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Comparative Advantage of Cow Milk in Syria

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Foreword

The Syrian economy is gradually going through in-depth transformations for the last decade with an increasing exposure to international competition. The agro-industrial sector has a critical role in this transformation due to its contribution to GDP and employment as well as to its potential for diversifying sources of foreign currencies earning through export increases. However, this transformation poses a number of challenges for several agricultural products in particular animal products including milk concerning competing with other countries exporting similar products.

Accordingly, policy makers need a comprehensive assessment of the potential impact of possible policy changes on the economic viability of these commodities. This assessment will assist policy makers in formulating the most relevant and adapted policies required to facilitate the adjustment of the agro-industrial sector and to anticipate and control any potential drawbacks on rural population welfare.

To this end the National Agricultural Policy Centre, with the assistance of the FAO project **GCP/SYR/006/ITA,** supported by the Government of Italy, and the FAO project of TCP, has carried out a systematic review of the comparative advantage of selected agricultural commodities (cotton, wheat, olive, tomato, orange and livestock), the Comparative Advantage Study (CAS), in order to provide the necessary information base for decision making.

This report presents the results for cow milk, while the results for the other commodities have been published in separate similar commodity reports that are available from the NAPC. A synthesis has been produced putting in perspective the status of each commodity and where the methodology applied is presented in details.

The report was edited by Samir Grad the chief of Agro-Food Division.

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Executive summary

The agriculture sector in Syria is considered one of the most important sectors in the national economy for the following reasons: first of all, it is one of the main sources for generating GDP; second, it covers the increasing food demand of population and food industry. Therefore, the social and economic development process in Syria has concentrated on the development of the agriculture two main sub-sectors: plant and animal production. This study focuses on cow milk production.

Animal production in Syria has a major role since it is considered a basic source of individual food consumption and energy requirements as well as a main source of income especially in the Syrian steppe and contributes by 15% to total agricultural exports.

The main issue is that Syrian economy needs to give high priority to the promotion of competitiveness in an economy opened to international trade. Therefore, the agricultural production systems in the field of animal and plant production have to depend on comparative advantage to use domestic resources efficiently, in other words; this means an optimal utilization of natural resources. If the country has less production cost than that of the world, it has to produce this good with its own domestic resource for consumption and export. Otherwise, it is economically more efficient to import this good and to reallocate domestic resources to other goods for which the country has comparative advantage. The Policy Analysis Matrix (PAM) provides an analytical framework to estimate the comparative advantage of a given production system.

This study aims at assessing the comparative advantage of cow milk produced that used in processing animal products and affected by trade globalization and establishing an easily computable model to be managed and used in future by the NAPC staff according to the following steps:

First of all, a survey to collect data about the subject was conducted by choosing the middle region (Homs and Hama), because it's famous in these activities; in addition, factories and farmers in Damascus and Damascus Rural were visited. Then fill all information in questionnaires.

Then budgets were made for all agents involved in the commodity chain including farmers, traders, and processors.

After that, the best representative budgets of the system were chosen to establish the PAM. In this regard, the calculation of the parity price of imported powder milk from foreign country was necessary.

The main output of the mission is to build at least one PAM for each commodity system. In addition, sensitivity analysis was applied to cow milk to assess the relationship between the PAM variables) and a selected number of variables (costs, prices and so forth) and to check the range of its impact and significant.

As a result, depending on the PAM indicators and budget summary, Syria has comparative advantage in local milk production compared to imported powder milk because of the high cost in buying powder milk.

I . Introduction

Syrian Economy has been changing and moving from a state driven to a more liberalized economy which forms a challenging task to the decision makers in Syria. Expected changes on the sector can be tracked through assessing the comparative advantage. The concept of comparative advantage provides us by information about the efficiency of domestic resources, and the affects of agricultural policies on the efficient use of these resources. In addition, it assesses the economic profitability of agricultural and agro-industry systems. Before applying this concept to the milk sector in Syria, an overview of the policies in place, the importance of milk production and the recent trends of the milk industry is provided.

I.1. Policy issues

Many policies in Syria affect milk production such as price policies, trade policies, marketing policies, and credits, inputs, and investment policies.

I.1.1. Price policies

In principle, the Government announces an indicative price for milk purchased by state dairy, but different sources indicate that fluctuations in milk prices prevail, which reached up to 20% during last years. Wholesale prices are less stable than retail prices. The prices of milk fluctuate from year to another depending on demand and supply and available fodders.

I.1.2. Trade, investment, and tax policies

In 2000, the Law NO 7 has been issued, which includes many amendments in relation to Investment Law NO 10 of 1991 and allows for agricultural companies to work in the field of animal production such as dairy factories and frozen storage. This investment law offers exemption from tax for all projects such as income taxes, building tax, and import custom fee. The exemption period extends to five years after the establishment date.

I.1.3. Credit policy

The Cooperative Agricultural Banks provides loans for farmers by subsidized interest rates. Most of these loans are short term accounting for about 80-90% from total; the repayment period is one year. This will encourage farmers to investment in small projects such as traditional milk processing and cattle breeding.

I.2. The place of the product in agriculture

The milk sector creates opportunities to increase farmer's income especially in the case of fair prices since farmers use the by-product crops after harvesting in feeding their animals. Also, there is a special importance for milk in the Syrian food system because of its nutritional components.

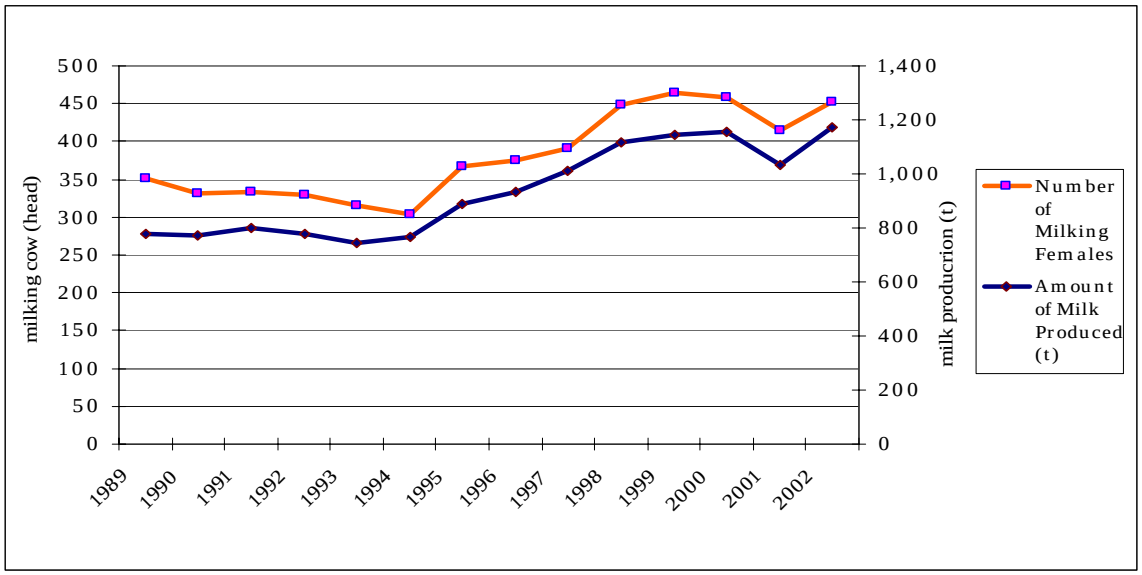
I.2.1. Cow milk trends

Cow milk is considered the first source of fresh milk for human consumption in Syria compared with other sources of milk. More than of 60% of fresh milk is transferred into main urban markets in opening containers for consumption by the seller and traders of milk who buy it from the small cow farms that found on the board of cities. But the processing milk which found in battles and cans is covering a part of market because its cost and consumer preferring to consume fresh milk.

