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Poultry

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1. Abstract

This paper is considered the first step toward building a complete picture of the Syrian poultry sector focusing on the supply and demand sides of white meat and eggs, within the preliminary preparation for the comparative advantage and supply and demand studies of agricultural products, which are conducted by the National Agricultural Policy Centre (NAPC).

So after giving a general background and reviewing the goals of this outlook the following points of view are considered:

- Some governmental policies related to the poultry sector, such as banking system, fodder supply policies, distribution policies, and the benefits of these policies, were reviewed.
- The role of the public and private sector in the field of poultry production.
- The general policies implications especially for import and export.
- The existing systems of giving licenses to poultry farms.
- The organization of the poultry breeding profession.
- The availability and efficiency of the use of production factors.
- The development of the breeding systems and their impacts on production efficiency. In this regard, the quantity of production for each product was separately presented indicating the absence of import of poultry meat and eggs. The time series analysis over the period 1967-2004 showed an annual growth rate for broiler meat and eggs of 9% and 6% respectively.
- Number of poultry farms and its distribution by Syrian governorates.
- Inputs and composition of production cost and their shares and roles in increasing or decreasing the costs.
- The domestic uses of every commodity, marketing trends, some structural aspects of the marketing chain and export situation. These aspects were analyzed in the context of identifying the aggregate demand for poultry meat and eggs.

Depending on the above the following results can be illustrated:

- There is a decrease in cash loans starting from 2000 and a suspension of in-kind loans after 2003.
- Concerning the fodder distribution, the private sector plays a key role in import and internal marketing, and the major share of maize and soy beans is from external sources.
- There is a need to enforce a law for organizing the poultry career.
- There is a tangible improvement in the productivity of water and employment.
- Layer farms are concentrated in some Governorates, while broiler farms are distributed among Governorates. The unlicensed layer farms don't exceed 6%, while the unlicensed broiler farms amount to 36% of the total number.
- Concerning costs, the value of fodder is about 55%, while the value of breeding asset is about 20% of the total cost.

- There is no available data about marketing trends especially for table eggs which are used for final consumption and have intermediate uses in the food industries.
- Regarding prices, the price correlation among Governorates is low by broiler (segmentation) and high by eggs (integration).
- The export of poultry meat is absent, while there are limited quantities of table eggs to be exported but not exceeding 3% of total production.
- The study of supply and demand has to be completed in order to perform more reliable estimations.

2. Foreword

The poultry sector substantially contributes to the livestock sector in Syria. Its importance results from fulfilling the increasing demand for poultry meat and eggs, supplying animal protein at the least cost and effectively contributing to income improvement especially the income of rural families who perform poultry breeding at homes and farms. Therefore, the Syrian Government is paying a great attention to the development of the poultry sector in its Agricultural Development Strategy and Five Year Plans to enhance and facilitate its production, processing and marketing. The following facts can be traced about the evolution of the poultry sector in Syria:

The value of livestock production accounted for 34,5 % of the value of agricultural production during the period 2001-2004. The share of total meat production reached about 52% of the value of livestock production while egg production accounted for 6,6%. The average poultry population increased by 25% comparing the averages of the periods 2001-2004 and 1997-2000 (Mid Term Review of Agricultural Development Strategy); white meat amounted to about 44% of total meat production in Syria during the period 2001 -2004.

3. Objectives of the paper

This review of the poultry sector is considered one of a series of working papers concerned with the sectoral governmental policies and the in-depth investigation of the productive and economic components of the agricultural sector. Relying on the supply, demand and comparative advantage aspects, this finding focuses on the following:

- Using various analysis methods, this paper reviews the major activities of the poultry sector namely poultry meat and egg sub-sectors taking into account the supply and demand sides of these products and the economic agents' operational activities.
- This review aims to illustrate the potential of the poultry sector to meet the local demand of the population and the food industry, and the foreign demand by realizing a surplus for export.

The activities of the poultry sector comprise many kinds of poultry and birds like turkeys, ducks and rabbits, but this paper is focusing on egg production and broiler breeding as main activities in this field.

4. Governmental policies governing the poultry sector

The agricultural development strategy for the period 2001-2010 incorporates both general and specific goals of the agricultural sector. Particular objectives are focusing on the growth of some food products such as increasing the production of red meat annually by 5%, white meat by 5%, milk by 4% and fish by 6%. Furthermore these indications have been the major concern of the ninth and tenth five year plans by enhancing the improvement of local breeds, vaccines production, disease surveillance, disease control, the production of local veterinary medicine and the provision of feeds for the livestock sector.

If a comparison of the averages of the two periods 1997-2000 and 2001-2004 is made, an increase in white meat production by 41% and a decline of red meat production by 6% due to the decrease of sheep meat production are observed. During the period 2001-2004, the annual growth of white meat production amounted to 9.3%, and that of red meat production was negative (-1.5 %).

Accordingly, the governmental polices related to the poultry sector can be summarized as follows:

4.1. Banking policy

One of the goals of the ninth and tenth five-year plans is improving the operations of the Agricultural Cooperative Bank (ACB) in order to simplify and facilitate the loan's procedures.

The poultry sector is benefiting currently from the governmental financial policies of the ACB. In spite of the fact that there are three kinds of loans: short, medium and long-term credits the poultry sector is benefiting from two kinds of loans namely: short term for the purchase of production services, fodder and chicks, which are due in several months and medium term, for more than one year and less than five years, for buying the necessary equipment to operate the poultry farm. In both cases these loans are granted according to the productive capacity of the farm recorded in the final license issued by the Ministry of Agriculture (MAAR) after making the approval.

4.2. Fodder distribution policies

According to the agricultural development strategy that aims to insure an adequate supply of feed and fodder for the livestock sector, the government allows the private sector to import several kinds of feed to overcome the deficit in local production especially poultry feeds, where the general establishment for fodder (GEF) provides only a part of the necessary feeds for the poultry sector. The GEF receives the raw products from both the private and public sectors: barley from the private sector's Traders and the General Establishment for Grain Trade and Processing (GEGTP), bran from the General Establishment for Milling (GEM), oilcake from public oil factories and maize and soy beans, which their delivery to the GEF is not obligatory, at official prices from the farmers.

4.3. Export and import policies

The recent orientations of the Government concerning export promotion are incorporated in the Agricultural Development Strategy from 2001 through 2010, which includes the following:

- Studying the needs of external markets for agricultural products.
- Establishing a marketing information system to serve exporters and producers.
- Adopting procedures to encourage export and remove exporters' obstacles.
- Removing all taxes and duties imposed on exported agricultural commodities.

Regarding the poultry sector, after having the technical approval of the MAAR, the recent laws permit to export and import of hatching eggs, chicks, several kinds of poultry meat and table eggs, and all poultry requirements provided having a breeding license, or being a member of a specialized cooperative in poultry breeding and fattening or having a licensed private office or not importing from suspected countries concerning poultry diseases like Bird Influenza.

4.4. Special policies for granting farm licenses and organizing poultry breeding

Up to now, there is no law to organize poultry breeding profession; there is only a set of technical and administrative procedures stated by the directorate of livestock production in the MAAR. These instructions help to manage some activities in this sector, however they don't discriminate among the various activities of the sector, which makes this profession unstable and affected by seasonal circumstances, monopoly and market oscillation. Currently, the Government is going to form a committee comprising many related stockholder of the poultry sector in order to set up a law organizing this profession.

The farms of poultry breeding and fattening have been established through licenses granted by the MAAR, depending on certain laws and international standards determining building's specifications, number of birds per square meter for every kind of poultry breeding and sanitary, environmental and technical conditions. These establishments are stipulating the supervision of

specialized veterinarians and agronomists relying on their productive capacity according to the following:

- Farms specialized in producing table and hatching eggs which their capacity exceeds 5000 birds / period.
- Farms for broiler fattening which their capacity is more than 6000 birds / period.
- Hatching units whose production capacity is not less than 120000 hatching eggs /year.
- Specialized offices for importing and exporting chicks and hatching eggs.

