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The Dairy Sector of Armenia: Relationships among Supply Chain Members

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Executive Summary

Agriculture plays a special role in transition economies, in both economic and social terms. The sector produces a major portion of the country's GDP and not only provides food but often serves as the only source of income for a large part of the population.

For the Armenian government, the key objectives of dairy sector development are to attain the country's full self-sufficiency in dairy products, make them more competitive in foreign markets, protect local suppliers' rights, and ensure that rural incomes are compatible with urban income levels. But, according to data of 2015, the milk self-sufficiency of Armenia remains low (62.7 percent) and processors continue to underprice farm-gate milk.

In Armenia, the insufficiency of milk output is accounted for, primarily, by the uncompetitive standing of raw milk producers in the chain of added value. Most of these producers (99.2 percent) are individual farms with an average livestock population of 1 animal. For this reason, the margin is distributed among farmers, processors, and traders disproportionately relative to their inputs; incomes of local people go down; milk supplies for commercial processing is decreased; processing capacities are underutilized; and the performance of the dairy sector as a whole is impaired.

To make milk producers more competitive, several policy options are proposed: the introduction of a

mechanism for regulating price relations among milk producers and processors; the use of incentives such as direct payments to producers to encourage them to reduce the seasonality of milk supply to processors; the establishment of marketing and milk processing cooperatives; the establishment of large commercial milk producers; and the delivery of training programs for farmers.

The key stakeholders in the dairy sector of Armenia are government bodies, farmers, milk processors, retailers, and dairy product consumers (rural and urban populations).

Your task is to develop recommendations for decision makers to help them select the best government regulation policies in the dairy sector, taking a balanced approach to the interests of all supply chain participants; and to identify the economic, social, and food implications of such policies.

Background

Armenia is a small mountainous country located in the South Caucasus with a total area of 29,743 square kilometers (Figure 1); Armenia borders with Azerbaijan and self-proclaimed Nagorno-Karabakh Republic, Georgia, Turkey, and the Islamic Republic of Iran. Foreign trade is actively pursued only with Georgia and the Islamic Republic of Iran.

The country's landlocked position and huge variation in elevation define its climate, with hot summers and cold to moderate winters.



Figure 1. Armenia and Neighboring Countries

Source: <http://www.mapnall.com/>

Agricultural land comprises about 67 percent of the country's territory. The area of tilled land in Armenia has been shrinking every year (see Table 1).

Administratively Armenia is split into 10 marzes (regions): marz Aragatsotn, Ararat, Armavir, Vayots Dzor, Gegharkunik, Kotayk, Lori, Syunik, Tavush, and Shirak, along with the city of Yerevan, which has a special administrative status as the country's capital. Yerevan is the largest city, with a population of 1,071,500.

Armenia is a member of the Council of Europe, the Eurasian Economic Community, and the World Trade Organization.

As of the beginning of 2015, the population of Armenia was 3,010,600, of whom 64 percent resided in rural areas.

Agriculture is an important sector of the Armenian economy: based on 2015 data, it accounts for 20.5 percent of the GDP with crop production taking up 59 percent and animal husbandry 41 percent. The dairy sector produces 2.56 percent of the GDP. Agriculture employs about 36 percent of the country's population, but this share has been shrinking as a result of inadequate profitability of the business [1].

Self-sufficiency in staple agricultural products in Armenia in 2014 was 60 percent in caloric equivalent. The lowest self-sufficiency level is observed for poultry and pork, wheat and milk (see Table 2). Food self-sufficiency of a country is understood as reliable (sustained) and sufficient (according to respective dietary standards) supply of the country's population with food which is produced domestically and independently of imports, and adequate availability of inputs for agroindustry.

The State of the Dairy Sector in Armenia

Dairy farming holds a special place in agricultural production. According to 2015 data, the availability of domestically produced milk (that is, Armenia's self-sufficiency in milk) per capita per annum is 196.1 kilograms, which is 38.7 percent lower than the recommended human nutrition norm. The per capita milk consumption, including imported milk, is 240.1 kilograms per annum with import considered; this is 25.0 percent lower than the recommended standard (320 kilograms per capita per year) (Table 3).

Armenia is number two among the Eurasian Economic Union members in terms of the share of imported dairy products in gross consumption (18.3 percent), trailing the Russian Federation where the share of dairy imports is 30 percent; according to

Table 1. Land Resources of Armenia

Land resources of Armenia, 1,000 hectares	1995	2010	2011	2012	2013	2014	Area increase / reduction (%)
Total area	2,974.3	2,974.3	2,974.3	2,974.3	2,974.3	2,974.3	0.0
Agricultural land	1,391.4	2,100.9	2,076.9	2,052.4	2,051.0	2,049.4	47.29
<i>Including</i>							
Tilled land	483.5	448.5	449.2	448.4	448.2	447.5	-7.45
Perennial plantings	74.7	32.9	33.0	33.4	33.3	33.7	-54.89
Hayfields	138.9	127.1	128.3	121.6	121.8	121.7	-12.38
Pastures	693.5	1,104.3	1,067.2	1,056.3	1,055.3	1,054.2	52.01
Other	0.8	388.1	399.3	392.7	392.4	392.3	48,937.5

Source: The National Statistical Service of Armenia [1].

Table 2. Domestic Outputs of Key Agricultural Products in Armenia, 2014–15

Agricultural product	Total output (1,000 tonnes)		Per capita consumption (kilograms per annum)		Share of domestically produced outputs in the total supply (%)	
	2014	2015	2014	2015	2014	2015
Wheat	338.2	383.7	150.3	153.4	48.7	50.9
Potato	733.2	764.5	47.9	69.7	101.1	101.7
Vegetables	1,200.4	1,318.3	384.2	226.4	99.1	100.0
Fruit except grapes	291.0	493.1	97.7	116.5	93.8	102.0
Grapes	261.3	309.2	4.7	4.7	101.9	101.2
Beef	59.0	63.6	22.9	24.3	87.9	92.3
Pork	16.2	17.5	10.2	10.7	54.2	57.8
Lamb and goat meat	9.1	9.8	3.0	3.2	103.4	107.7
Poultry	8.4	9.5	14.5	15.5	20.0	21.8
Milk	700.4	728.6	260.7	257.7	81.5	93.0
Eggs	35.3	36.3	11.4	12.2	97.2	99.5

Source: The National Statistical Service of Armenia [1].

the Armenian government's food security strategy, it would be expedient if this share of consumption could be covered, instead, by domestically produced products.

In 1991, after the breakup of the Soviet Union, agricultural land, fixed assets, and livestock were privatized in Armenia. Instead of large collective

farms and state-owned farms, 332,900 small farms appeared. At that time, vertical links in the production and marketing of milk and dairy products were severed, and they took a long time to restore.