The number of milked dairy cows increased during last decades to reach the highest in 1999 (465 thousand heads) and the lowest in 1994 (304 thousand heads) because of the drought. The quantity of milk produced also increased during the same period to reach the highest in 2002 (1,174 thousand tons) because of the high rainfall and the high number of cows (453 thousand heads) but the decreasing of milk production in 1993 to 743 thousand tons because of the low number of dairy cows to 316 thousand heads and the unavailability of fodder (Figure i.1**)**.

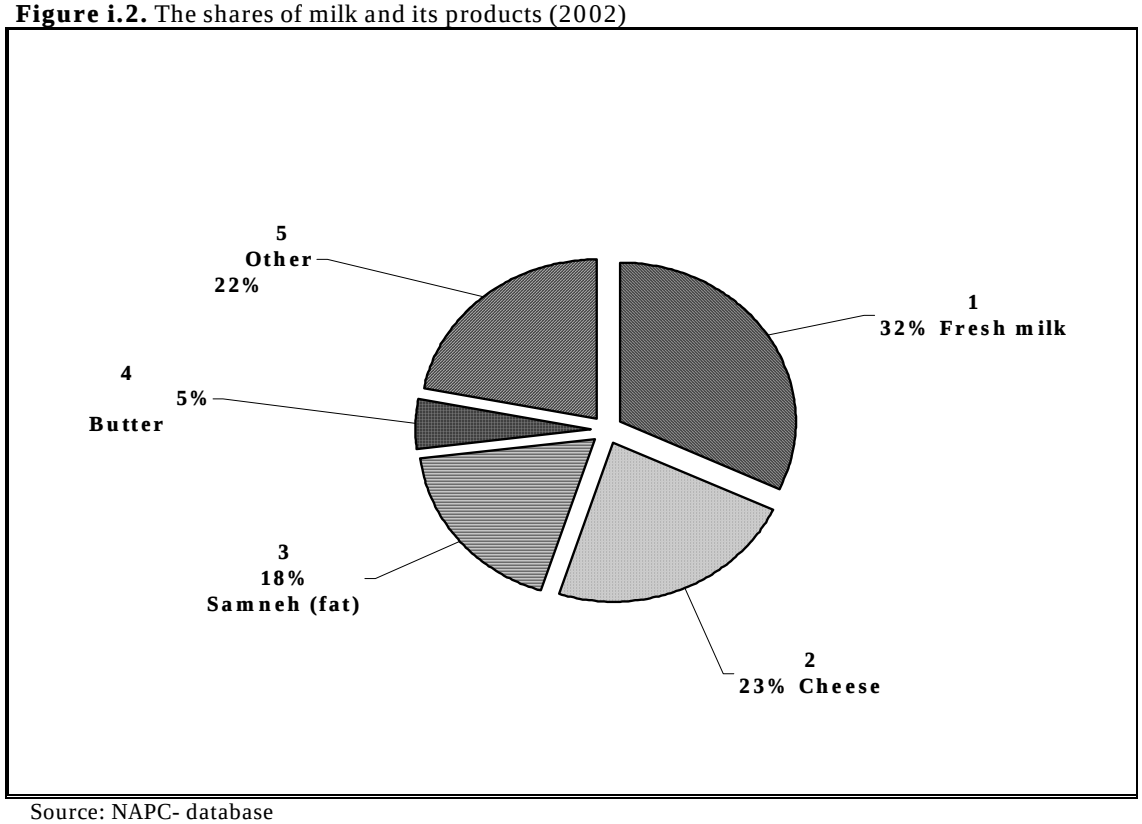
Figure i.2 shows that 32% of milk is sold as fresh milk to consumer and the rest is processed to dairy products. The amount of milk produced varies during the seasons of the year, so it reaches the highest in summer and the lowest in winter, so it affects on the production of the dairy factories.

Figure i.1. Evolution of the total number of milked dairy cows (000 heads) and milk production 1989-2002 (000 ton)



Source: NAPC- database

Figure i.2. The shares of milk and its products (2002)



Source: NAPC- database

In the winter season when the supply of milk decreases, the dairy factories shift to use imported powder milk to transfer it milk products, to cover the market needs to produce continuously during the year. The study of the milk market refers to if the consumption growth rate of milk is 1%, the country will face a deficit of 540 thousand tons in 2010, which will correspond to a decrease of the self sufficiency rate to 78.6% (working paper No. 7 Rama Daniel etal. 2001. Supply chain coordination and policy implications: The case of dairy and red meat products in Syria. NAPC, Damascus.). This deficit will be covered by imported powder milk. Therefore, it is important to enhance the local production to meet the increasing demand for fresh milk.

All studies show (table i.2) that the expected per capita consumption of milk will increase from 9.6 Kg/month in 2010 to 10.4 Kg/month in 2020, so it's advisable to increase the production of milk to cover the market demand because of the deficit milk supply. Table i.3 shows the evolution of milk and its products from 1998 to 2002.

Table i.2. The expected consumption per capita of milk (kg/month) (1997-2010-2020)

Commodity	1997 (Actual)	2010	2020
Milk	7.8	9.6	10.4

Source: Hamdi Salem- Food security -2000

Table i.3. The evolution of milk and its products, 1998-2002

Material	Reference	1998	1999	2000	2001	2002
Milk and its Derivatives	Total Milk (000 ton)	1,781	1,656	1,673	1,578	1,767
	Fresh milk (000 ton)	665	628	610	535	584
	Ghee (ton)	12,250	11,559	12,214	10,771	13,607
	Cheese (ton)	97,639	82,169	87,317	89,336	96,943
	Butter (ton)	3,516	3,357	2,939	4,269	6,012

Source: Central Statistic Barbue

I.2.2. Trends of exporting and importing milk

As fresh milk is perishable, the exported and imported quantities are very low during the last decade except in 2001; table i.5. This increase in import refers to lack of local milk production especially in winter season. Most quantities use to feed children and to process in factories.

In addition, the imported quantities of powder milk increased in the periods 1990-1992, 1993-1995, 1996-1998, and 2002 by 73, 185, 331, and 1099 million SP, respectively. Most of these quantities are used for infants' foods and processing in factories.

Table i.5. Commodity balance of milk, 1992-2001

Material	Reference	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Milk (000 ton)	Production	1,351	1,244	1,226	1,414	1,508	1,610	1,780	1,656	1,673	1,578
	Imports	0	0	0	0	0.26	0.05	0	0	0	9
	Exports	0	0	0	0.07	0	0.02	0	0	0	11
	T.Supply	0	0	0	0.1	0	0	0	0	0	-8.9
	Commodity balance	478	493	470	541.9	583.2	621.3	664.5	627.7	610.1	543.8
	Processing	873	751	757	872	926.1	988.7	1,115.5	1,028.4	1,063.1	1,042.8

Source: NAPC-database

Chapter 1 –Description of the commodity system

The main product of the system is liquid milk which sells fresh, sterilized, or pasteurized.. Therefore, data are collected at farm, collector and factory levels. Factories process milk to many products such as sterilized milk, Labneh, yogurt, pasteurized milk, samneh, cheese, butter, and so forth. Nevertheless, sterilized milk is chosen to compare it with the imported powder milk after transferring it to liquid milk then to process it to know if last one is more efficient or not.

1.1. Description of the milk commodity chain

This section describes the milk commodity chain including all the agents from farm level until the final consumer as depicted in figure 1.1.

