: Retail sale shares of different product groups	12
16: Distribution of basic good sales	13
17: Dairy consumption in Argentina	13
18: Direct employment in Argentina's dairy industry	15
19: Organization of dairy farm labour	15
20: Quality systems implemented by industries	18
21: Effluent disposal by dairy farms	19
22: Estimated dairy farm effluents at the regional/provincial level	19
23: Results of 2000 GHG inventory, by gas and sector (Gg CO ² equivalent)	20
24: GHG emissions from domestic livestock, by source, 2000	20
25: CH ⁴ emissions from enteric fermentation	20
26: N ² O emissions from manure management, 2000	20
27: Private dairy organizations	23
28: Estimated GPV from the dairy industry	26
29: Economic projections for Argentina's dairy industry ADI, to 2020	26
30: Argentina's dairy trade, 2008	27
31: Dairy industry employment, 2008 and 2020	28
32: Argentinean population, 2001	29
33: Problems, solutions and actors in the dairy industry	33

FIGURES

1: Evolution of milk production	1
2: Main dairy regions	2
3: Shares of total milk intake handled by each of the four size groups of dairy companies	5
4: Comparison of milk production systems (dry matter intake per cow)	6
5: Distribution of milk productivity among dairy farms	7
6: Farm-gate milk prices, 2002 to 2009	8

Acronyms

AFC	Argentinean Food Codex
AI	artificial insemination
ALADI	Asociación Latinoamericana De Integración, Latin American Integration Association
ANMAT	Administración Nacional de Medicamentos, Alimentos y Tecnología Médica, National Administration for Drugs, Foods and Medical Technology
ATILRA	Asociación de Trabajadores de la Industria Lechera de la República Argentina, Dairy Processing Industry Workers' Union
BFB	basic food basket
BGR	bovine genetic resources
CFU	colony-forming units
CIL	Centro de la Industria Lechera, Dairy Processing Industry Federation
CONAL	Comision Nacional De Alimentos, National Food Commission
CREHA	Plan Nacional de Control de Residuos e Higiene de Alimentos, National Plan for Control of Residues and Hygiene in Foods
DDP	Dairy Development Programme
EME	economic multiplier effect
EMS	environmental management system(s)
EU	European Union
FOB	free on board
GAP	good agricultural practice
GDP	gross domestic product
Gg	Giga gram
GHG	greenhouse gas
GMP	good manufacturing practice
GPV	gross production value
HACCP	Hazard Analysis and Critical Control Point
INAL	Instituto Nacional de Alimentos, National Food Institute
INDEC	Instituto Nacional de Estadística y Censos National Institute for Surveys and Statistics
INTA	El Instituto Nacional de Tecnología Agropecuaria National Institute of Agricultural Technology
INTI	El Instituto Nacional de Tecnología Industrial National Institute of Industrial Technology
ISO	International Organization for Standardization
LULUCF	land use, land use change and forestry
MC	milking cow
MERCOSUR	Southern Common Market
MHSA	Mastellone Hnos S.A.
NAFTA	North American Trade Agreement
OPS	Office for Project Services
PHS	Permanent Household Survey
PRODENOA	Programa de Crédito y Apoyo Técnico para Pequeños Productores de Noroeste Argentino, Rural Development Programme for the Northwest

PRODENEA	Programa de Crédito y Apoyo Técnico para Pequeños Productores de Noreste Argentino, Rural Development Programme for the Northeast
PROINDER	Proyecto de Desarrollo de Pequeños y Medianos productores, Small-Scale Rural Development Project
SAGPyA	Secretaría de Agricultura, Ganadería, Pesca y Alimentos Secretariat of National Agriculture and Livestock Services
SAP	Rural Social Programme
SCC	somatic cell count
SENASA	National Agrifood Quality and Animal Health Service
SME	small and medium enterprise
SNF	solids-not-fat
UHT	ultra-heat treated
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
VAT	value-added tax
WHO	World Health Organization
WTO	World Trade Organization

Preface

Over the last five decades the global dairy sector has seen substantive changes with major intensification, scaling-up and efficiency of production driven by demand from a growing human population and disposal incomes. This growth was achievable through the developments in animal breeding, nutrition, feed efficiency, animal health, housing and automation and supporting policies, strategies and organizations. Such changes are not however reflected across the whole dairy sector and while some developing countries have seen a major expansion in small-scale milk production, small-scale dairying in other countries has largely stagnated.

Dairying contributes positively to human wellbeing in a variety of different ways: nutrition through quality food products, income and employment, organic fertilizer as well as assets and savings. There are however negative aspects associated with dairying including its contribution to Green House Gases, pollution and waste disposal, food safety and human health, use of grains for feed, animal welfare and erosion of biodiversity. In order to inform the public and to make rational policy and investment decisions related to the dairy sector, it is essential to fully understand these complex interactions and their consequences.

This paper provides a review of these issues for the dairy sector of Argentina. We hope this paper will provide accurate and useful information to its readers and any feedback is welcome by the author and the Livestock Production Systems Branch (AGAS)¹ or to the Rural Infrastructure and Agro-Industries Division (AGS)² of the Food and Agriculture Organization of the United Nations (FAO).

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- ² For more information visit the website of the FAO Rural Infrastructure and Agro-Industries Division at: <http://www.fao.org/ag/ags/> or contact Anthony Bennett – Livestock Value Chains and Infrastructure Officer – Email: Anthony.Bennett@fao.org
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Chapter 1

Overview of the Dairy Industry

The origins of Argentina's dairy industry can be traced back to the beginning of the twentieth century. Since then, important comparative advantages for milk production – owing to the temperate climate and soil conditions of the Pampas region – have helped it expand. During the 1990s, milk production had an annual growth rate of 6 percent, reaching the historical record of 10.3 million litres of milk in 1991, which put Argentina thirteenth in global milk production. This growth has been erratic (Figure 1), however, and after a period of expansion, milk production declined by 25 percent between 2000 and 2004; since then there has been a moderate recovery. For more details, see Annex 1.

MILK PRODUCTION

Argentina has approximately 1.85 million dairy cows distributed in 11 800 dairy farms (SENASA, 2009). Most of these cows (95 percent) are in the central region (see map in Annex 2), where a significant consolidation process has led to average herd sizes increasing while the number of dairy farms has decreased by an average of about 4.5 percent per year (Terán, 2007). This is similar to the disappearance rate of small dairy farms in other countries with a developed dairy industry (Taverna, 2008).

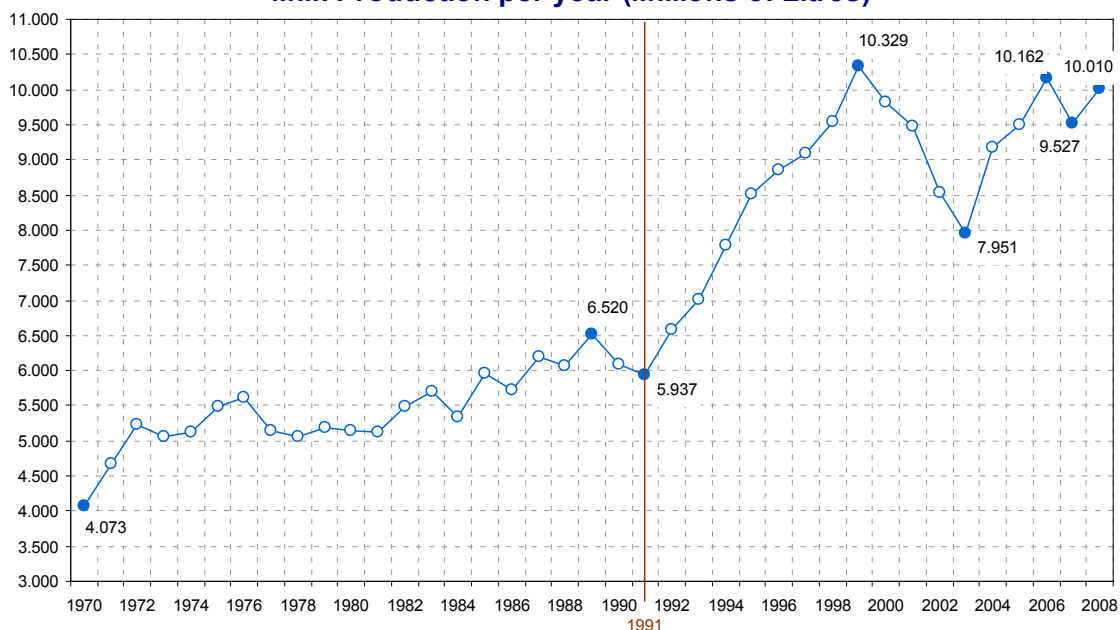
TABLE 1
Dairy production parameters, 2008

Production (million litres)	Population (million people)	Availability (litres/capita)	Exports (million litres)	Imports (million litres)	Consumption (million litres)	Per capita consumption (litres/capita)
10 010	39.75	251.9	1 998	13	8 030	202.0

Source: SAGPyA, 2009.

FIGURE 1:
Evolution of milk production

Milk Production per year (Millions of Litres)



Source: SAGPyA - Dirección de Industria Alimentaria

Main dairy basins

Argentina's milk production is based in the central and east-central regions of the country, known as the Pampas, which includes parts of Córdoba, Santa Fe, Buenos Aires, Entre Ríos and La Pampa provinces. In these regions, dairy farming is all pasture-based and depends exclusively on rainfall, with no confinement of dairy herds. Figure 2 shows the main dairy regions and Table 2 the relative distributions of dairy farms and milk production.

Most of these regions are also crop areas, so dairy competes with soybean, maize and wheat production. Almost all dairy farms have diversified operations, devoting between 10 and 50 percent of their land to crop production. Sown pastures – typically alfalfa, tall fescue, rye grass and clover, among others – are part of the crop rotation pattern, but also reflect the ratio of milk to grain prices. Such direct competition with crops makes milk production unusually sensitive to any change in the relative profitability of both activities.

Average dairy farms

There is considerable heterogeneity among the 11 800 dairy farms and the dairy regions in Argentina. Dairy farms are mostly run by men (96.5 percent), aged an average of 52 years. About 29 percent of dairy farmers have completed

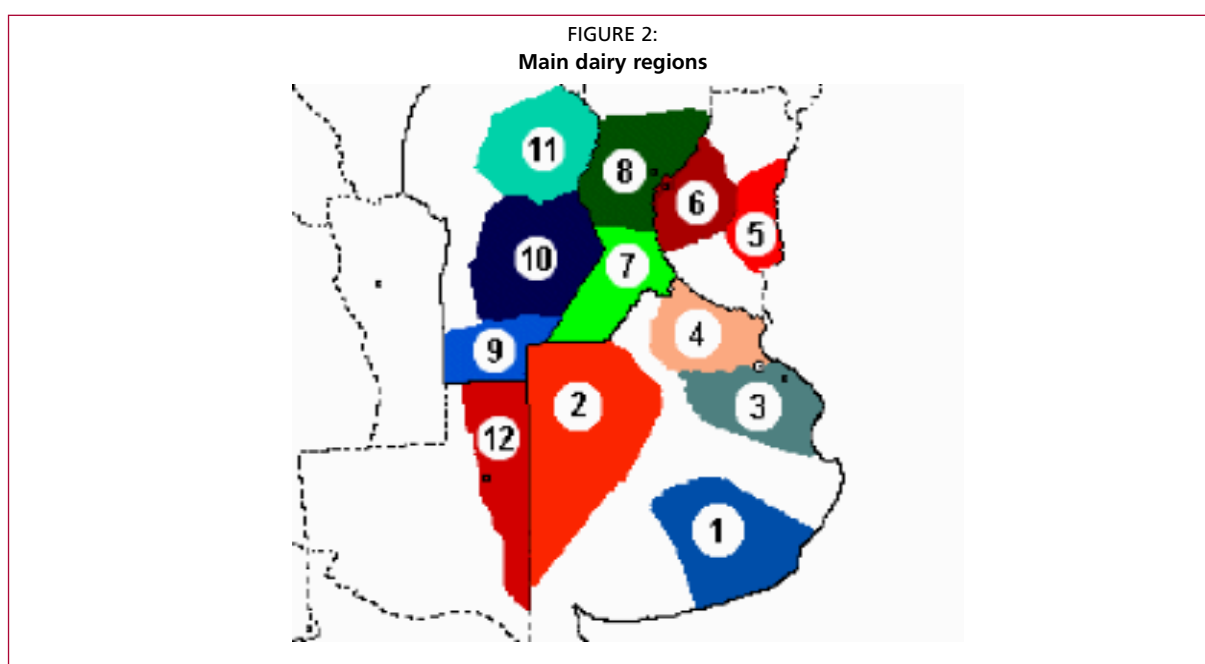


TABLE 2
Main dairy regions

Map	Region	Dairy farms (% of total)	Milk production (% of total)
1	Buenos Aires Mar y Sierras	2	4
2	Buenos Aires West	10	16
3	Buenos Aires South	4	5
4	Buenos Aires North	2	3
5-6	Entre Ríos	11	5
7	Santa Fe South	4	6
8	Santa Fe Centre	37	30
9	Córdoba South	4	4
10	Córdoba-Villa María	10	12
11	Córdoba Northeast	14	13
12	La Pampa	2	2

Source: Chimitz and Gambuzzi, 2007.

school education, and 31 percent have attended university (Chimitz and Gambuzzi, 2007). The dairy herd is almost exclusively (98 percent) of a nationally adapted Holstein breed, the Holando Argentino, totalling more than 3.5 million head (Table 3). Herd selection and genetic improvement are common to all farms. More than half³ of the dairy cow population is inseminated with semen from selected bulls, through artificial insemination (AI), but it is still common practice for cows to be serviced naturally by bulls after a second failed AI attempt.