In 2004, the number of licensed farms reached 4861 farms for broiler production forming about 64% of the total of broiler farms, and 1956 farms for layer production constituting about 94% of the total of layer farms (Table 1).

Table 1. The total number of licensed and unlicensed broiler farms (2004)

Number of broiler farms		Number of broiler parent farms		Number of layers farms		Number of layers parent farms	
licensed	Un licensed	licensed	Un licensed	licensed	Un licensed	licensed	Un licensed
4,861	2,699	220	14	1,956	114	59	0

Source: MAAR - The Annual Agricultural Statistical Abstract 2004

It seems that there is an owners' evasion from the license due to the high costs. The special instructions for licensing of poultry establishments require the notarization of building designs from both the specialized engineering offices and the related technical departments. In spite of the importance of these procedures, they cause supplementary costs and duties for the owners of the farms, which may constrain the sector expansion especially because they are considered very high. The Technical Offices of the MAAR can help in providing these services against low duties because the MAAR is originally responsible for both issuing the technical conditions of breeding and granting the final license.

5. Production

Eggs and poultry meat are produced in specialized farms. These farms constitute about 97% of meat and 90% of egg production and are managed by the cooperative, private and governmental (represented by the General Establishment for Poultry (GEP)) sectors. The remaining share is produced in the countryside by open farms, which are not the focus of this paper because of their small share. Figures 1 and 2 illustrate the distribution of poultry population and egg production between the cooperative and private sectors over the period 2000-2004. Concerning the cooperative sector, the share in egg production and the total number of poultry ranged between 31 and 42 %, respectively in 2000, and increased to 49 % for both in 2004.

5.1. Production factors

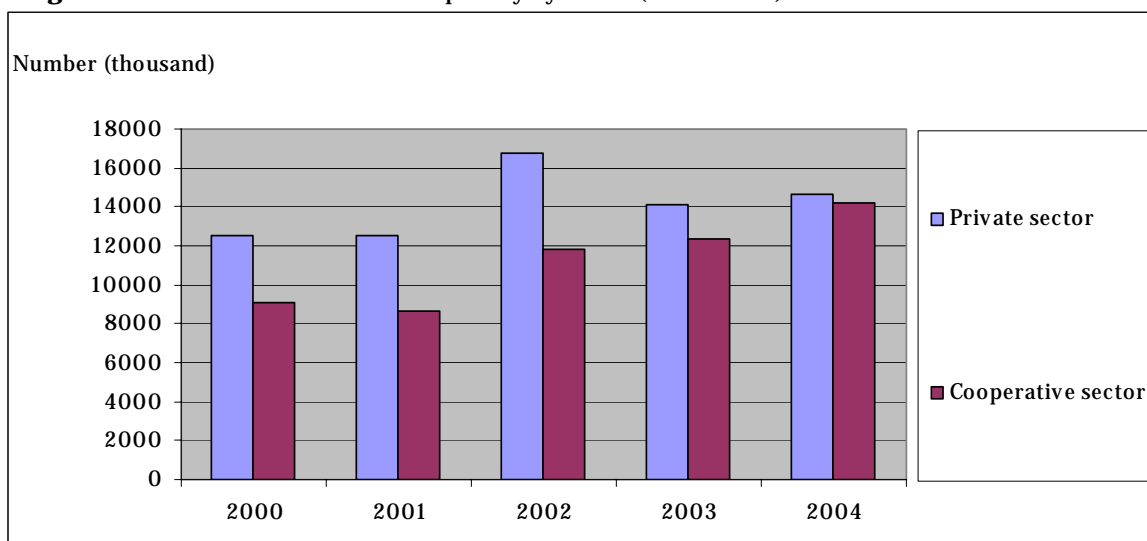
Every productive activity needs the provision of the necessary factors underlying it, like natural resources, labor, fixed and variable capital, infrastructure for marketing and production services.

5.1.1. Natural resources

The agricultural development strategy and the five-year plans enhance the rational and sustainable exploitation of natural resources including land and water through:

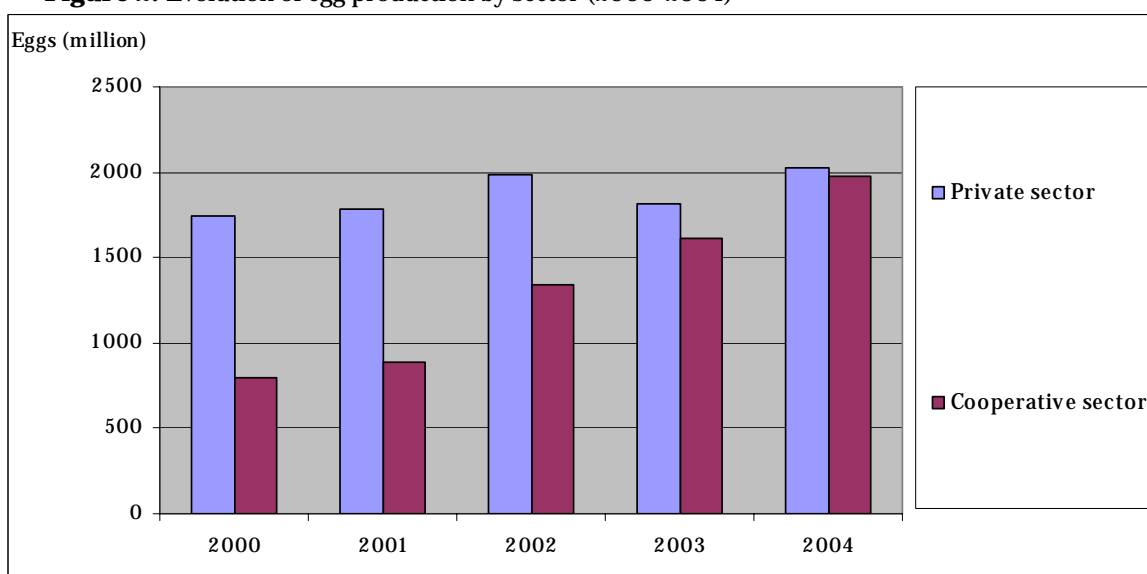
- Ensuring sustainability through conservation of agricultural lands.
- Giving a great attention to the efficiency of water use.

Figure 1. Evolution of the number of poultry by sector (2000-2004)



Source: MAAR – The Annual Agricultural Statistical Abstract

Figure 2. Evolution of egg production by sector (2000-2004)



Source: MAAR – The Annual Agricultural Statistical Abstract

5.1.1.1. Land resources

The production of livestock, especially dairies, is ultimately competing with crop production on water and land resources. Poultry breeding, however, can be performed in areas, where there aren't any activities related to both plant and animal productions. It is well known that poultry breeding doesn't need large areas of land. So this activity is not considered rival with the other agricultural and productive activities on land resources, especially because poultry breeding is able to expand vertically.

In Syria, there are no available official statistics about the total areas occupied by poultry establishments. But these areas can be estimated if the required area (productive and supplementary) per bird and the number of farms (table 2) are taken into account. The license instructions of poultry farms indicate that the area of a poultry farm has to be not less than 150 m² and the distance among the buildings has not to be less than 10 m and to exceed 50 m. The

buildings can be of one story or several stories. The number of birds per square meter is 7 for egg production, 14 for poultry fattening, 5 for broiler parents and 6 for hatching eggs.

Table 2. Evolution of the number of poultry farms (1997- 2004)

Item	1997	1998	1999	2000	2001	2002	2003	2004
Number of broiler farms	3,860	4,040	4,366	4,705	5,574	5,981	7,114	7,560
Number of layer farms	1,447	1,573	1,535	1,553	1,327	1,798	1,798	2,070

Source: NAPC Database

It is clear from the table above that the number of broiler and layer farms increased by 96% and 43% during the period 1997-2004, respectively. This indicates that the needs of the poultry sector for land resources expanded nearly by the same level or more, taking into consideration that modern farms' productive capacities exceed those of the old ones.