1.1.1. Milk farms

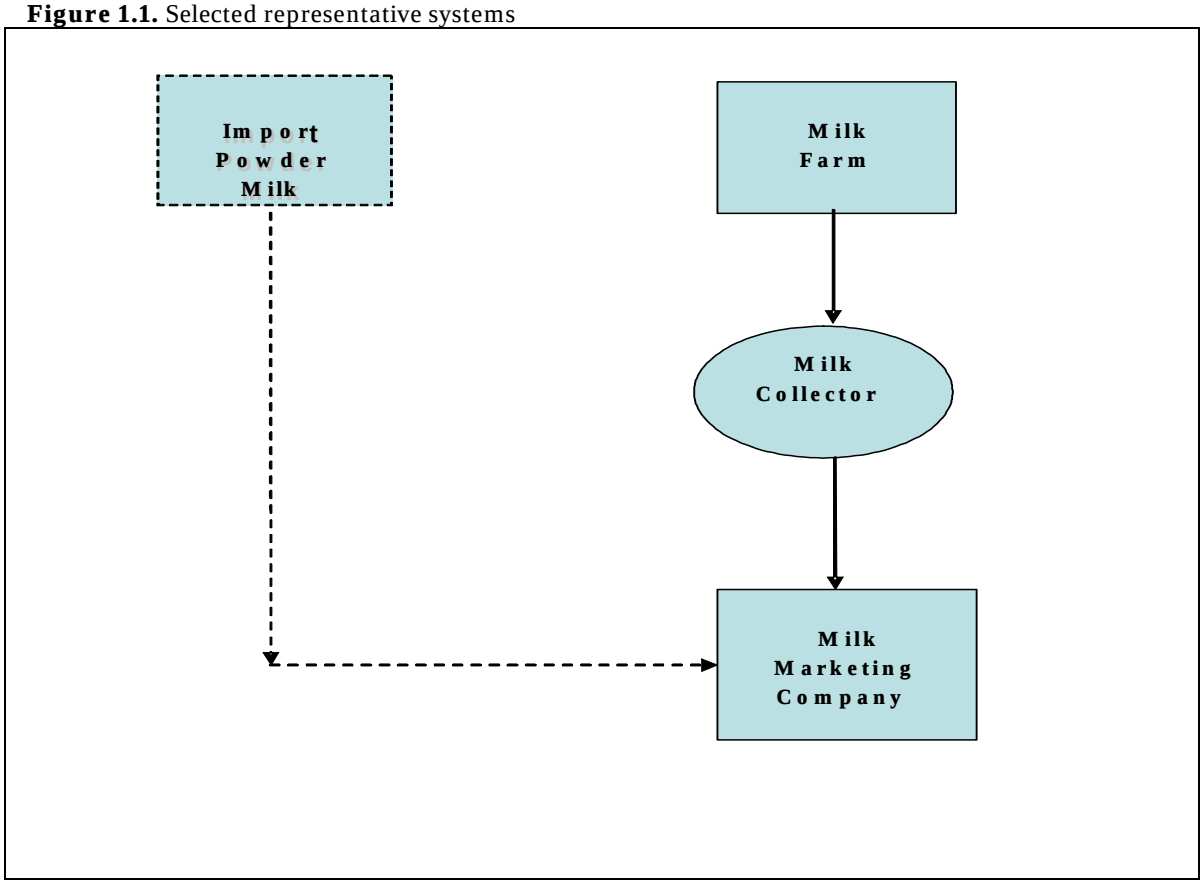
The private farms produce about 17 % of cow milk production and generally have 9 to 10 heads. These farms keep part of the milk for self consumption while the major part is sold to home processing, wholesale traders, and consumers. Farmers also produce ghee, cheese, butter, and yogurt and sell them to retail traders by current prices.

The cooperative farms produce about 81 % of milk and have the same number of animals as the private farms; they apply also the same techniques in selling milk.

The state farms produce about 2% of milk. The most of these farms have a higher productivity because they have improved breed; almost all of their production is sold to state dairies.

Most of farmers have milk machine and use cleaning materials before milking, but there are few of them still use traditional ways in fattening and milking. Sometimes they lose money especially because of the fluctuation in the price of milk. Small farmers depend on the by-products of their crops in the farm to feed the animals.

Figure 1.1. Selected representative systems



Source: collected and analyzed by the editor of this report

1.1.2. Milk collectors

Milk traders buy milk from private and public cooperative sectors, and sell it to traditional processors, private, and public factories, but the most of them sell it to retail traders.

Milk transportation is done by collectors over long distance (about 50 km) without cooling in small containers, so there is often an increasing contamination of bacteria which causes a bad test in milk. Some collectors are obliged to throw away the milk after collecting because they discover that there are changes in milk colors which mean that there are antibiotics in milk because of veterinary treatment. The collector either sells the milk to factories and processing units or processes it by himself. In the last case he achieves more profits by making butter, cheese, labneh, and yogurt and selling them to supermarkets in the city.

1.1.3. Milk marketing companies

Most factories have modern machines and apply modern technologies to reduce the cost of production. These factories produce many products according to demand and supply conditions, so some of them work three shifts per day to cover the demand especially in the case of export to other countries.

Few factories face some problems from buying bad quality milk of collectors because it contains big amounts of bacteria and foreign matters. Therefore, the firms has imposed new standards to deliver the milk to them like cold temperature (must be not more than 5 degree), acidity, bacteria capacity, and water adding. The period of collecting milk from farmers lasts a long time because most of the farmers are distributed in a far distance which increases the bacteria capacity.

Before buying the milk by the factory, the latter makes some tests before moving it to the processing operations (cheese, butter, labneh, Yogurt, sterilized milk, and pasteurized milk).. Then the factory sells the products to wholesale traders, who transport the commodities to cities and deliver them to shops. In addition, some factories have special camions to distribute their products directly to consumers in urban areas.

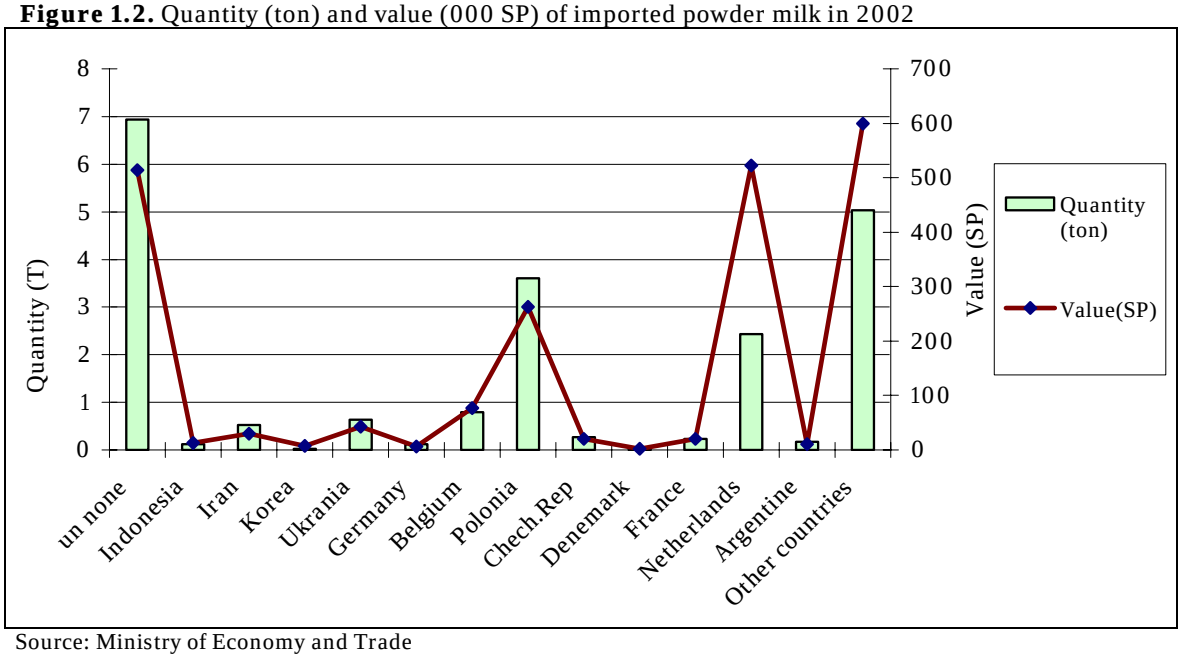
The most of dairy production goes to the local market because of the high domestic demand from the local consumers. Some factories can't work in full capacity because the local fresh milk, which is close to the location of the factory, isn't enough.

