

Ministry of Agriculture and Agrarian Reform

# NAPC

National Agricultural Policy Center

**OUTLOOK NO 1**

# **Agricultural Commodity Outlooks Sheep Meat**

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# Agricultural Commodity Outlook of Syrian Sheep Meat

## Summary

Pursuing the objectives of economic efficiency entails in-depth investigation the whole food system from primary production to final consumption taking into consideration the supply and demand aspects as well as the comparative advantage related issues. This commodity outlook presents both the production and consumption side of the sheep meat commodity system in Syria to assess their economic importance, their expected and them underlying underpinnings. This provides a base for studying the supply, demand, and comparative advantages of sheep meat.

Consequently, the importance of Syrian sheep meat and the objectives of the research are presented to show the peculiarity of the sheep meat commodity chain. The major general policies affecting the chain are overviewed and explained in details in the subsequent sections. In this regard, by using the commodity chain analysis approach, the agents of the sheep meat chain, the supply and demand sides of the chain and the underpinning affecting its performance are described. Moreover, by applying the one equation approach, the supply, demand, elasticities of supply and demand and the factors underlying the supply and demand responses of sheep meat are determined relying on the data of the Central Bureau of Statistics (CBS), the Ministry of Agriculture (MAAR) and the National Agricultural policy Centre (NAPC) Database.

Accordingly, the aggregate sheep meat supply is affected by the production of sheep meat in the previous year, the wholesale price in the previous year, the fodder concentrate in the previous year, and the difference in the herd number and the wholesale price between two successive periods. The retail price of sheep meat (as expression of inverse demand) depends on the per capita consumption of sheep meat, the per capita private expenditure and the time trend.

The paper recommends the improvement of the database of the NAPC and MAAR to comply with the use of advanced and more efficient mathematic statistical methods concerning the supply and demand estimation, and the conduct of field surveys to improve the quality of information.

## 1. Background and Justification

The Syrian Government aims to enhance agricultural production, its economic growth and performance to achieve an overall economic development of rural areas, to contribute to the improvement of producers' income, to reduce poverty, and to improve the food security situation. These goals have to be achieved by:

- Developing plant production through providing its requirements and improving its competitiveness.

resources, the quality improvement, the use of advanced technologies, and the reduction of the cost of agricultural production.

- Improving the productivity of animal production and its products including sheep meat by providing the needed services and requirements.

Accordingly, in Syria, sheep farming plays a central role because of its high contribution to the supply of animal protein due to the high share of the consumption of sheep meat products, the provision of employment opportunities, its contribution to the increase of farm income especially in Al-Badia and the foreign currency earning.

It can be distinguished among several breeds of sheep according to the purpose (milk, meat, wool, etc.). For example, the American lamb has mild flavor meat. Syrian sheep are also famous for their good quality milk, meat, and wool, and their high milk productivity. Syrian is famous for Awassi sheep keeping, which is mostly concentrated in Al-Badia (Syrian Steppe). The Awassi has evolved as a nomadic sheep breed through centuries of natural and selective breeding to become the highest milk producing breed in the Middle East. It has also a high quality meat. Furthermore, the importance of Syrian sheep meat results from its position as the first source of red meat for human consumption (73% in 2004) and as export-oriented commodity. Therefore, the Syrian government promotes the private investments concerned with sheep raising and fattening and the public investments as well and applies a series of measures to balance supply and demand at affordable prices and to attain surpluses for export such as:

- Improving grazing potential and protecting natural pastures.
- Developing breeding centers to improve local breeds.
- Improving the animal production services especially veterinary and extension services.
- Improving the availability of fodder supplies.
- Providing credits.

Finally, studying sheep meat for the purpose of decision making entails in-depth investigation of both its production and consumption sides. Such a study has the following objectives:

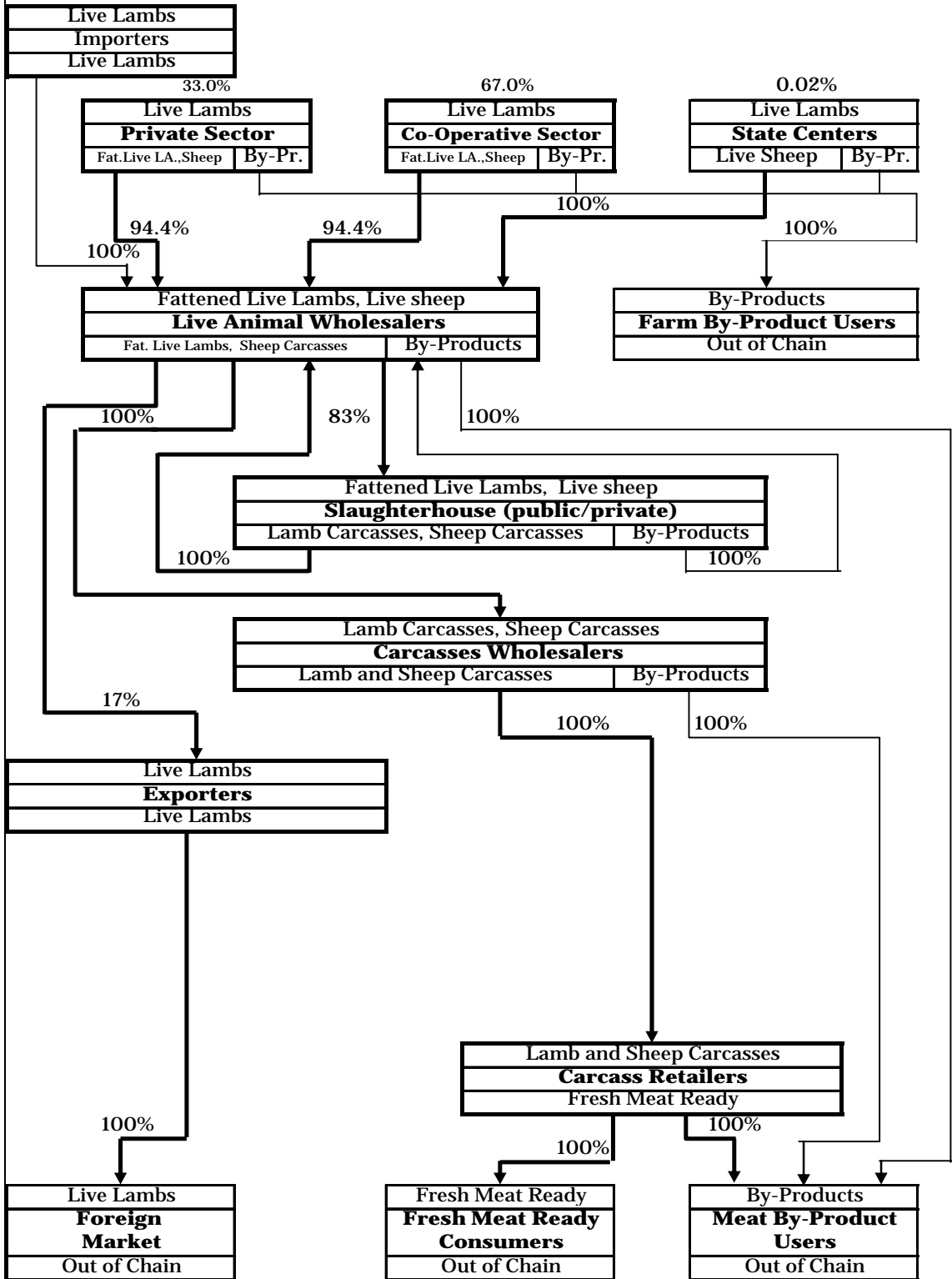
- Providing a description of the sheep meat commodity system.
- Identifying the factors of production concerning sheep fattening, their uses and their evolution to assess the use of domestic resources.
- Describing the production systems underlying sheep fattening to determine the level of technology.
- Assessing the production costs of sheep fattening to identify the weights of cost components and to conduct time series analysis.
- Tracing the trends of the sheep meat supply, competing commodities and the aggregate supply affecting factors.
- Identifying the domestic uses of sheep meat, main markets and domestic prices to determine the various levels of demand and the market integration as well.
- Identifying the different export markets of sheep meat, and trade agreements to assess the foreign demand.
- Tracing the evolution of aggregate sheep meat demand and its underlying factors.

Before discussing the aforementioned objectives, it is useful to give an overview of the policies affecting the sheep meat commodity system (Figure 1) which has been the focus of the study.

Purcell (1979) highlighted that the marketing decision of the firms must always be made within the constraints imposed by the economic environment prevailing in the economy. Thus, the flexibility of the decision maker, the alternatives he can consider, the power to influence price or other terms of trade, and whether he has any discretionary power in the market place are all a direct function of the economic environment. Here, the economic environment will be defined as the set of macro policies which affect the marketing process from both supply and demand side as well as the sectoral policies to improve international competitiveness (Khan and Knight 1985 and Grad 2004). Accordingly, this section presents the following policies:

- Agricultural planning policies.
- Pricing policies.
- Inputs', credits' and investments' policies.
- Research and extension policies.
- Rural development policies.
- Market information policies.
- Risk management policies.
- Environmental policies.

# SHEEP MEAT CHAIN IN/OUT Commodities and Flow Percentages



Food security has been constantly a major and fundamental objective of Syrian agricultural strategy. Up to the mid 80s, agricultural strategies and policies were strictly geared towards assuring self-sufficiency in important and strategic food commodities. Large-scale exploitation of natural resources for agricultural production (i.e. land reclamation and expansion of irrigated areas based also on infrastructures' creation) and Government intervention in agricultural activities under a central planning system led to the achievement of self sufficiency in major foodstuffs.

The policy reform program, introduced thereafter, aimed at removing or reducing these distortions, thus ensuring increasing efficiency in domestic resources use. Initially input subsidies were reduced, producer prices were augmented and planning intervention started being less rigid. Subsequently, toward the 90s, trade liberalization started. Crop diversification policies were also promoted and increased attention was given to the comparative advantages of Syrian agriculture. The concept of self-reliance has been gradually substituting the concept of self-sufficiency, implying a more active participation of the country in international trade (see chapter 3). Agricultural trade expanded and played a more important role than in the past in achieving food security. Policies aiming at making exports more competitive in international markets were implemented with success. At present, agricultural trade is considered an essential element in ensuring national food security.

The Syrian planning process consists of two main instruments: production plan and investment plan (only for public sector). The obligations only concern strategic products, while for other products, farmers only receive indications or, for "minor crops", their decisions are completely free. Thus, the main objective is the determination of input and cash credit needs, which is the basis for issuing licenses to farmers.

The agricultural strategic orientations of the Syrian Government until 2010 are to increase the production of red meat by 5% and to enhance investments in rural area concerning the processing of animal products in order to improve the value added situation.

## **2.2. Pricing Policies**

Rama et al. (2001) wrote: the importance of price policies in the marketing chains for meat and dairies results from their role in providing an efficient and well functioning supply chain when they function according to free market mechanism in order to reallocate resources, to distribute income, and to encourage investments and capital formation. Moreover, direct price policies, which normally lead to price distortion and social losses, propose increasing outputs, stabilizing prices and income, achieving self-sufficiency and food security, and generating or saving foreign exchange.