Table 4 shows the average dairy farm size (260 ha); more than half of all dairy farms are within the range of 140 to 300 ha each.

Of the total dairy surface, 66 percent is owned by the farmer while the remaining 34 percent is rented. Land rents are an important part of the average cost of milk production, given that 58 percent of dairy farmers rent at least part of the land they use for their milking herds. The average dairy farm has mixed milk, grain and beef production (Chimitz and Gambuzzi, 2007). Table 5 shows that almost one-third of farms produce less than 1 000 litres of milk per day; this low level of production is below the economic threshold.

The main source for dairy herds' diets is still sown pasture (56 percent), while other sources are maize silage (17 percent) and grain concentrates (27 percent). Grain concentrates are very widely used (by 96 percent of dairy farms), and are composed mainly (47 percent) of off-farm commercial concentrates, plus 28 percent maize grain (mostly produced on-farm) and other feeds such as sorghum grain, wheat by-products and cotton seed. The average dairy farm has good facilities, with a small to medium-sized herringbone milking parlour, although most smaller dairy farms still use the pass-through system. All dairy cows are milked mechanically twice a day, with the milk passing directly into a cold storage tank from where it is collected by the processing company once a day.

New dairy regions

Although dairy farming has not yet spread into new regions, there are potential areas where this could happen. The following are the most important of these (INTA-Parana, 2007):

TABLE 3
National dairy herd (thousand head)

Cows	Heifers	Steers	Calves	Veal calves	Bulls	Total
1 814	724	222	283	482	32	3 560

Source: SENASA, 2009.

TABLE 4
Main parameters of the average dairy farm

Total area (ha)	260
Total cows (milking and dry)	160
Milk/day/farm (litres)	2 000

Source: Castignani et al., 2005.

TABLE 5
Distribution of dairy farms according to their daily output

Daily production (Litres/farm)	Dairy farms (No.)	Average (Litres/farm/day)	Farms (%)	Production (%)
< 1 000	2 513	520	32%	6%
1 001–3 000	3 107	1 834	40%	25%
3 001–5 000	1 064	3 828	14%	18%
5 001–12 000	811	7 361	10%	26%
> 12 001	257	22 945	3%	26%
Total	7 752	2 960	100%	100%

Source: SAGPyA-ONCCA Dairy Farms Registration, October 2008.

³ According to ABIA (2008), during 2007, some 2 228 842 semen doses (75 percent imported) from dairy bovine breeds were used for AI in dairy farms (Etcheverry, 2008).

- a) New areas in the traditional dairy region (central region, east of La Pampa; central region, southeast of San Luis; and south of Santa Fe): These areas in the traditional dairy Pampa region, have soils that are submarginal but appropriate for dairying, and there is high investment potential based on opportunities for intensive utilization of by-products from the local grain processing industries (Giunta, 2007)⁴.
- b) Non-traditional areas (north Santa Fe/south Chaco, north Entre Ríos, south Buenos Aires, and southeast La Pampa): These areas have soil and climate restrictions, but dairy farming could be as technically efficient here as they are in the traditional basins, provided farmers receive adequate technical advice (Gastaldi, Galetto, and Lema, 2007).
- c) Dairy areas outside the Pampas region: There are several distant regions (mainly in the northwest and north-east of Argentina) where dairy clusters could be developed given the local demand for dairy products. Surveys show that there is already an underdeveloped dairy system in this region, with more than 2 000 dairy farms, ranging from very poor to well-developed⁵.

MILK PROCESSING INDUSTRY

There are about 848 dairy companies with more than 1 100 processing plants (Cartier, 2008). Of total milk production, 7.5 percent is sold through the informal market and/or consumed by farm households, while 92.5 percent is processed as fluid milk (Table 6) or manufactured dairy products (Table 7).

TABLE 6
Fluid milk production, 2008

Product	Litres	Share
Informal milk	746 000.000	7.5%
Pasteurized milk	1 282 251.003	12.8%
UHT milk	453 194.048	4.5%
Chocolate	88 162.982	0.9%
Total fluid milk	1 823 608.032	18.2%

Source: Estimates based on SAGPyA, 2008 data.

TABLE 7
Processed dairy products, 2008

Product	Tonnes	Litres	Share
Whole milk powder	200 056.251	1 666 468.571	16.6%
Skimmed milk powder	24 759.281	273 094.869	2.7%
Subtotal milk powder			19.4%
Soft cheese	259 758.084	2 093 650.154	20.9%
Semi-soft cheese	143 871.001	1 453 097.112	14.5%
Hard cheese	74 431.994	1 004 087.598	10.0%
Processed cheese	12 526.451	25 052.901	0.3%
Subtotal cheeses			45.7%
Cream	39 154.000	39 545.540	0.4%
Butter	50 779.684	102 574.961	1.0%
Milk caramel	124 980.263	262 458.552	2.6%
Yoghurt	519 111.000	467 199.900	4.7%
Desserts	63 901.000	49 842.780	0.5%
Subtotal other			9.2%

Source: Estimates based on SAGPyA, 2008 data.

⁴ It has been stressed that "there are strong economic chances for the development of dairy farms in some areas based on the intensive use of the by-products of the soybean processing industry allocated in those areas" (Giunta, 2007).

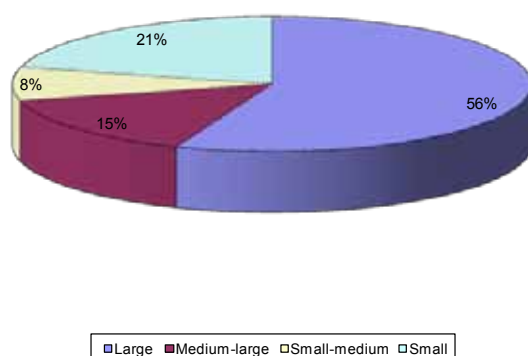
⁵ According to Scala, Quintana and Nieto (2008), there are about 2 000 dairy farms distributed in the provinces of Misiones (450), Corrientes (336), Formosa (350), Chaco (250), Salta (77), and Tucumán (56). These have approximately 129 000 dairy cows and produce about 500 000 litres of milk a day.

Argentina's dairy processing sector is highly fragmented and can be classified into the following four groups:

- a) *Large companies*: About ten high-tech companies process multiple dairy products for domestic and export markets, and account for about 90 percent of total dairy exports. The average milk intake of each of these is about 1.5 million litres per day, ranging from 4 million to 500 000 litres/day.
- b) *Medium-large companies*: About 25 to 30 companies have daily milk intakes averaging about 200 000 litres. These companies focus mainly on domestic markets, but an increasing number of them are gaining some export experience.
- c) *Small-medium companies*: Approximately 50 companies have average milk intakes of less than 20 000 litres per day. They focus entirely on cheese production, usually marketing at the regional level.
- d) *Small companies*: More than 700 small and micro-scale plants⁶ process cheeses using very basic processing technology and obtaining only very low quality standards for products and processes. These compete on local informal markets, and represent 21 percent of Argentina's total milk production.

Figure 3 shows this high level of fragmentation, with the ten largest companies processing 56 percent of total milk production, the medium-sized companies 15 percent, and a large group of small and very small companies processing 21 percent.

FIGURE 3
Shares of total milk intake handled by each of the four size groups of dairy companies



Source: Estimates based on CIL April 2009 data.

DAIRY TRADE

About 15 to 25 percent of total production is sold to external markets, with almost 2 billion litres exported in 2008. Argentina is the world's third largest exporter of whole milk powder, shipping 140 000 tonnes last year; cheese exports are also growing, and reached 45 000 tonnes in 2007⁷. More than 100 export markets import Argentinean dairy products, but three countries – Venezuela, Brazil and Mexico – account for almost half of all external sales. In terms of trading blocks, roughly 14 percent of Argentina's dairy exports go to the Southern Common Market (MERCOSUR), 14 percent to the North American Trade Agreement (NAFTA), 35 percent to African countries, and 23 percent to Latin American Integration Association (ALADI) countries. However, dairy export volumes are highly dynamic, owing to the volatility of dairy free on board (FOB) prices and the government's changing export policies; for example, for the last two years, the Government of Argentina has put a damper on export growth by increasing export taxes on dairy products.

⁶ Micro-scale farm cheese units are not included, but some surveys estimate these to number at least 200 to 300.

⁷ In 2008, cheese exports declined to 36 000 tonnes as a result of government export restrictions.

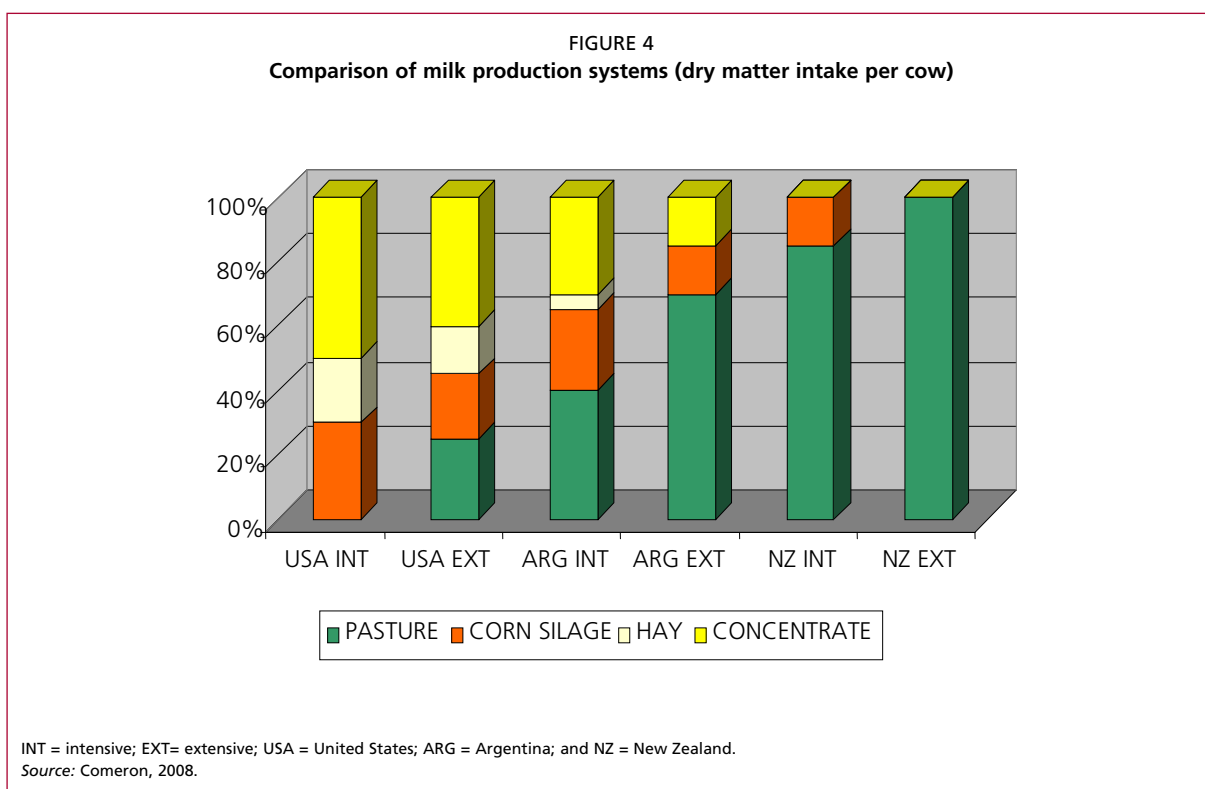
Chapter 2

Dairy Value Chain

(see also Annex 3)

PRIMARY PRODUCTION**Predominant production system**

Dairy production has evolved from an extensive grazing system to a more mixed system, where pastures continue to contribute about 55 percent of the herd's total food intake (Chimitz and Gambuzzi, 2007), but there is growing use of supplements in variable proportions, depending on the relative stocking rate. Figure 4 compares different production systems, ranging from the intensive to the extensive.



There are important differences among dairy regions (Table 8); the central area of Santa Fe and Córdoba has the smallest dairy farms, but shows the best stocking rate per hectare. This is also the region with the clearest strategy of medium productivity from pastures. The west basin of Buenos Aires shows a clear strategy of medium productivity from concentrate use.