I.2. Importance of powder milk in the milk chain

Some factories need powder milk to improve their performance by transferring it to liquid milk and processing it to ice cream especially in the case of lack of fresh milk. This operation is done by signing contracts with traders who import powder milk from Europe and other countries.

The quantity of imported powder milk in 2002 reached 21tons by value of 2,128,116 SP and the price of one ton in average is about 100 thousands Syrian Pounds. Figure 1.2 and present the imported quantity and the value of powder milk in 2002.

Figure 1.2. Quantity (ton) and value (000 SP) of imported powder milk in 2002



Source: Ministry of Economy and Trade

Chapter 2 - Agent characteristics

2.1. Sources of information

There are two sources of information namely: primary data, which are collected from survey after visiting the Governorates, and secondary data, which are collected from many sources such as Ministry of Agriculture and Agrarian Reform, Central Bureau of Statistic, Ministry of Economy and Trade, Animal Production Directorate, NAPC and markets of powder milk.

Concerning the primary data, Hama, Damascus and Rural Damascus are chosen since there are a lot of farmers, collectors, and factories both private and public.

The data of farming system are collected by the team of farming system who consists of six researchers. The number of gross margins executed is 16 which are distributed in four Governorates as the following: Damascus rural (Douma), Lattakia, Sweida, and Dar'a. The larges number is 9 in Douma.

Data of the marketing cost have been gathered by interviewing three collectors in rural Damascus. In addition, three dairy factories in Hama and Damascus were visited.

2.2. Producers

Table 2.1 disaggregates the cost at farm level.

Table 2.1. Disaggregation of the cost at farm level SP/Ton (2002)

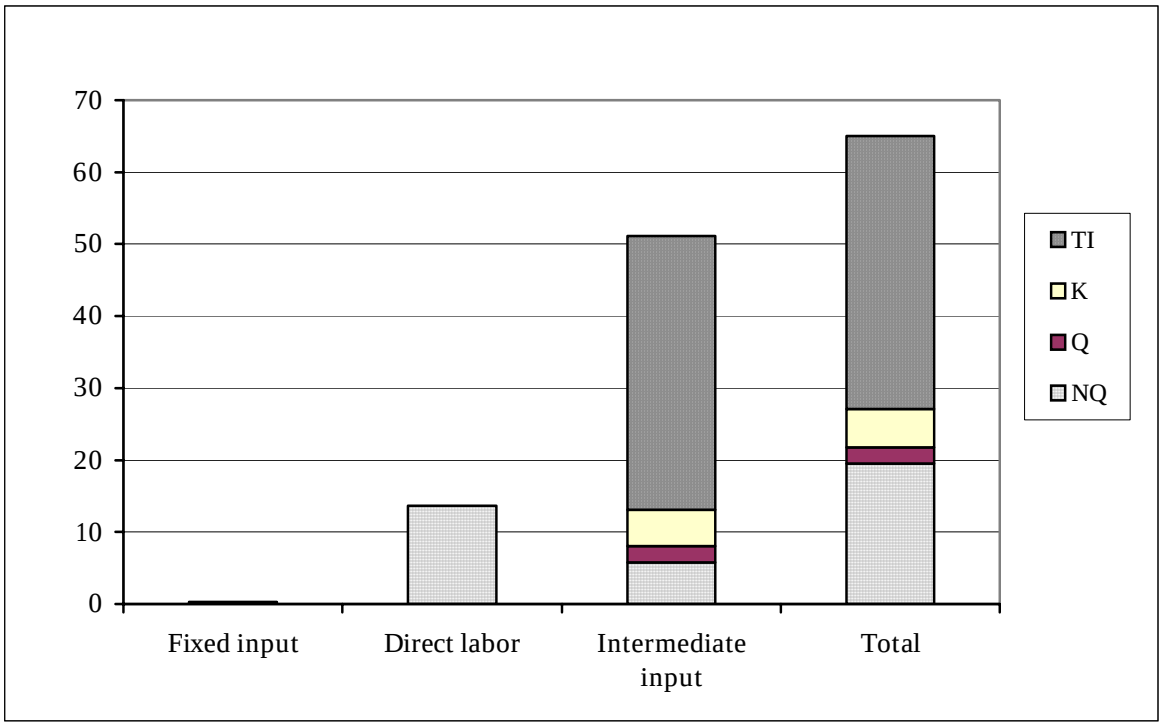
Item	NQ	Q	K	TI	Total	Share %
Fixed input	89	30	89	89	298	0.45
Direct labor	14947	0	0	0	14947	22.5
Intermediate input	5775	2250	5167	37852	51043	77.0
Total	20810	2279	5257	37941	**66288**	**100.00**
Share %	31	3	8	57	**100.00**	

Source: collected and analyzed by the editor of this report

The shares of cost items in total cost at farm level are 0.45% for fixed inputs, 22.5% for direct labour since all labour at farm level is considers nonqualified labour, 77% for intermediate inputs because of the increasing price of fodder especially concentrated mixture and 57% for total tradable inputs.

The share of nonqualified labour in total cost at farm level reached 31% because most family members work on farm, but when the size of farm is big the owner rents some workers to perform some activities. The disaggregation into domestic factor (non qualified labor, qualified labor, and capital) and tradable inputs of the main parts of the budget in the PAM like fixed cost, direct labor, and intermediate input is also calculated. Figure 2.1 illustrates the total cost of fixed inputs, direct labor, and intermediate inputs at farm level.

Figure 2.1. Distribution of the cost at farm level SP/Ton (2002)



Source: collected and analyzed by the editor of this report

Chapter 3 – Comparative advantages of milk representative system

There are many fluctuations in the prices of inputs and goods because of the distortions in agricultural policies and market failures. The comparative advantage analysis allows us to estimate revenue independent of all market distortions. In other words, it permits the analyst to compare real or economic costs of production to international price references in order to determine what the activity profitability would be in the absence of those policies.

The comparative advantage is measured by what is called the Policy Analysis Matrix (PAM). The PAM relies on the data from the private and social budgets to assess the effects of policies and market failure on tradable inputs, domestic factors, resources, and outputs; for more detail see annex**.**

The calculation of private profitability provides information about the competitiveness of commodity systems at actual market prices. Also, the same computations using social prices indicate information on the profitability when commodities and factors are priced at their social or opportunity costs.

The divergences between private and social values provide insights into the extent of policy interventions in the form of taxes, subsidies, trade restrictions, and exchange rate distortion pointing out to imperfections in the functioning of commodity and factor markets.

3.1. Macro economic environment

Before using the data in the PAM of milk some hypotheses are made for selecting the macro prices (exchange rate, interest rate, and ...); for example, the private interest rate is 5.5% and the social interest rate is 3%.

In addition, it is assumed that the market exchange rate is equal to the social exchange rate which is 51.5 SP/$, indicating there is no distortion in exchange rate.

Also for labour market, the hypothesis is no distortion with unskilled labour, but for qualified labour there is health insurance about 25.8%. Furthermore, it is taken into consideration that all the imposed duties on tradable inputs are according to the official book named Custom Tariff Spreadsheet by Harmonized System 2001.