Moreover, Marion (1986) highlighted that the market price is the major means for the coordination of the exchange between the stages of the food system. The price also may be used as a basis for other coordination mechanisms such as contracts. Thus, prices will be discovered according to the process by which buyers and sellers arrive at a specific price for a given lot of produce in a given location (Grad 2004).

Concerning the price policies of Syrian sheep meat, they work completely free according to market forces.

## **2.3. Inputs', Credits' and Investments' Policies**

The dimensions of input policies in Syria are price level, delivery system, information flows, and the integration between plant and animal production with the objectives to adopt new technologies and to increase the production efficiency (Rama et al. 2001 and UN 1995). Consequently, the main

orientations until 2010 are:

- Expanding of the artificial insemination and providing its requirements to involve sheep.
- Completing the production of vaccines used domestically and improving the production technology to provide surplus for export.
- Establishing a program to identify animal diseases in an improved manner.
- Improving of veterinary medications and substituting their imports.
- In addition to input policies, credit policy, as presented in Rama et al. 2001 and Grad 2004, also has enormous impact on the sheep sector because it assists the acceleration of economic development and the improvement of farm income.

Investment policies also assist in strengthening the coordination of the marketing chains. However, to achieve efficient investment policies the government has not to invest in direct production activities, which can be performed by private sector investments. Thus, all public investments have to function as research centers to improve standards, product quality, and productivity. Accordingly, the Syrian government has issued the investment law number 10/1991, which is in continuous improvement, to promote private investments and its modification by law 7 of 2000. Moreover, the investment plan of MAAR provides services that assist maintaining the integration between plant and animal production and the improvement of the supply chains. Moreover, According to Rama et al. (2000), the public investments in Syrian agriculture are mostly oriented to create infrastructures, offer production support services, realize irrigation systems, etc. Consequently, the strong impact on the marketing chain will result from encouraging the private investments.

#### **2.4. Research and Extension Policies**

Research and extension services are crucial for increasing the efficiency of the marketing chains because they generate and transfer new technologies to agricultural marketing activities. The Government intends to develop these activities through:

- Establishing the General Commission for Agricultural research to encourage researchers and to benefit from their expertise.
- Improving the strategy of agricultural research and restructuring the research programs in order to implement advanced technologies in all research areas.
- Establishing of advanced research centers and providing their requirements (plant and animal production).
- Conducting of advanced education programs for researchers to comply with the scientific development.
- Expanding of selection and genetic programs for all animal varieties.
- Educating the cadre of the extension units to conduct specialized programs.
- Increasing the number of extension units and providing their requirements.
- Improving the education centers concerning equipment and establishing new highly developed ones in rural areas.
- Establishing of new institutions for education (high schools and intermediate institutes).

#### **2.5. Policy for rural Development**

Policy for rural development can be considered as a basic element of the Syrian government farm policies to increase farm income and productivity. These policies are especially important for the farms concerned with animal production because of the processing activities on farm level. Thus, in addition to the government initiatives to increase the educational level of the rural population, the Ministry of Agriculture (MAAR) in Syria gave a great attention to rural development issues in its

According to Rama et al. (2001), the main functions of Syrian marketing policies are assisting the transmission of price signals between producers and consumers as well as the transformation of commodities in form, space, and time in order to:

- Provide protection for producers and consumers.
- Stabilize or increase farm gate prices.
- Maintain reasonable marketing margins.
- Improve product quality and minimum standards.
- Insure food security.

Consequently, Syrian marketing policies have the following objectives:

- Covering the demand on basic food of the domestic market through domestic production and imports at reasonable prices to consumers.
- Balancing the demand and supply in most agricultural commodities.
- Matching imports with exports within the economy.
- Encouraging the private marketing activities and their competition with the public sector on equal footing.

In addition to marketing policies, trade policies play an important role in determining the structure and performance of the marketing chain. Trade will be beneficial for all countries because it leads to specialization of the countries in the products in which they have comparative advantages as well as to transition the traditional food system, which is production oriented, to a modern food system, which is market oriented. In this context, import and export policies constitute the main components of trade policies.

Finally, the strategic orientation of the Government until 2010 is to develop the internal and external marketing of agricultural products by providing its requirements.

## **2.7. Market Information Policies**

Market information is a facilitating marketing function, and market intelligence is essential to a smooth, efficiently operating marketing system. Thus, accurate and timely market information facilitates marketing decisions, regulates the competitive market processes, and lubricates the marketing machinery (Kohls and Uhl 2002). Moreover, market information is the lifeblood of markets; it improves the decision making process and the operational efficiency in the food industry, and regulates product flows and prices in the food market. Accordingly, market information plays an important role both as a coordination mechanism and as a key issue in vertical coordination (Marion 1986).

Consequently, numerous private and public agencies are specializing in food marketing information and research. Hereby, the market information should fulfill several criteria to be of maximum benefit for its users. Hence, information should be complete, comprehensive, accurate, trustworthy, relevant and in usable form, confidential, and timely. Moreover, it is desirable to have a balance of market information at all levels of the food industry that each marketing agency can have equal access to all the information relevant to the bargaining and marketing processes Kohls and Uhl 2002). In this context, "An asset market is said to be efficient with respect to the information set if revealing that information to all agents would not change equilibrium-asset prices or equilibrium-portfolio holdings" (Kilmer and Armbruster 1987).

Finally, regarding the Syrian sheep sector, the government tries to improve the quality of information combined with the use of information technology by making the information available for each stage of the supply chain taking into account the needed information for the analysis of

Risk is defined as an uncertainty that affects an individual's welfare, and is often associated with adversity and loss (Grad 2004). It may involve the probability of losing money, possible harm to human health, repercussions that affect resources, and other types of events that affect a person's welfare. Consequently, risk management includes choosing among alternatives to reduce the effects of risk. Thus, producers can reduce or avoid risk by enterprise diversification, vertical integration, contracting, and other possibilities (Grad 2004).

## **2.9. Environmental Policy**

The Syrian government is concerned about the environment in order to:

- Maintain and improve the resources which are utilized to generate wealth as well as help meet wider social needs;
- Provide benefit to humans by providing a range of services;
- Avoid causing real economic and social costs through a badly managed environment;
- Improve the rational utilization of Albadia, which comprises 55% of Syria's land mass and most of the sheep population;
- Improve the fodder supply by maintaining pastures and establishing protected grazing areas (Fiorillo and Vercueil 2003).

## **3 . The Input Suppliers**

They are concerned with the delivery of farm inputs such as male lambs, credits, fertilizer, fodder concentrates, and veterinary services. Input suppliers in the sheep meat chain are the CAB, State Centers for Sheep Breeding, General Establishment for Fodder (GEF), MAAR, and the private and cooperative sector (included in farming).

The Agricultural Cooperative Bank provides farmers with supported credits both in kind and in cash; farmers have also other sources of credits when they wish to have more liquidity.

The State Centers are considered research centers to develop Awassi breed (small share).

The General Establishment for Fodder (GEF) is responsible for the delivery of raw fodder (grain) and self- processed fodder concentrates (feed) to the farming system. GEF distributes the fodder by ration according to the economic conditions of breeders. Its role is declining regarding the fodder supply compared to the private sector firms established according to the investment law 10/1991 and the free market policies.

The Ministry of Agriculture provides free veterinary services for farmers (extension, vaccination, and artificial insemination) because the private sector currently has not the ability and incentive to invest in such services.

The aforementioned services are very crucial to improve the sheep meat chain performance concerning inputs and outputs and risk management (Fiorillo and Vercueil 2003). Nevertheless, these agents are not included in the chain calculation in spite of their economic importance.

## **4. Production**

Production is the pillar of food availability. The level of production attainable however is limited and relies on the availability of resources. Therefore, investigating the production side of a commodity entails studying its share in the use of factor of production, the production systems underlying the product and the level of production costs. Thereafter, the aggregate supply is

## **4.1. Farming**

### *4.1.1. Use of Factors of Production*

The use of factors of production is expressed by the use of natural resources, labor and capital. Therefore, this section discusses natural resources, labor and capital related to sheep fattening. In this regard, there is no official data available for sheep fattening to identify these factors. Some indications, however, can be made relying on the farming budget of 1994 for 100 lambs (UN 1995).

#### *4.1.1.1. Natural Resources*

The 10<sup>th</sup> five year plan (2006-2010) enhances the rational and sustainable exploitation of natural resources including land, water and pastures through:

- Establishing of management programs and providing investments to improve their efficiency.
- Applying the integrated management of water resources to increase the economic returns per unit of water.
- Improving the management of pastures in Al- Badia and providing income generating sources for its population to ensure their sedentary residence.

Natural resources include land and water. Sheep breeding occurs mostly in Al-Badia. Therefore, sheep breeders use the wells available in Al-Badia and the natural pastures. The Syrian government is very much concerned about the protection and improvement of these resources because Al-Badia comprises 55% of Syria's land mass and pasture comprises 70% of Al-Badia which provides a grazing resource for six to seven months in a good year. To follow this purpose, recently, there are two governmental projects concerned with the improvement of the Syrian Steppe namely: Syrian Al-Badia Development project and Al-Badia project for digging, renewing and equipping of wells (MAAR, Investment Plan 2006).

### **Project for the development of the Syrian Al-Badia**

This project aims to replant of the depleted locations in Al-Badia with pasture plants and seeds, to improve the pastures, to provide fodder reserves in drought years, to stop sand's movement and to increase the productivity of sheep. The major components of the project are 67 protected pastures, 13 grazing nurseries, 8 centers for seed multiplication, 4 oases and 4 observing centers. The total cost of the project is 1.3 billion SP; its budget in 2006 is 230 million SP; and its expenditure until 2005 is 997 million SP. The major objectives of the project in 2006 are:

- Producing 15 million grazing seedlings.
- Planting 35 thousand hectares by grazing seedlings and direct sewing of depleted locations.
- Protecting Al-Badia.
- Providing services for Al-Badia activities.
- Providing job opportunities and services for Al-Badia population.