Those developments resulted in a high prevalence and low consolidation of small milk producers, which makes them somewhat dependent on

Table 3. Annual Balance of Milk in Armenia and Self-Sufficiency Levels

Indicator	2012	2013	2014	2015
Opening balance, 1,000 tonnes	59.8	60.1	85.9	75.1
Domestic production, 1,000 tonnes	618.2	657.0	700.4	728.6
Used as animal feed, 1,000 tonnes	61.8	65.7	77.0	80.1
Losses, 1,000 tonnes	8.6	8.6	9.7	8.9
Exports, 1,000 tonnes	9.0	17.8	20.8	77.6
Closing balance, 1,000 tonnes	60.1	85.9	75.1	46.8
Self-sufficiency in milk, 1,000 tonnes	538.5	539.1	603.7	590.3
Self-sufficiency level relative to the nutritional standard, %	57.0	57.0	64.0	62.7
Self-sufficiency in milk per capita per year, kilograms	178.2	178.1	200.1	196.1
Imports, 1,000 tonnes	134.8	133.6	151.9	132.6
Consumption, including imported products, 1,000 tonnes	673.3	672.7	755.6	722.9
Share of imports in milk consumption, %	20.0	19.9	20.1	18.3
Total consumption per capita per year, including imported products, kilograms	222.8	222.2	250.4	240.1

Source: The National Statistical Service of Armenia [1].

large processors that are more competitive in the market. The imbalance in the competitive positions of dairy market participants causes disproportional distribution of margin among producers, processors, and traders; higher transportation and transaction costs; and, ultimately, lower cost-effectiveness for the entire sector and for milk producers in particular.

In order to analyze the dairy market in Armenia it is necessary to study the entire supply chain, identify the market position and interests of all stakeholders, and understand the extent to which the government can influence the processes in the sector. The number of links in the dairy chain may vary depending on the number of intermediaries, while the number of operations and processes needed to obtain a certain dairy product is fairly constant. Supply chain efficiency is defined by the optimal allocation of all necessary processes that create added value among participants.

The value chain for dairy products includes five key stages: (i) milk production and storage, (ii) raw milk collection and delivery for processing, (iii) milk processing and production of dairy products, (iv) transportation of final products to the places of sale, and (v) sale of dairy products to consumers (see Appendix A).

The retail price for finished dairy products is determined by the cost of production, transaction and logistics costs defined in the course of establishing contractual relations, and the cost of the movement of goods between production stages along the value chain.

According to the sector competition level assessment technique suggested by Michael Porter, a sector's appeal is defined by the five "horizontal" and "vertical" competition forces. The horizontal competition forces include the rivalry within the existing players, the threat of new entry, and the threat of substitution. The vertical competition forces include the bargaining power of suppliers and the bargaining power of buyers. A sector is appealing if it offers sufficient profitability for all players; it is not when competitive forces reduce profitability for at least one group of players [2].

In Armenia, the demand for milk is higher than its domestic supply, judging by the large share of imported dairy products in the Armenian market. The high degree of rivalry in the raw milk market is observed in six of Armenia's marzes: Aragatsotn (producing 644.3 kilograms per capita per year), Gegarkunik (551.9 kilograms), Lori (377.2 kilograms), Shirak (448.5 kilograms), Syunik (495.0 kilograms), and Vayots Dzor (496.1 kilograms; see Figure 2). Since the milk outputs of other marzes are not sufficient to meet the nutritional standards for its consumption, the problem could be resolved through encouraging cross-regional exchange.

Wide variations between different marzes in terms of own-production milk availability are explained by natural and climatic conditions that define availability of usable pastures and the possibility of producing succulent fodder. The productivity of cattle in Armenia is low (see Table 4) as a result of [3], [4]:

- the dry climate and the need for irrigation;

Table 4. Cattle Population, Volume of Milk Production, and Average Productivity of Cattle

Indicator	2010	2011	2012	2013	2014	2015
Cattle population (1,000 head)	273.9	272.6	283.3	303.3	309.6	313.9
Commercial organizations	2.4	2.5	2.6	2.2	2.7	2.7
Individual farms	271.5	270.1	280.7	301.1	306.9	311.2
Milk production (1,000 tonnes)	600.9	601.5	618.2	657.0	700.4	728.6
Commercial organizations	3.4	3.6	3.5	4.1	5.3	6.3
Individual farms	597.5	597.9	614.7	652.9	695.1	722.3
Average annual milk yield per cow (kilograms)	2 193.8	2,206.5	2,182.1	2,166.2	2,262.3	2,321.1
Commercial organizations	1,416.6	1,440.0	1,346.1	1,863.6	1,962.9	2,333.3
Individual farms	2,200.0	2,213.6	2,189.8	2,168.3	2,264.9	2,321.1

*NSSA [1]

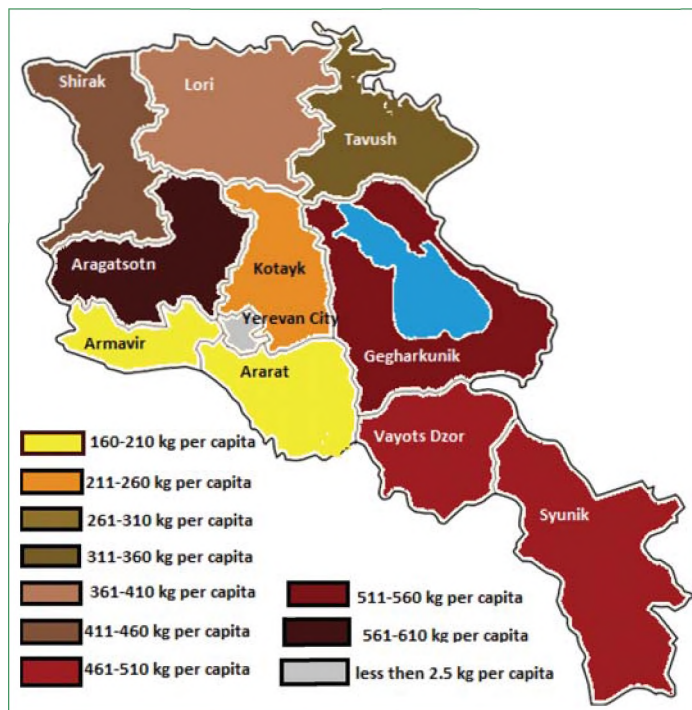


Figure 2: The Volume of Milk Produced in the Regions of Armenia per Capita, 2014

Source: Developed by I.Poleshkina and E.Peplozyan; data from www.armstat.am.