Furthermore, the annual growth rate of the number of poultry was 9% for broiler and broiler parents, 7% for layer farms and 23% for layer parents over the period 1997-2004.

5.1.1.2. Water resources

Poultry breeding requires a limited quantity of water; it can be estimated according to the table of requirements for one bird taking into account kind of breeding, gender and bird size. During the fattening cycle for broiler production, the bird consumption was estimated by 4 liter during 7 weeks and 21 liter per year. While layers need more quantities of water for egg production compared to broiler production; the water consumption is estimated by 1 liter per week/ bird or 52 liter/year/bird for the period before production, and about 72 liter/year/bird for the production stage¹. Depending on the aforementioned estimates, the consumed quantities of water are estimated by 40 liter/year/bird for non-productive broilers and 72 liter/year/bird for productive broiler, as illustrated in table 3. The table indicates that the per unit productivity of water improved during the studied period in spite of the increase in water consumption resulting from the enlargement in the number of birds due to the improvement of productive efficiency, the optimal use of resources, the enhancement of modern technologies and the use of mechanical drinking places.

5.1.2. Labour

Labour in poultry farms consists of unskilled laborers who take care of all services inside the farm in addition to sentry. Their number and skills differ according to the productive capacity, the level of technology and the applied breeding system. Temporary laborers are usually used for this purpose.

Technical supervisors are contracted during production periods in order to provide health and veterinary services, medicine and vaccines, and to prepare balanced fodder mixture complying with the available fodder concentrates.

Recently, public farms use whole families to work inside the farm; they provide residence for these families in order to both decrease employment costs and insure labor stability.

Labour size in the poultry sector is instable due to the periodical and seasonal nature of poultry production and the instability in the production throughout the year.

¹ Hasan esa. *Feeding Poultry*. Faculty of Agriculture, Damascus University, 1992

Table 3. Evolution of various poultry measures (2000-2004)

Item	Non layer Chicks (thousand)	Consumed quantity of water (m³)	The productivity of water for poultry meat (ton/m³)	Productive layers (thousand)	Consumed quantity of water (m³)	The productivity of water for egg production (1000 eggs/m³)	The total quantity of consumed water (m³)
2000	7,453	298,120	0.36	14,176	1,020,672	2.49	1,318,792
2001	7,220	288,800	0.40	13,902	1,000,944	2.67	1,289,744
2002	10,997	439,880	0.28	17,637	1,269,864	2.62	1,709,744
2003	6,047	241,880	0.66	19,011	1,368,792	2.52	1,610,672
2004	7,994	319,760	0.54	20,867	1,502,424	2.66	1,822,184

Source: Elaborated by the Author

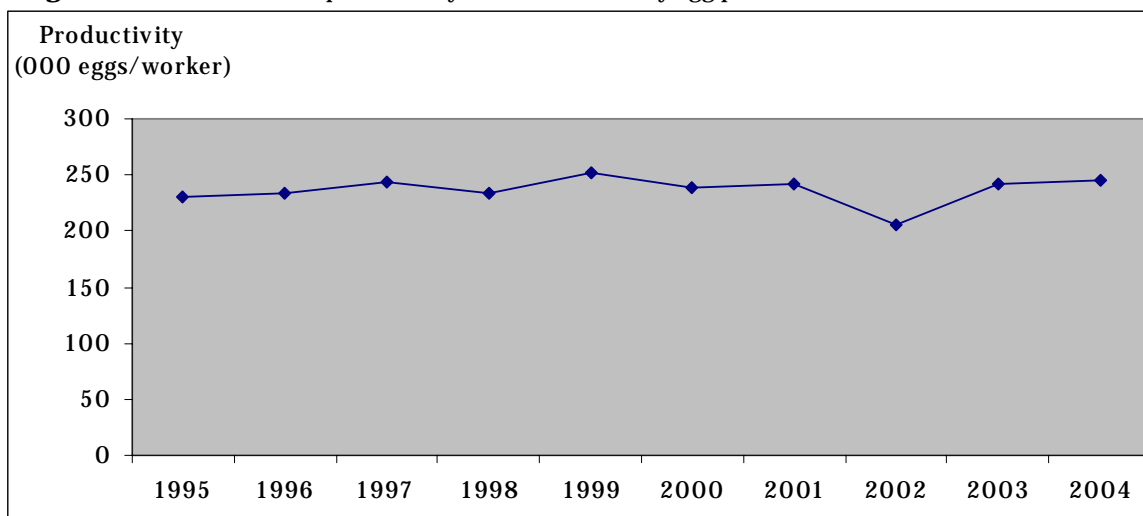
There is no available data concerning size and categories of labour in the poultry sector. However, cost studies for broiler farms applying the mechanical services on 5000 birds suppose the presence of 3 unskilled labourers and 1/8 specialized, technical supervisor for each 8 hours. Layer farms incorporating 10000 birds require the presence of 2 unskilled laborers and 1/8 specialized, technical supervisor for each 8 hours. Accordingly, the approximate labor estimates of the poultry sector are presented in Table 4. These estimates enabled the assessment of labour productivity in the egg and broiler meat sub-sectors. Figures 3 and 4 present the evolution of labour productivity of both egg and broiler meat productions over the period 1995-2004. The productivity of egg production increased from 231 thousand eggs/worker in 1995 to 245 thousand eggs/worker in 2004. The productivity of broiler meat showed a better growth than that of eggs.

Table 4. Evolution of labour in the poultry sector (2000 – 2004)

Item	Producing layers (thousand)	Unskilled labour	Skilled labour	Non Layers (thousand)	Unskilled labour	Skilled labour	Total unskilled labour	Total skilled labour
2000	12,215	7,329	153	7,453	4,472	186	11,801	339
2001	12,723	7,634	159	7,220	4,332	181	11,966	340
2002	20,553	12,332	257	10,997	6,598	275	18,930	532
2003	18,741	11,245	234	6,047	3,628	151	14,873	385
2004	21,714	13,028	271	7,994	4,796	200	17,825	471

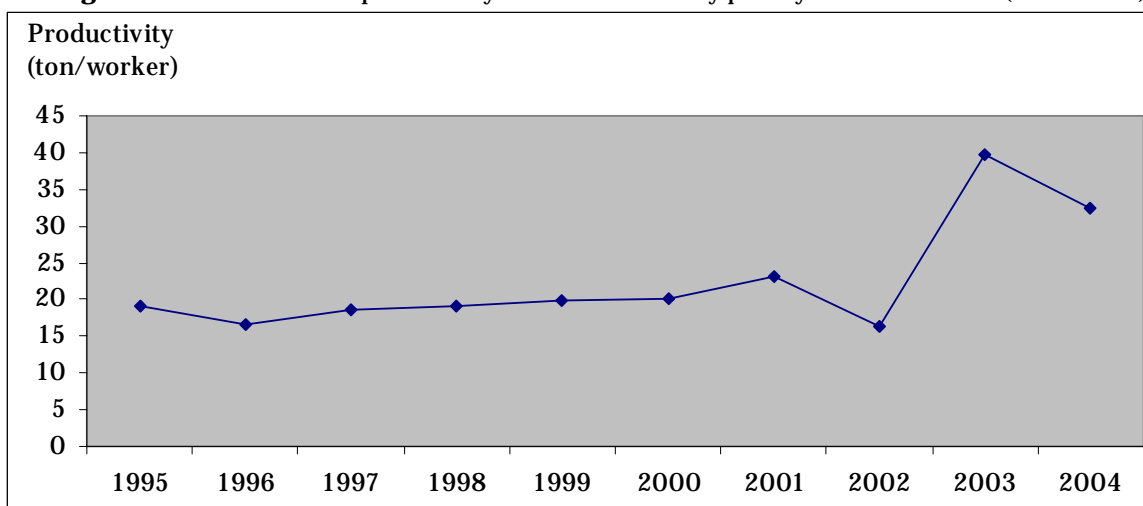
Source: Elaborated from MAAR Database

Figure 3. Evolution of the productivity of normal labor by egg production 1995-2004



Source: Elaborated from MAAR Database

Figure 4. Evolution of the productivity of normal labour by poultry meat 1995-2004 (ton/worker)



Source: Elaborated from MAAR Database

5.1.3. Capital

Capital consists of fixed and variable assets. Fixed assets comprise land, buildings, equipment and machines. Variable assets incorporate breeding birds and other variable inputs.