### **Al-Badia Project for Digging, Renewing and Equipping of Wells**

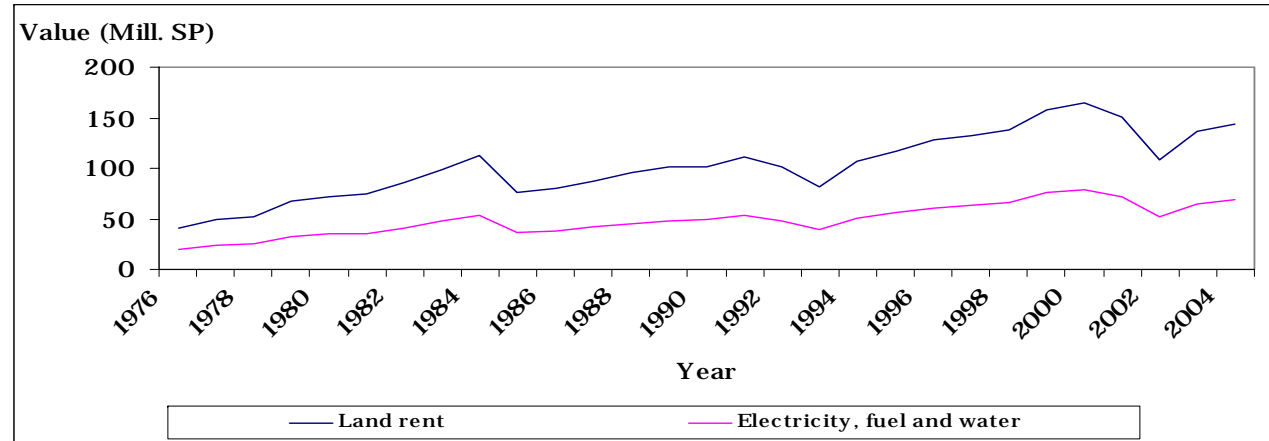
This project is concerned with the study of the locations in which no water sources available for the breeders of livestock, the digging of wells and their establishment and equipping the wells with the needed requirements (fuel, furniture, tools, regular maintenance etc.). The total cost of this project is 1.6 billion SP; its budget in 2006 is 220 million SP; and its expenditure until 2005 is 1 billion SP. This project has the following goals:

- Maintaining the wells and their equipment.
- Providing job opportunities for the Al-Badia population.

In 1950, there were 2.6 million sheep, against currently 17.6 million in 2004, which entails due attention. Therefore, a network of veterinary clinics, which provide services to sedentary sheep production units, has been established. More details about the Syrian Steppe including background and basic ecology, history of relevant land use legislation, management institutions, access to water, overgrazing, removal of shrubs, motor vehicles, grazing protectorates, policies and their impact are presented in Fiorillo and Vercueil (2003). The most important policy options are soil conservation, protection of ground waters, salinization of soils, degradation of the grazing resource of Al-Badia and Al-Badia management.

According to the farming budget of 1994, land use is expressed by land rent. Water use is included in the costs of fuel, electricity and water. Annex table 1 indicates the evolution of sheep meat production, land rent, and the costs of fuel, electricity and water over the period 1976 through 2004. The annual growth rate of each of these items is 4.8%. To observe the accurate variations in land rent and water use among producers, however, a survey is needed, because there is no official data available concerning this matter. Furthermore, according to 1994 census, there are breeders who own land, animals, and machines and are without land. Annex table 2 depicts the holder having land and animals, which shows that sheep breeding is mostly concentrated in Aleppo, Al-Hassake, Deir-Ezzor, Al-Raqqa, Hama and Homs, and annex table 3 includes the holders having land and animals and agricultural machines, which indicates the same results as annex table 2 by governorates. Figure 2 traces the evolution of land rent and electricity, fuel and water over the period from 1976 to 2004.

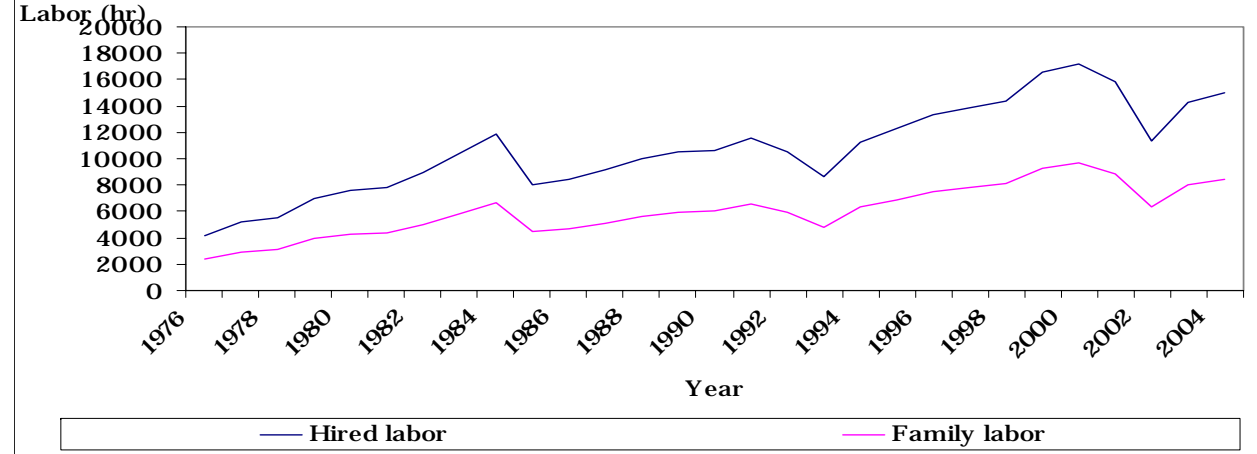
**Figure 2.** Evolution of land rent and electricity, fuel and water for lamb fattening, 1976-2004



Source: See Annex Table 1.

#### 4.1.1.2. Labor

The labor requirements of sheep fattening consist of hired and family labor. Here again, there is no official data available to observe the accurate variations in labor needs among producers. Therefore, a survey is needed. The share of hired labor is 64% and of family labor 36%. Annex table 1 shows the evolution of labor requirements and costs from 1976 to 2004 indicating that the use of labour grew in the same pace as production trend whereas labor cost increased at a higher rate. The type of labor needed is unskilled for feeding, fattening, loading and unloading, which is provided according to market forces. Seasonality in labor requirements is absent. Figure 3 depicts the evolution of labor needs for lamb fattening. In this regard, the knowledge of labor cost, its structure



Source: See Annex Table 1.

#### 4.1.1.3. Capital

Capital for lamb fattening includes land rent, credit, purchased inputs and machinery. Here again, there is no official data available to observe the accurate variations in capital among producers.

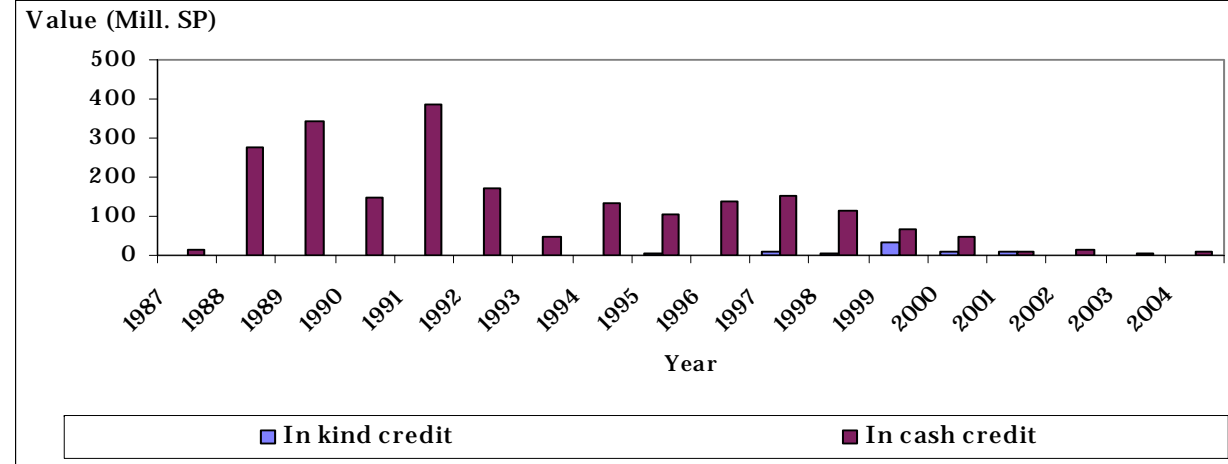
##### 4.1.1.3.1. Credit

Credits assist the acceleration of economic development and the improvement of farm income through realizing the following goals:

- Increasing capital formation.
- Maintaining the profitability of agricultural activity.
- Increasing marketing efficiency.
- Dealing with variable economic conditions and seasonality between costs and revenues.
- Providing protection from bad natural conditions.
- Improving the coordination of the marketing chain.
- Improving the integration between plant and animal production.

Accordingly, the Syrian Government aims to develop the credit system contributing to the development of agricultural production and its modernization, and to encourage domestic and foreign (Arabic and international) investments related to the agricultural sector (10<sup>th</sup> five year plan).

Credits are provided in cash and in kind for short, medium and long term. Annex table 4 depicts the evolution of these two types of credits for sheep. Both types of credits show on average an increasing then a decreasing trend (Figure 4).



Source: See Annex Table 4.

Short-term loans are provided in kind and in cash. They are granted for periods not exceeding 300 days. Interest rates vary according to the volume of the loan and are different for cooperative members and individuals. They are 4% for cooperatives' members and 5.5% for individuals, for loans less than SP 50 thousands and 6% and 7.5%, respectively, for loans exceeding SP 50 thousands. Medium term loans (maximum duration of 5 years) and long term loans (don't exceed 10 years) bear an interest rate of 5.5% (SOFAS 2005).

According to annex table 4, there is on average a sharp decrease in the credits, both in kind (from 1999 to 2004) and in cash (from 1988 to 2004), which are provided for animals and sheep.

#### 4.1.1.3.2. Purchased Inputs

Purchased inputs are ready made feed mixture (concentrate), forage, fattening lambs and veterinary materials. Annex table 4 depicts the evolution of purchased inputs for sheep fattening. In this regard, relying on the strategic orientation of the Government and the 10<sup>th</sup> five year plan, the Government enhances the sustainable development of natural resources, improves the supply of purchased inputs, promotes the supply of production requirements by other sectors and increases its role in quality monitoring.

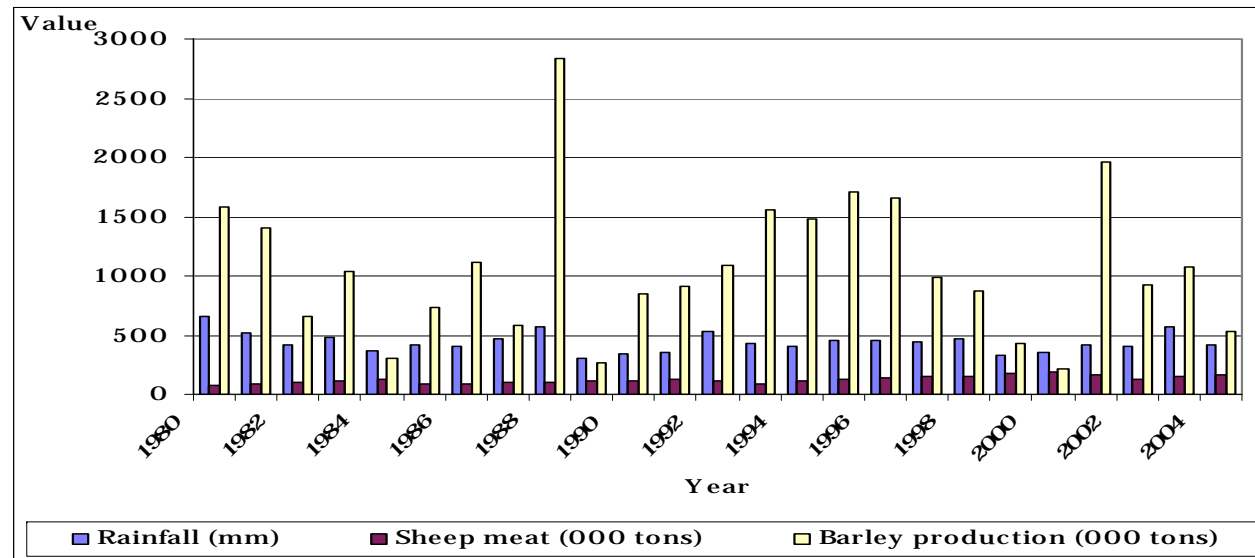
The most important component of purchased inputs is the availability of feed and forage because fodder resources in Syria are scarce and limited. According to Fiorillo and Vercueil (2003), there will be a fodder deficit in the future from both natural pastures and processing, which necessities the integration between plant and animal production and the cooperation between both the public and private sectors.