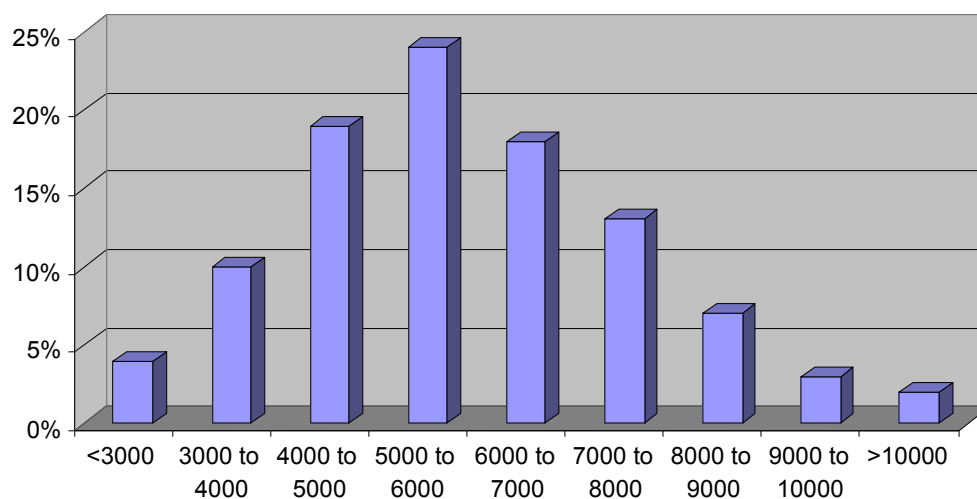
Another important characteristic is the high dispersion of productivity regardless of the size of the farm. About 40 percent of dairy farms operate below the economic threshold, defined as about 5 000 to 6 000 litres/ha (Figure 5).

TABLE 8
Production parameter differences among dairy region

Parameter	Entre Rios	Santa Fe / Córdoba	Buenos Aires	Villa Maria	West Buenos Aires	Average
Land per cow (ha)	112	123	169	171	245	164
Rented land (ha)	43	47	97	147	107	88
Total milking cows (MCs)	71	114	140	136	220	136
Sown perennial pastures	43%	58%	53%	52%	53%	52%
Annual winter grass	14%	12%	10%	26%	24%	17%
Annual summer grass	4%	5%	4%	10%	5%	6%
Silage (kg/MC/year)	986	1 001	1 084	1 060	1 488	1 123
Yield (litres/MC/day)	14	13.9	15.8	15.6	16.6	15.18
Yield (litres/ha/day)	3 379	4 915	5 065	4 930	5 302	4 718
Stocking rate (MC/ha)	0.85	1.25	1.12	1.09	1.13	1.088
Low productivity	74%	33%	40%	40%	25%	42%
Medium productivity + concentrates	10%	15%	41%	40%	62%	34%
Medium productivity + Grazing	14%	39%	11%	10%	3%	15%
High productivity	2%	13%	8%	10%	10%	9%

Source: Chimitz and Gambuzzi, 2007.

FIGURE 5
Distribution of milk productivity among dairy farms (litres/ha/year)

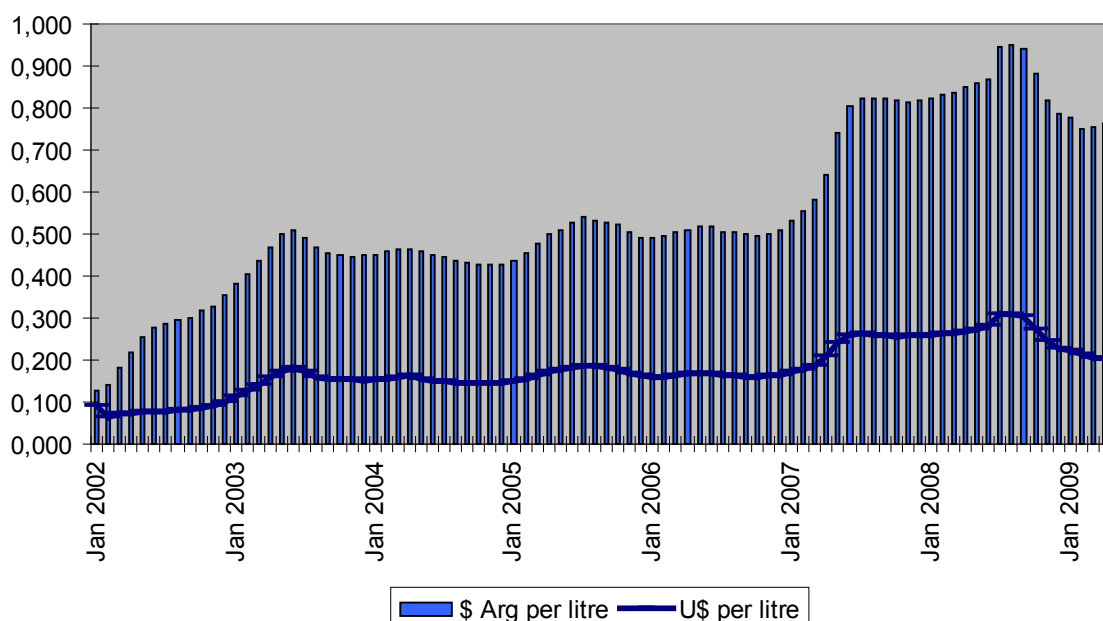


Source: Cameron, 2008.

Farm-gate prices

Current milk prices are about U\$0.20/litre. Milk prices at the farm-gate show extreme volatility (Figure 6) with an important standard deviation (SD = 0.06), and ranging from less than US\$0.09/litre (2002) to a maximum of US\$0.31/litre (2008). This is owing to recurrent cycles of over- and undersupply of milk, and erratic economic policies.

FIGURE 6:
Farm-gate milk prices, 2002 to 2009



Milk production costs

Table 9 gives an updated calculation of milk production costs (Margenes Agropecuarios, 2009) in four different production systems (Annex 5):

- Direct/variable costs represent almost 60 percent of total costs, with feeding being by far the major direct cost component followed by labour.
- Within feeding costs, grain concentrates (40 percent) and maize silage (13 percent) represent more than half of direct costs.
- Land opportunity costs represent 13 percent of total costs.
- Gross margins are positive, but when total costs (or long-term costs) are considered, milk production shows negative economic results at current farm-gate prices.

Grain prices directly affect the milk production costs shown in Table 9 in various ways (Cappellini, 2008):

- Land opportunity costs: Given that milk competes with crop production in terms of relative income, there is a high pressure on land opportunity costs, which represent 10 to 15 percent of long-term or total costs, depending on international grain prices.

TABLE 9
Average milk production costs

Parameter	US\$/ha	US\$/litre	% total costs
A. Gross income: milk sales	1 090	0.208	
B. Direct costs (short-term cost)	804	0.16	58%
Feeding costs	440		32%
Labour costs	115		8%
Other direct costs	249		18%
C. Gross margin (A – B)	286	0.048	21%
D. Fixed costs	200	0.047	14%
E. Depreciation + financial cost	380	0.076	27%
Land opportunity cost	180		13%
Total (long-term) cost	1 384	0.274	100%

Source: Margenes Agropecuarios, 2009 (for more details, see Annex 6).

- b) Feeding direct costs: Owing to the pressure for land for other agricultural uses, dairy is evolving from extensive grazing systems to more intensive systems, which increase direct feeding costs. These costs are closely related to the prices for grains and their by-products, including silage, and represent about 55 percent of direct costs.
- c) Land rental costs: Approximately one-third of the area used for dairy production is rented, with rents based on the value of grain (at 1 to 2 tonnes of soybean/ha). Land rental can therefore represent about 25 to 35 percent of total production costs.

Off-farm payments for milk

The farm-gate price of milk is not based on any statutory law or regulation, but is instead the result of free negotiation between the individual farmer and the dairy company. This means that there is neither a uniform payment system nor a compulsory basic or minimum farm-gate milk price in the Argentinean dairy industry. There are no legal or formal contracts between parties, with factories establishing the payment criteria under which farmers agree to deliver their milk. Although the usual practice is to express milk prices in United States dollars per litre, the majority of milk is paid for on the basis of criteria such as kilograms of butterfat, total protein, solids-not-fat (SNF) and/or total milk solids, depending on the dairy company's quality standards. Most companies set a basic price and pay additional premiums for milk that achieves certain quality standards. For example, the two leading dairy companies have different quality payment schemes: MHSA⁸ establishes a basic price based on the total or crude protein content, with premiums for various quality standards such as somatic cell count (SCC) and bacterial count (colony-forming units [CFU]); SanCor bases its basic price per litre on a set "quality-standard milk", with bonuses or penalties depending on the milk's compositional content and hygienic criteria.

Today's average milk quality is the result of a long process that started in 1963 with the introduction of a compulsory quality system established by law (Decree 6640/63). This law was phased out in 1991, and since then quality standards are established by each company. Table 10 shows the results of a survey carried out under the Raw Milk Quality Programme of the Secretariat of National Agricultural and Livestock Services (SAGPyA).

Milk collection and bulking

Considering the long distances between dairy farms and processing plants, the transport of raw milk is a major cost element for the Argentinean dairy industry. Prices range from US\$0.012 to \$0.016/litre/km, with an average distance of 150 to 250 km per truck (CIL, 2009).

In the 1970s and 1980s, most medium-sized and large companies facilitated dairy farms' acquisition of cooling tanks. Currently, milk is collected once a day from all but the largest farms (producing more than 21 000 litres/day), from which it is collected twice daily. All the milk collected is transported directly from the farm to the processing plant; only one company has six pre-collection plants where raw milk is classified before it is transported to the different processing plants. Only three major companies use automatic sampling systems in their collection trucks. Testing is carried out in the companies' own laboratories, as neither farmers nor publicly owned milk laboratories can carry out raw milk analysis for payment purposes.

THE PROCESSING INDUSTRY

There are a considerable number of processing companies in Argentina's dairy industry, but the main companies retain an important share of total milk production. Among these major companies, type of ownership varies, ranging from cooperative organization (e.g., SanCor, Milkaut and Manfrey) and national private companies (Mastellone, Williner, etc.) to multinational firms such as Saputo and Nestlé (Annex 4).

TABLE 10
Average milk quality, December 2008*

Sampled*	7 358 farms
Butterfat	3.66%
Crude protein	3.28%
CFU	65 000 bacteria/ml
SCC	384 000 cells/ml

* 60 percent of national milk production.
Source: Di Bartolo, 2009.

⁸ Mastellone Hnos SA (MHSA), also known as La Serenisima, is the leading dairy company in Argentina.

Fluid milk sector

The pasteurization of raw milk has been mandatory by law in Argentina since the early 1960s, and non-pasteurized milk accounts for only a minor portion of total consumption⁹. Over the last two decades, there have been considerable developments and product segmentation in the fluid milk market. Health considerations have triggered an increasing demand for lower-fat types of milk and for functional dairy foods¹⁰. Although fluid milk shows the lowest elasticity for price and income of all dairy products, its consumption has been growing very slowly (at less than 1 percent per year) and now averages 43 litres per capita per year (2008).

Traditionally, pasteurized milk accounts for the major share of fluid milk (Table 11), with 70 percent. Pasteurized milk is marketed mainly in sachets or plastic bags (75 percent), although other packaging types include cartons. Ultra-heat treated (UHT) milk accounts for the remaining 30 percent of the fluid milk market, but this varies according to the local economic and milk supply situation, as medium-sized and large companies can transport UHT milk into urban centres without needing refrigerating systems. About 25 companies produce and market fluid milk, although this sector shows the highest market concentration, with just one company (Mastellone SA) accounting for 75 to 80 percent of the total national pasteurized milk market.

TABLE 11
Fluid milk production data, 2008

	Pasteurized	UHT	Chocolate milk	Total
Production ('000 litres)	1 221 191.431	431 613.379	83 964.744	1 736 769.555
Stock (2008 vs 2007) ('000 litres)	242.000	2 917.000	-187.000	2 972.000
Ex-factory price (million US\$)	1 494.577	740.686	144.389	2 379.653
Sales (million US\$)	473.212	234.927	37.942	753.579
Exports ('000 litres)	1.241	23 044.019	NA	23 045.260
(million US\$)	2.552	15 356.766	NA	15 359.318
Imports ('000 litres)	0.014	50.531	NA	50.544
(million US\$)	0.027	29.479	NA	29.506
Consumption (litres/capita)	30.86	10.26	2.12	43.25

Source: SAGPyA, 2009.

Cheese sector

Cheese is by far the principal dairy product as it accounts for approximately 45 percent of national milk production (Table 12). The most important category of cheese are the fresh or soft types (cremoso, Saint Paulin and mozzarella), representing more than half of total cheese production, followed by the semi-soft types (Gouda or Swiss type), with a 30 percent share; hard cheeses (Italian type, such as provolone and sardo) represent 15 percent of total production. Processed cheeses account for a minor part of cheese consumption (Annex 8).

Cheeses present major income elasticity as compared with other dairy products (approximately 1.25 to 0.50 respectively). Among the cheeses, throughout the decade analysed, the soft types were the most sensitive to fluctuations in revenue, followed by hard types and semi-soft types. Some specialists mention excessive mark-ups (percentage of the cost price added to the selling price) in the retail sector as a significant barrier for the development of cheese consumption. Usual mark-ups range from 20 to 30 percent for soft cheeses to nearly 60 percent for hard cheeses (provolone type), with margins of about 40 percent for semi-soft cheeses (pategras, gouda). The SanCor cooperative is the market leader in cheese categories, and the seven largest companies supply about 35 to 40 percent of the total cheese market. Remaining production is highly fragmented among more than 800 dairy companies, most of which are small and medium enterprises (SMEs), many operating in the informal circuit.

⁹ Although official statistics show that about 7 percent of total production is consumed outside the processing industry, most of this milk is consumed as fresh unpasteurized cheese rather than fluid milk.

¹⁰ Functional foods refer to processed foods containing ingredients that aid specific bodily functions in addition to being nutritious.