Land and buildings

Modern breeding systems of poultry follow the pattern of intensive production. Therefore, the establishment of farms requires limited areas of land.

Poultry farms are more frequently established on cheap uncultivable lands, which are bought or rented at low prices. These lands are preferred to be close to the cities and public roads. Public farms are often established on state lands.

Buildings of poultry breeding are established according to limited specifications, after verifying the building's schemes and getting the agricultural and technical license, taking into

consideration both the productive capacity and the production purpose. These buildings are established from materials available in the local market.

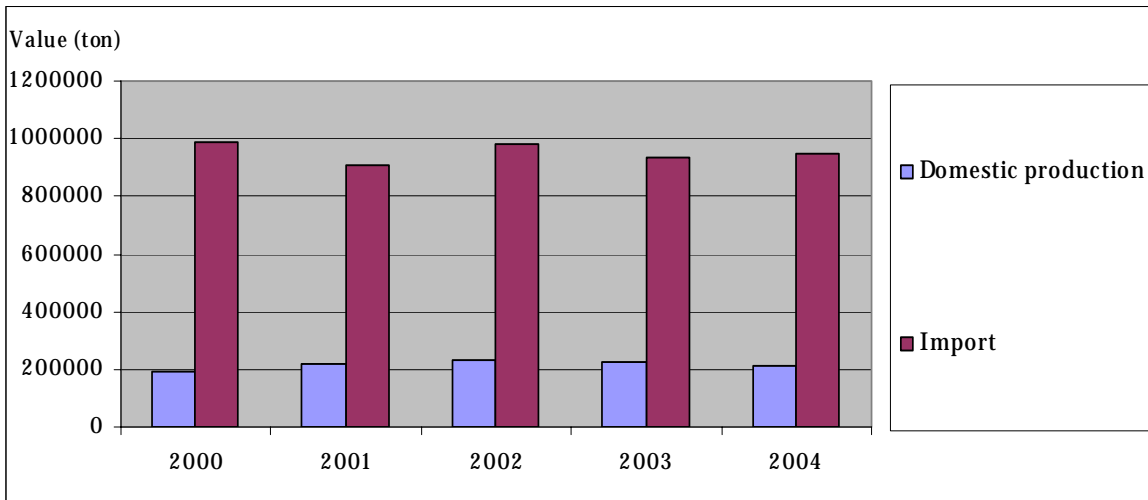
Equipment and machines

Part of this equipment is produced locally in various types and forms. In addition, the private sector is permitted to import all kinds of equipment through licensed offices and the ACB provides medium term loans to finance some equipment.

Feed and other inputs

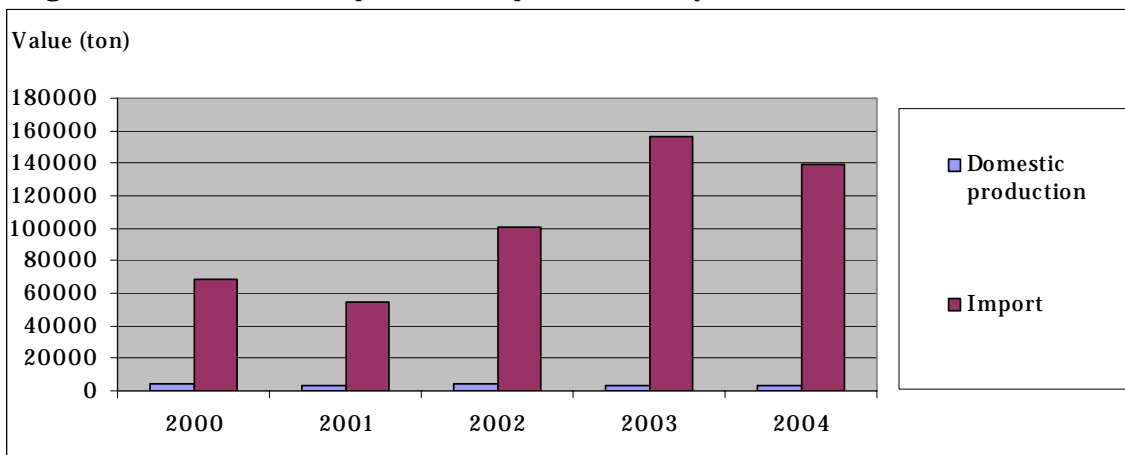
Some feed components are purchased by the public sector (GEF) like barley and bran to comply with the demand of the poultry sector for these materials at governmental prices taking into consideration that the production of barley and bran doesn't meet the local needs of these materials, especially in drought seasons. This leads to vacillation in the imported quantities from year to year. However, these materials don't account for more than 3-5 % of poultry feed mixtures. The other fodder components like maize and soy beans are supplemented through the imports of the private sector because domestic production covers only a part of local market needs. Over the period 2000-2004 the local production accounted respectively for about 23% and 4% of the imported quantities of maize and soy beans (figures 5 and 6). Soya cake extracted from local production doesn't form more than 1% of that produced from the imported quantities converted in the oil factories. Therefore, the private sector imports the largest part of these materials, which forms more than 85% of the poultry feed components, after granting the license from the MAAR. Veterinary medicines and vaccines are also provided through import. Figure 7 illustrates the price development of the most important components of poultry feed.

Figure 5. Evolution of the import and local production of maize 2000-2004 (ton)



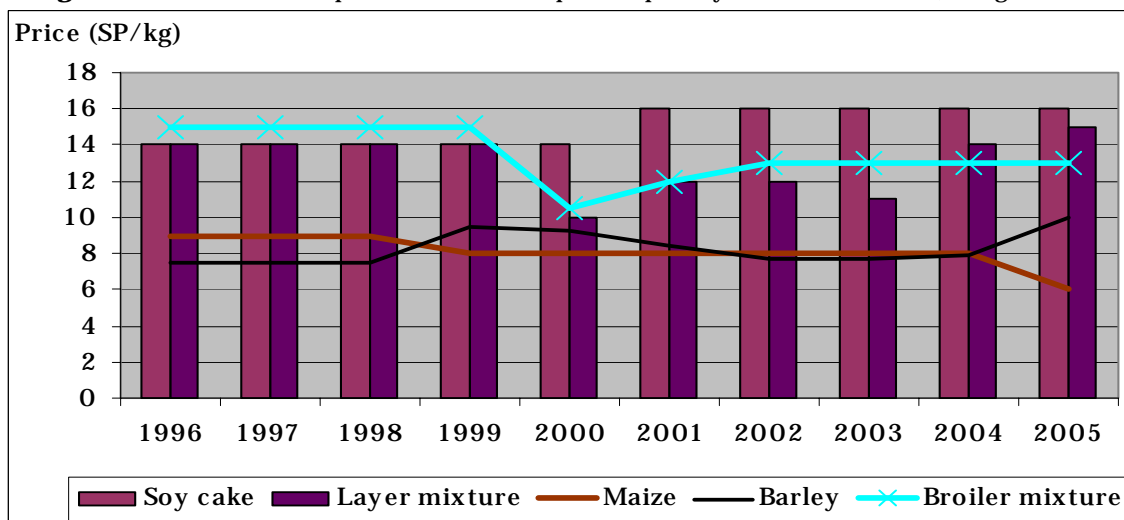
Source: Elaborated from MAAR Database

Figure 6. Evolution of the import and local production of soy beans (2000-2004)



Source: Elaborated from MAAR Database

Figure 7. Evolution of the price of the most important poultry feeds 1996-2000 (SP/kg)



Source: Elaborated from MAAR Database

Accordingly, feed prices didn't face large oscillations, especially soy bean prices because the main portion of it is imported. Before 2000 its price was stable, then it increased by 14% from 2000 to 2001 and after then it has been stable up to 2005. Maize price, however, faced some changes according to production season because the share of local production to import reached about 23%. The prices of barley are affected by seasonal variations and the increasing demand for barley from the sheep sector. Barley price increased by 27% from 2000 to 2005.