- the low genetic potential of animals and the lack of modern technologies to breed high-yielding young cattle;
- poor pasture load management system, which results in exhausting pastures near settlements;
- the less nutritious winter diet;
- high animal morbidity; and
- the lack of experience with commercial milk production.

Individual farms tend to satisfy their own needs for milk, preferring to sell milk they process on their own. Surplus milk goes to commercial processing. As a result, only 63.1 percent of milk goes to commercial processing; individual farms process and sell 22.8 percent of gross milk volume, and the remaining 14.1 percent is consumed by producers' households (see Figure 3).

According to the Ministry of Agriculture of Armenia, there are 61 milk-processing organizations in the country with a total productive capacity of 490,000 tonnes of milk per annum; they produce



Figure 3. Levels of Milk Marketability, by Marz

Source: Developed by I.Poleshkina and E.Peplozyan.

dairy products on a commercial basis all year round. Furthermore, there are many small cheese-making factories [5] (Table 5). The average capacity utilization rate of these factories is 30–40 percent because many processors use obsolete equipment and barely manage to recover their maintenance and operation costs. At the same time, 80 percent of dairy products are produced by 10 major milk processors, actually using about 85 percent of their capacity.

The operation of small producers is characterized by high seasonality; thus, milk for processing comes mostly during the summer, while the milk supply in winter all but ceases. Therefore milk processors start to compete for raw milk suppliers (see Figure 4).

Underutilization of capacity results in a loss of profit due to the inadequate use of economies of scale, which in turn prevents processors from increasing farm-gate price. This makes the delivery of milk for processing unprofitable and forces farmers to produce dairy products on their own; such products do not always meet sanitary and hygienic standards. Farmers are unable to sell their milk at acceptable prices; this prevents the increase of the dairy livestock population and thus constrains the development of the milk processing industry.

The threat of new entries into the domestic dairy market is low because of low cost recovery in dairy husbandry and the lack of foreign investment. The threat of new entries into the foreign market is present if the dairy market has unused capacity. At the same time, the majority of the Armenian population prefers to consume domestic dairy products with a short shelf life.

There is no threat of substitution since the local population tends to consume traditional dairy products made from natural raw milk.

The impact of “vertical” competition forces is manifested in the bargaining power of suppliers. It comes in the form of price pressures from energy suppliers and the high volatility of fodder prices, which affects the cost of milk production.

The bargaining power of buyers is defined by the influence of three players: processors, wholesalers and retailers, and dairy product consumers. At each stage milk can be both raw material for the subsequent stage of the logistics chain and the final product.

The monopolistic position of processors results in retail prices that undermine the sector’s development.

Table 5. Volume of Dairy Product Production in Armenia

Product	2012	2013	2014	2015
Cheese, tonnes	17,658	17,375.4	18,317.3	18,592.5
Milk, dairy products (processed) including processing at farms (except internal consumption), tonnes	319,800	362,700	430,000	447,900
Ice cream, 1,000 liters	3,628.6	4,265.1	6,345.0	9,639.5

Source: *The National Statistical Service of Armenia* [1].

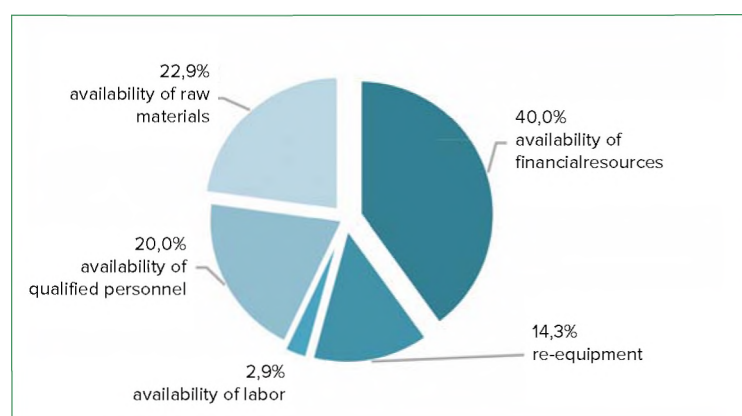


Figure 4. Constraints to Milk Processors' Development

Source: *Ministry of Agriculture of the Republic of Armenia* 2014.

Table 6. Retail Price Composition in the Dairy Market in Armenia, 2015

Period	Average sale price in Armenia (dram/liter)			Share of each market participant in the pasteurized milk sale price (3.2 % fat content) (%)		
	Raw milk by farmers	Pasteurized milk (3.2% fat content) by processors	Pasteurized milk (3.2% fat content) by trade organizations (consumer price)	Farmers	Processors	Retailers
January	181	335	418	43.3	36.8	19.9
February	177	334	417	42.4	37.6	19.9
March	175	332	416	42.1	37.7	20.2
April	166	325	411	40.4	38.7	20.9
May	150	323	410	36.6	42.2	21.2
June	136	322	409	33.3	45.5	21.3
July	131	321	408	32.1	46.6	21.3
August	130	320	407	31.9	46.7	21.4
September	135	319	406	33.3	45.3	21.4
October	140	320	407	34.4	44.2	21.4
November	151	324	409	36.9	42.3	20.8
December	146	325	410	35.6	43.7	20.7

Source: Calculations of I.Poleshkina and E.Peplozyan.

According to experts, the optimal composition would be when 50 percent of retail price reflects the farm-gate price of milk, 30 percent reflects the sale price of processors, and 20 percent reflects the share of retail trade [6]. When this composition is not achieved, producing milk becomes unprofitable, and instead of extended reproduction and new upgraded farms a declining cattle population is observed. Compare this to the following: in the United Kingdom, the share of farmers in the sale price of pasteurized milk is 56 percent; in Germany, it is 46 percent [7], [8]. The retail price composition of the Armenian dairy market is presented in Table 6.

Policy Issues

The overwhelming majority of cattle worldwide (68.3 percent) have productivity below the world average level—of 2,319 kilograms per cow per year. Productivity of cattle in Armenia is the lowest among member countries of the Eurasian Economic Union (see Figure 5).