TABLE 12
Cheese production data, 2008

2008	Hard	Semi-soft	Soft	Processed	Total
Production ('000 litres)	74 431.994	143 871.001	259 758.084	12 526.451	490 587.529
Stock (2008 vs 2007) ('000 litres)	1 057.000	-7.000	-570.000	167.000	647.000
Ex-factory price (million US\$)	1 437.395	1 877.867	2 523.618	114.462	5 953.341
Sales (million U\$)	453.976	594.055	798.241	36.231	1 882.503
Exports ('000 litres)	13 291.243	11 281.724	11 453.458	115.601	36 142.026
(million U\$)	67 760.852	50 137.826	52 206.489	549.037	170 654.204
Imports ('000 litres)	170.923	226.334	228.369	2 194.759	2 820.385
(million U\$)	1 087.204	1 346.412	1 293.509	8 857.887	12 585.012
Consumption (litres/capita)	1.51	3.34	6.26	0.36	11.48

Source: SAGPyA, 2009.

Milk powder sector

The production of whole milk powder has been one of the most dynamic sectors over the last decade (Table 13), mainly in response to external demand. Whole milk powder represented 55 percent of Argentina's total dairy export. About 20 companies have a total drying capacity of about 14 million litres per day, but no more than ten companies have the scale and technology for meeting export requirements.

TABLE 13
Milk powder production, 2008

	Whole	Skimmed	Total
Production ('000 litres)	200 056.251	24 759.281	224 815.532
Stock (2008 vs 2007) ('000 litres)	-11 698.000	1 331.000	-10 367.000
Ex-factory price (million US\$)	2 138.317	307.375	2 445.693
Sales (million U\$)	673.225	96.275	769.500
Exports ('000 litres)	137 224.658	13 934.599	151 159.257
(million U\$)	542 805.212	50 669.397	593 474.609
Imports ('000 litres)	695.138	0.041	695.179
(million U\$)	3 627.687	0.370	3 628.057
Distribution (tonnes)	75 224.731	9 493.723	84 718.454

Source: SAGPyA, 2009.

Other dairy products

There have been interesting growth and development in other dairy categories and sub-products, among which milk caramel and yoghurts are the most important, especially the latter, which has duplicated its production and consumption rates in the last decade (Table 14).

DOMESTIC MARKET

All the dairy products sold on the domestic market are distributed through the following mechanisms (Dvoskin and Brudny, 2002):

- Inter-factory (ingredients): No statistics on this market are available. Dairy products are distributed to companies that process a wide range of other foods: pizzerias, pasta and pastry factories, ice cream makers, etc. are important users of various dairy products and sub-products as food ingredients in their processed products.
- Government of Argentina: The government is still an important client of the dairy industry, through implementation of its food aid programmes that include distribution of powdered and fluid milk. An estimated 600 to 800 million litres of milk equivalent per year is sold to these government programmes.

TABLE 14
Other dairy products, 2009

	Cream	Butter	Milk caramel	Yoghurt	Other	Total
Production ('000 litres)	39 154.000	50 779.684	124 980.263	519 111.000	114 479.000	848 503.947
Stock (2008 vs 2007) ('000 litres)	-93.000	-149.000	-92.000	-534.000	5 664.000	4 796.000
Ex-factory price (million US\$)	298.493	530.145	576.399	2 066.662	31.601	3 503.301
Sales (million US\$)	94.421	168.294	182.910	651.526	10.058	1 107.209
Exports ('000 litres)	395.897	21 591.777	6 494.708	11 113.749	44 334.205	83 930.336
(million US\$)	646.963	80 236.251	10 349.105	9 976.960	168 713.840	269 923.119
Imports ('000 litres)	0.029	0.782	7.561	1 657.314	8 874.438	10 540.124
(million US\$)	0.459	5.037	22.517	1 145.347	20 368.547	21 541.907
Distribution (tonnes)	38 851.132	29 337.689	118 585.116	510 188.565	73 355.233	770 317.735
Consumption (litres/capita)	0.10	0.74	2.99	12.84	1.85	19.38

Source: SAGPyA, 2009.

c) Retail: The final consumer market is the most important channel for all dairy categories, which are sold through a highly complex retail network.

Retail sector

There are four basic retail store formats in Argentina:

- i) hypermarkets, of at least 5 000 m² and with at least 25 checkouts;
- ii) supermarkets, of 400 to 5 000 m² with four to 25 checkouts;
- iii) small supermarkets and discount stores, of about 250 m² with two to three checkouts; and
- iv) traditional grocery stores, of less than 100 m² with one checkout.

Argentina has more than 315 000 food stores, including 93 300 kiosks, 118 000 traditional food retailers, 4 200 mini-markets, 17 000 self-service shops and supermarkets, and retail stores specializing in bakery, meat, pasta, fruits and vegetables, etc. Modern retail marketing (through hyper- and supermarkets) is still being developed; it currently accounts for approximately 40 to 50 percent of total sales of basic goods (Asaretail, 2009a).

Sales through modern retail formats increased significantly during the 1990s, but at present there is a recovery or marginal increase in dairy sales through traditional stores and smaller supermarkets, suggesting that the traditional retailing channel can exist alongside larger stores. As shown in Table 15, supermarkets are of major importance to the dairy industry, with 40 percent of total retail dairy sales. Nonetheless, the smaller retail format is still the main channel for general foods, including dairy, especially dairy products with short shelf-life, such as pasteurized milk, cream and butter. Supermarkets have a larger share of longer-life dairy products, such as UHT milk, cheeses and milk powder.

Distribution of dairy products

Table 16 shows the differences in distribution channels between dairy and other basic food products. Company distribution centres are a very important part of the dairy distribution chain, allowing major companies to supply their products directly – using their own fleets or independent marketing agents – to traditional and self-service shops and supermarkets.

The rationale for the distribution shown in Table 16 depends mainly on the need for frequent deliveries of fresh dairy products and for a cool storage system, which most wholesalers lack. Most production from small cheese processing

TABLE 15
Retail sale shares of different product groups

	Milk and dairy	General goods
Traditional stores	26%	36%
Self-service shops	35%	32%
Supermarkets	40%	32%

Source: Nielssen, 2008.

TABLE 16
Distribution of basic good sales

	Wholesalers	Distribution centres	Other
General	40%	12%	48%
Food and beverages*	33%	17%	50%
Milk and dairy	9%	36%	55%

* Excluding meat, and fresh fruit and vegetable sales.

Source: Dvoskin and Brudny, 2002.

companies is distributed locally and/or regionally through a very simple and direct system in which local wholesalers buy production directly at the farm-gate.

As is happening in most developed countries, the dairy industry in Argentina has been losing market negotiating power as a result of the increasing concentration of modern retailing. Carrefour is the retail leader, with a share of 25 percent of sales, through 25 hypermarkets and 170 supermarkets acquired from a former national company (Norte). The Jumbo chain of stores has a 20 percent share, with 15 hypermarkets and 230 supermarkets in the Disco chain. Other big players include the national Coto, with more than 120 supermarkets (12 percent share) and Wal-Mart with 23 hypermarkets (8 percent share). There has also been important growth in the smaller discount format, and in some other regional chains (Asaretail, 2009b).

DAIRY CONSUMPTION

Per capita dairy consumption

As shown in Table 17, there was important growth in consumption of all categories of dairy during the 1990s; consumption has since remained very stable. Because the estimated demand price elasticity of dairy products – apart from fluid milk – is relatively high, the national income crisis of 2002 implied an important reduction in dairy consumption, most notably of cheeses.

TABLE 17
Dairy consumption in Argentina

	2008	2000	1990
Fluid milk (litres/capita)	43.04	42.31	31.40
Pasteurized (litres/capita)	30.72	25.71	30.08
UHT (litres/capita)	10.21	15.98	1.18
Chocolate milk (litres/capita)	2.12	0.64	0.13
Milk powder (kg/capita)	2.13	3.67	2.46
Whole milk (kg/capita)	1.89	2.91	1.89
Skimmed milk (kg/capita)	0.24	0.76	-0.25
Cheese (kg/capita)	11.49	11.99	8.81
Hard (kg/capita)	1.52	1.41	1.10
Semi-soft (kg/capita)	3.34	3.60	3.08
Soft (kg/capita)	6.27	6.73	4.47
Processed (kg/capita)	0.36	0.25	0.16
Milk caramel (kg/capita)	2.99	3.02	2.15
Condensed milk (kg/capita)	0.20	0.31	0.19
Yoghurt (kg/capita)	12.84	6.88	3.95
Desserts (kg/capita)	1.6	0.60	0.31

Source: SAGPyA, 2009.

Consumer preferences

Approximately 95 percent of households and 85 percent of the population are aware of the importance of a healthy, natural and balanced diet in which dairy and milk products are seen as a critical component and the main source of calcium (IPCVA, 2005). Dairy products are therefore a very important part of the normal diet in Argentina; according to the latest available Permanent Household Survey (PHS) carried out by the National Institute for Surveys and Statistics (INDEC), it represents 3.41 percent of total household expenses and 8 percent of food expenses, ranking third after meat, and bread and bakery products. Such consumer valorisation of milk and dairy products has its roots in consumers' belief that milk is the best food for children, which probably originated in the longstanding National School Milk Cup Programme (Aguirre, 2005). Within this "Argentinean milk culture" there are clear distinctions among the fluid milk and dairy products consumption rates of different population groups.

Chapter 3

Employment in the Dairy Sector

DIRECT EMPLOYMENT

Although no national employment survey or register of dairy-related jobs is available, estimates of the number of jobs in the dairy industry range from 85 000 (Table 18) to almost 100 000 (Llach, Harriague and O'Connor, 2004).

TABLE 18
Direct employment in Argentina's dairy industry

Sector	Jobs available
Dairy farms	45 400
Milk collection	2 500
Processing	24 600
Logistics and sales	12 500
Total	85 000

Source: Gutman, 2007.

Table 19 shows the three main ways in which labour is organized on dairy farms. Share-milkers¹¹ are the main category involved in milk production.

TABLE 19
Organization of dairy farm labour

Type of labour	Output	Technological Skills	Source of income	Estimated monthly income
Household	Low	Low	Farm income	< US\$1 000
Share-milker	Low-medium	Low-medium	% milk output	US\$1 500–\$2 500
Commercial	High	High	Salary + bonus	> US\$2 500

In the dairy processing industry, the average productivity per employee (including logistics and sales) is approximately 2 000 to 2 500 litres of processed milk per day. Labour is organized according to formal contracts, especially in large and medium companies where the Dairy Processing Industry Workers' Union (ATILRA) negotiates basic salaries every year. Dairy is one of the best paid of the food industries, with basic salaries averaging about US\$800 to \$1 500 per month, plus social welfare costs, depending on several factors. SMEs usually pay lower salaries, and the smaller the company, the more informal the job contract.

INDIRECT EMPLOYMENT

As Argentina's dairy industry intensifies, especially at the farm level, it is using increasingly diversified inputs, including direct services from veterinarians, advisers, AI technicians, etc. The same is occurring at the processing and distribution stages. Coremberg (2005) estimates that there are about 100 000 indirect jobs generated by the dairy industry.

¹¹ A share-milker is an independent contractor who works in return for a share of the income from selling milk and other produce.

Chapter 4

Safety of Milk and Dairy Products

LEGAL CONTEXT

The Argentinean Food Codex (AFC) is the main legislation related to food safety. It sets mandatory minimum quality standards in a law that currently contains more than 1 400 articles classified into 20 main chapters covering technical specifications, product definitions, terms and principles of processing, ingredients, packaging, labelling, etc. related to food security and human health. It also includes product standards and the basic characteristics of final products, such as product denominations, shapes, sizes, weights, nutritional contents and taste qualities. Specific rules for dairy products are contained in Chapter VIII, and applied by all food sanitary agencies.

AFC is used by the various government agencies responsible for food control. This control is regulated by Decree 815/99, which establishes the National System of Food Control that makes the National Agrifood Quality and Animal Health Service (SENASA) responsible for food control at the farm and factory level, while the National Food Institute (INAL) is responsible at the retail level.

National dairy food control

At the federal level, the control of dairy foods is coordinated by two government bodies – the National Health Ministry and the Agriculture and Agrifood Secretary – under which are various undersecretaries and agencies, such as:

- the National Food Commission (CONAL);
- SENASA;
- INAL;
- the National Administration for Drugs, Foods and Medical Technology (ANMAT).

Decree 815/99 establishes the responsibilities of these food control agencies and bodies, but there is considerable overlap among them. For example, Chapter VI of the decree classifies dairy processing plants according to their final market, while federal inspection applies only to those dairy plants producing for federal and/or external markets; processors that market locally or within provincial limits are controlled by the provincial and municipal health and food authorities. The roles of CONAL are to:

- i) keep AFC updated and propose amendments to it; and
- ii) recommend procedures for controlling and inspecting food companies and end-products.

SENASA is the public organization in charge of controlling animal health and sanitary issues and certifying quality and safety within the agrifood manufacturing sector, based on application of AFC and its own legislation. Among SENASA's main objectives are controlling animal production and food processing, and designing and implementing plans for the eradication and control of animal diseases.