The major sources of livestock fodder in Syria come from natural pastures and rangeland, grazing crops, fodder concentrates and residues of crops. The supply of feed and forage is seasonal both in terms of quality and quantity relying on rainfall. Procurement of feeds and fodders accounts for a high percent of the cost of production of all categories of livestock. The coefficient of variation of fodder costs for sheep is about 29%. Therefore, the availability and cost of feed and forage are regarded as a major constraint to increasing the livestock production and the profitability of all livestock enterprises. This attracted the government to raise policies maintaining the integration between plant and animal production (Annex Table 4).

Due to the increasing intensity of animal production in all classes of livestock production, the fodder market is well developed in both the public and private sectors. The major feed crops are barley, maize, bran (wheat), straw (wheat and barley), cotton seed cake and soy bean cake (Annex

governorates from 1976 to 2004. Figure 5 traces the relationship among rainfall, barley production and sheep meat production over the period 1980-2004, which shows a positive relationship between rainfall and barley production explaining the fluctuations in the production of barley, and points out to an inverse relationship between rainfall and sheep meat production. Barley production peaked at 2,836 thousand tons in 1988, began to decline gradually, and decreased sharply in 2004 mounting to 527 thousand tons, whereas the number of livestock is increasing.

**Figure 5.** Evolution of rainfall, barley and sheep meat production, 1980-2004



Source: See Annex Table 5.

Annex table 6 depicts the evolution of rainfall according to governorates, which shows variations in rainfall among governorates leading to different levels of fodder and sheep meat supply, and a decreasing trend for almost all governorates concerning rainfall. In this regard, the government has established a project (artificial raining), under the control of MAAR, to increase the rainfall by artificial methods. This project has been established in 1991 and has achieved an improvement in the rainfall from 6 to 16% of the natural rainfall.

Consequently, it is worth to address the fodder deficit. Cummins (2001)<sup>1</sup> assessed the gap between feed requirements and availability in 1998. In general, the Syrian government tries to improve its services towards purchased inputs in order to enhance both the overall efficiency of animal production and the performance of the private sector. Concerning public sector agencies of feed and fodder and government interventions on livestock feed prices refer to (Fiorillo and Vercueil 2003).

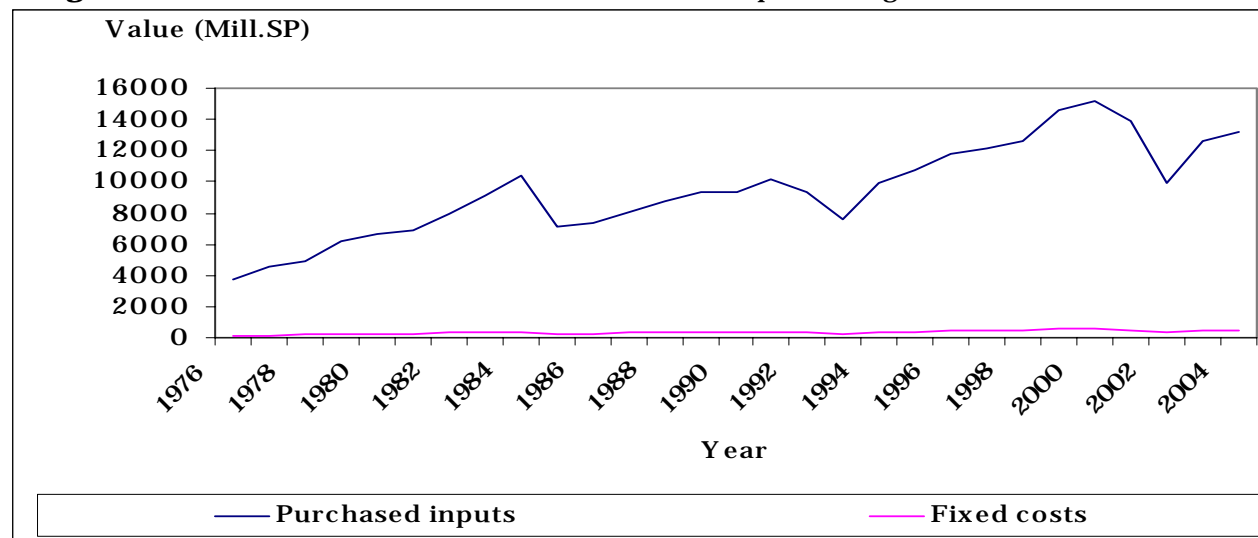
Over the period 1976 through 2004, the production of barley, maize, and grazing crops grew annually by 1%, 6% and 2% (moving average), respectively, whereas steppe and pastures remained stable. Over the same period, the number of sheep, cattle, and poultry grew annually by 1%, 1.2% and 3.6%, respectively, whereas the number of goats remained stable. According to the projection of MAAR, until 2010, the production of barley and maize will amount to 1080 and 300 thousand tons, respectively, whereas the demand will be 2119 and 865 thousand tons respectively, which points out to a great barley deficit. The number of sheep population will mount to 25 million heads in 2010. This stresses the importance of agricultural trade to achieve the sustainable development of livestock.

#### 4.1.1.3.3. Machinery

Machinery can be quantified by using the maintenance costs and depreciation. These types of costs are estimated in annex table 1. The government assists obtaining machinery by providing credits.

Figure 6 compares between the evolution of purchased inputs and fixed costs.

**Figure 6.** Evolution of fixed and variable costs for sheep fattening, 1976-2004



Source: See Annex Table 4.

#### 4.1.2. Production Systems

According to SOFAS 2005 "Animal production systems underwent important changes in recent years; this is particularly true for sheep. Traditionally, sheep livestock is raised in arid areas located in eastern and south eastern zones of Syria (the Syrian steppe). Sheep breeding relies on natural pastures as a main feed source. Historically, sheep production was based on a system of seasonal movement between the Syrian steppe (rangeland) and the rainfed and irrigated crop areas located in western zones. However, with the decreasing availability of pasture resources in Al Badia, especially in drought periods, livestock farmers started to keep the sheep flocks longer in the latter zones. This forced sheep breeders to increase the use of supplementary feed and to shift from a transhumance to a sedentary breeding system, based on early weaning and feed-lotting of young animals. This modernization of sheep breeding helps meeting the increasing export demand for live sheep. It also enables farmers to market higher quantities of milk." This change in the production system has been supported by improved transportation and infrastructure as well as by regulation of animal trade through the Syrian boundaries.

The Government contribution to the improvement of the production system is illustrated by conducting the following activities:

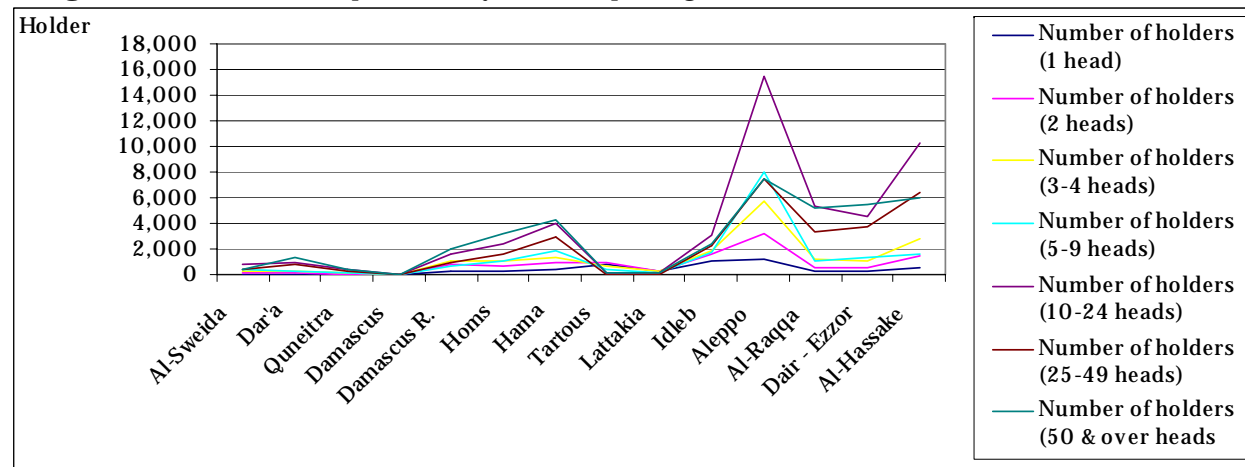
- Providing services and infrastructure to the population of Al-Badia.
- Applying the integrated water management technologies including distribution of blocks and small, medium and large storage holes.
- Increasing the number of wells for both drink water and herds of livestock.
- Using substitute energy sources to protect pastures and plant coverage.
- Improving and developing the pastoral planting, the production of pastoral seedlings and seeds, and the execution of these activities.

and the provision of fodders.

- Improving of legislations and law concerning livestock.
- Enhancing the rural and traditional industry in Al-Badia to increase the number of income generating projects to limit the breeders' movement.
- Encouraging the small and medium food industry of livestock products to increase income.