In this context, government regulation should be regarded as a way to mitigate dairy market failures and set up conditions for successful development

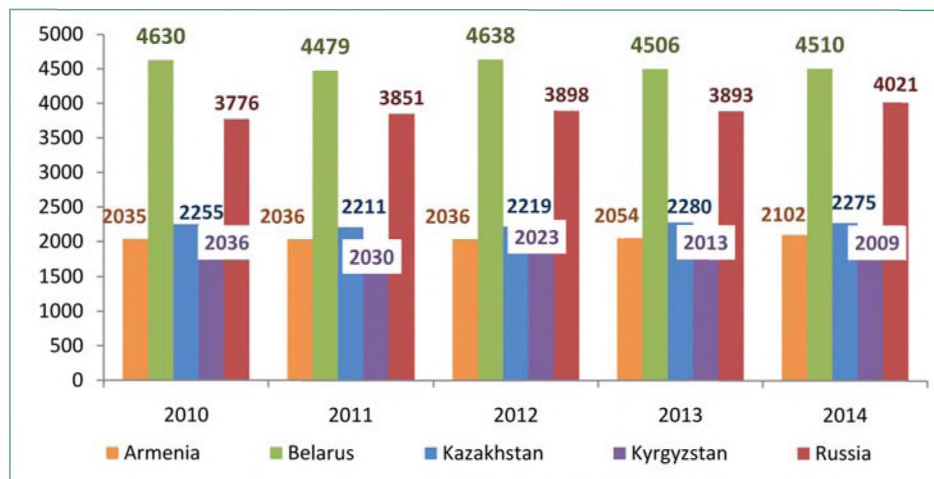


Figure 5. Milk Yields per Cow in Eurasian Economic Union Members, All Farm Types (kilograms)

Source: Armenia and the Customs Union: Evaluation of the Integration Economic Impacts, 2013 [9]

of the sector. Government regulation of the dairy market is objectively needed in view of the fact that producers, processors, and traders inherently have unequal power in the market because of the specific characteristics of milk as an asset. The leading milk-producing countries provide many examples of government regulation used to encourage dairy sector development. For instance, in the Netherlands the government focused on establishing cooperatives; in Canada, on setting up a market for dairy products and regulating farm-gate prices at each stage of the production chain [10]; in the European Union, on maintaining high domestic prices for dairy products by using quotas to constrain milk supply [11], [12]. Over the course of more than 80 years, the United States has experimented with many regulation tools, including government support of raw milk producers and regulating raw milk prices [13].

The sector's development can be spurred only if normal profitability is achieved, thus allowing extended reproduction. The profitability of milk producers is determined not only by the production efficiency but also by the relations established along the supply chain all the way to the end consumer.

The key challenges for the Armenian dairy sector that need to be addressed by the government are as follows:

1. low productivity of cattle—its causes are outlined in the previous section;
2. poor milk quality, since farmers do not employ state-of-the-art milking, collection, and cooling technologies;
3. small-scale milk production with high seasonality and low marketability that prevents full and even utilization of processing capacity during the year;
4. an unfair distribution of margin between the dairy chain participants, with an obvious advantage for processors—their share of the retail sale price is 42.3 percent; and
5. an underdeveloped market infrastructure—a sound market infrastructure is required to build long-term vertical links between the dairy chain participants with minimal transportation and logistics costs.

The above constraints result in inadequate self-sufficiency for Armenia in dairy products. In concurrence with this, 100 percent self-sufficiency

of Armenia in milk is a high-priority objective for the government—a priority that is reflected in the Food Security Concept for Ensuring Food Security of the Republic of Armenia. Insufficient milk output is compensated for with imported powder milk and those dairy products that have not been traditionally produced in Armenia. The imported products allow foreign companies to consolidate their positions in the Armenian domestic market. The situation is aggravated by Armenia's joining the Customs Union of the Eurasian Economic Union.

The state policy in agriculture in Armenia is implemented by the Ministry of Agriculture. It comprises the Licensing Center, the State Inspection of Agricultural Machinery, the State Service of Food Safety, and the State Committee on Water Industry. The ministry disseminates knowledge through a network of regional agriculture support centers that provide extension services to farmers.

The Government of Armenia is aware of the grave situation in the dairy sector, and is implementing a series of programs to address the challenges. Implementation of the Animal Husbandry Development Program for 2007–2015 was completed in 2015. This program aimed to improve selective breeding of cattle, support farms, enhance the productivity of farm animals, and preserve the genetic material of the locally selected breed Brown Caucasian with average yield of 4,000–5,000 kilograms of milk per year. Under the program, 2,067 bred heifers of the Holstein and Simmental breeds were brought to Armenia; they were provided at cost to cattle farms on the installment plan for four years. The amortization schedule calls for the repayment of 10 percent of the cost in year 1, 20 percent in year 2, 30 percent in year 3, and the remaining 40 percent in year 4.

In order to encourage fodder production, the country is carrying out the Program to Promote Production of Barley, Alfalfa and Sainfoin in Armenia for 2016. Under this program, farms with more than 0.3 hectares of land are eligible to obtain seeds at a subsidized price.

The Farm Animals Vaccination Program intends to reduce animal morbidity in Armenia. The program uses public funds to perform prevention for eight infectious animal diseases and diagnostics for two annually; this helps to maintain a stable sanitary and epidemiological situation.

A program of subsidized agricultural loans aims to promote industry technology upgrades: each farm

can obtain a loan of 3 million drams for two years at 14 percent per annum. The state subsidized 4 percent of the interest rate prior to 2015, and 6 percent after 2015.

A special place in animal husbandry development belongs to the Community Agricultural Resource Management and Competitiveness Project implemented by the Ministry of Agriculture with the support from the World Bank in 2015–2020. The project aims to support livestock farms by improving roads to remote pastures, improving irrigation and rehabilitating degraded pastures, building capacity for milk collection and processing, improving veterinary and breeding services, and other activities. At its initial stage, the project was implemented in six out of ten marzes (Aragatsotn, Lori, Shirak, Tavush, Gegharkunik, and Syunik). The activities are mainly financed by the government; farmers cover only 20 percent of the cost of agricultural machinery purchased and 5 percent of other costs. The productivity of livestock in participating communities has grown 20 to 25 percent, and at the same time the livestock population and incomes of livestock farms increased.

All government-sponsored programs aiming to support the dairy sector provide direct subsidies to farmers and targeted financial support to meet intra-farm needs. Such measures do not immediately result in larger farms and greater marketability of milk. Besides, they disregard price relations between dairy chain participants. Therefore some financing intended for the livestock sector is redistributed to processors through underpriced farm-gate raw milk prices.

The Government of Armenia has opted for a hands-off trade policy in the dairy sector, and does not interfere with market interactions between the

players. There are no quantitative restrictions in Armenia with respect to the export and import of dairy products. Imported products are subject to ad valorem duties of 0 and 10 percent¹. Zero customs duties apply to imported food ingredients, and the rate of 10 percent applies to final products. Such policy encourages import of ingredients and domestic production of goods that could be later exported [9]. There are no export duties on agricultural produce in Armenia. Armenia's foreign trade policy is rather liberal, which is characteristic of majority of developing countries. This policy ensures growth in cheese exports and a relatively stable situation with regard to dairy products import (see Table 7).

Prices of domestic dairy products in Armenia are higher than in the Customs Union member countries [9]. On the one hand, Armenia has no protection against imports; on the other hand, people have low purchasing power. In addition, market integration and transport infrastructure are underdeveloped, which constrains a further increase in dairy imports.