ANMAT is in charge of controlling and inspecting the quality of inputs used in food final products, including chemical products, reagents, pharmaceuticals, diagnostic elements and medical technologies, and any other ingredients used in the foods. INAL is part of ANMAT and is in charge of controlling food final products and applying traceability processes throughout the production chain to ensure consumer security, especially during a food crisis (e.g., dioxin, melamine).

General requirements for dairy foods

Nutritional labelling (AFC, article 235)

At present, the Government of Argentina does not require, approve or prohibit any claims about nutrient contents (e.g., low in saturated fat), absolute descriptors (e.g., high-fibre or low-fat) or relative descriptors (e.g., reduced sugar or light in sodium). However, this situation is being reviewed in light of MERCOSUR standards.

Health claims

As functional dairy foods are developed, the Health Ministry – through INAL – has established rules (Res. 4980/08) regarding health claims in the labelling and publicity for functional foods and has created a special committee for the approval of these claims.

Packaging and container regulations (AFC, Section III)

Argentina does not have any official packaging or container size requirements. At present, there are no municipal waste disposal laws or product recycling regulations for food or other packaging.

Food additive regulations

Argentina uses a positive list of food additives. Article 2/Decree 2092/91, states that "... all foods, condiments, beverages, or their raw material and food additives which are manufactured, fractioned, preserved, transported, sold, or exposed, must comply with the AFC requirements".

Pesticides and other contaminants

Pesticide tolerances are regulated by AFC, based on Codex Alimentarius recommendations. SENASA carries out regular monitoring – the National Plan for Control of Residues and Hygiene in Foods (CREHA) – of several pesticides and contaminants in raw milk and dairy products.

Biotech products

Argentina does not have a national regulatory system for biotech foods.

Organic milk

Organic dairy marketing and production have not expanded in Argentina, despite serious efforts by a leading company several years ago. In 2008, a total of only 41 243 litres of organic milk were registered (SENASA, 2008b).

Good manufacturing practices (GMPs)

AFC's Chapter II includes regulations related to GMPs, and MERCOSUR's Resolution 80/96 makes it mandatory to apply certain GMPs in all the food processing establishments that market within the MERCOSUR region.

Good agricultural practices (GAPs)

Some GAP guidelines apply only to fruits and vegetables and not to dairy. SENASA currently operates a voluntary GAP certification system for dairy farms (Regulation 9/04) adapted from European rules and applying only to dairy companies that export to the European Union (EU).

Chapter 5

Dairy Production and the Environment

PRESENT SITUATION

Buenos Aires Law 11459/96 (Environmental Aptitude Certification) classifies all types of industry (including those in the agrifood sector) into three main categories according to their relative environmental impacts. The dairy processing industry is in the second or intermediate of these categories.

Most major companies have implemented environmental management systems (EMS), ranging from the Hazard Analysis and Critical Control Point (HACCP) system to International Organization for Standardization (ISO) 9000 and 14000, which refer to the treatment of effluent liquids (biological stabilization lagoons), solid and semi-solid waste processing systems for treatment and/or final disposition, and monitoring and control of gaseous effluent, including better use of water and energy resources. This greater concern for environmental management is a response to not only the requirements of national authorities, but also the increasing demands from external markets. In SMEs the situation is very different; in general, the smaller the company, the less effective is EMS, with the smallest companies having virtually no EMS at all (Poblet and Lecca, 2009).

An important and growing group of companies are implementing some of these systems in Argentina (Table 20), but the food processing industry still accounts for less than 6 percent of total ISO 14000 certification in the country. Although only one dairy company currently applies ISO 14000, a group of dairy companies apply ISO 9002 and ISO 9001, which is a good starting point for adopting ISO 14000 in the near future, especially because most of these companies have locally adapted EMS based on very similar standards to those contained in the ISO 14001 norm (Poblet and Lecca, 2009).

Because there are several federal and provincial environmental regulations, there is some overlapping among authorities at the national and provincial levels (Leila, 2009, INTI).

TABLE 20
Quality systems implemented by industries

System	Total	In agrifood industry
ISO 14000 series	862	55
ISO 9000 series	4257	330
GAP	11	11
GMP	52	33
HACCP	---	76

Source: Estimates based on INTI Certificaciones y Acreditaciones en Argentina

Effluents management

A major problem for many dairy companies, especially SMEs, is the disposal of liquid effluents and, to a lesser extent, the inefficient use of cleaning water¹². As the majority of dairy SMEs are cheese factories, their greatest challenge is whey disposal, which is highly critical in terms of effluents pollution¹³. The dumping of whey in watercourses is still a serious environmental problem in Argentina, and is the most common practice among dairy SMEs, along with using the whey as a feed supplement for calves or pigs. Nevertheless, whey dumping has been significantly reduced, owing to the strict application of environmental policies and the increasing economic value of whey protein. In 2008, the Argentinean dairy industry generated approximately 3 800 million litres of whey. Every year, about 36 000 tonnes of whey powder or protein are produced, implying that only one-third of the available raw whey is processed.

¹² In SMEs, between 3 and 7 litres of water are used for every litre of milk processed; in larger companies the ratio ranges from 1:1 to 2:1.

¹³ SAGPyA: it has been estimated that a medium-sized cheese factory processing more than 100 000 litres of milk per day generates 600 m³/day of effluent, which is comparable to the amount generated by an urban population of 36 000 people: www.alimentosargentinos.gov.ar/0-3/revistas/r_13/13_02_ambiente.htm.

Table 21 shows that most farms dispose of effluents in artificial ponds without pre-treatment or solid separation, as manure is not commonly used as fertilizer. The worst situation is on those farms (10 percent of the total) that dispose of their effluents in natural watercourses (rivers or lagoons), generating serious contamination. There are no specific regulations for farm's effluents disposal and the only maximum limits established by law are those created and applied for the processing industry. Dairy farms are high producers of effluents at the regional level (Table 22) and generate an important pollution problem from the liquid contamination they produce (Nosetti *et al.*, 2008).

TABLE 21
Effluent disposal by dairy farms

Final destination	Pre-treatment	Post-treatment
Artificial ponds	69%	22%
Natural ponds	10%	25%
Paddocks	9%	29%
Reuse	5%	17%
Other	7%	7%

Source: JICAL III, 2009.

TABLE 22
Estimated dairy farm effluents at the regional/provincial level

Province	Dairy region	Dairy farms	Head per farm	Effluents per farm (tonnes/day)	Effluents per region (tonnes/day)	Effluents per province (tonnes/day)
Córdoba	Villa Maria	1 239	344	17	21 300	54 000
	Northeast	825	343	17	14 147	
	South	877	320	16	14 027	
	Centre	399	227	11	4 526	
Santa Fe	Centre	3 623	254	13	46 032	54 012
	South	369	324	16	5 980	
	West	855	423	21	18 065	
Bs.Aires	Abasto South	660	250	13	8 256	35 622
	Abasto North	425	259	13	5 495	
	Mar y Sierras	249	306	15	3 806	
Entre Ríos	Cuenca A	1 328	80	4	5 291	7 653
	Cuenca B	348	136	7	2 362	
La Pampa	La Pampa	412	148	7	3 049	3 049

Source: Nosetti *et al.*, 2008

Greenhouse gas (GHG) emissions

As part of the obligations it assumed under the United Nations Framework Convention on Climate Change (UNFCCC), the Government of Argentina has submitted its second National Communication, which presents inventories of GHG emissions, including a summary of the contributions of each source to total emissions (uptakes) (Table 23).

As shown in Table 23, the energy sector accounted for 46.8 percent of Argentina's total emissions, followed by the agriculture and livestock sector with 44.3 percent, wastes with 5.0 percent, and industrial processing with the remaining 3.9 percent. The results of Argentina's GHG inventory are therefore fairly similar to those of global and other studies (IDF/FIL *Bulletin*, 2009), which show that the largest GHG emissions from the dairy chain are generated by dairy farming, while all the other phases account for only about one-fifth of these. The main causes of GHG emissions from dairy farming are enteric fermentation, manure management, feed production and direct soil emissions from grazing (Table 24).

Methane emission from enteric fermentation contributed 66.78 percent of total emissions from livestock. Cattle contributed 95.46 percent (Table 25). The second most important emission is nitrous oxide from direct soil emission

TABLE 23
Results of 2000 GHG inventory, by gas and sector (Gg CO² equivalent)

Sector	CO ²	CH ⁴	N ² O	HFC	PFC	SF	Total
Energy	118 712	12 241	1 009				131 961
Industrial processing	9 612	27	145	947	326	50	11 108
Agriculture and livestock		59 533	65 386				124 919
Wastes		13 049	964				14 013
Total, excluding LULUCF	128 323	84 849	67 503	947	326	50	281 998
LULUCF	-43 941	583	59				-43 299
Total including LULUCF	84 383	85 433	67 563	947	326	50	238 702

Gg = Giga gram.

LULUCF = land use, land use change and forestry.

Source: SNC, 2007

TABLE 24
GHG emissions from domestic livestock, by source, 2000

Source	Original gas Gg	CO ² equivalent Gg	% contribution
CH ⁴ enteric fermentation	2 739.31	57 525.55	66.78
CH ⁴ manure management	57.32	1 203.70	1.40
N ² O manure management	0.52	160.85	0.19
N ² O direct soil/mineral grazing	59.03	18 299.30	21.24
N ² O indirect soil/livestock manure	28.85	8 943.50	10.39

Source: SNC, 2007.

TABLE 25
CH⁴ emissions from enteric fermentation

Livestock	CH ⁴ Gg	CO ² equivalent Gg	% contribution
Dairy cattle	183.58	3 855.18	6.70%
Beef cattle	2 431.31	51 057.51	88.76%
Total	2 739.33	57 525.57	100%

Source: SNC, 2007.

TABLE 26
N²O emissions from manure management, 2000

Manure management system	N ² O Gg	CO ² equivalent Gg	% contribution
Anaerobic lagoons: dairy cattle and swine	0.05	15.5	9.62
Other: poultry	0.38	117.8	73.08
Total	0.52	161.2	100

Source: SNC, 2007.

due to nitrogen excretion by grazing animals (21.24 percent) and nitrous oxide from indirect soil emission due to the volatilization and leaching of nitrogen contained in manure (10.39 percent).

Among the other sources, methane and nitrous oxide emissions from manure management represent only 1.40 and 0.19 percent respectively (Table 26).

LIVESTOCK DIVERSITY

Holando Argentino breed

As Argentina's dairy industry surges, milking herds are starting to grow through the importation of selected Holstein-Friesian animals from the Netherlands and other countries. AI is used by most dairy farms, and there are 40 registered AI centres and 29 semen banks. In 2007, 2 600 000 doses of semen were used on dairy herds, most (96 percent) from Holstein breeds from the United States and Canada, which were used to inseminate about 1 300 000 dairy cows (65 percent of the total dairy herd). Further information of breed characteristics is included in the FAO/DAD-IS database (<http://dad.fao.org/>).

Criollo breed

During the nineteenth century, there were more than 20 million head of the Criollo breed in the Pampas area, representing 90 percent of the total cattle population. At present, however, there are an estimated 200 000 head of Criollo, located in the northwest and northeast regions. Although this breed's milk production is not particularly high, it can be used to produce milk in some regions where modern dairy breeds cannot be reared. The breed's dairy production is of good quality, but could be much improved in terms of quantity. Dairy and beef biotypes are mixed in the Criollo breed, and more selection work should be carried out to differentiate between the two. "The values that we have observed on fat content averaged 5.5 percent (with maximums of 6.7 percent), although the milk volume produced is still very low. So it is possible to conclude that much remains to be done on its properties as a milk producer breed, but due to its genetic diversity it would be possible to obtain a cattle breed suitable for milk producing in some regions of Argentina where temperate cattle do not perform well" (Martínez *et al.*, 2005).

Bovine genetic resources (BGR)

At present there is no national programme for the conservation of animal BGR, neither is there a formal policy for encouraging the conservation of bovine or other domestic animal biodiversity. The Criollo breed has been under threat of genetic erosion/extinction because of its low population and limited commercial use. INTA has been carrying out BGR conservation activities for approximately 20 years, establishing a bovine germplasm bank at INTA-Balcarce (Buenos Aires), which keeps cryogenic semen and embryos of the Criollo breed and of some genetic lines of the Angus and Hereford breeds. Joint activities between the Criollo Breeders' Association and universities are making it possible to keep some pure-breed herds.

Chapter 6

Dairy Institutions and Development Programmes

DAIRY ORGANIZATIONS

For the purposes of this review, the term “dairy institution” applies to all the public and private dairy organizations or agencies in Argentina, including milk producer groups, cooperatives, processing industry associations and any other body directly involved in promoting the Dairy Development Programme (DDP).

Public dairy institutions

According to the State Organization Norm (Ministries Law), SAGPyA is the main federal public agency responsible for rural and dairy development programmes. The following three main areas are related to DDP.

*The National Dairy Policy Programme*¹⁴

Created by Resolutions 320/02 and 335/03, the main objective of this programme is “to promote the harmonic integration of the different sectors of the dairy chain, in order to assure the development of the sector”. It includes six working areas:

- i) creating a central dairy information system (on production, milk prices, production costs, domestic and external markets, etc.);
- ii) coordinating dairy activities among provincial agencies;
- iii) surveying milk markets and formulating prices for the whole dairy chain;
- iv) providing and facilitating financing tools for the dairy chain;
- v) coordinating and promoting research activities with other countries and/or international dairy bodies (public or private); and
- vi) proposing legislation for the dairy sector. To accomplish these objectives, the Dairy Working Group (Resolution 544/06) is the formal institutional forum for analysing and discussing dairy policies, complemented by the main private and government dairy organizations.