3.2. Presentation of the hypothesis for selecting the macro prices

Some difficulties arise by establishing the farming budget because it is not an easy task to meet the farmers due to their presence in their fields from morning till night.

3.2.1. Milk farm budget

The data were collected by the farming system group and averaged for many farmers in more than one Governorate. After that these information were filled in a budget.

3.2.2. Milk collector budget

In the budget of milk the price is taken as an average between summer and winter. After that, the fixed cost and variable cost were determined. The life time of machine (Honda, Mazda) is 15 years and the life time of office is 25 years. The discount rate is 0.03. In most cases, the collector achieves a profit because he always sell the milk by adding at least 1 SP more than the buying price, but in some cases he collects vulnerable milk because the farmer uses an antibiotic for the cows, so the collector loses because he is obliged to throw away the milk.

3.3. Determining the parity price of imported powder milk

The parity price is the price equals to the international or border price adjusted for domestic transportation, processing, and marketing costs to reach the parity point at the dairy factory.

The parity price is calculated by the following steps: first, find an international price for the commodity. The import parity prices is computed by using international market sources being usually a major exporter with the F.O.B (free on board) price at the border of the reference country. Insurance and freight are added to obtain C.I.F (cost, insurance, and freight) price to move it from the point of export to the harbor of the importing country; second, find an appropriate exchange rate to convert prices expressed in international currency to prices expressed in domestic currency; the third step is computing the value of a commodity at the farm gate which includes the cost of marketing, transportation, storage and processing activities

The parity price of milk is calculated to compare the milk processed from powder milk (sterilized milk) with liquid milk processed from fresh local milk and to know if it is better and more efficient. The sterilized milk is chosen because it is considered the tradable form can be preserved for three months from packing date; table 3.1.

3.4. PAM for liquid sterilized pack milk

3.4.1. Budget summary presentation

Table 3.2 shows the budget summary of the milk PAM. Accordingly, the value added is calculated by subtracting the tradable inputs from revenues. The ratio of value added from total revenue is 49%, at farm level 98%, and at collector and factory levels is 53%. Figure 3.1 illustrates the distribution of ratio of value added (value added equal to total of profit, capital, skilled labour, and unskilled labour) from total revenue of milk according to the agents of the milk chain. Figure 3.2 depicts the distribution of tradable and non-tradable for milk. The aforementioned figures show that the shares of tradable in total cost at farm, collector and factory levels are 66%, 0.4% and 33.6% respectively; of unskilled labour are 92%, 1% and 7% respectively; and of skilled labour are 46%, 0.7% and 52.3% respectively; the cost concentrates at farm level at farm level for tradable and unskilled labor because there are many items and materials which are required to be bought in order to start the project. But the cost at factory level concentrates in skilled labor and capital. In brief, the shares of the total cost at farm, collector, and factory levels in total cost of the system are 68%, 1%, and 31% respectively. The shares of profit at farm, collector, and factory levels are 30%, 32%, and 38% respectively.

In other words, the domestic factor cost (unskilled labor, skilled labor, and capital) at farm, collector, and factory levels in total cost of the system are 73%, 2%, and 25% respectively; the share of domestic factors and tradable in total cost at farm, collector, and factory levels are 68%, 1.6%, and 25% respectively.

Table 3.1. Determining the parity price of imported powder milk (2002)

Milk	Unit	Private	Social
Milk powder F.O.B. prices	USD/Ton	1,500	1,500
Freight and insurance	USD/Ton	100	100
C.I.F. prices	USD/Ton	1600	1600
Exchange rate	SP/USD	51.5	51.5
C.I.F. prices, domestic curr.	SP/Ton	82400	82400
Domestic tax	SP/Ton	14000	0
Domestic price	SP/Ton	96400	82400
Transportation	SP/Ton	1000	1000
Marketing	SP/Ton	1000	1000
Value before conversion	SP/Ton	98400	84400
Conversion factor from powder to liquid milk		0.125	0.125
Processing and packing	SP/ton	7600	5664
Import parity price, factory gate	**SP/ton**	**19900**	**16214**

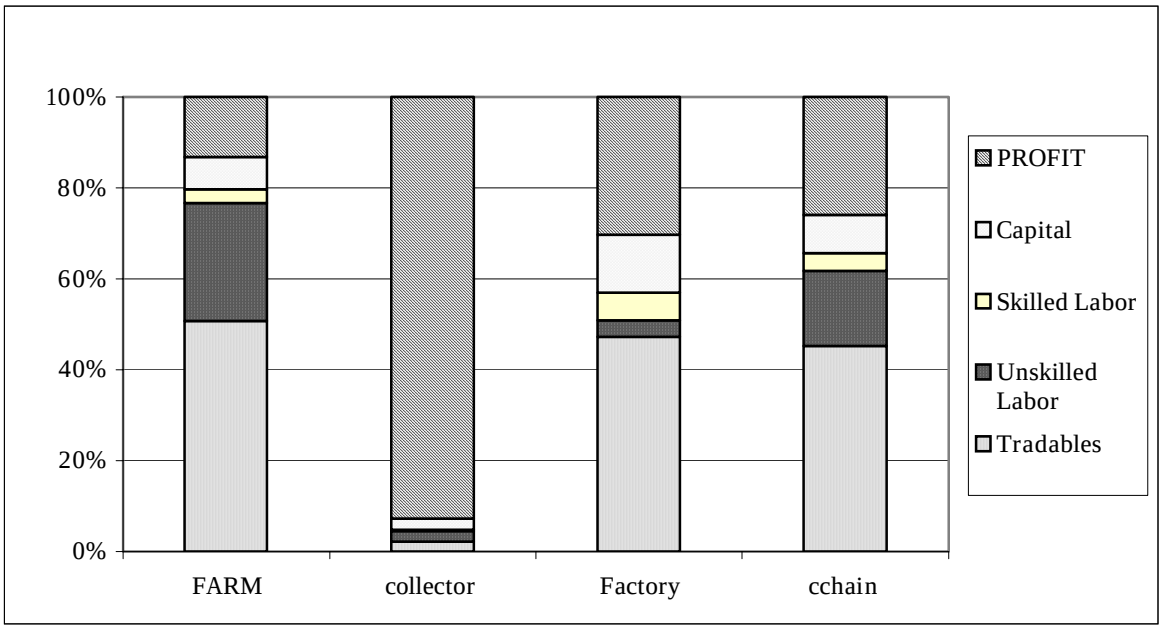
Source: collected and analyzed by the editor of this report

Table 3.2. Budget summary of the milk PAM (2002)

	----Values at market price-----					
Item		**Budget #2**	**Budget #3**	**Budget #4**	**Post farm**	**Repre. system**
	Farm					
1.Total revenues	19618	13000	24000	24000	24000	33618
Main final output	10000	13000	24000	24000	24000	24000
By-products	9618	0	0	0	0	9618
2. Total cost	17380	10216	20679	24000	17895	25275
A. Commodity in process		10000	13000	24000	10000	
(tax+subsidy-)				0	0	0
B. Tradables	9936	64	5191	0	5255	15190
C. Domestic factors	7444	152	2489	0	2640	10085
Unskilled labor	5478	70	399	0	469	5946
Skilled labor	593	10	686	0	695	1289
Capital	1373	72	1405	0	1477	2850
Profit before-taxes	2238	2784	3321	0	6105	8343
Direct taxes	0	0	0	0	0	0
Profit after-taxes	2238	2784	3321	0	6105	8343