In Armenia, average dairy products tariffs are 5.64 percent lower than the Unified Customs Tariff used by the Customs Union. Therefore, in order to protect local milk and dairy products producers, the government has to reconsider its import policy. Higher customs duties will help to reduce budget deficit and redirect trade flows; however, if this is to be achieved, domestic milk production volumes must increase.

The total cash transfers to agriculture are very low in Armenia: according to 2015 data, they account for about 1.4 percent of the country's gross agricultural output. Only 1.1 percent of the public budget was

¹ Ad valorem duties are set as percentages of the customs value of the goods imported.

Table 7. Export versus Import of Dairy Products in Armenia

Product	2012	2013	2014	2015
<i>Export, tonnes</i>				
Cheese	903.6	1,541.1	1,542.4	9,114.7
<i>Import, tonnes</i>				
Milk (all kinds)	3,066.5	3,095.2	4,455.6	4,343.6
Butter	4,907.4	4,749.0	5,262.3	4,419.7
Cheese	1,056.2	1,243.7	1,187.9	1,118.4

Source: The National Statistical Service of Armenia [1].

spent to support agriculture although this sector generates 20.5 percent of the GDP, with the dairy subsector contributing 2.56 percent of the agricultural share of the GDP.

The above government regulation measures are obviously insufficient; this is evidenced by the huge volume of milk and dairy products entering the market informally. The informal dairy chains appear because of the price pressures that processors put on milk suppliers—their relations are free from any state regulation. Therefore the key challenge for the government in Armenia at present is to identify the best mechanisms that would help regulate market relations between dairy chain participants. There are good reasons that the dairy market in the majority of developed countries is the most heavily regulated.

Stakeholder Groups

The Government

The key stakeholder in the dairy sector development in Armenia is the government; achieving food security is a strategic objective, and this is set forth in the *Law On Ensuring Food Security of 2002* [14], the National Security Strategy of the Republic of Armenia, and the Concept for Ensuring Food Security of the Republic of Armenia. Measures to reach the objective are specified in the *Strategy*

for Sustainable Development of Agriculture of the Republic of Armenia for 2014–2025 [15], which was amended when the country joined the Eurasian Economic Union. The responsibility for the implementation of this strategy rests with the Ministry of Agriculture. Financing of the program is approved by the Ministry of Finance, which keeps reducing the amount of money made available for the dairy sector. The main goals of the strategy are to reach the milk production volumes necessary to ensure food security (100 percent self-sufficiency in milk); to boost the competitiveness of domestic dairy products in the international market; to uphold the rights of local producers; and to assist rural communities in mountainous and piedmont areas that specialize in domestic livestock breeding. Table 8 shows the targets for the dairy sector established in the Strategy for Sustainable Development of Agriculture of the Republic of Armenia.

Farmers

Another stakeholder group is farmers producing milk and dairy products. Armenia has close to 170,000 such farms, and they are responsible for 99.2 percent of gross milk output; commercial organizations account for less than 1 percent of output (see Table 9) [16]. The predominance of small producers in the dairy sector is typical for developing countries, but their share in Armenia is indeed huge.

Table 8. Targets for the Dairy Sector

Indicators	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Milk output, 1,000 tonnes	721.8	759.3	800.3	838.3	883.0	924.6	968.4	1,013.5	1,057.0	1100.8
Cattle population, 1,000 head	325.9	330.7	335.3	339.6	343.7	347.1	350.7	354.1	357.4	360.6
Average annual milk yield per cow, kilograms	2,250	2,330	2,420	2,500	2,600	2,690	2,790	2,890	2,985	3,080

Source: *Strategy for Sustainable Development of Agriculture of the Republic of Armenia for 2014–2025* [15].

Table 9. Size of Livestock Farms in Armenia

Indicator	Over 100 head	70–99 head	15–69 head	7–14 head	Up to 7 head	Total
Number of dairy farms (%)	49 (0.03%)	505 (0.29%)	1,971 (1.13%)	4,057 (2.34%)	167,134 (96.21%)	173,716 (100%)

Source: Dries et al. 2014 [16].

Milk sales comprise the main source of income and food for the majority of small farms, as milk provides a relatively quick return on investment for small farms. Farmers are mostly interested in getting normal income from milk sales that would allow them to fully cover the cost of its production and realize a profit. The majority of farmers are unable to scale up milk production because they lack the needed labor force because of the migration of young people from rural areas. For this reason, in order to scale up milk production, they need resources to automate production processes. The average cattle population per farm in Armenia is one animal. Extremely small output per farm makes farmers dependent on price policies pursued by processors and deprives them of any voice in policy and decision-making.

Milk Processors

The next group of stakeholders is represented by milk processors. They are mostly interested in securing a stable supply of high-quality milk throughout the year so that they can fully utilize their capacity. Since processors have the strongest competitive position in the Armenian dairy market, they absorb the main share of the dairy chain margin, thus reducing farmers' incomes and dampening the impact of public support provided to farmers. The milk processors would like to set up large operations for commercial milk production.

Retailers

Dairy product retailers want to be able to offer the full range of fresh products demanded by the local population. The products need to be delivered to stores at an acceptable price that would allow the retailers to set desirable mark-ups and still benefit from effective demand. The worst-case scenario for retailers would entail losses due to shortages of dairy products: in this case they lose not only revenues but their loyal customers as well. Any disruption in the dairy chain triggers a shortage of dairy products. Retailers in Armenia do not possess excessive bargaining power, which can be seen from the normal distribution of the margin in their favor.

Consumers (Rural and Urban Population)

The last link in the dairy chain is represented by dairy product consumers. They comprise two groups: urban and rural. The groups differ in terms of their income levels and consumer preferences.

The rural population prefers to buy milk and dairy products through informal channels; such products as a rule are processed in-house, since there is no mark-up for delivery, processing, and packaging. The majority of informal transactions represent barter trade [17], [18]. These consumers prioritize milk price over the degree of processing or dairy products variety.

Urban residents have higher incomes and generate actual effective demand for a wide range of dairy products produced by processors as well as those imported to Armenia. They are interested in having high-quality dairy products available at affordable prices, with government bodies expected to perform quality control.

Policy Options

The dairy sector plays a prominent role in the Armenian economy in terms of generating income for the rural population and ensuring food security for the nation. It is one of the most challenging in terms of balancing stakeholders' interests. Milk as an asset possesses some very special properties that determine the nature of competition and interactions among the dairy chain components. It is a highly perishable good that demands special treatment to be done very quickly; it is also a strictly standardized asset that puts special demands on the production, collection, cooling, and transportation technologies that affect its quality. The demand for milk does not coincide with its production peak, and this has pricing implications. The hands-off approach in dealing with the dairy market pursued by the Government of Armenia undermines the effectiveness of public support to milk producers and does not help the sector develop in a sustainable manner. A set of policy measures is proposed to stabilize the situation in the Armenian dairy sector.