The Federal Dairy Committee

This group is under the presidency of SAGPyA, and is represented exclusively by the ministries of the main dairy provinces. It is the forum for coordinating federal dairy policies and programmes.

Rural development programmes

Within SAGPyA, several rural development programmes aim to promote, develop and help small-scale farmers and contribute to poverty alleviation in rural areas: the Rural Social Programme (SAP), the Small-Scale Rural Development Project (PROINDER), and rural development programmes for the northwest (PRODERNEA) and northeast (PRODENOA) regions. Although these programmes are not specifically oriented to dairy producers, they include small- and micro-scale milk producers among their target groups.

Private dairy organizations

Dairy cooperatives

These account for less than 25 percent of total milk production. When they first started, most of them had important roles in the development of their members through extension and social services, technical assistance, economic and financial help, and developing local infrastructure. In recent decades however, they have had to refocus on developing

¹⁴ www.sagpya.mecon.gov.ar/new/0-0/programas/pn_politica_lechera/pnpl.php.

their own competitive capacities, mainly in the processing and commercial areas, which has led to reduced services for their members. Nonetheless, an upsurge of these cooperatives could help in the development of small dairy farmers in some regions (Fernandez, Lattuada and Renold, 2004).

Dairy farmers' organizations

Owing to the heterogeneity of Argentina's dairy industry, there are several farmers' and other dairy organizations (Table 27), ranging from national rural producers' groups – each with its own dairy commission – to specific dairy farmers' organizations at the national, provincial and regional levels. Most of these organizations have focused almost exclusively on dairy policy issues, resulting in considerable overlapping among them. As there is no law or regulation to promote these associations, they do not receive any direct or indirect economic support from the government; consequently, their annual budgets are so low that they lack the structure necessary for providing services and adequate support to their members in such areas as financing, the legal framework, trade and social services. Farmers' associations tend not to be very representative, owing to such factors as the lack of a consistent national policy, poor governance, lack of supporting regulations, low budgets, and poor coordination with the government on DDP.

Dairy processing organizations

The main organization for dairy companies is the Dairy Processing Industry Federation (CIL), whose more than 30 members account for almost 70 percent of total milk intake. Very recently, some small and medium-sized dairy companies have created an organization to represent their interests in DDP-related fora.

Research and technical organizations

As well as the universities that carry out dairy research work, the following national research and extension organizations specialize in dairy research.

INTA

The National Institute of Agricultural Technology (INTA) is the main government organization responsible for developing agricultural and livestock extension and rural research. The Dairy Integrated Research Project is coordinated at the Rafaela Experimental Station. This project involves seven sub-projects aimed at generating and transferring milk production technology:

TABLE 27

Private dairy organizations

Type of organization	Name
National rural farmers	Sociedad Rural Argentina (SRA)
	Federacion Agraria Argentina (FAA)
	Confederacion Rural Argentina (CRA)
	Conf. Entidades Cooperativas Agropecuarias (CONINAGRO)
National dairy farmers	Asociacion Productores de Leche (APL)
	Union General de Tamberos (UGT)
	Mesa Nacional de Productores de Leche
National dairy processors	Centro de la Industria Lechera (CIL)
	Asociacion Pequeñas y Medians Industrias (APYMEL)
	Junta Intercooperativa Prod.de Leche (JIPL)
Regional dairy farmers	Camara del Centro de Buenos Aires (CAPRELOBA)
	Mesa Productores de la Pcia.de Santa Fe (MEPROSALFE)
	Camara de Productores de Entre Rios (CAPROLER)
	Camara de Productores de Cordoba (CAPROLER)
	Federacion Tamberos del Centro Santa Fe (FECET)
Regional dairy processors	Asociacion Provincial de Ind.Lacteas de Córdoba (APIL)
	Centro de Ind.Lacteas de Entre Rios (CILER)

- i) quality of raw milk;
- ii) environmental management and development of infrastructure for milk production systems;
- iii) characterization and genetic evaluation of bovine dairy biotypes;
- iv) production efficiency and conversion of feed to milk solids;
- v) strategies for preventing and controlling animal diseases;
- vi) epidemiologic study and control of mammary infections; and
- vii) training and technology extension services for milk producers.

INTI

The National Institute of Industrial Technology (INTI) has a dairy department whose mission is to promote the technological development of the milk processing industry, by carrying out specific research and offering capacity building services such as technical assistance on dairy products and processing methods. REDELAC is a network of public and private dairy laboratories working under INTI.

AACREA

This is a private professional consulting organization providing advice to livestock, crop and dairy producers. All the dairy work carried out in the region is coordinated by AACREA's Dairy Commission. The system uses fees paid by farmers to sponsor local consultants and the overall organization. Every month, each local group of typically ten to 15 dairy farmers meets and tours a member's dairy farm, where group members evaluate, discuss and suggest improvements and production practices.

Dairy clusters¹⁵

The wide variety of dairy organizations – each covering different products, from fresh to long-life, and involving a different production scale, from large transnational firms to micro-enterprises – has led to the creation of multiple sub-clusters of input-output linkages, with different types of agents participating in each. There are very few linkages between these sub-clusters, and the different networks tend to be isolated from each other. Argentina therefore lacks a well-defined dairy cluster at the national, regional or even micro-regional level (UNIDO, 2002). Altenburg & Meyer-Stramer (1999) have identified three main types of cluster in Latin America: those for survival; those for commodity-type goods; and those centred on transnational companies. This classification of clusters is used in the present paper since it applies and well describes the diversity and heterogeneity of Argentina's dairy processing sector:

A large group of dairy operators share some of the characteristics of Altenburg & Meyer-Stramer's "survival clusters". This group is composed of micro-scale dairies where dairy farming and processing are integrated in one unit. These dairies process their own milk production and tend to generate low incomes from very low productivity based on an artisan system. These survival sub-clusters are oriented towards the production of commodity-type dairy goods (mainly soft cheese or mozzarella) for local markets, and most labour is provided by the farming household/family.

The second group is very heterogeneous and shares many characteristics with the previous group, given that it is mainly made up of operators in the informal sector, with laxer control of taxes and of hygiene and environmental requirements. Members of this group usually have no entry/exit barriers, and produce unbranded products of medium or low quality for the regional market. They are more supply- than demand-driven, and compete in an environment of cycles of over- and undersupply, with periods of underutilization of their productive capacities, when cooperation among them tends to be very low.

The third group is made up of about 15 to 25 larger companies. Although competition among these companies is very fierce, sometimes reaching the verge of price or milk wars, they resemble the ideal clusters as defined by M. Porter and other authors, in that they are horizontally and vertically integrated, with technological spillovers increasing competitiveness. The other two groups usually have little in common with these "ideal clusters", in spite of having positive externalities such as product design, semi-qualified labour, easy access to milk production and other inputs such as locally produced machinery, and low management costs. This is because they suffer from the disadvantages usually associated with small-scale production, which makes them less efficient or attractive to investors. However, they are also more flexible – because of their size and organization – which helps them to survive or even grow during crisis periods.

¹⁵ The United Nations Industrial Development Organization (UNIDO) defines clusters as "a sectoral and geographical concentration of enterprises that produce and sell a range of related or complementary products and thus face common challenges and opportunities".

DAIRY DEVELOPMENT PROGRAMMES (DDPS)

There is considerable scope for improvement of Argentina's dairy industry, and general consensus (PEL, 2008)¹⁶ that the absence of a short-, medium- and long-term DDP and the lack of integration among the different institutions involved in the industry are among the most important weaknesses for the long-term development of the dairy chain.

DDP instruments can generally be categorized as:

- i) price policies (domestic, trade exchange);
- ii) institutional policies; and
- iii) promotion policies (technical, financial, etc).

Price policies

Successive governments have made attempts to promote DDPS, but most of these have collided with the strategic interest in keeping the domestic prices of basic foods low. Milk and cheeses are a very important component of the basic food basket (BFB) defined by INDEC, in which pasteurized milk accounts for 10 percent of the total, and some cheeses for 7 percent. Dairy products therefore have a high influence on the total price index surveyed by INDEC. On the other hand, the high elasticity between farm milk prices and total milk production (Castignani *et al.*, 2004) confirms that farm milk price is a very effective instrument for providing a rapid production response that is proportional to the level of the price increase.¹⁷ When the milk price decreases, it has the opposite effect, generating a downturn in production, typical of the historical cycles that characterized the Argentinean dairy industry in the past. It is therefore clear that any DDP designed for traditional commercial dairy farms will have first to deal with the milk price issue, which would involve introducing a more market-oriented policy and modifications to the export tax and domestic price control policies.

Promotion policies

A dairy promotion policy for Argentina has to take into consideration the heterogeneity of the dairy industry's components. One way could be to use a sub-clusters approach, by developing a tailored DDP for each of the different groups outlined in the previous section, taking into account their different needs. These needs range from direct technical and financial assistance for smaller traditional dairy farmers to a more integrated approach for underdeveloped regions and micro-scale farmers. Scala, Quintana and Nieto (2008) suggest that the principal elements of such a DDP should include:

- i) promotion of dairy development policies that focus on smallholder production systems, with due emphasis on prices and imports;
- ii) assistance to farmers' organizations, to enhance milk producers' participation in all aspects of dairying, for the improvement of milk collection, processing and marketing systems; and
- iii) establishment of dairy training organizations, etc.

¹⁶ PEL is an inter-professional group of experts from the private and public institutions coordinated by AACREA that is developing a national dairy strategic plan for up to 2020.

¹⁷ "It is observed that milk production is highly dependent on its price and to a much lesser extent on the cost of other inputs, confirming the hypothesis that milk price is a key instrument for any dairy development programme. The estimated strong elasticity for milk price implies an important capacity from dairy producers to respond rapidly to any milk price improvements" (Castignani *et al.*, 2004).

Chapter 7

The Role of the Dairy Industry in Economic Development

ECONOMIC IMPACT

In 2008, the dairy industry generated a gross production value (GPV) of approximately US\$4 512 million (Table 28), ranking it the third most productive sector in Argentina's total food and beverage industry, with a 17 percent share of gross domestic product (GDP) from the national food sector, 3.9 percent of the GDP from produced goods, and 1.6 percent of total national GDP.

Table 29 shows two possible growth scenarios for 2020, and their economic and labour impacts. These estimate an increase in GPV of 105 or 146 percent, and the creation of about 78 300 or almost 100 000 new jobs (direct and indirect).

Economic contribution

As well as the obvious direct economic impact described in the previous section, other important economic effects¹⁸ of dairy industry development include the following.

TABLE 28
Estimated GPV from the dairy industry

Product	GVP (million US\$)
Fluid milk	753.6
Powdered milk	769.5
Cheese	1 882.5
Other	1 107.2
Total	4 512.8

Source: SAGPyA, 2009.

TABLE 29
Economic projections for Argentina's dairy industry ADI, to 2020

Parameter	Base 2007	Estimate 1 2020	Estimate 2 2020	Estimate 1 (%)	Estimate 2 (%)
Milk production (million litres/year)	9 310	15 000	18 000	61.12%	93.34%
Productivity (litres/day/cow)	17.4	20	22	14.94%	26.44%
Dairy herd (million cows)	2	3.1	3.5	55.00%	75.00%
Domestic consumption (million litres/year)	7 334	9 806	9 806	33.71%	33.71%
Dairy exports (thousand tonnes)	174	200	220	14.94%	26.44%
Export value (million US\$)	718	1 921	3 030	167.55%	322.01%
GPV (million US\$)	3 500	7 200	8 640	105.71%	146.86%
Economic multiplier (million US\$)		16 920	20 304		

EME = economic multiplier effect.

Source: Mozeris, 2009.

¹⁸ To evaluate the economic importance of an industry such as the dairy industry, it is necessary to reframe the context of the analysis. As most milk products are considered basic necessities for the population (with low elasticity of demand), if the dairy industry and its products disappeared, products would have to be imported to replace them. The money used to purchase these non-local products would leave the national economy and reduce spending, revenues and jobs for the region/country. When the economic importance of an industry or activity is evaluated in these terms, it is more appropriate to refer to the estimated economic impacts as economic contributions (Watson *et al.*, 2007).

Regional economic impacts

These are generated in the local and regional economy when money made in the dairy industry is spent locally. They come from the goods and services provided by local businesses; dairy farmers and companies purchase a wide variety of inputs and use an array of professional services, thereby creating additional economic activity in the local economy, with new jobs and increased income. The total impact of a change in dairy industry sales is termed the multiplier effect. Using INDEC's input-output model, Regunaga *et al.* (2006) estimate that the Argentinean dairy industry has a very important economic multiplier effect (EME) of 2.35, ranking it sixth among the 124 local industries included in their survey. Based on this, the total output contributions or revenues of the dairy industry in 2008 could be estimated at approximately U\$10 605 million¹⁹.

Fiscal budget contribution

Argentina's dairy industry is also a very important contributor to national and provincial budgets through the State income generated from the direct payment of taxes by the industry and from the indirect taxes paid on expenses and investments in each related input sector. UNLP (2007) estimates that tax revenues represent more than 30 percent of total GVP from the dairy chain (not counting municipal levies and income taxes), so the dairy industry's fiscal contribution in 2008 could be estimated at approximately U\$1 352 million.