In general the prices of ready feed mixtures are considered relatively stable during the period 1996-2005. This stability in prices helps to provide consistency in the poultry sector and to keep high growth rates for this sector. The situation is similar in the state farms, because the GEF provides them with an adequate supply of feed and fodder taking into consideration the prohibition of the additives of animal origin like bones and fish powder.

Table 5 illustrates the components of various fodder mixtures according to breeding aim.

Table 5. The composition of various fodder mixtures according to breeding aim

Item		Ration Weight (kg/cycle)	Maize %	Soya %	Primex Concentrate %	Barley %	Bran %	Other Components %
Broiler		4	62	30	5	-	-	3
Layer	Care stage	7	61	24	5	6	3	1
	Production stage	13	62	23	5	2	1	7

Source: GEF

Breeding assets

All breeding assets, like layer, broiler parents and all kinds of breeding chicks, are provided by the private sector. So local markets can provide them, but their prices are unstable, especially those of broiler chicks. Grand parents are imported by the licensed offices of the private sector.

Credits

According to the recent laws, the ACB is concerned with providing in-kind and in-cash loans complying with the requirements' tables for financing poultry breeding. There are two kinds of loans namely: short and medium term loans.

Short term loans are granted for several months to purchase chicks feed and services (Table 6).

Table 6. Short term loans

Item	Granting date	Loan (SP/bird)	Loan period
Egg	Round the year	75	Ten months
Parent	Round the year	150	Ten months
Broiler	Round the year	40	six months
Hatching	Round the year	4.5	Three months

Source: ACB

Medium term loans are provided for more than one year and less than five years to buy the required equipments for operating the farm. They aim to finance the mechanical feeding and drinking places, incubators, fodder mill and electricity generating group. On average, these loans amount to 60 S.P / bird for parents breeding and egg production and 40 S.P /bird for broiler production. In both cases, the loans are granted according to the productive capacity of the farm listed in the final license of the MAAR after acquiring the approval.

Table 7 clarifies the value of loans granted during the last five years.

Table 7. Loans granted by the ACB for the poultry sector during the period 2000-2004 (000 SP)

Activity	2000		2001		2002		2003		2004	
	In-cash	In-kind	In-cash	In-kind	In-cash	In-kind	In-cash	In-kind	In-cash	In-kind
Poultry breeding	242,882	1,101	230,999	11,460	227,053	1,189	188,672	1,207	204,133	0

Source: MAAR – The annual Agricultural Statistical Abstract

The table illustrates that in-cash loans decreased from 2000 to 2004, while in-kind loans increased until 2003 and fell to zero in 2004, although the orientation of the agricultural development strategy and the five year plans tend to improve the operations of ABC.

5.1.4. Infrastructure and the supporting services

Infrastructure and the supporting services, which are the focus of the Agricultural Development Strategy and the five year plans of the Government, have contributed to the improvement of the marketing and productive sectors, especially the productive establishments like poultry farms. Recently, poultry production has benefited from infrastructure provided by the government like highway nets, mountainous and agricultural roads, telecommunications, bridges to transmit production, inputs, banking, marketing and productive services, water nets, wells, dams and drainage establishments. This sector has benefited also from other supporting services provided by the state like animal production centers, animal health services, veterinary services and extension services.

5.2. Poultry breeding systems

Poultry breeding systems have witnessed a remarkable development during the last two decades. The gradual transformation has began from the open traditional breeding systems, spreading out in rural areas, to the breeding systems in closed farms (manual service), and then to the modern intensive mechanical breeding systems. In 1995 rural chickens accounted for 48% of the total layer in Syria. Their egg production reached 28% of the total production. In 2004 the number of rural chickens decreased to about 25% and egg production declined to about 10%. For this reason, this system can't be considered competitive to modern breeding systems.

Current production systems depend on both broiler and layer parent stock breeding. Layer and broiler chicks are produced in specialized farms related to both the private and the public sectors, after importing the grand parents by the private sector.

The private poultry farms buy layer and broiler chicks, one day of age, from the specialized farms mentioned above. Then, they begin the breeding and fattening cycle which lasts 45 days for broilers, until the bird weight reaches 1500-1800 g to be ready for consumption and marketing, and 5 months for layer chicks to enter the age of production with an annual average of about 270 egg / bird. The public farms buy the broiler chicks from the private farms specialized in producing broiler meat, and import the parent layer chicks to produce the layer chicks for their self-consumption. The surplus on layer chicks is sold to the private farms.

The public sector uses fodder mixtures and specific concentrates due to the kind of breeding, mandated by the central administration. The private sector, however, in its typical farms applies both fodder concentrate for poultry breeding and veterinary medicines under specialized supervision. The traditional breeding systems in rural areas rely on home food surpluses and cheap bran to feed their rural chicks.

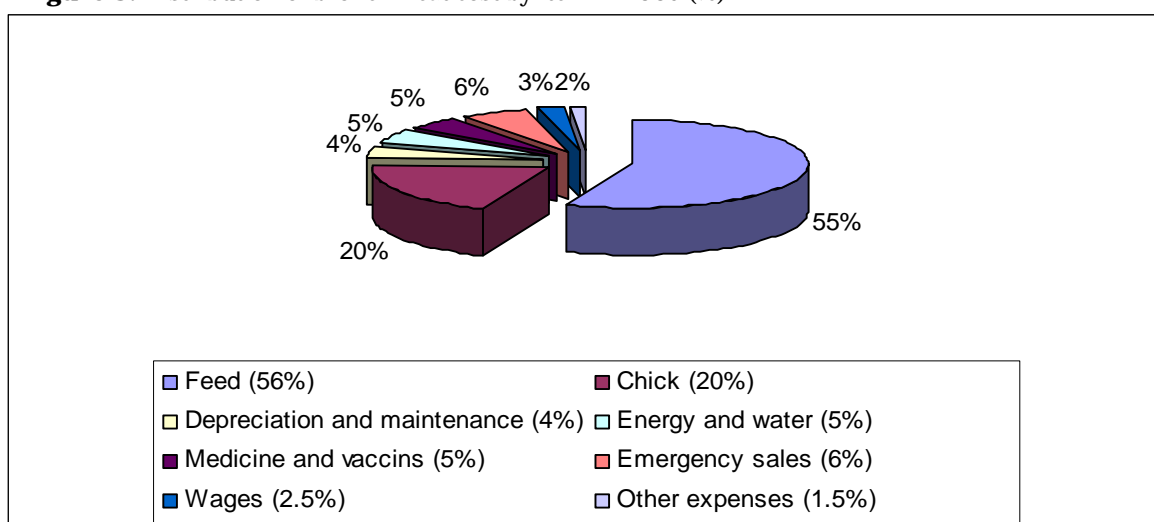
5.3. Production costs

Production costs comprise the cost items of buildings, equipment, maintenance, chicks according to breeding purpose, fodder, labor, water, electricity, vaccines ...etc). There are two major kinds of costs namely: the costs of broiler meat production and the costs of the production of table eggs.