1. Set a farm-gate price floor based on the quality of milk delivered for processing

Farmers are the most disadvantaged group of Armenian dairy market participants, yet they produce ingredients for the entire dairy chain. Milk production volumes can be increased only if fair milk pricing is guaranteed. The above analysis of margin distribution suggests that most of the margin is captured by processors. A more balanced profit distribution can be achieved only by bolstering the competitive position of the farmers through scaled-

up production. However, in the near term, and given low profitability, significant public financing would be needed to achieve this. In this context the best option would be to introduce a floor for farm-gate milk price that would be calculated on the basis of the cost of production and would ensure normal profit for expanded reproduction (15 percent profitability). Thus, the farm-gate price floor would be cost-based and determined separately for each marz, taking into account the effective demand and current economic situation in the country. In this case, guaranteed prices should be paid contingent on maintaining an even supply of milk to processors throughout the year to encourage farmers and producers to lower the seasonality of their operation.

The beauty of this arrangement is that no public support or subsidies to milk producers are required. Normal profits are ensured by the fair distribution of the margin among players; a similar system operates in Canada [19], [20] and, to some extent, in the United States. The experience of Canada suggests that such arrangements cause higher retail sale prices; thus the cash transfer from consumers to producers occurs directly via market mechanisms and not through the budget system, which makes it more transparent. The use of such a mechanism must be accompanied with an aggressive import restriction policy because high domestic prices would make local producers less competitive than foreign ones.

This approach would benefit farmers but it would reduce profits for processors and cause higher prices of dairy products, which would affect the rural population most strongly; it would be a bit less painful for the urban population owing to its higher incomes.

2. Encourage milk supply to processing plants

One alternative to a farm-gate price floor could be direct payments to farmers per liter of milk delivered for processing contingent on maintaining even supply of milk to processors throughout the year. Volumes of milk supplied to processors would be calculated on the basis of signed contracts. This would help to increase farmers' incomes, milk marketability at farms, and capacity utilization rate, and therefore would improve processors' profitability. This would be the best option in the eyes of the processors. However, dishonest processors may be tempted to subtract the amount of such payment from the farm-gate price. Yet processors would like to increase their capacity utilization rate.

For the government this would mean a higher burden for the budget, and would not help ensure a fair redistribution of the margin in the dairy chain. On the other hand, this would increase tax revenues collected from processors thanks to a greater production volume of dairy products and putting more milk into formal circulation.

This measure would partially affect the rural population since the supply of less expensive dairy products sold informally would drop.

3. Set up and develop marketing and milk processing cooperatives

There are virtually no large commercial milk producers in Armenia. A lot of farms sell raw milk on their own without any long-term guarantees or obligations, and often with no contract with the processor. Vertical integration in the dairy market requires an enlarged initial component in the supply chain; this can be achieved by setting up marketing cooperatives that would bring together small producers. Collecting milk from many small farmers results in higher transportation costs and lower overall milk quality—since it is impossible to control each and every supplier—and a lack of feedback between processors and farmers.

Agricultural cooperation in the dairy sector is a strategic area in the Armenian agrarian policy, but no effective mechanisms that would encourage establishment of cooperatives have been implemented yet. Besides, until the end of 2015 there had been no law On Agricultural Cooperatives [21] in Armenia that would define the principles and legal framework for agricultural cooperatives activity. Up to that time the activity of farmers' associations had been regulated by the Law On Consumer Cooperatives that was passed back in 1993; that law defined cooperatives as not-for-profit organizations with a membership of at least 30 individuals [22].

Between 1992 and 2005, the Marketing Assistance Program was implemented in Armenia with the assistance from the U.S. Department of Agriculture; the program aimed to establish cooperatives (co-ops) in the dairy sector. Upon its completion, however, many of the newly established co-ops split up or became inactive. The key problem regarding co-op development in Armenia is a lack of trust in collective ownership. According to a survey of the new co-op members, only 39.5 percent believed that co-ops would help increase their incomes; 28.4 percent considered themselves owners of the co-

ops, and 28.2 percent realized their right to control the co-ops' activity. However, the survey revealed that co-op membership motivates farmers to invest more in the development of their farms. Thus, 42 percent of the surveyed co-op members invested in modernization of cattle stalls; 39 percent increased their livestock population; and 20 percent increased livestock population, upgraded cattle stalls, and procured new equipment [23].

The experience of Israel, where co-ops produce some 80 percent of the country's agricultural output, confirms that co-ops should be built on a philosophy, government policy, and effective production processes. The Government of Israel invests heavily in the development of co-ops and positions them as the main marketing channel for agricultural produce. Co-ops in the Israeli dairy sector have allowed an increase in milk production volumes and strengthened the farmers' voice and their market positions [24].

A two-pronged approach should be pursued to set up co-ops in the Armenian dairy sector, given its specific development patterns. The first approach would be to identify raw milk purchase areas used by large milk processors based on reasonable milk transportation costs, and to set up marketing co-ops in those areas. This would help to dramatically improve marketability for the co-op members and encourage them to increase their dairy livestock population. Studies done in Armenia demonstrate that the more milk farmers produce, the greater the share of such milk sold to the market [25]. Farmers specialize in milk production, and they prefer to get a higher income from milk sales and buy finished dairy products. A higher profitability for co-op members would be achieved thanks to the consolidation of milk lots sold to the market and thanks also to quality control; co-ops would be able to enter into long-term contracts with processors on better terms. But a mandatory condition of financing such marketing co-op programs should be the even supply of milk to processors throughout the year.

The second approach would be to establish cheese-making co-ops in the areas that are outside of the purchase areas used by active processors and are fairly remote: production sites located far from the markets make the transportation of fresh milk unprofitable. The best option for the areas outside the purchase areas would be to produce cheese and bring it to sales venues (to cities or for export). This would help farmers to significantly increase their revenues from sales of processed dairy

products. Arrangements for the establishment of a milk-processing co-op require a detailed business plan and a feasibility study. A lot of money is needed to procure milk processing equipment. The number of co-op members, as well as their capacity to supply milk for processing and possible purchases of milk from outside suppliers, must be defined precisely in order to set the processing capacity of the co-op. The demand for dairy products, possible sales volumes for each marketing channel, and optimal assortment and quantity must be identified. Production technology based on the local raw milk properties should also be developed.