Trade balance

During 2008, the Argentinean dairy industry exported dairy products for a total value of US\$1 057 million, representing about 2 percent of total exports from Argentina. Imported dairy products were worth US\$673 million, generating a net trade balance of US\$990 million (Table 30).

TABLE 30
Argentina's dairy trade, 2008

Product	Exports (million US\$)	Imports (million US\$)
Fluid milk	23.0	29.5
Powdered milk	593.5	3.6
Cheese	170.7	12.6
Other	269.9	21.5
Total	1 057.1	67.3

Source: Estimates based on SAGPyA 2009 data.

Contribution to employment

As well as the direct employment generated in the Argentinean dairy industry, the industry also has a very important role in the generation of new employment in the rest of the national economy. Using the multiplier estimation (Regunaga *et al.*, 2006) calculated for total sales, the dairy industry ranks sixth in importance for employment²⁰, with a 6.10 multiplier effect representing the number of full-time-equivalent jobs generated in the country for each new job created in the dairy industry. Table 31 shows two hypotheses for dairy industry development up to 2020, which estimate that the dairy industry will create 78 000 or almost 100 000 new jobs by 2020, based on the growth hypotheses of experts (PEL, 2008).

POVERTY ALLEVIATION

Although INDEC and other agencies lack data differentiating rural and urban poverty, it is evident that in Argentina, as in other Latin American countries, most poor people live in urban and suburban areas, where cheap food prices are a major determinant of real incomes.

¹⁹ Using the EME estimated by Regunaga *et al.*, a multiplier effect of approximately 2.35 times was generated in direct sales by the dairy industry.

²⁰ Multiplier effects measure the total (direct, indirect and induced) activity resulting from a change in sales by a given basic industry and may be expressed in terms of sales or employment. In this case, multipliers were calculated using INDEC's (1997) national input-output model. Input-output models are based on a table of transactions representing the distribution of sales and purchases among economic sectors within a local area.

TABLE 31
Dairy industry employment, 2008 and 2020

	Total employment		EME (%)	New jobs created	
	2008*	2008 [§]		2020*	2020 [§]
Direct employment	85 000	167 000	42.35	35 998	70 725
Indirect employment	100 000	63 000	42.35	42 350	26 681
Total	185 000	230 000	42.35	78 348	97 405

Sources: * Gutman, 2007; [§] Llach, Harriague and O'Connor, 2004.

Contribution to household food security

According to FAO's definition, food security refers to a household's ability to secure, either from its own production or through purchases, adequate food for meeting the dietary needs of all its members. The *Food and Nutritional Guide for Argentina*²¹ defines daily needs for milk and dairy products as equivalent²² to two cups (400 cc) of fluid milk for adults and three cups (600 cc) for children, adolescents and pregnant and lactating women. It estimates that about 50 to 60 percent of total calcium requirements are met through this recommended milk and dairy intake. A report by CIL (Pagano, 2008) states: "Following the nutrients recommendations of the FAO/WHO (Thailand, 2001) report, we can conclude that the total population of Argentina (39.3 million in 2008) is secure in terms of nutrient requirements for milk and dairy products with a domestic supply of approximately 5 500/6 000 million litres per year, while the present domestic supply exceeds this volume by approximately 40 percent, thus generating a basic domestic surplus of 4 000 to 4 500 million litres per year."

In-kind contributions

The dairy industry is an important contributor to diverse government food aid and nutrition programmes. About 53.4 percent of poor households (those living under the poverty line defined by INDEC) in the country have received dairy food aid. Some 14.6 percent of surveyed households with children aged 6 to 72 months received milk powder, while more than 35 percent received fluid milk (ENNYS, 2007). Given that an important proportion of the population is classified as poor, with earnings below the costs of basic goods or the poverty line²³, achieving minimum nutrition-related goals requires government and other programmes for improving household food security and promoting the regular consumption of nutritionally adequate diets. Several ongoing provincial and municipal food aid programmes include milk distributions, and there are two major federal programmes involving fluid or powdered milk assistance:

- a) The Infant and Maternal Programme: This national programme has been operating since the 1940s and remains the most important food aid programme in Argentina. It consists in the free distribution of whole milk powder to pregnant women and children aged two to six years suffering from malnutrition. Since 2001, more than 1 million pregnant women and children under the age of two have received milk powder through this programme, which is run by the Ministry of Health and Social Services and implemented through the provinces. Under Law 25459, milk powder must be enriched with calcium, zinc, iron and vitamin C.
- b) The National School Milk Cup Programme: Created in 1964 by Law 6905, this government programme provides milk to all the schools under the National Schools Direction in 21 provinces. Each child receives a cup of milk a day to ensure minimum dietary requirements (Britos *et al.*, 2003).

Contribution to rural and regional development

On average, slightly less than 11 percent of Argentina's population live in dispersed and rural areas. The country has the most urbanized population in Latin America.

However, these figures seem to be underestimates, given that some surveys (Llach, Harriague and O'Connor, 2004) estimate that 35 percent of the entire population (rural and urban) is directly involved in the rural food processing

²¹ The Government of Argentina has declared Res. SG 559/02 Food and Nutritional Guide for Argentina of high national interest. It is supported by the United Nations Children's Fund (UNICEF), the Office for Project Services/ World Health Organization (OPS/WHO), FAO, INCAP and other Argentinean government and non-governmental organizations.

²² Res. 47/2003 defines one cup as equivalent to 200 cm³.

²³ INDEC calculates the number of households below the poverty line from the Permanent Household Survey (PHS). This involves estimating a BDB and a total basic goods basket (TBGB). The income required to buy the TBGB defines the poverty line or threshold, while the indigence line is when a household's income is below the BFB.

TABLE 32
Argentinean population, 2001

	Population (million people)	%
Total	36 260 130	100%
Urban	32 431 950	89.44%
Rural	3 828 180	10.56%
in rural towns	1 223 533	3.37%
on rural farms	2 604 647	7.18%

Source: INDEC, 2009.

industry. Dairy farms are the cornerstone of the socio-economic fabric in traditional dairy areas, so whenever a dairy farm closes down, there is a direct deterioration in local conditions. For example, a survey conducted in a traditional dairy area of Santa Fe found rural emigration and deterioration of rural socio-economic networks following the closures of large numbers of dairy farms (Taverna, 2008).

Chapter 8

Conclusions

Argentina exhibits strong comparative and some competitive advantages for dairy production, but also faces significant internal and external barriers to expanding the dairy industry.

Global policy reforms (e.g., following a successful outcome of the World Trade Organization [WTO] Doha Development Round) would resolve some of the international obstacles to dairy expansion, but current national macroeconomic policy distortions and the lack of a national dairy development policy also need to be dealt with.

As described in previous chapters, farm incomes have high potential because on- and off-farm employment can be critical to economic development, especially in the traditional and potential dairy regions; it is therefore important that small and poor dairy farms and rural households are supported. The development of dairy sub-clusters could be a way of reaching these goals, especially by involving dairy processing and agro-service activities that can provide critical inputs to regional dairy organizations. However, a sustainable DDP is essential, and can only be achieved with the full involvement of federal and provincial government, particularly in the following key issues.

Fiscal policy

The Government of Argentina taxes the agrifood industry heavily, particularly the dairy industry, where taxes represent more than 30 percent of total dairy GVP. The main distorting taxes are the value-added tax (VAT) applied on all domestically consumed dairy products at 21 percent of the final price, and the export taxes²⁴ applied on FOB prices (when exports are permitted)²⁵ at 15 percent. The CAI Forum (2007) has suggested making deep structural changes to the national tax system, particularly these two taxes, which are considered highly regressive and a major barrier to the future development of Argentina's dairy industry.

Dairy institutions

One of the main difficulties facing private dairy associations is the absence of government support in creating and facilitating investment and interest in dairy institutions. Another restriction is the lack of a legal framework to encourage these organizations to support their budgets via levies or other kind of assessment even though international experience shows that farmers' and other dairy institutions play a central role in the development of dairying all over the world. This is particularly the case in countries where governments provide supportive policy to encourage farmers' and other dairy groups: "The key should be based on building a permanent institutional system where the main actors of the dairy chain would be able to reach consensus and define a long-term national dairy policy. Without a high-quality institutional system there are few or no chances for Argentina's dairy development" (Linari, 2005).

Concentration of dairy farms

The average dairy farm in Argentina is increasing in land area, cow productivity and herd size, but there is also a significant group of smaller farmers leaving the dairy business. The challenge is to reduce the decrease in farm numbers, especially considering the important socio-economic impacts at the regional level. There is a clear need for a DDP within a stable macroeconomic policy framework to assist in the training, financing and development of small-scale dairy farmers in traditional dairy areas

Expansion of new dairy areas

As dairy is forced to compete with crops for land use in the traditional dairy areas, the only way of expanding the dairy industry is to intensify dairy production systems and expand dairy into other regions. Coordinated efforts by the private sector, development agencies and provincial and central government are needed to create and develop regional dairy sub-clusters. Experts stress the importance of marketing and coordinating inputs by establishing marketing infrastructure that links rural producers with urban markets as the only way to stimulate significant growth in milk supply and

²⁴ Export taxes on all dairy products have been temporarily set at zero owing to an important milk surplus and low international FOB prices.

²⁵ Through Res. 61/07, to control price inflation, dairy export taxes in 2007 to 2008 were set at a high trigger FOB price, which has the same effect as a prohibitive export tax.

farmers' income. This would make dairying a valuable instrument in accelerating integrated rural development and social change. Satisfying the needs of existing survival clusters also requires financial and social aid, plus training to increase efficiency in all aspects of dairy production.

Rural poverty alleviation

Rural poverty accounts for a minor proportion of total poverty in Argentina, apart from in remote regions such as the northwest and northeast. Unlike many other dairy industries in the world, Argentina's is not predominantly in the hands of small or micro-dairy farms, so it has only limited potential to contribute directly to alleviating rural poverty. This situation has important implications on DDPs, as government development policies have focused almost exclusively on urban industrial development and urban poverty alleviation, especially through price controls for basic foods, and have overlooked dairy's importance as a tool for national development and poverty alleviation. Dairy is a very important component of the socio-economic network in rural central regions, contributing directly and indirectly to the development of local, regional and national economies. Although a few government programmes are oriented towards micro-scale rural producers, the low proportion of small and poor dairy farmers could be one of the reasons why DDPs have not been tailored to development.

Environmental issues

There have been significant advances in environmental management, particularly in the dairy processing sector, but there are still some important issues to work on, such as the following:

- a) *Dairy effluents*: Barriers to the implementation of new technologies for treating dairy effluent and residues are linked to:
 - i) the absence of or poor access to financing for the implementation of new technologies;
 - ii) the lack of information about environmental problems and of accessibility to new treatment technologies;
 - iii) limited training on environmental issues for human resources; and
 - iv) lax controls by provincial and municipal agencies, especially regarding the disposal of treated effluent. There have been some important advances in correcting such problems through close collaboration among the government, government agencies such as SAGPyA, INTA, INTI, SAyDS and MINCyT, and universities such as UNCPBA and UNL, among others carrying out research and promoting environmental practices for dairy farms and processors.
- b) *GHG emissions*: It has been proved that an improvement in feed quality reduces the CH₄ and N₂O emissions per unit of product through a significant increase in milk productivity – an increase in milk yield per cow means fewer methane emissions per unit of milk. It has been estimated that increasing milk yields by 3 litres per cow, increasing the pregnancy rate of herds by 2 percent, and diminishing the abortion rate by 2 percent would reduce methane emissions by 16.5 percent (Casanovas, 2005). However, such dairy intensification is a very expensive way of reducing GHG emissions (monitoring costs were estimated at US\$4 to 5/tonne of CO₂ equivalent) and an increase in total production may also lead to an increase in total emissions. One proposed solution is to improve feed quality while maintaining total production, thus releasing part of the land currently used for dairy for other uses, particularly forestation (Casanovas, 2005).

BGRs and diversity

A country-wide survey is needed of all regional dairy herds, especially those of the Criollo breed. Some dairy biotypes may be vulnerable; for example, intensified dairy systems and genetic selection with imported genetic material (almost entirely of the Holstein biotype from the United States and Canada) could gradually replace by absorption the smaller Frisio type, which is better adapted to pasture grazing conditions. At present there are no regulations for the conservation of BGR; legislation should be developed to encourage joint private and government research on this issue.

Table 33 summarizes some of the main problems identified in Argentina's dairy industry, along with possible solutions and the actors involved in developing them.