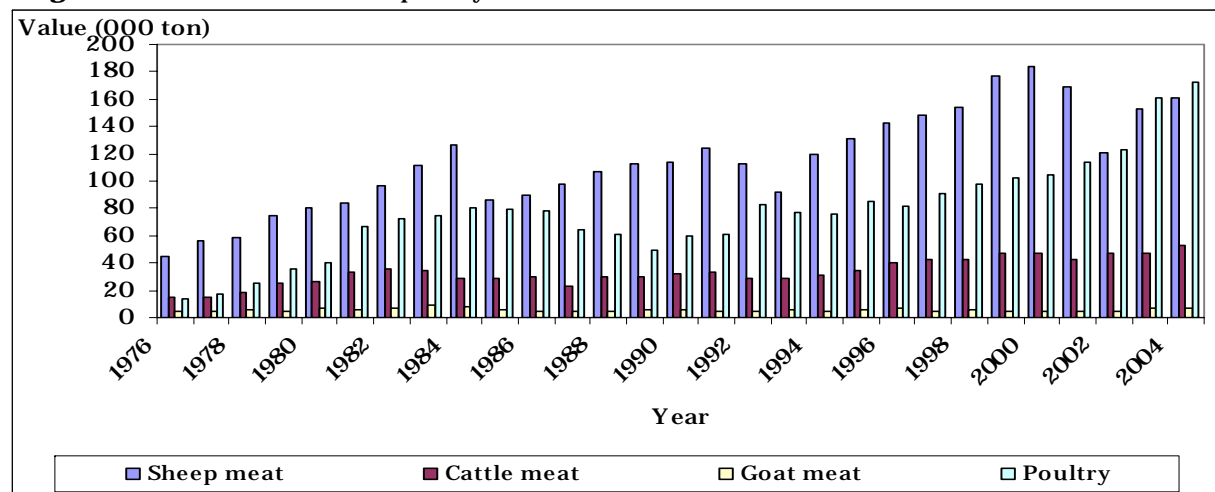
Sheep breeders can be of various types. Some have land and animals; some have land, animals and agricultural machines; and others own only animals. They can be classified also according to the number of heads they have. The breeders either perform their activities privately or within cooperatives. Annex tables 2, 3, and 7 and 8 depict the various types of breeders in 1994 (census) distributed by governorate (Fiorillo and Vercueil 2003). Figure 7 depicts the number of sheep holders by ownership and governorates in 1994. The competing animals are cattle, goats and chickens. Annex table 9 depicts the evolution of meat production of these animals. Figure 8 compares sheep meat production with the meat production of competing animals, which shows an increasing trend for all types of livestock.

**Figure 7.** Number of sheep holders by ownership and governorates, 1994



Source: See Annex Table 8.

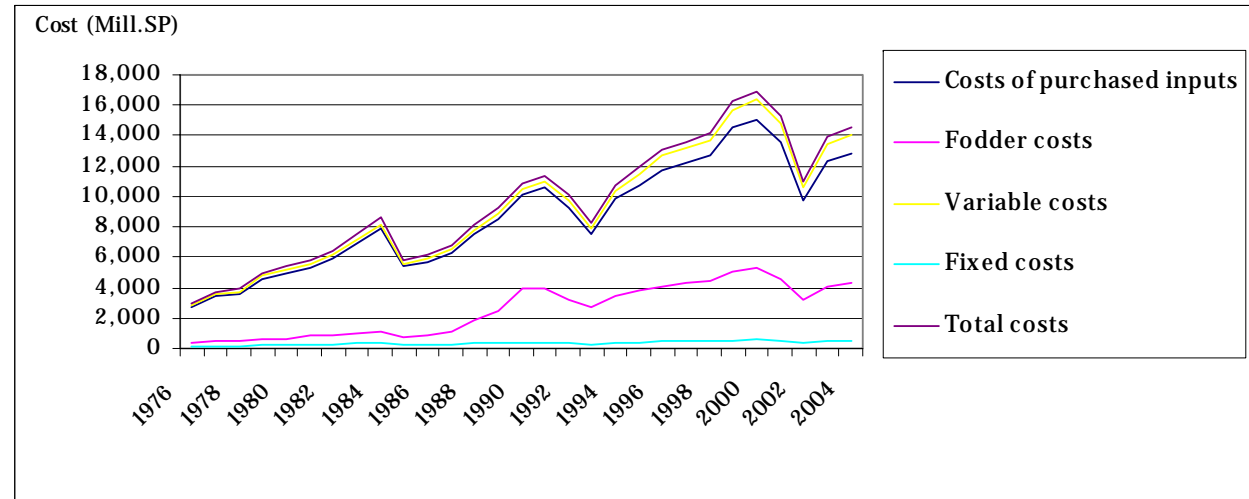
**Figure 8.** Evolution of red and poultry meat, 1976-2004



Source: See Annex Table 9.

There are no official data about the costs of sheep fattening. However, there are survey data of 1994 which assesses revenues and production costs (UN 1995). Adjusting these data with the recent costs of labor, machinery and fodder prices can give an acceptable guess about the evolution of production costs. Annex table 10 includes the assessment of production costs for sheep fattening in 1994. Annex table 11 can be used for conversion factors. Annex table 4 depicts the evolution of total costs, variable costs, fixed costs and fodder costs of sheep fattening over the period 1976-2004. Accordingly, the annual growth rate is 5.8%, 4.6%, 5.9% and 9.3% respectively for the same reference period. Figure 9 shows the evolution of the various types of costs.

**Figure 9.** Evolution of the various types of costs by sheep fattening, 1976-2004 (Mill.SP)

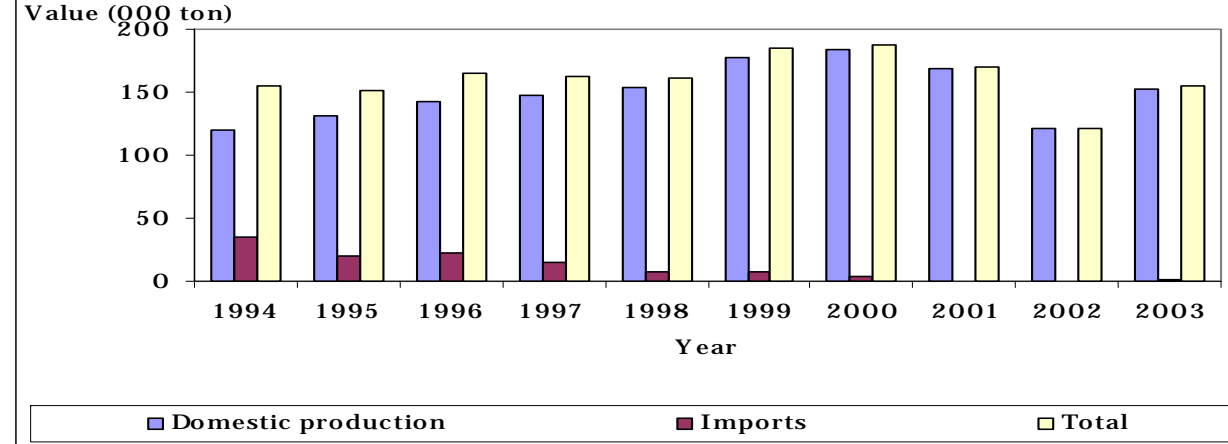


Source: See Annex Table 4.

#### 4.1.4. Aggregate Supply

Annex table 12 depicts the production of major producing countries for sheep meat including Syria. The major producing countries are Australia, New Zealand, Europe and Asia.

The aggregate supply of sheep meat comprises domestic production and imports. Therefore, the level of supply depends on the progress in agricultural trade and domestic performance (adopting extra breeds for sheep meat). Annex table 13 depicts the evolution of sheep meat supply according to governorates and the imports of sheep meat over the period 1985-2004. In general the production trend is increasing until 2000, and then decreasing. Imports are constantly decreasing. Accordingly, in 2004, sheep meat production concentrates in Homs (31,200 tons), Aleppo (26,700 tons), Deir-Ezzor (23,500 tons) and Al-Raqqa (20,500 tons). Figure 10 depicts the evolution of aggregate supply which reached a peak in 1999 and 2000, decreased until 2002 and then increased.



Source: See Annex Table 10.

The projected production of sheep meat until 2010 will vary from 197 to 295 thousand tons and until 2020 from 263 to 421 thousand tons. Assuming an annual growth rate of 2.45% (the same as the projected population growth), the projected production of sheep meat will be 196 thousand tons in 2010 and 243 thousand tons in 2020.

The level of domestic production relies on the production efficiency. "Productive efficiency requires that each firm produces in such a way as to place the economy on its production possibility frontier" (Kilmer and Armbruster 1987). Consequently, "An economy is said to exhibit productive efficiency if, within the limitations of technology and resources, there is no feasible way to increase the amount of produced output, holding fixed the current amount of inputs to production, or to decrease the amount of inputs to production, holding fixed the current amount of produced output" (Tefatsion 2002).

To improve the production efficiency of sheep, the Government of Syria in the context of the 10<sup>th</sup> year plan promoted the following activities:

- Balancing the integration between animal and plant production, expanding of fodder crops and utilizing the farm by-product in feeding animals.
- Providing improved breeds and their fodder requirements.
- Improving the pastures in Al-Badia and organizing their grazing.
- Encouraging the intensive breeding of sheep especially in the fourth ecological zone.
- Improving the rural industry of livestock products and encouraging the establishment of factories in production areas.
- Establishing of an integrated program to identify animal diseases.

The sources of domestic supply are the farming activities, which comprise the private and cooperative sectors.

The share of private sector in meat production mounted to 33% in 2003. Fattening (feeding) occurs in stalls; the private sector sells 94.4 % of its live sheep (the rest is considered as home consumption and waste) to live animal wholesalers according to supply and demand conditions by open market operations; the private holding number is 34,267 (1994 census). Here, it is worth mentioning that the average holding size between 10-24 heads is dominant and it is tending to be smaller. This results in non-utilization of economies of scale. In this context, the government subsidizes the private sector with veterinary services, and the governmental planning of private farms is indicative for credit purposes (Rama et al. 2001). Moreover, it is worth noting that there are no exact statistics about holding number and size of the private sector.

sector, fattening occurs in stalls; the cooperative sector sells also 94.4 % of its live sheep to live animal wholesalers according to supply and demand conditions by open market operations and keeps some sheep for home-consumption; the cooperative holding number is 137,070 (1994 census). Here again, it is worth noting that the small size holding between 10-24 heads is dominant and it is tending to be smaller which leads to non-utilization of economies of scale. In this context, the government subsidizes the cooperative sector with veterinary services and the governmental plan is indicative (credits); however, the cooperative sector is affiliated to the General Farmers Union (Rama et al. 2001). Moreover, cooperatives can be specialized and non-specialized. The number of fattening cooperatives mounted to 102 and 107 in 2005.

### **Descriptive Analysis of Sheep Meat Supply**

There are several factors affecting the level of firm and aggregate supply. Table 1 shows the summary statistics of sheep meat supply over the period 1976-2004 (Annex Table 1), where KVM and KVT denote the coefficient of variation calculated at sample mean and trend respectively.

**Table 1 .** Summary statistics of domestic sheep meat supply, 1976-2004 (000 ton)

<b>Sample Mean</b>	<b>Maximum</b>	<b>Minimum</b>	<b>Standard Deviation</b>	<b>KVM %</b>	<b>KVT %</b>
115	184	45	36	32	16

Source: Author elaboration; see Annex Table 1.

Table 1 indicates that there is a substantial variation in sheep meat production between 1976 and 2004 indicating a high variability in production (KVM and KVT). This means the existence of production risk.

Table 2 shows the summary statistics of sheep meat prices over the period 1980-2004 (Annex Table 17). Accordingly, it can be concluded that the price variations around the mean are higher and around their trend are less than the sheep meat production, indicating also a high variability in prices. This points out to the presence of price risk.