The key support mechanisms for marketing and processing co-ops should be targeted grant financing to procure equipment as well as scientific and technical advice provided throughout the project implementation. The U.S. experience suggests that technical assistance to farmers often produces a greater development impact than financing. Eligibility for grant financing would be provided if a certain annual volume of milk is guaranteed to be processed or delivered for processing. Currently the only support for co-ops comes as interest rate subsidy of 6 percent.

The number of founding members would be determined by the number of those willing to join and the co-op's need for cash to buy transportation, milk cooling, and quality control equipment. To build an effective cooperative, special attention should be given to the establishment procedure. Since co-ops are based on voluntary membership, only future members should make the decisions to set up a co-op and participate in its creation. The government, financial institutions, and farmers associations may inform farmers and provide training and advice, but may not initiate the procedure—this should come only from those wishing to set up a co-op. Large farms that have sufficient livestock population, land, and equipment to produce fodder would function as facilitators during this process (see Appendix B).

The government would use cost-benefit analysis to evaluate the effectiveness of such support measures. Costs include the financing of investment projects to set up marketing and processing co-ops; benefits come as tax revenues from the co-op members and milk processors, based on increased output of dairy products.

Milk processors would find this measure especially appealing because it would help increase the purchases of raw milk; marketing cooperatives

would do milk collection, cooling, and transportation. Having larger suppliers would allow the introduction of a system to manage their own supply chains. The introduction of such a system would ensure the balanced and concerted development of its participants, help develop a uniform strategy, and gain competitive advantage in two areas:

1. Better satisfaction of dairy products consumers' demands thanks to: the establishment of close feedback with milk suppliers; the management of new product development as a result of changes in raw milk production technologies; the faster movement of products with a short shelf life within the distribution network; and the joint creation by all the participants of an efficient, uninterrupted cold chain, allowing for maintaining desired temperatures at each stage of the supply chain.
2. Reduction of the total costs for all the supply chain participants thanks to: alignment and optimization of technology and logistics processes; minimized transportation and transaction costs; fewer intermediaries; reallocation of logistics functions among the supply chain participants; the management of return flows that help reduce losses caused by the short shelf life of dairy products; a reduced number of activities that do not create value; and lower risks of unfair collaboration.

All cooperative ventures would allow farmers to strengthen their bargaining power and policy influence, increase revenues from milk sales, and invest additional resources to scale up their production.

The rural population would have somewhat less access to cheaper dairy products sold on informal markets.

4. Invest in establishing large commercial milk producers

One alternative to enlarging the primary segment of the milk supply chain (the milk producers) would be to establish large agricultural farms for commercial milk production. This would be economically sound since the cost of milk production there would be significantly lower than at small farms thanks to the economies of scale, the introduction of intensive technologies, automation, and so on. The experience of developed economies suggests that

the trend in the dairy sector has been to have fewer farms and more animals per farm. However, given the budget deficit in Armenia, the implementation of such projects is impossible in the short run—on average, it takes about 15 years for a large farm to pay back its loans. Besides, large dairy farms would crowd out a lot of family-held farms, which would affect the incomes of the rural population. Thus, considering the fiscal capacity of the government and social interests of the rural population, a gradual farm size increase thanks to higher profitability caused by fair margin distribution would seem a better idea.

5. Establish a farmer education program to introduce intensive technologies for milk production, cheese-making, and the establishment and operation of marketing and processing cooperatives

A majority of Armenia's rural residents involved in milk production lack the specialized knowledge that allows the application of scientific approaches to production. Therefore one important public support measure would be to design, together with milk processors, a set of training programs dealing with the implementation of standardized milk production technology that duly recognizes area-specific climatic conditions. This would help produce milk with the pre-defined biological properties required for some dairy products. Such programs would be delivered by regional agriculture support centers. Furthermore, a program on cheese-making is needed; participation in the program would serve as eligibility criteria when obtaining grant financing to set up cheese-making cooperatives. Another education program should deal with the establishment and operation of marketing and processing co-ops based on the recent *Law On Agricultural Cooperatives* [21] and best international experience. The program should cover legal, market operation, contracting, and sound management issues.

Assignment

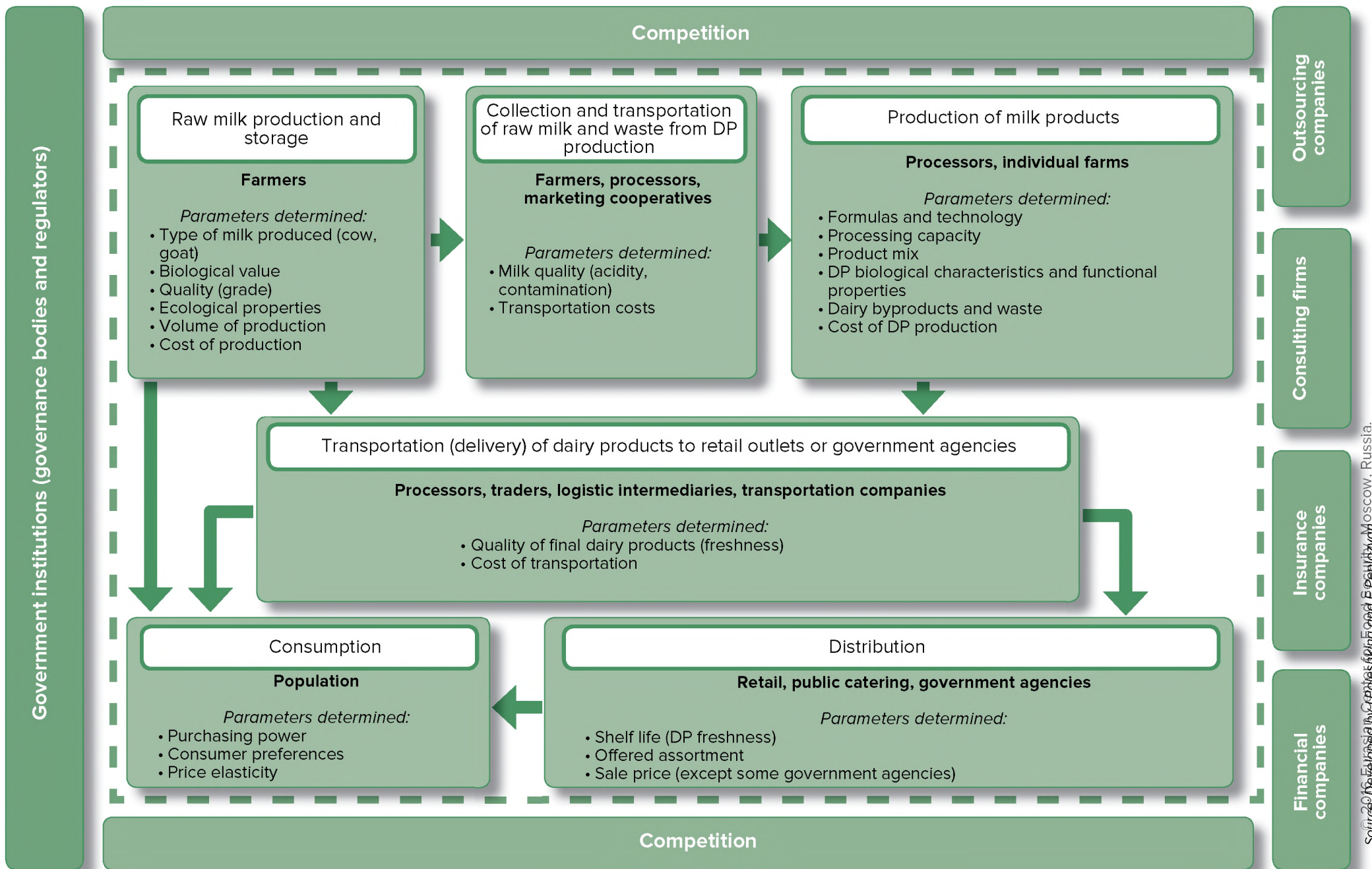
Your task is to develop recommendations for decision makers to help them select the best government regulation policies in the dairy sector, taking a balanced approach to the interests of all supply chain participants, and to identify the economic, social, and food implications of such policies.