TABLE 33
Problems, solutions and actors in the dairy industry

Problem	Solution	Partners
Most dairy farms show very low productivity	Design and implementation of a DDP for these farms Training of farmers	Dairy cooperatives Dairy processors Government of Argentina Research bodies
Expansion of the industry into new dairy regions	Rural (dairy) development programmes Economic and financial support from regional and national government	Dairy cooperatives Dairy processors Provincial and central government Research bodies
Lack of training in modern dairy farming techniques		Private and public rural (dairy) research bodies
Cheese market dominated by SMEs with low quality standards	Modernization and consolidation of the cheese processing sector	Dairy processors Public control agencies
Numerous and highly fragmented dairy farmers' organizations	Consolidation of the dairy farming sector to protect farmers' interests	Dairy farmers' organizations Government of Argentina
Rural poverty	Use of the dairy industry as a tool for regional development and poverty alleviation	Dairy cooperatives Dairy processors Provincial and central government Research bodies

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Annex 1

Annual Dairy Production and Consumption

Year	Production (million litres)	Population (million people)	Availability (litres/capita)	Exports (million litres)	Imports (million litres)	Stock (million litres)	Consumption (million litres)	Consumption (litres/capita)
2008	10 010	39.75	251.9	1 998	13	-5.30	8 030	202.0
2007	9 527	39.36	242.1	1 815	23	101.65	7 633	194.0
2006	10 162	38.97	260.7	2 850	20	-55.20	7 387	189.6
2005	9 493	38.59	246.0	2 215	53	246.56	7 085	183.6
2004	9 169	38.23	239.9	2 176	63	-105.89	7 162	187.3
2003	7 951	37.87	210.0	1 292	94	-10.32	6 763	178.6
2002	8 529	37.52	227.3	1 721	29	-439.75	7 276	194.0
2001	9 475	37.16	255.0	1 163	75	190.40	8 196	220.6
2000	9 817	36.79	266.9	1 476	67	-76.72	8 484	230.6
1999	10 329	36.58	282.4	1 848	81	116.34	8 446	230.9
1998	9 546	36.12	264.2	1 322	183	230.94	8 176	226.3
1997	9 090	35.67	254.8	1 196	253	4.34	8 142	228.2
1996	8 865	35.22	251.7	1 118	238	169.02	7 816	221.9
1995	8 507	34.77	244.7	1 094	227	61.15	7 578	218.0
1994	7 777	34.18	227.5	527	391	-24.72	7 666	224.3
1993	7 002	33.78	207.3	306	301	-185.00	7 182	212.6
1992	6 591	33.38	197.5	57	857	270.04	7 120	213.3
1991	5 937	32.69	181.6	403	540	17.10	6 057	185.3
1990	6 093	32.30	188.7	950	23	-127.77	5 294	163.9
1989 (1)	6 520	31.91	204.3	870	5	-	5 656	177.2
1988(1)	6 061	31.49	192.5	438	62	-	5 685	180.5
1987 (1)	6 190	31.08	199.1	91	122	-	6 221	200.1
1986 (1)	5 721	30.68	186.5	137	71	-	5 655	184.3
1985 (1)	5 962	30.27	197.0	78	20	-	5 904	195.1
1984 (1)	5 341	29.86	178.8	100	31	-	5 272	176.5
1983 (1)	5 697	29.46	193.4	379	14	-	5 332	181.0
1982 (1)	5 487	29.05	188.9	340	10	-	5 157	177.5
1981(1)	5 092	28.64	177.8	111	145	-	5 126	178.9

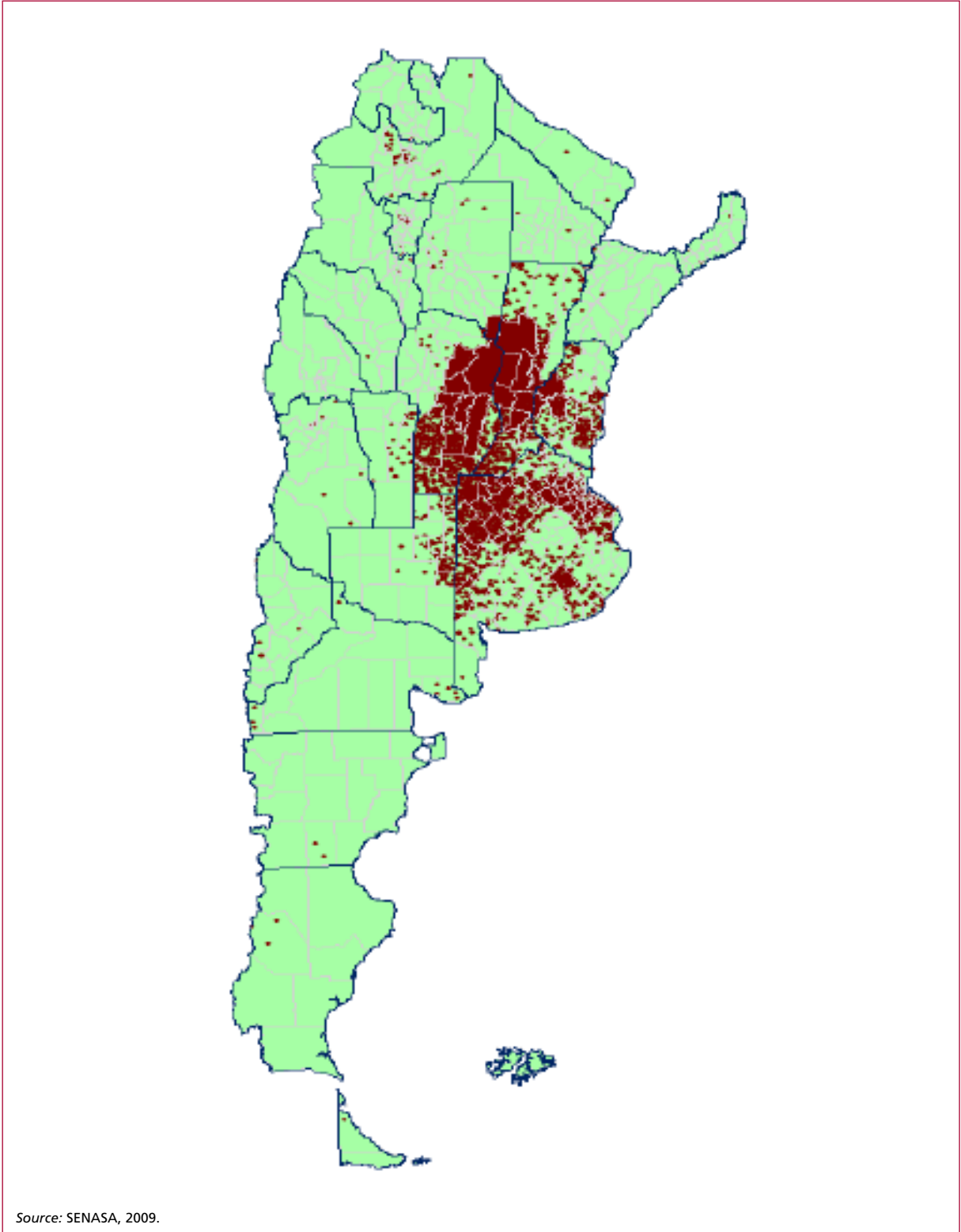
¹ Apparent consumption = (production + imports – exports)/population.

² Stocks = net difference (final stocks – initial stocks)

Sources: Milk – Dirección de Industria Alimentaria, SAGPyA; Production – Convenio Lechería, SAGPyA/CIL/FIEL

Annex 2

Regional Distribution Of Dairy Farms



Annex 3

Major Elements in the Dairy Value Chain

Production	<p>On-farm activities:</p> <ul style="list-style-type: none"> • Milk production • Sown pastures • Hay and grain feeding • Automatic milking • Herd management and breeding 	<p>Structure/systems:</p> <ul style="list-style-type: none"> • 3 500 small-scale farmers • 5 500 medium-scale farmers • 1 500 large-scale farmers • (rainfed)
Bulking and cooling	<p>Activities:</p> <ul style="list-style-type: none"> • Milk cooling carried out at the farm level: 100% 	<p>Structure:</p> <ul style="list-style-type: none"> • Number of bulking and/or cooling centres: 0
Processing and packaging	<p>Activities:</p> <ul style="list-style-type: none"> • Processing of pasteurized milk, cheese, powdered milk and other dairy products • Quality testing • Packaging • Delivering 	<p>Structure:</p> <ul style="list-style-type: none"> • Number of dairy plants: 1 100 • Number of large-, medium- and small-scale: 950 • Total milk marketed: 92.5%
Transport and distribution	<p>Activities:</p> <ul style="list-style-type: none"> • Pasteurized milk: 12.8% • Raw milk (informal sector): 7.5% 	<p>Structure:</p> <ul style="list-style-type: none"> • Number and characteristics of milk transport: NA
Retailing	<p>Sales activities:</p> <ul style="list-style-type: none"> • Retail channel: 75% • Government: 5–10% • Food industry: 15–20% 	<p>Structure:</p> <ul style="list-style-type: none"> • Stores: 25% • Supermarkets: 40% • Self-service: 34% • Kiosks: < 1% • Mobile sellers: 0%

Annex 4

Major Dairy Companies (based on daily milk intake), March 2009

	Name of company	Ownership	Milk intake ('000 litres/day)	Share(%)
1	Mastellone Hnos SA	National	3 650	14.8%
2	SanCor CUL	Cooperative	2 700	10.9%
3	Molfino Saputo	Multinational	2 100	8.5%
4	Suc de A Williner SA	National	1 200	4.9%
5	Verónica SA	National	1 100	4.4%
6	DANONE ARG SA	Multinational	1 100	4.4%
7	Milkaut	Cooperative	760	3.1%
8	La Sibila	National	650	2.6%
9	Nestlé - DPA	Multinational	600	2.4%
10	García Hnos SRL (Tregar)	National	410	1.7%
11	Manfrey Coop de Tamberos	Cooperative	320	1.3%
12	Francisco Lockey	National	300	1.2%
13	La Lácteo	National	300	1.2%
14	Coop. Ctral Un de San Guillermo	Cooperative	250	1.0%
15	Punta del Agua SA	National	250	1.0%
16	NOAL	National	250	1.0%
17	CORLASA	Multinational	250	1.0%
18	Ramolac Productos Lácteos	National	150	0.6%
19	Canut	National	150	0.6%
20	Lácteos Conosur (Suipachense)	Multinational	150	0.6%
21	Lácteos Pozo del Molle	National	150	0.6%
22	E. Rodríguez e Hijos (Vacalín)	National	150	0.6%
23	Cremigal	National	150	0.6%
24	Sobrero y Cagnolo	National	150	0.6%
25	Lactear SA	National	150	0.6%

Source: Estimates based on CIL 2009 data.

Annex 5

Milk Production Cost Models

	Model A	Model B	Model C	Model D	
Sown pastures (ha)	300.0	300.0	270.0	270.0	
Winter annual grass (ha)	50.0	50.0	50.0	50.0	
Summer annual grass (ha)	30.0	30.0	25.0	25.0	
Maize silage (ha)	0.0	0.0	50.0	50.0	
Grain + concentrate (kg/day)	3.0	4.2	6.4	8.0	
High-value concentrate (kg/45 days/MC)*	1.0	1.0	1.0	1.0	
Hay roll (kg/MC)	1.2	1.2	1.2	1.6	
Total area (ha)	380	380	380	380	
	Stocking rate (MC/ha)	0.79	0.79	0.79	0,98
Heifer reposition: 26% of MCs	Total cows	300	300	300	374
MC culling: 23% of MCs	MCs	230	230	230	288
Birth rate: 90% of MCs	Daily production (litres/MC)	15.00	17.40	22.80	22,80
	% butterfat	3.25	3.25	3.50	3,50
Production (kg of beef/ha/year)		108	125	176	221

* Supplemented for the first 45 days of lactation.
Source: Margenes Agropecuarios, 2009.

Annex 6

Milk Production Costs – Major Components

		Model A	Model B	Model C	Model D
		US\$/ha	US\$/ha	US\$/ha	US\$/ha
Total revenues					
Milk sales	US\$0.99/litre	661	766.8	1 004.7	1 258
Culling cows: 580 kg live weight per cow	US\$0.48/litre	38.7	38.7	38.7	48.4
Calves on production	US\$7.98/head	4.3	4.3	4.3	5.4
Beef gross income		43	43	43	53.8
Beef net income		37.8	37.8	37.8	47.3
Total net income		698.8	647.2	919.5	1 108.3
Variable costs					
Share-milker (labour)	10% of total milk revenue	66.1	76.7	100.5	125.8
Other salaries	US\$8 626/year x 0.66/cap.	15	15	15	15
High-value concentrate	US\$0.18/kg	122.1	170.2	255.9	397.7
Resowing of pastures	US\$283.20/ha	55.9	55.9	50.3	50.3
Pastures	US\$33.00/ha	13	13	11.7	11.7
Winter grass	US\$160.66/ha	21.1	21.1	21.1	21.1
Summer grass	US\$97.48/ha	7.7	7.7	6.4	6.4
Hay rolls of 500 kg	US\$16.67/roll	12.1	12.1	12.1	20.2
Maize silage	US\$628.23/ha	0	0	82.7	82.7
Animal health and AI (2 doses/MC)	US\$34.55/cow	18.6	18.6	18.6	23.2
Acquisition of new heifers	US\$1 000/head	157.4	157.4	157.4	197
Insemination labour cost	US\$3.99/pregnant cow	3.1	3.1	3.1	3.9
Cleaning	US\$3 989/year	10.5	10.5	10.5	10.5
Energy and electricity (14 kW/MC/month)	US\$0.16/kW	16.3	16.3	16.3	20.4
Official dairy recording	US\$3.50/MC/month	25.4	25.4	25.4	31.8
Total variable costs	US\$/ha	399.6	458.3	642.2	836.5
Gross margin	US\$/ha	141.8	188.9	242.9	271.8

Exchange rate (US\$1 = AR\$3.76)

Source: Margenes Agropecuarios, 2009.