**Table 2 .** Summary statistics of domestic sheep meat retail price, 1980-2004 (SP/kg)

<b>Sample Mean</b>	<b>Maximum</b>	<b>Minimum</b>	<b>Standard Deviation</b>	<b>KVM %</b>	<b>KVT %</b>
175	338	29	98	58	12

Source: Author elaboration; see Annex Table 17.

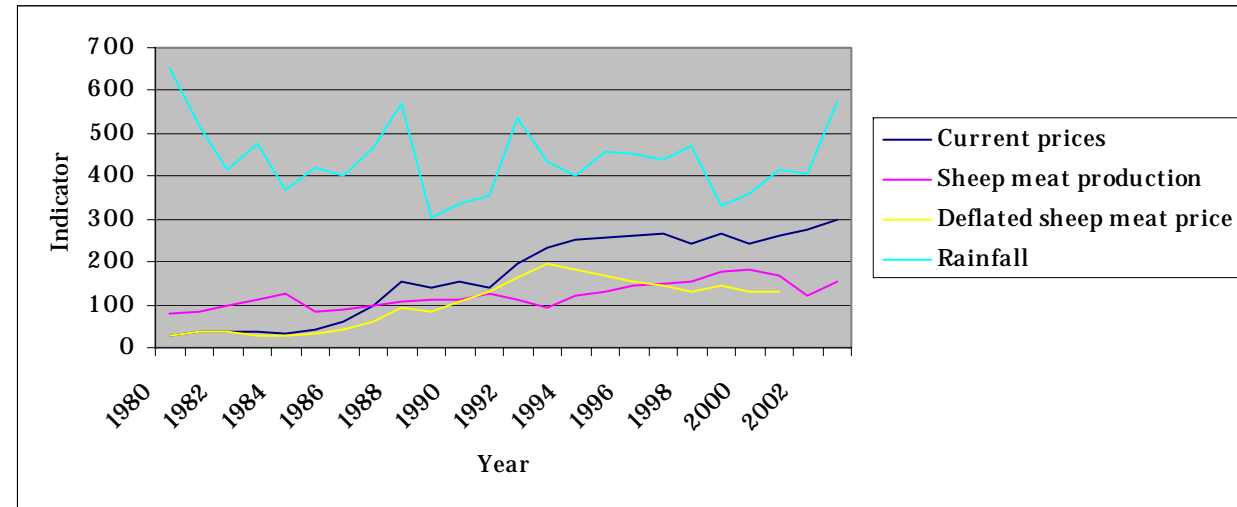
The production and price risks result to a great extent from variations in rainfall (drought). The drought in 1999 caused a loss for sheep producers of about 8.8 billion SP because of the extra costs of feed and water (Fiorillo and Vercueil 2003). Therefore, the Syrian government has taken actions to limit the negative effects of this problematic situation including:

- Providing of medicines and vaccinations for sheep.
- Distribution of extra feed rations to sheep producers on subsidized and flexible payment basis.
- Supplying water for livestock breeders and their flocks.
- Supplementing additional financial resources to the feed revolving fund.
- Providing price support.
- Authorizing the General Establishment for Fodder to import additional barley.
- Allowing grazing in protected areas.
- Giving allowance to the private sector to import feeds particularly barley.

Figure 11 depicts the relation between local sheep meat supply, local sheep meat price (current and deflated) and rainfall over the period 1980-2004. Accordingly, sheep meat production moves in the

current feeds and rainfall over the period 1980-2003. Table 4 depicts the same matrix, but at deflated prices. Accordingly, the correlation coefficients at deflated prices are lower than those at current prices. The tables show a strong relationship among the variables. Table 5 and 6 depict the same relationships mentioned above, but with lagged variables.

**Figure 11.** Evolution of sheep meat production, sheep meat prices and rainfall, 1980-2004



Source: Author elaboration, See Annex Tables 4, 5, 6, 16 and 17.

**Table 3.** Correlation matrix at current prices among the variables of sheep meat supply, 1980-2003

Item	Sheep meat	Sheep meat price	Wages	Feed price	Rainfall
<b>Sheep meat</b>	1.0000				
<b>Sheep meat price</b>	0.7633	1.0000			
<b>Wages</b>	0.8910	0.8967	1.0000		
<b>Feed price</b>	0.6168	0.8762	0.7163	1.0000	
<b>Rainfall</b>	-0.2988	-0.1179	-0.2415	-0.3627	1.0000

Source: Author elaboration, See Annex Tables 4, 5, 6, 16 and 17.

<b>Item</b>	<b>Sheep meat</b>	<b>Sheep meat price</b>	<b>Wages</b>	<b>Feed price</b>	<b>Rainfall</b>
<b>Sheep meat</b>	1.0000				
<b>Sheep meat price</b>	0.5197	1.0000			
<b>Wages</b>	0.7528	0.8390	1.0000		
<b>Feed price</b>	0.3639	0.8575	0.6748	1.0000	
<b>Rainfall</b>	-0.2988	-0.1738	-0.1475	-0.2939	1.0000

Source: Author elaboration, See Annex Tables 4, 5, 6, 16 and 17.

**Table 5.** Correlation matrix at current prices among the lagged variables of sheep meat supply, 1980-2003

<b>Item</b>	<b>Sheep meat</b>	<b>Lagged sheep meat price</b>	<b>Lagged wages</b>	<b>Lagged fodder cost</b>	<b>Lagged rainfall</b>
<b>Sheep meat</b>	1.0000				
<b>Lagged sheep meat price</b>	0.8211	1.0000			
<b>Lagged wages</b>	0.8208	0.8714	1.0000		
<b>Lagged fodder cost</b>	0.6014	0.8651	0.7613	1.0000	
<b>Lagged rainfall</b>	-0.2169	-0.1649	-0.2720	-0.2768	1.0000

Source: Author elaboration, See Annex Tables 4, 5, 6, 16 and 17.

**Table 6.** Correlation matrix at deflated prices among the lagged variables of sheep meat supply, 1980-2003

<b>Item</b>	<b>Sheep meat</b>	<b>Lagged sheep meat price</b>	<b>Lagged wages</b>	<b>Lagged fodder cost</b>	<b>Lagged rainfall</b>
<b>Sheep meat</b>	1.0000				
<b>Lagged sheep meat price</b>	-0.1153	1.0000			
<b>Lagged wages</b>	0.7751	-0.2154	1.0000		
<b>Lagged fodder cost</b>	0.1150	-0.5393	0.2615	1.0000	
<b>Lagged rainfall</b>	-0.2169	0.3199	-0.2407	-0.0581	1.0000

Source: Author elaboration, See Annex Tables 4, 5, 6, 16 and 17.

to determine the supply elasticities in the short and long run, forecast production and improve the decision making process (Sadoulet and de Janvry 1995 and Cafiero et al. 2005).

By applying the single equation approach (econometric estimation) over the period 1980-2003, the results are documented in annex table 14. The table shows alternative supply models for sheep meat and their hypothesis testing (1980-2003). Accordingly, based on the criteria goodness of fit (R square), adjusted R square, T-Statistic (5% level), P-Value (all coefficients are statistically significant), autocorrelation (no auto-correlation), and heteroskedasticity test (homoskedastic), model 4 is the best alternative. Thus, the supply function of sheep meat will take the form:

$$Y_s^{\wedge} = 87.97 + 0.2932 * q_{t-1} + 0.0006 * P_{t-1} - 0.0052 * PF_{t-1} + 0.0072 * DN_t - 0.0011 * DP_t$$

Where:

$Y_s^{\wedge}$  - Estimated sheep meat supply (thousand tons).

$q_{t-1}$  - Lagged sheep meat production (thousand tons).

$P_{t-1}$  - Lagged wholesale price of sheep meat (SP/ton).

$PF_{t-1}$  - Lagged fodder price (SP/ton).

$DN_t$  - Difference in total sheep herd (thousand).

$DP_t$  - Difference in the wholesale price of sheep meat (SP/ton).

From the supply equation above, it can be concluded that the signs and relative magnitude of the regression coefficients are as expected. Thus, a positive relationship is present among the sheep meat supply, lagged sheep meat production, lagged sheep meat wholesale price, and difference in sheep herd. A negative relationship, however, is present with the lagged fodder concentrate price and the difference in sheep meat wholesale price. In this context, according to adjusted R square and R square, the equation explains 89.02 – 91.77 % of the total variations in sheep meat output (high degree). The equation means also that one unit increase in lagged sheep meat production, lagged sheep meat wholesale price, lagged fodder concentrate price, difference in sheep herd, and difference in sheep meat wholesale price (others constant) leads to 0.2932 increase, 0.0006 increase, 0.0052 decrease, 0.0072 increase, and 0.0011 decrease in the supply of sheep meat, respectively. These coefficients are all statistically significant at the 5% level (Annex Table 14 model 4).

In this context, the average price elasticity of sheep meat supply is 0.2871 in the short run and 0.2873 in the long run. This means that the sheep meat supply is rigid to price changes in the short and long run. However, it is more elastic in the long run.

However, to study the supply response more adequately and in more detail taking into account the micro aspects and constraints, mathematical programming models are used, which consider the integration between plant and animal production. In this regard, an improvement of the database of the NAPC and MAAR is required.

## **4.2. Slaughterhouse**

Most slaughterhouses are owned and operated by the governorates. Sheep must be slaughtered in these facilities to ensure quality control and to comply with public health and hygiene regulations.

## **5. Destination**

of all production activities. Accordingly, in the 10<sup>th</sup> five year plan, the Government aims to improve and develop the following activities:

1. Organizing the relationship between the producers and marketing agencies to enhance improved marketing.
  - Conducting continuous marketing studies to observe the movement of agricultural products (quantities, quality, prices, and environment) at wholesale and retail markets to develop them complying with the recent local and international changes.
  - Establishing a marketing information system to offer information for producers and exporters about the needs of foreign markets concerning agricultural products (quantity, quality and time).
  - Improving the internal marketing by providing its requirements (credits, storage and sorting facilities) to protect producers and encouraging the establishment of producers' and exporters' unions to enhance competitiveness especially by post farm operations.
  - Developing of external marketing and removing of its constraints (providing of laboratories and establishing a public agency for exploring new foreign markets and advertising of Syrian products).
2. Enhancing and improving the performance of the Agro-Industry to absorb surplus production relying on comparative advantages.
3. Encouraging local and foreign investments concerning marketing and processing of agricultural products.

According to Fiorillo and Vercueil (2003), despite the continuing increase in supply, Syria's per capita consumption of livestock products, with the exception of milk, is considerably lower than in industrial countries. Therefore, the overall, per capita consumption of livestock food products including sheep have to be boosted by increasing availability, maintaining suitable prices and improving income. Furthermore, animal products (dairy, meat and eggs) constitute a high share of family expenditure on food items. These facts entail studying the consumption of sheep meat in more detail.

Investigating consumption requires deliberate data about stocks, domestic uses, exports and aggregate demand.