Policy Recommendations

Based on the proposed set of government regulation measures for the Armenian dairy sector, a combined support program can be developed that would help create a balanced dairy chain with due consideration of all stakeholders' interests. Such a program should envisage the establishment and development of marketing and processing co-ops as well as incentives to supply milk for processing. Money for the milk supplied for processing or the milk processed by co-ops can be provided directly to new co-ops in advance—as a lump sum upon approval of the project to set up a co-op, and based on the expected annual milk collection or processing volumes. These resources, together with grant financing, would be used to purchase equipment and establish co-ops. Mandatory eligibility criteria for the establishment grant would be participation

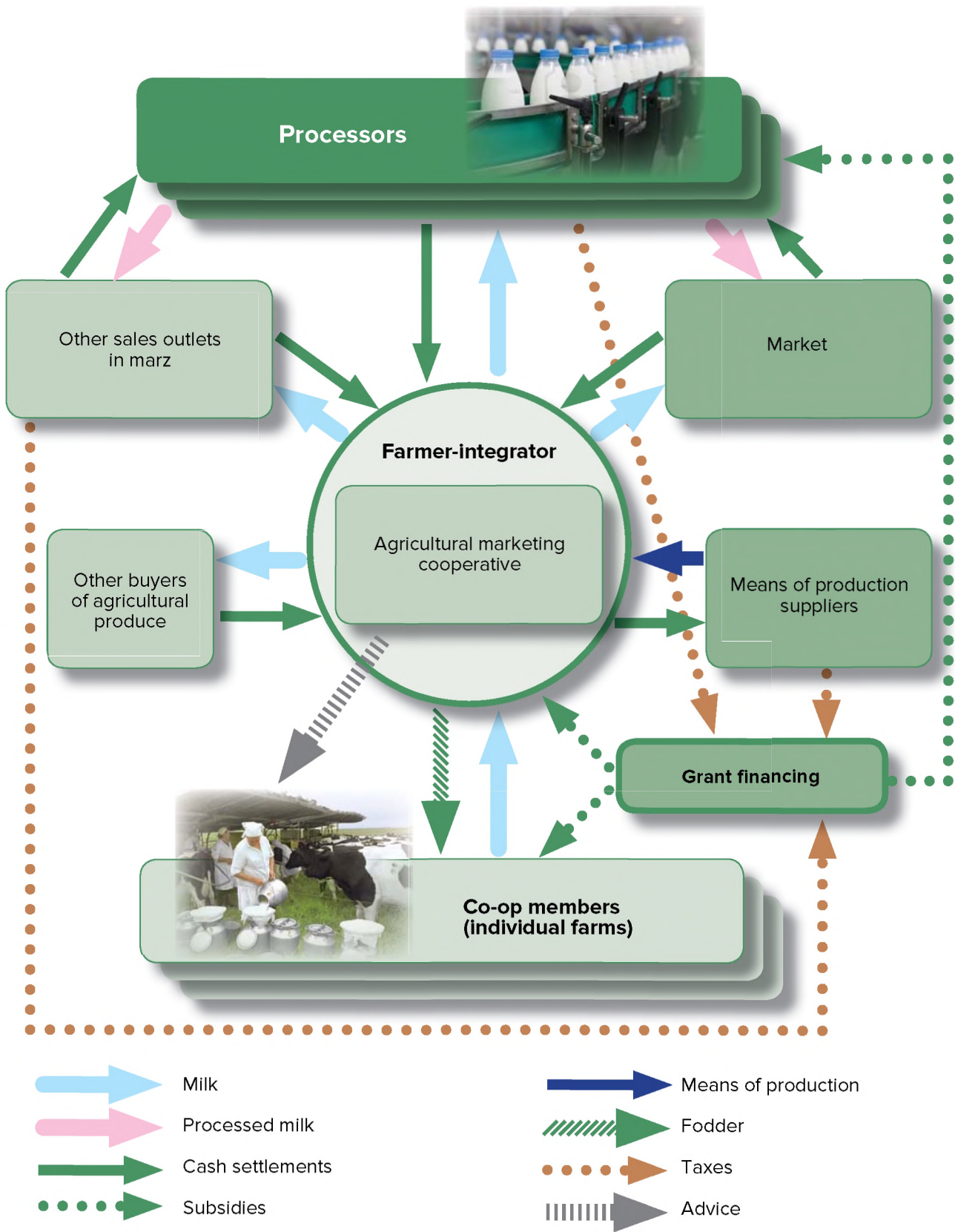
in an established program designed together with processors and successfully passing an examination.

A farm-gate floor price of milk supplied for processing is the most effective tool for establishing fair relationships within the dairy chain, but processors would be reluctant to embrace it. Therefore such a floor price could be introduced in stages. Initially a public-private partnership arrangement could be employed to upgrade processing facilities conditional on guaranteeing a farm-gate price floor when purchasing raw milk from farmers. Then an in-depth analysis of margin distribution within the chain would be completed, and gradually such conditions would be expanded to the entire sector. This measure would have to be accompanied by heavier restrictions on dairy product imports to Armenia because the farm-gate floor price would trigger an increase in retail dairy prices.



Source: Developed by G. Poleshina and E. Pelyayev, Moscow, Russia.

Appendix B: Operation of an Agricultural Marketing Cooperative



Source: Developed by I.Poleshkina and E.Peplozyan.

Additional Readings

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