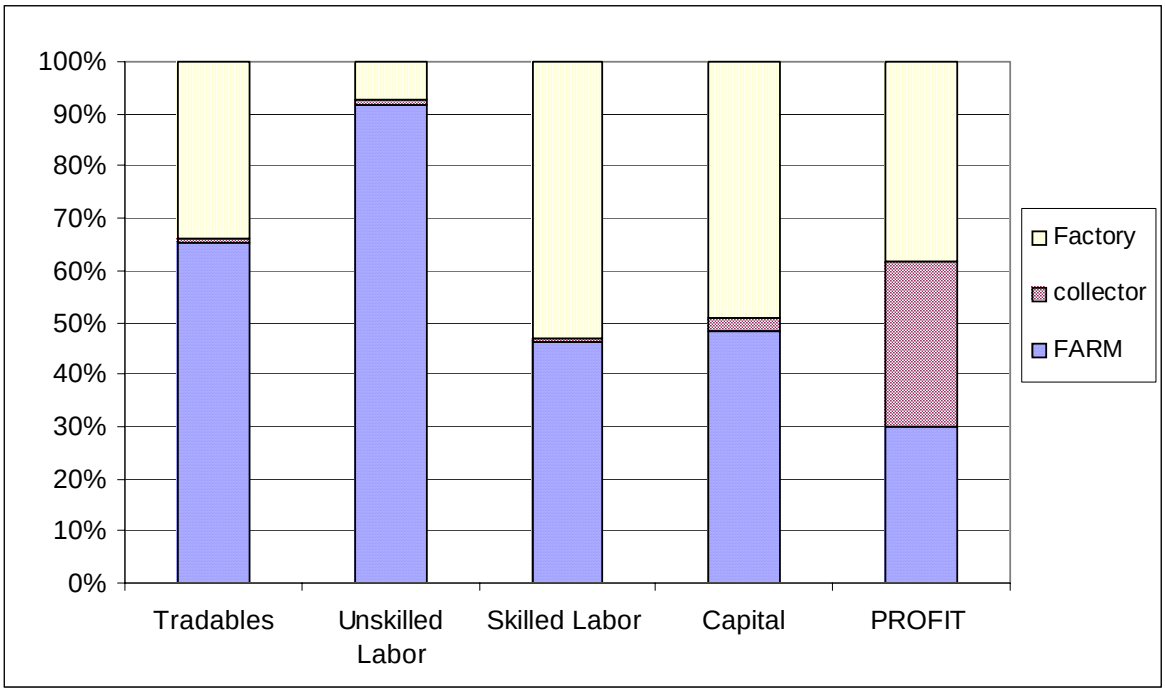
Source: collected and analyzed by the editor of this report

Figure 3.1. Distribution the ratio of value added of milk from total revenue (2002)



Source: collected and analyzed by the editor of this report

Figure 3.2. Distribution of tradables and non- tradables for milk (2002)



Source: collected and analyzed by the editor of this report

3.4.2. Presentation of the milk PAM

In table 3.3, the information included regarding private and social costs and returns allows the policy analyst to calculate private profits indicating the willingness of an entrepreneur to manage resources and accept risk. Social profits mean the returns to the economy when products and factors are valued at their opportunity costs. The divergences indicate the effects

of policy interventions and market failures by making the difference between private and social costs, returns and profits.

Table 3.3. The policy analysis matrix of packed sterilized milk 2002 (SP/ton)

Item	Revenues	Costs		Profits
		Tradable inputs	Domestic factors	
Private prices	A 33,618	B 15,190	C 10,085	D 8,343
Social prices	E 25,832	F 14,725	G 9,303	H 1,805
Divergences	I 7,786	J 466	K 782	L 6,538

Source: collected and analyzed by the editor of this report

The private profitability provides information on the competitiveness of commodity systems at actual market prices including the given current technologies, output values, input costs, and policy transfers. In table 3.3, private profits, are the difference between revenues (A) and costs (B+C); and all four entries in the top row are measured in observed prices. As it is noticeable, the private profit is positive (D>0) which means there are good returns, and the system is competitive leading to a future expansion of the system. Alternatively, if the private profits are negative (D<0) this will indicate to the uncompetitiveness and contraction of the system.

On other side, the calculation of social profits (H), outputs (E), and inputs (F+G) are priced at their social or opportunity costs. In the table above the social profits (H) are positive which means there is comparative advantage referring to using economic resources efficiently, so the system achieves high levels of outputs and income.

The third row is computes policy and market divergences by subtracting the second row of the PAM from the top row. Divergences refer to distortions created by under or over valued exchange rates and by direct taxes and subsidies. Because the social prices row is obtained by assessing export and import parity prices, it is also possible that the divergences reflect the effects of non-traded goods and services such as transportation, marketing, and processing.

The revenue at private prices is more than the revenue at social prices. Consequently I is positive which means there is a subsidy by I or the system benefits from system protection. J>0, so it can be said there is a tax on tradable inputs by this value. K is positive which means there is a tax on domestic factors by K value.

As a result, L>0 which means the subsidy policy increases the final level of private profits, or there are transfers from the whole economy to the system.

On the other hand, to compare the profitability and efficiency of different crops especially when the production processes and outputs are very different, ratios ca be used to provide information on private and social profitability (table 3.4). In table 3.4, the results of the previous PAM are used to calculate some indicators. If the value of Financial Coefficient Benefit ratio (FCB) is more than one then there isn't competitiveness in the system.. In the table, DRC is less than one, so the country has a comparative advantage in producing the commodity. The transfers value is (6538 SP) which means there are transfers from the economy to the system by this value. The Nominal Protection Coefficient (NPC) is more than one, so the system is subsidized, and the Effective Protection Coefficient (EPC) is more than one too which means there is a protection

for the sector, or the Government subsidizes the final output in terms of the subsidy to farmers; the Profitability Coefficient (PC) is more than one, so the system benefits from a net transfer from the economy due to policy in place; the value of Producers Subsidy Ratio (PSR) is 0.25 which means there is a subsidy by 25% of social revenue, and the value of Equiv. Producer Subsidy (EPS) is 0.19 which means there is a subsidy to producers by this value.

Table 3.4. The policy analysis matrix indicators of sterilized pack milk (2002)

1. Financial profitability		[D = A - B - C]		8,343
2. Financial cost-benefit ratio (FCP)		[C / (A - B)]		0.547
3. Social profitability (SP)		[H = E - F - G]		1,805
4. Domestic resource cost (DRC)		[G / (E - F)]		0.837
5. Social cost-benefit ratio (SCB)		[(F + G) / E]		0.930
6. Transfers		[L = I - J - K]		6,538
7. Nominal protection coefficient (NPC)		[A / E]		1.301
(including by-product)				
7a. Nominal protection coefficient		[A* / E*]		1.480
(main final output only)				
8. Effective protection coefficient (EPC)		[(A - B) / (E - F)]		1.659
9. Profitability coefficient (PC)		[D / H]		4.622
10. Producers subsidy ratio (PSR)		[L / E]		0.253
11. Equiv. producer subsidy (EPS)		[L / A]		0.194

Source: collected and analyzed by the editor of this report

3.5. Sensitivity analysis

The objective of sensitivity analysis is to assess the relationship between the PAM variables (DRC, SCB, and other indicators) and a selected number of variables (costs, prices and so forth) to check the impact of these variables on the PAM results and these results have been established on the basis of reliable and sound estimates.