5.3.1. Costs of broiler meat production

The production cost of one kilogram broiler meat is assessed for one phase (starting from buying the broiler chicks until the end of the breeding cycle, which is 45 days, and marketing the product). This kind of cost is calculated by including all the cost items mentioned before divided by the total number of produced birds or their weight taking into account 5.2 breeding cycles annually. This cost hasn't been stable during the last few years from 2000 to 2005 because of the variations in breeding chick prices during short periods of time. While the fodder prices and the other cost components have been relatively stable during the mentioned period². For example, the broiler chick price varied between 10 and 20 SP in 2005³. In light of the estimated production costs for 2005, the shares of ready made fodder and chicks in total cost amounted to 56% and 20%, respectively, whereas the remained shares of the other cost components were approximately distributed evenly as depicted in figure 8.

Figure 8. Distribution of broiler meat cost by item in 2005 (%)



Source: Elaborated from the data of MAAR- Directorate of Agricultural Economics

5.3.2. Costs of table egg production

The calculation procedure of these costs differs from that of meat production because of the two stages budgeting.

The first stage is concerned with the estimation of chick production as preparation phase for the second stage. This stage lasts for 5 month starting by buying the layer chicks aged one day. The annual birds' number is estimated for 2.5 cycles annually. The cost of this phase includes the same cost components of meat production.

The second stage focuses on the calculation of the total costs of egg production for one year period. These costs comprise the chick cost of the first stage plus all other cost items of the second phase. After that, the secondary revenues such as the placement meat and bird fertilizer are omitted from the total costs of breeding. Then, the resulting net cost of one bird are divided by the annual rate of egg production which is 270 egg/ bird to determine the cost of producing one egg.

It's worth noting that these costs are estimated for the private sector at the country level. Also, the public sector calculates the costs of producing eggs and broiler meat in its poultry farms

² NAPC- "State of Food and Agriculture 2005".

³ MAAR- Directorate of Agricultural Economics.

approximately by the same methodology depending on the formal data records of the farm. For example, in 2005, the average costs of the private sector were 59.8 SP/kg for broiler meat and 3 SP / egg, while those of the public sector were 57.67 SP / kg for broiler meat and 2.5 SP/egg. It's clear that the public sector costs are lower than those of the private sector for both kinds", since the public sector purchases some inputs at lower prices than those of the private sector and has more control on costs because of the implementation of the unified cost calculation system in all its farms.

In general, to reduce the costs of poultry production and to have comparative advantage, the input costs which form more than 75% of the total cost have to be reduced (i.e. the ready-made fodder prices and chick price). This can also be achieved by reducing the monopoly power on the major inputs in the market. In addition, special policies have to be adopted such as raising incentives to increase the local production of these fodder components such as maize and soy beans or providing them through import (the least cost of them).

6. Total supply of poultry products

The total supply of poultry products is calculated due the following equation:

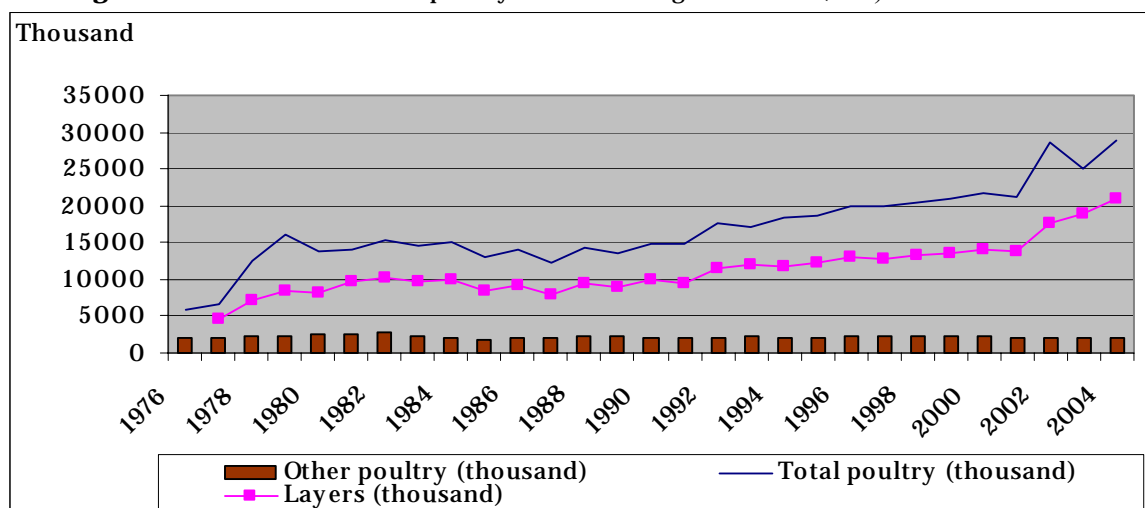
The total domestic supply = Total local production + import + stock change – (export + loss)

The total available supply = Total domestic supply + stock

6.1. Aggregate local production

The total poultry number (including Layers and broilers) recorded high rates of increases during the last decade attaining about 154% during 1995-2004, while the other kinds of poultry slightly increased ⁴ as illustrated in figure 9. This increase positively impacted the production of broiler meat and eggs, accompanied with the increasing demand for poultry products due to the population boost and the low prices compared to other animal products.

Figure 9. Evolution of the total poultry number during 1996-2004 (000)



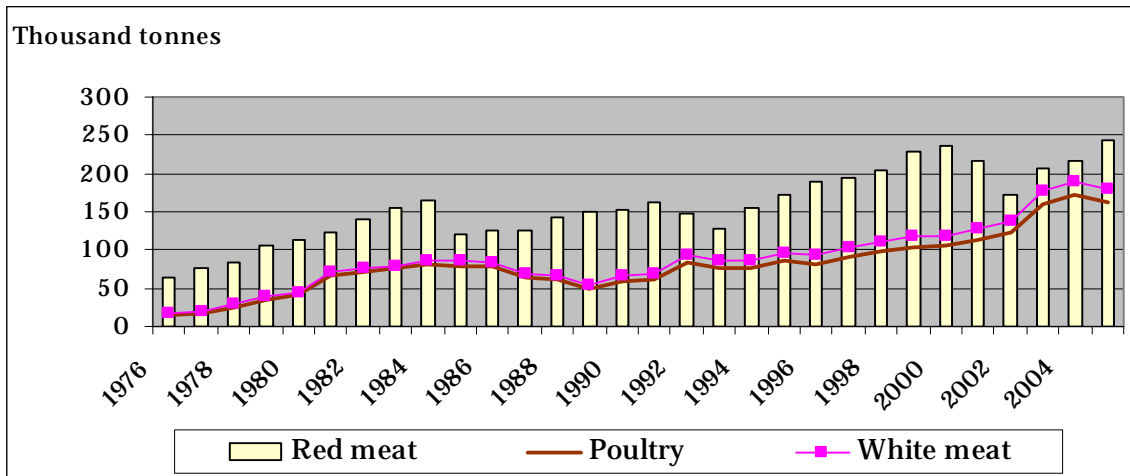
Source: Elaborated from MAAR Database

6.1.1. Aggregate production of poultry meat

⁴ The other kinds of poultry include pigeon, turkey, goose, duke, and rabbits.

The production of poultry meat amounted to 172 thousand tonnes in 2004 realizing a 100% increase against the production of 1995. Figure 10 presents the evolution of poultry meat and red meat over the period 1976-2004. It can be noticed that high rates of growth were achieved combined with short periods of slow down due to fodder availability, weather conditions and drought.