### **5.1. Stocks**

Stocks concerning sheep meat are not available. Because of the low per capita availability, it can be said that there is no stocks either public or private. However, it can be said that the number of animals at the end of the current year represents the beginning stock of the following year and the number of animals at the end of the following year is the ending stock.

### **5.2. Domestic Uses**

Sheep meat is used only for final consumption because there are no processing activities. Therefore, the value added creation is weak, which is considered a bottleneck of the sheep meat supply chain. However, there are slaughterhouses, which are considered very important agents of the sheep meat chain. Their performance affects substantially the quality of the final product by consumers. The Ministry of Health and the Ministry for Local Management and Environment control these agents for sanitary conditions.

markets in the various governorates.

#### *5.2.1.1. Wholesale Markets*

A wholesaler is a business unit that buys and resells merchandise to retailers and other merchants and /or industrial, institutional, and commercial users. In this context, exporters and importers are belonging to wholesaling activities. Moreover, wholesalers don't sell in significant amounts to ultimate consumers. Accordingly, a wholesaler conducts the following services:

*For his manufacturers or suppliers:*

- Providing a sales force to sell the goods to retailers and other buyers.
- Communicating manufacturers advertising deal and plan.
- Maintaining inventory, thus reducing the level of inventories suppliers have to carry.
- Arranging or undertaking transportation.
- Providing capital by paying cash or quick payments for goods.
- Providing suppliers with market information they can not afford or are unable to obtain themselves.
- Undertaking credit risk by granting credit to customers and absorbing any bad debts, thus relieving the supplier of this burden.
- Assuming risk for the product by taking title.

*For his customers:*

- Buying goods the end market will desire and make them available to customers.
- Maintaining inventory, thus reducing customers' costs.
- Transporting goods to customers quickly.
- Providing market information and business consulting services.
- Providing finance through granting credit to small retailers.
- Ordering goods of the types and in the quantities desired by the customers.

Syrian wholesaling activities are numerous and small scale, and function according to open market operations. In the U.S. and Europe, however, the trend is to more concentrate, larger, more efficient, and more powerful wholesaling (Kohls and Uhl 2002 and Meulenberg 1993). In Syria wholesalers can perform the activities of live animal wholesalers, carcass wholesalers, importers, and exporters. Here, it is to highlight that there are no official statistics about their number and marketing costs. Therefore, extra investigation is needed to obtain the data required. Wholesalers can be local and foreign.

#### **Local Wholesalers**

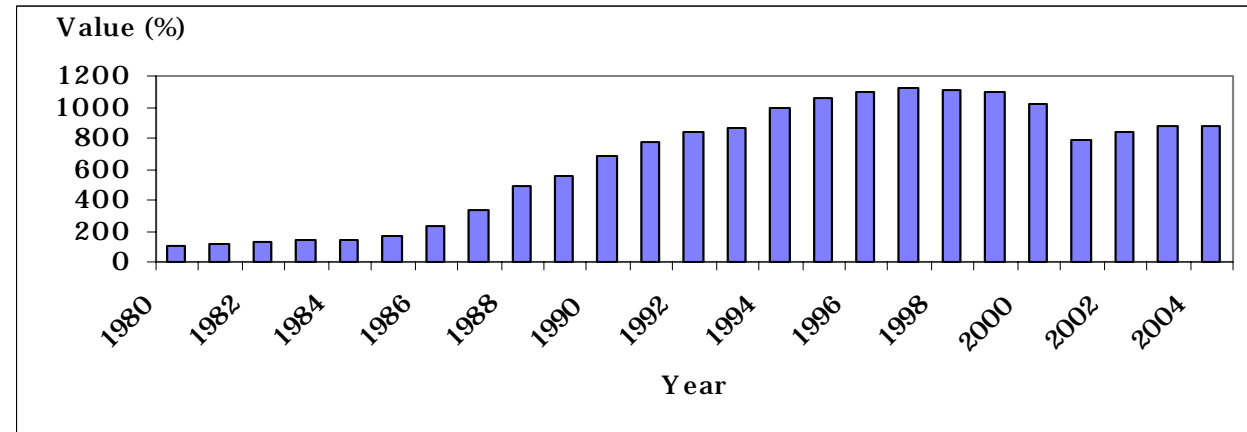
These agents comprise live animal wholesalers and carcass wholesalers. They perform their activities in the various governorates according to open market operations and wholesale price signals. In this regard, prices and price indexes are useful to calculate seasonality and coefficient of variation as well as the degree of market integration among governorates. Such markets are located in villages and cities close to the suppliers of sheep meat.

Annex tables 15 illustrates the evolution of boned sheep meat wholesale prices from 1999 to 2004 and the evolution of the corrected wholesale price index (1980-2004) considering 1980 as base year. It can be concluded that the wholesale prices follow an increasing trend, but there is a decline in the prices from 2000 to 2004. Figure 12 depicts the evolution of the corrected wholesale price index from 1980 to 2004.

Annex table 16 depicts the evolution of wholesale price indexes for food and non-food commodities

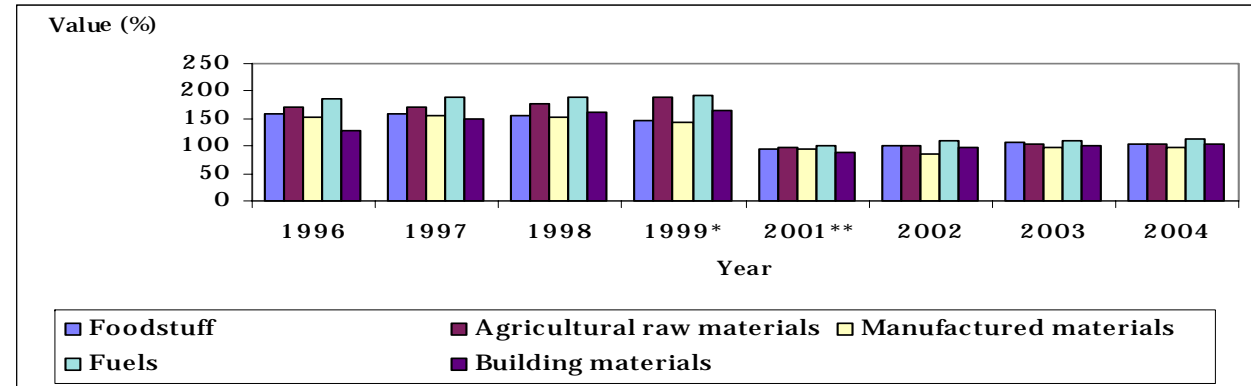
year is 1990. For 2001 the base year is 2000. Food prices decreased from 1996 to 1999, but increased from 2001 to 2004. Fuels price, however, increased in both periods.

**Figure 12.** Evolution of the corrected wholesale price index for sheep meat, 1980-2004



Source: See Annex Table 15.

**Figure 13.** Evolution of wholesale price indexes for various products, 1996-2004



Source: See Annex Table 16.

\* Base year 1990.

\*\* Base year 2000.

### Live Animal Wholesalers

Live animal wholesalers are specialized agents who purchase live sheep from private and cooperative sectors at current prices according to supply and demand conditions by open market operations. They slaughter 83% of their live animals in private and public slaughterhouses and 17% is sold to exporters in 2003; carcasses will be fully sold (100%) to carcass wholesalers at current prices; and the entire by-products (100%) will be sold to by-product users. Hereby, Ministry of Economy and Trade (MET), Ministry of Local Management and Environment, and Ministry of Health control those regarding sanitary conditions.

### Carcass Wholesalers

Carcass wholesalers are specialized actors who buy sheep carcasses from live animal wholesalers and sell carcasses (100%) to carcass retailers at current prices according to demand and supply conditions by open market operations. Here again, MET, Ministry of Local Management, and Ministry of Health control them regarding sanitary conditions. Consequently, it is to highlight that

The performance of such agents depends mainly on trade liberalization procedures. Foreign wholesalers perform the tasks of importers and exporters.

### **Importers**

They buy live sheep from the foreign market at current prices and sell those (100%) to live animal wholesalers at current prices by open market operations. Their influence on the chain performance is expected not to expand because of domestic consumers' preferences, which prefer domestic sheep meat, and the small quantities imported. In this context, the share of imported sheep meat is 1.2% in 2003.

### **Exporters**

They buy live sheep from live animal wholesalers and export those (100%) to foreign market according to supply and demand conditions. Consequently, their impact on the chain is increasing due to the export-oriented chain. In this context, the share of exported sheep meat is about 17% of the produced quantities of sheep meat in 2003. Here also the liberalization of the economy and trade agreements plays an enormous role in improving the effectiveness of these agents.

#### *5.2.1.2. Retail Markets*

Retailing is a dynamic marketing activity with a large influence on the economy. It attempts to satisfy the needs of consumers by purchasing and merchandising food products for final consumers (Kohls and Uhl 2002, Rama et al. 2001 and Grad 2004). Retailers have the following functions:

#### *For their suppliers:*

- Anticipating ultimate customer needs.
- Providing inventory, storage, and transportation.
- Financing inventories and breaking bulk.
- Providing market information.
- Assuming product risk.
- Providing personal selling and advertising effort.

#### *For ultimate consumers:*

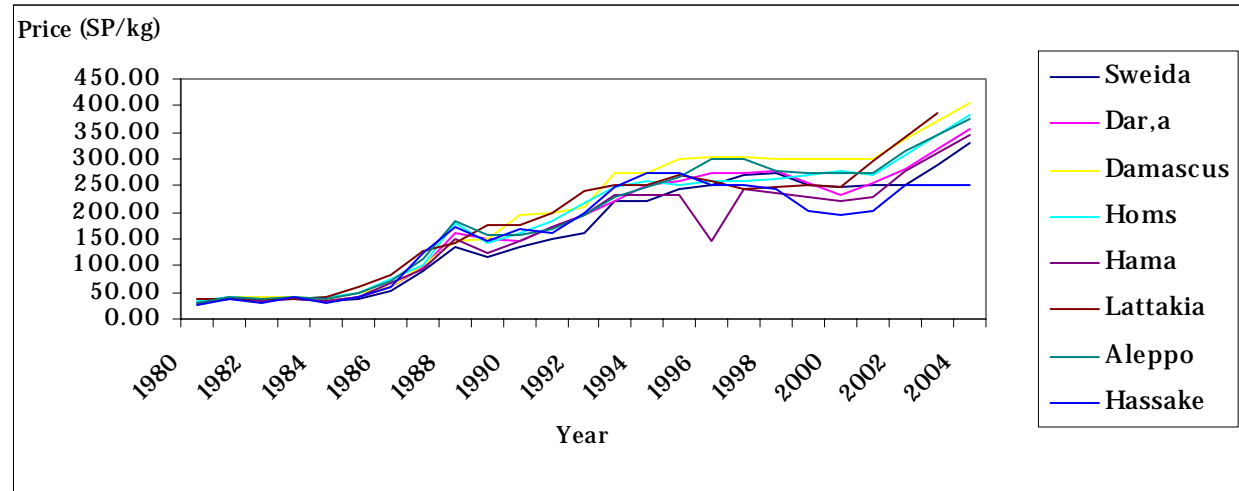
- Anticipating their product and service needs.
- Providing product storage and delivery.
- Breaking product bulk into acceptable size.
- Providing credit.
- Providing product and service information.
- Assuming risk by giving guarantees and after sale service.