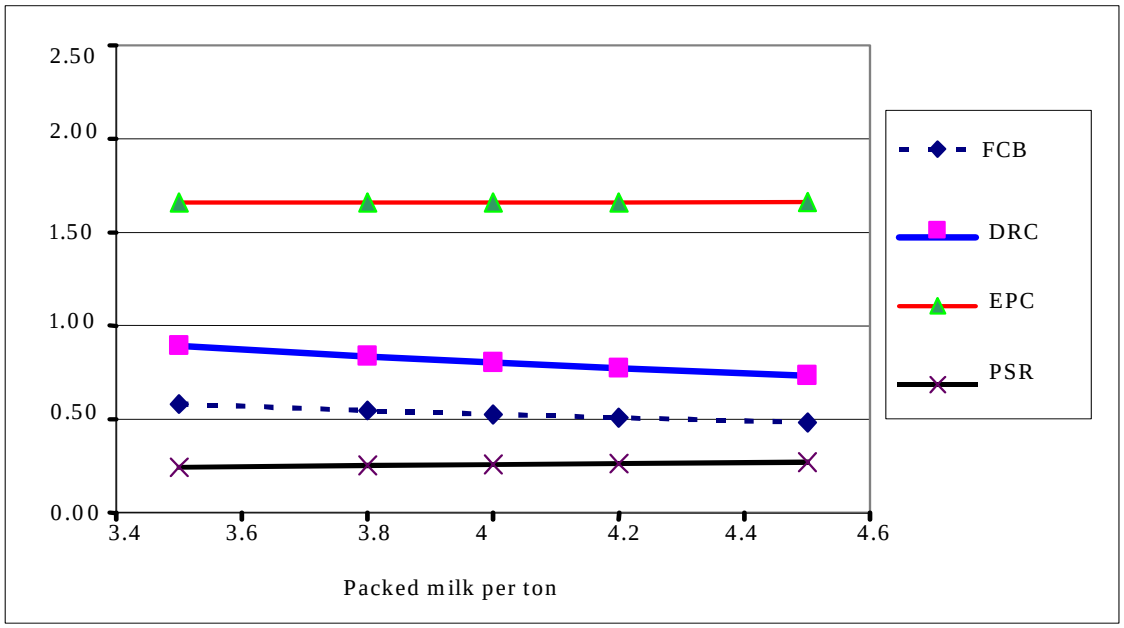
The indicators that can be taken as a reference in the sensitivity analysis are Financial Cost Benefit Ratio (FCB), Domestic Resources Cost Ratio (DRC), Effective Production Coefficient (EPC), and Producer Subsidy Ratio (PS). While the basic variables that by experience have a large effect on the PAM are yield, parity price for the main output, conversion factor from the raw material to main output at the processing level, exchange rate and conversion factor from nominal exchange rate to real exchange rate.

An analysis of the complete cost structure of the system should be carried out to identify cost items that represent an important share of the total cost (more than 5 %).

3.5.1. Packed Milk

Figure 3.3 reports the value of PAM variables in the case there is any modification in yield. When the yield increases by one unit, FCB decreases by 0.60 and DRC by 0.63; Whereas, EPC increases by 0.01 and PSR by 0.38. On the other hand, when the yield amounts to 3.1 ton then DRC equal to one and the profit is zero at social price, so this point is the break even point (figure 3.3). In this figure, the numbers in the legend represent the values of indicators of financial cost benefit ratio (FCB), domestic resource cost (DRC), effective protection coefficient (EPC), and producer subsidy ratio (PSR) when the yield is 3.8 packed milk per tone. After that, numbers less and more than 3.8 Kg are used to see the affect of sensitivity of yield on the indicators.

Figure 3.3. Variation of FCB, DRC, EPC, and PSR due to the yield of packed milk (ton) (2002)

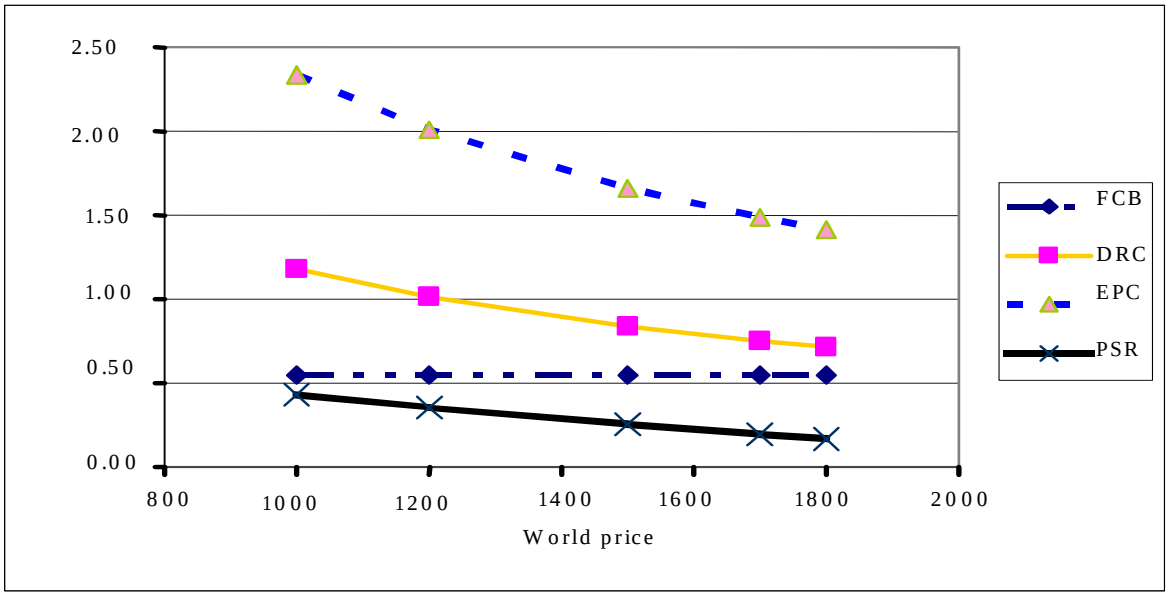


Source: collected and analyzed by the editor of this report

3.5.2. World Price

In figure 3.5**,** there are fluctuations in PAM variables by changing the world price as following:

Figure 3.4. Variation of FCB, DRC, EPC, and PSR due to the world price of powder milk ($/ton) (2002)



Source: collected and analyzed by the editor of this report

- When the world price changes by one unit, there isn't any modification in PAM indicator FCB; whereas, the DRC, EPC, and PSR will increase by 0.40, 0.40, and 0.62 respectively.
- When the world price decreases to 1200$ the DRC will be one reaching the break even point and at this point there isn't any profit, or the FCB equals DRC.

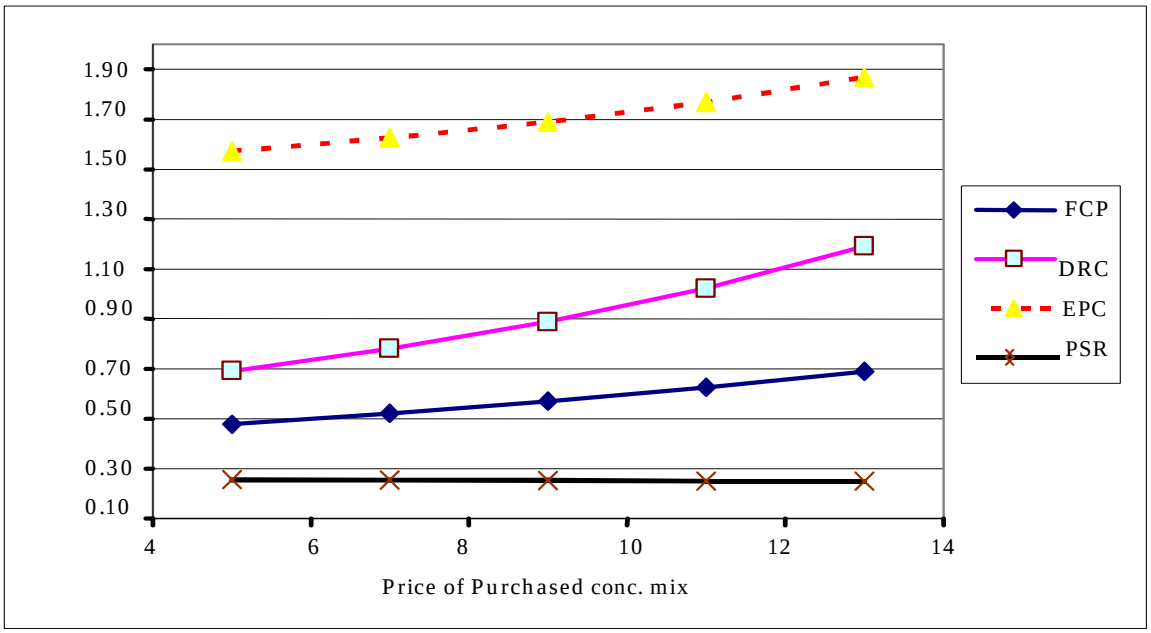
3.5.3. Price of purchased concentrated mixture