Figure 10. Evolution of poultry, white and red meat 1976-2004 (000 tonnes)



Source: Elaborated from MAAR Database

The descriptive statistics of the time series of white and red meat over the period 1976-2004 are presented in Table 8 taking into consideration that poultry meat forms about 90% of white meat. White meat shows a coefficient of variation of 47% and an annual growth rate of 6.2%. While Red meat has a coefficient of variation of 29% and an annual growth rate of 3.4%. Both mentioned indicators of red meat are substantially lower than those of white meat. These deviations are related to the enormous growth of white meat production since 1992.

Table 8. Descriptive statistics of white and red meat 1976 – 2004 (000 tonnes)

Item	Mean	Standard deviation	Minimum	Maximum	Coefficient Of variation %	Annual growth rate (trend) %
White meat	86	40	17	189	47	6.2
Red meat	154	45	65	236	29	3.4

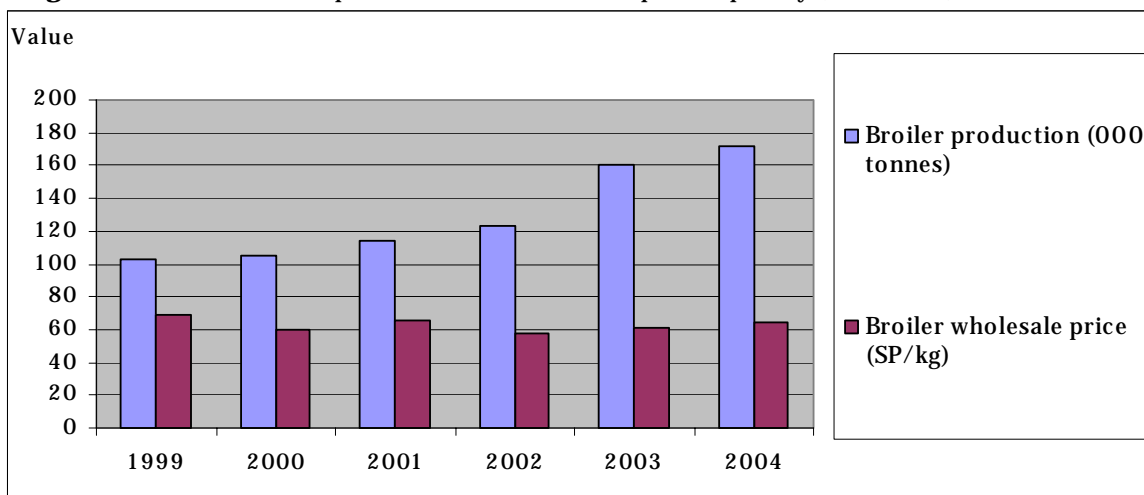
Source: Elaborated from MAAR Database

Figure 11 relates the evolution of the current wholesale prices of poultry to that of the poultry meat production; it indicates a direct relationship between the two measures.

The aggregate poultry production includes the public sector production, which was 4436 tonnes in 2004 forming 2.5% of the total meat production. It is expected that poultry meat production will amount to 278 tonnes in 2020 (Salem 2000).

In spite of the sound development of the local poultry production, it can't be concluded that this production meets the local market needs because of the absence of accurate scientific assessments to identify both the demand for poultry products and the equilibrium between market supply and demand.

Figure 11. Evolution of the production and the current price of poultry (1999-2004)



Source: Elaborated from MAAR Database

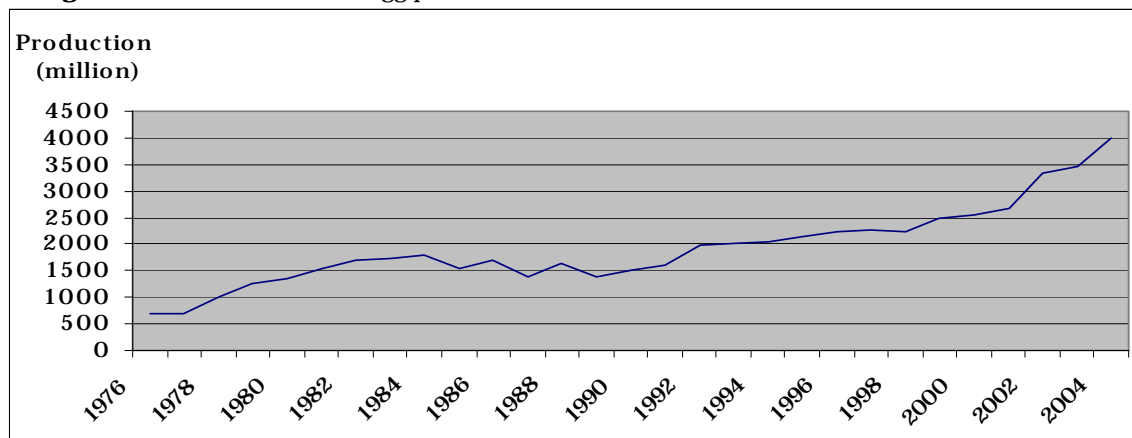
The number of poultry farms increased by 124% from 1995 to 2004 with an annual growth rate of 9%. The highest share of these farms (80%) is located in the suburbs of Damascus, Homes, Hama, Idleb, Tortuous and Dar'a. Homs Governorate has the highest number of these farms, about 18% of the total poultry farms⁵. Here, it is worth to note that the number of poultry farms and their productive capacity don't reflect the actual production in this sector because of the instability of production due to the high variations in the prices of some inputs. This may result in unexpected high profits which encourage new entrants or high losses which force some produces to leave this sector.

6.1.2. Production of table eggs

The production of table eggs recorded slightly lower annual growth rate than the poultry meat production over the period 1976-2004. The annual growth rate ranged between 5-6% via the calculation method.

Figure 12 depicts the evolution of the production of table eggs from 1976 through 2004. Table 9 shows the descriptive statistics of the time series for egg production over the period 1976-2004.

Figure 12. Evolution of total egg production 1978-2004 (million)



Source: Elaborated from MAAR Database

⁵ MAAR- the Annual Agricultural Statistical Abstract 2004

Table 9. Summary statistics of egg production (1976-2004)

Indicator	Total Poultry (000)	Layers (000)	Egg production (million)	Productivity of eggs (egg)
Average	16,873	11,334	1,929	171
Standard deviation	5,298	3,583	762	13
Minimum	5,897	577	700	141
Maximum	28,861	20,867	4,002	192
Coefficient of variation	%31	%32	%39	%7
Annual growth rate 1	4%	4%	5%	1%
Annual growth rate 2	6%	6%	6%	1%

Source: Elaborated from MAAR Database

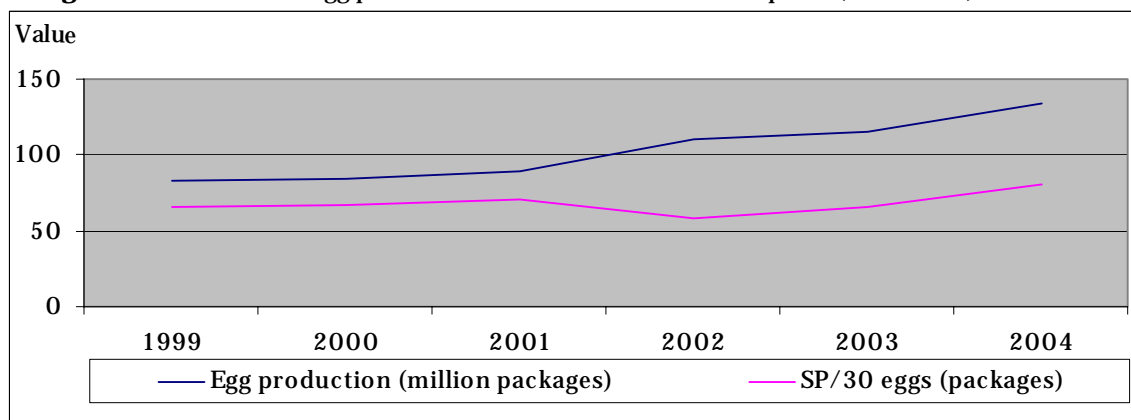
Annual growth rate 1 – Trend related method

Annual growth rate 2- Simple method

According to table 9, the coefficient of variation of egg production amounted to 39% which is lower than that for the poultry meat (47%) and higher than that for the number of layers (32%). Furthermore, the table indicates that there is a relatively stable improvement in egg productivity (+1% annual growth rate and 7% coefficient of variation) due to the progress in the quality of the provided services, the fodder mixtures and the breeding assets.