Again, Syrian retailing consists of numerous middlemen competing with each others according to open market operations. In the U.S. and Europe, however, the establishment of larger and more powerful firms characterizes retailing (Meulenberg 1993, Marion et al. 1979, Callahan and Zimmerman 2003 and Grad 2004). Retailers perform their activities in the various governorates according to retail price signals. Hereby, retail price indexes play also an important role. Annex tables 17 and 18 depict the evolution of retail prices of sheep meat by governorates and the price index of retailing for all products. Accordingly, there are differences in the prices among governorates and the trend of prices is increasing over time. Figure 14 illustrates the price differences among governorates and shows that the prices in the various governorates move in the same direction.

coefficient of variation varies between 52% and 59%. These high variations are maintained for both governorate and average prices.

Annex tables 19 shows the degree of market integration among governorates at current prices. Accordingly there is a very high degree of integration. Consequently, the law of one price is working fairly well.

**Figure 14.** Evolution of price differences among governorates, 1980-2004



Source: See Annex Table 17.

### Carcass Retailers

They buy sheep carcasses from carcass wholesalers at current prices and sell ready meat (100%) to consumers at current prices and by-products (100%) to meat by-product users (bones, etc.). Hereby, they perform their specialized activities either in their small shops or in organized central markets (Suk Al-Hal), which are controlled for sanitary conditions by MET and Ministry of Health. Moreover, Syrian meat retailers are very small in nature compared to developed countries. Therefore, they are so many. Sometimes, they process sausage and hamburger. In addition, they sell the sheep meat in various forms and grades to consumers (boned and dressed according to fat content). Again here, it is to highlight that the transportation conditions (cool transportation and healthy transport) of sheep carcasses are inadequate and need further improvement; and more statistics are needed about these agents.

### 5.3. Export

Improving opportunities for consumers and economic growth requires the integration with international communities at an increasing pace. Since the mid 1980s, Syria has started to pursue this goal because the Syrian Government has realized the importance of becoming more involved in the world trading system to modernize the structure of the economy, to attract capital for investment and to enhance the market for domestic products. Therefore, trade reform becomes an instrument for supporting the private sector and creating a regulatory environment favorable to investments.

According to Fiorello and Vercueil (2003) and SAT (2004), foreign trade policies in Syria aim at encouraging the exports of commodities and services as well as at diversifying the structure of exports. To support this objectives an Export Committee was established in 1986. This committee

lateral trade agreements as follows:

- The multilateral Arab Free Trade Agreement.
- Bilateral agreements with neighboring countries.
- Bilateral agreement with the European Union.

The Syrian government gives due attention to the export of sheep meat. Therefore, all trade restrictions were removed to boost exports (Baghasa 2006). Substantial improvements in trade agreements with the Arab countries, EU and the accession to the WTO have been also achieved. Annex table 20 traces the evolution of sheep meat exports. Accordingly, sheep exports show an increasing trend. The major sheep markets are the Gulf countries. In 2004, the export value of Syrian sheep mounted to 10,959 million SP. The main destinations were Saudi Arabia with 72.9% (of total export), Lebanon with 9.3%, Kuwait with 9.1% and Qatar with 7.6%.

Table 7 shows the top five exporting and importing countries in 2003. Syria came fifth by export of sheep.

**Table 7.** The top five exporting and importing countries of sheep, 2003

Countries	Export		Countries	Imports	
	Value 000\$	%		Value 000\$	%
<b>World</b>	<b>752176</b>	<b>100</b>	<b>World</b>	<b>1003317</b>	<b>100</b>
Australia	222,905	29.6	Saudi Arabia	390,000	38.9
Sudan	120,965	16.1	Italy	101,972	10.2
Romania	81,928	10.9	Kuwait	95,000	9.5
Hungary	44,432	5.9	Lebanon	61,108	6.1
Syria	43,231	5.7	Greece	38,324	3.8

Source: FAOSTAT and NAPC.

#### 5.4. Aggregate Demand

Aggregate demand results from domestic uses and exports of sheep meat. Annex table 20 shows the evolution of aggregate demand. Accordingly, the local per capita consumption is estimated by relating the total supply to population. The per capita consumption of sheep meat decreased substantially from 9 kg in 1981 to 4 kg in 2004 .

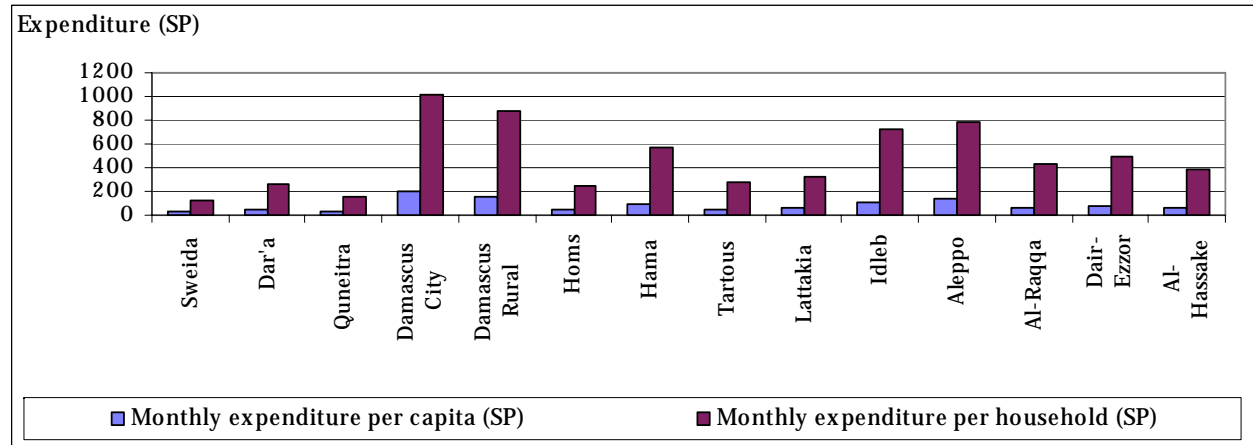
The level of demand can be studied in relation to the various prices and income. Thus, annex table 20 traces also the evolution of competing commodities namely: beef and poultry as well as private consumption (expression of income). Accordingly, the total demand for sheep meat is expected to vary between 180 and 285 thousand tons (average 215 thousand tons) in 2010 and between 229 and 357 thousand tons (average 286 thousand tons) in 2020. Annex tables 21 and 22 illustrate the monthly expenditure and consumption per capita and household concerning sheep meat according to governorates relying on the census results of 2003-2004 conducted by the Central Bureau of Statistics. The tables show substantial differences in the consumption patterns among governorates. Figures 15 and 16 show the variations in the monthly expenditure and consumption among governorates and between individual consumer and household.

decision making and policy analysis; see Sadoulet and de Janvry (1995) and Johnson, Hassan and Green (1984).

By applying the single equation approach, a relationship between the level of sheep meat demand per capita, the retail price of sheep meat and the private consumption per capita can be estimated. The results of the estimations are included in annex table 23.

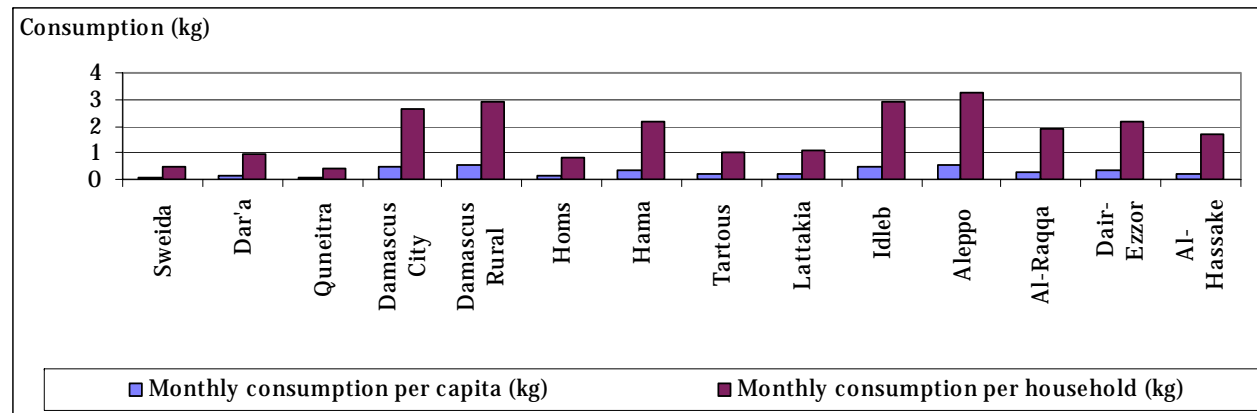
Accordingly, the demand for sheep meat was estimated by six alternatives. The first two were conducted without any correction; the others were estimated with correction either by the difference method or by adding a trend component. The estimated last four models can be considered as dynamic models. The best results were achieved by model 5 (according to the measures goodness of fit and statistical tests), which is linear and includes consumption per capita, private expenditure per capita, and a time trend.

**Figure 15.** Variations of monthly expenditure of sheep meat among governorates, 2003-2004 (SP)



Source: See Annex tables 21 and 22.

**Figure 16.** Variations of monthly consumption of sheep meat among governorates, 2003-2004 (kg)



Source: See Annex Tables 21 and 22.

Accordingly, the demand model for sheep meat will have the following form:

$$Pd_t = 709789.59 - 54124.51 * X_{1t} + 6.57 * X_{2t} - 4927.45 * t$$

Where:

$Pd_t$  = Fitted price,  $X_{1t}$  = Consumption per capita,  $X_{2t}$  = Private expenditure per capita,

meat retail price (inverse demand) and both consumption per capita and time trend. A positive relationship, however, is prevailing between sheep meat retail price and private expenditure per capita. This means that the signs and relative magnitude of regression coefficients coincide with the expectations. Moreover, all coefficients are statically significant at the 5 % significance level and 96.88-97.35% (R square and adjusted R square) of the variations in sheep meat retail price are explained through the demand equation. Thus, 1 unit increase in consumption per capita (others constant) indicates a decrease of the sheep meat retail price by 54,124.5 SP/ton (or 54.1 SP/kg), whereas 1 unit increase in private expenditure per capita (others constant) results in an increase of the sheep meat retail price by 6.57 SP/ton (or 0.007 SP/kg); in this context, the time trend has an inverse effect on the sheep meat retail price.

Hence, the price elasticity of demand is -0.131599 in the short run and -0.131600987 in the long run. This means that sheep meat demand is rigid to price changes both in the short and long run. However, in the long run the demand is slightly more elastic.

Finally, the availability of the data is a necessary condition to make more accurate and expanded demand estimation including demand systems estimation with demographic variables.

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