In Figure 3.5**,** there are some modifications in PAM variables when the price of purchased concentrate changes as the following:

- When the price of purchased concentrate mixtures increases by one unit the indicators FCB, DRC, and EPC will change by 0.28, 0.45, and 0.12 respectively; whereas, PSR will decrease by 0.01.
- When the purchased concentrate mixture price amounts to 10.7 SP the DRC will equal one reaching the break even point and at this point the profit equals zero.

In addition, an analysis of the complete cost structure of the system is made to identify the cost item that represents an important share of the total cost (more than 5%). Table 3.5 shows that the share of purchased concentrate mixture is 23% in total cost which represents a large effect on the budget.

Figure 3.5. Variation of FCB, DRC, EPC, and PSR due to the price of purchased concentrate mixtures (SP/kg) (2002)



Source: collected and analyzed by the editor of this report

Table 3.5. The items which represent more than 5% from total cost (2002)

Budget	Item	Share%
b1. Direct labor	Manual labor	16
b1. Intermediate input	Purchased conc. mix	23
	Replacement heifer	5
b3. Fixed input	Container of sterilized milk	17
Total		**61**

Source: collected and analyzed by the editor of this report

Chapter 4 - Conclusion and recommendations

Depending on the PAM and its indicators and the budget summary as well Syria has comparative advantage in producing milk locally compared with imported powder milk because of the high cost of buying powder milk. Noticeably, according to the sensitivity analysis of the comparative advantage indicators and the factors determining them, Syria has the break even point when the yield amounts to 3.1 tons then DRC equals to one and the profit is zero. So above this value Syria has comparative advantage.

In addition, when the world price decreases to 1200$, the DRC will be one and reaches the break even point. Above this value Syria has comparative advantage**.**

Also, when the purchased concentrate mixture price increases to 10.7 SP, the DRC will be one and reaches the break even point, but below this point Syria has comparative advantage (Lancon 2004)

Accordingly, the following recommendations can be made:

- Promoting the planting of profitable and efficient fodder crops to decrease the feeding costs because they constitute 23% of the total cost.
- Enhancing and improving the container industry because the cost of packaging forms 17% of the total costs.
- Encouraging the use of modern milking technologies and the establishment of milk collection centers to decrease the microbiological capacity of milk and avoid losses.
- Using a suitable bulk transportation (cool camions) to improve the quality of delivered milk.
- Improving the rural dairy industry.
- Improving the marketing information by establishing an adequate database.
- Improving veterinary services and fodder supply as well as promoting the establishment of modern fodder firms.
- Assessing the effectiveness of credits and investments, providing credits for the rural industry and increasing the long-term credits.
- Encouraging the establishment of companies that are specialized in marketing, and improving research and extension services. As a result, marketing research and policies should be promoted.
- Reorganizing the holding size to benefit from economies of scale, increase productivity, and decrease costs.

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Annex: Brief presentation of the PAM

The Policy Analysis Matrix (PAM) provides an analytical framework to estimate the comparative advantage of a given marketing system. It compares two accounting entities (Income = Input cost + Factors cost + Profit). One is computed for a level of price observed under the current economic conditions (called private prices), while the second entity uses the price (social price) that would prevails under perfect market conditions leading to an optimal allocation of resources within the economic system (a situation where the welfare of any economic agent cannot be improved without affecting the welfare of another one). The last line of the matrix is computed by subtracting private values from social values and represents the divergence between the current situation and the optimal situation. Those divergences are due to distortions attributed either to policy affecting the level of prices (taxes, subsidy) or to market failure (monopoly, externalities) that prevent markets to allocate resources efficiently. Prices prevailing on the world market are taken as the reference for building the accounting entities under social prices.

The Policy Analysis Matrix

	Revenue	**Tradable inputs**	**Domestic factors**	**Profit**
Private prices	A	B	C	D
Social prices	E	F	G	H
Divergence	I	J	K	L

For instance, if H>0, a commodity has a comparative advantage because it can be profitably produced in an open and competitive environment without generating any additional costs to the entire economy under the form of financial transfer through government policy or under the form of externalities caused by market failures.

The PAM provides straightforwardly a range of indicators for assessing the efficiency and the comparative advantages of a system.

Beyond commodity chains, the method can be easily adapted to assess the comparative advantages of a farming system, a region, a new technology and a development project. For each commodity, the CAS will build a PAM for the most representative commodity chains through which commodities are produced, marketed and processed.

PAM indicators

Indicators	Formula	Manning
1. Financial Profitability (FP)	[D = A - B - C]	Absolute value of the profit generated by the system at private price
2. Financial Cost-Benefit Ratio (FCB)	[C / (A - B)]	Indicator of the competitiveness of the system. If FCB<1, the system is competitive, if FCB>1 the system is not competitive, FP is negative
3. Social Profitability (SP)	[H = E - F - G]	Absolute value of the profit generated by the system at social price.
4. Domestic Resource Cost (DRC)	[G / (E - F)]	Indicator of the comparative advantage of the system. If DRC<1, the system have a comparative advantage, meaning that we use less value of Domestic Factors (labor, capital...) than the added generated (VA= E-F), if DRC>1 the system have no comparative advantage, SP is negative
5. Social Cost-Benefit Ratio (SCB)	[(F + G) / E]	Another indicator for measuring the comparative advantage of the system. It takes into account the full cost of production (F + G) instead of the Domestic factors only. It is a more appropriate ratio to rank the relative position of different systems when they have a different cost structure (i.e. tradable and non-tradable), because the DRC is biased in favor of system that have a high content in tradable.
6. Transfers	[L = I - J - K]	Absolute value of the transfer between the economy and the system
7. Nominal Protection Coefficient (NPC)	[A / E]	Indicate the level of protection for the main output, if NPC> 1, the system benefit from a protection, if NPC<1 the system is taxed.
8. Effective Protection Coefficient (EPC)	[(A - B) / (E - F)]	Indicate the total level of protection taking into account the effect of the policy on the private value of the tradable output and tradable input.
9. Profitability Coefficient (PC)	[D / H]	Measure the impact of the policy on the profitability of the system. If PC>1, the system benefit from a net transfer from the economy, if PC<1, the economy benefit from a net transfer from the system.
10. Producers Subsidy Ratio (PSR)	[L / E]	Indicator of the impact of the policy/market distortion on the increase (+) or reduction (-) of the total revenue of the system at social price. i.e. magnitude of the divergence from the reference situation at social price to the current situation at market price
11. Equiv. Producer Subsidy (ESP)	[L / A]	Indicator of the impact of the policy/market distortion on the increase (+) or reduction (-) of the total revenue of the system at market price. Equivalent to the Producer Equivalent Subsidy (PSE) as defined by OECD for trade negotiation. If + it is producer subsidy, if – its consumer subsidy.

Beyond, commodity chains, the method can be easily adapted to assess the comparative advantages of a farming system, a region, a new technology and a development project. For each commodity, the CAS will build a PAM for the most representative commodity chains through which commodities are produced, marketed and processed