Figure 13 relates the evolution of egg production to that of the current wholesale price indicating a direct relationship between the two measures.

Figure 13. Evolution of egg production and its current wholesale price (1999-2004)



Source: Elaborated from MAAR Database

Again here, in order to know whether the local production meets the domestic market needs, accurate scientific statistical methods have to be used.

The aggregate production of table eggs comprises the production of the public sector which is 351 million eggs in 2004 forming about 10% of the total egg production⁶. The projected production in 2020 is estimated by 4808 million eggs (Salem 2000).

Layer farms are mainly located in Homes (52%) and Rural Damascus (30%) then followed by both Hama and Dar'a (6% for each); this means that the Middle Region of Syria forms more

⁶ Central Bureau of Statistics- The Annual Statistical Abstract 2005

than 58% of the layer farms. Moreover, the average growth rate of layer farms was 4% for the period 1985-2004. The highest growth rates were in Dar'a (9%) and Hama (7%). Negative growth rates were present in Dair-Ezzor (-7%), Aleppo (-2%) and Damascus (-15%). The negative growth rate in Damascus is due administrative and environmental reasons. It's clearly noticeable that there are substantial differences between the number of layer farms among the Governments. For example, there is one layer farm in both Al-Rakka and Dair Ezzor while 1224 layer farms are there in Homs, which indicates a certain kind of specialization in this field because of the climatical, environmental and geographical conditions, the availability of inputs and the marketing environment.

6.2. Imports of poultry products

There are no imports of poultry meats while the import of table eggs is very limited.

6.3. Wastage and losses

In general, poultry products are exposed to emergency sales, disease attacks (i.e. bird flu) and spoilage. In this context, it is worth noting that there is no accurate assessment about wastage and losses along the marketing chain. The Directorate of Agricultural Economics of the MAAR estimates the wastage and losses by about 10%. When the cost of production is calculated, the wastage and losses are assessed only by 6% of the total broiler meat cost, and by 11-14% of the total layer and egg costs.

7. Aggregate demand of poultry products

The aggregate demand for poultry products is assessed by estimating their domestic uses, the change in stocks and exports (foreign demand).

7.1. Domestic uses (total supply)

Domestic uses comprise human consumption and the consumption of food industry.

7.1.1. Domestic uses of poultry meat

The total local consumption of poultry meat is related directly to the final consumption of the population because there are no processing activities. Therefore, the estimation of the aggregate demand relies on the assessment of the per capita consumption through dividing the total supply by the population number. Furthermore, the aggregate demand coincides with the aggregate production, because there are no imports and exports, after deducting the wastage and losses and taking the stock change into account (if exists). The change in stocks is estimated as an average for several years. Here, it is worth to note that the per capita demand is correlated with several factors, the most important of which are the number of population, income, price of poultry meat and prices of the substitute products. Table 10 presents the demand projection of poultry meat according to the assessment of the MAAR.

Table 10. Demand projection of poultry meat from 2005 through 2025 (000 tonnes)

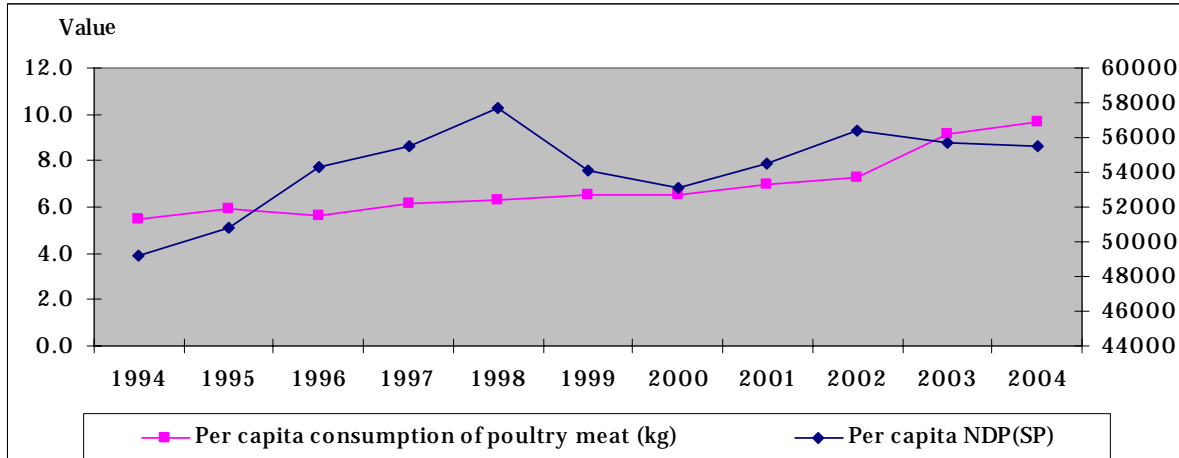
Item	2005	2010	2015	2020	2025
Poultry meat	116	141	170	206	249

Source: MAAR- Demand estimation for agricultural commodities (unpublished data)

The per capita consumption of poultry meat slightly increased until 2002 compared with the evolution of the production. Its annual growth rate amounted to 3.7% during period 1994- 2002. It increased by 32% between 2002 and 2004 following the boost in production. Taking into account that Syria doesn't export or import poultry meat, any increase in production is expected to be added to the per capita consumption. Furthermore, the attempt to relate between the evolution of the per capita demand of poultry meat and that of the per capita GDP indicates the same trend. On the other hand, relating the evolution of the per capita consumption of poultry

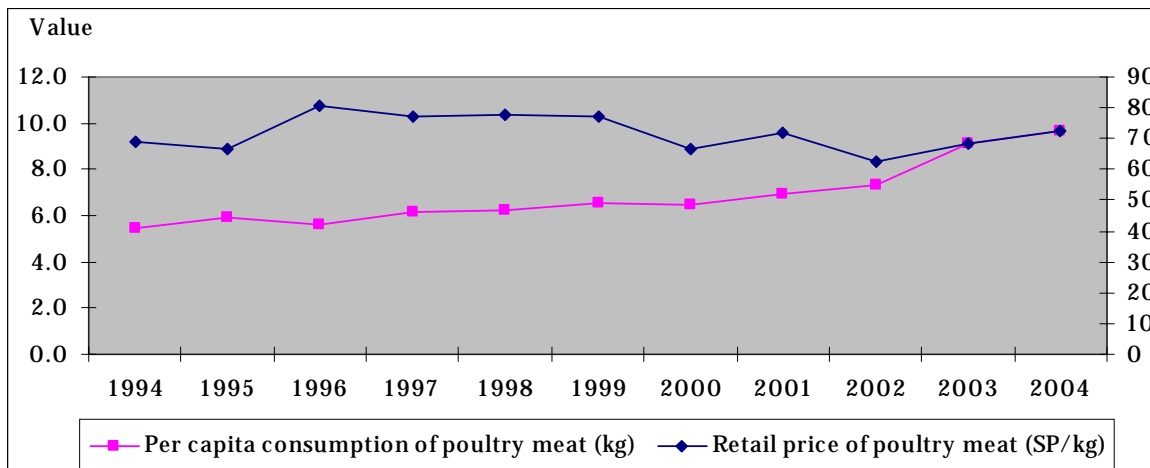
meat to that of the current retail price of poultry meat shows an inverse relationship (Figures 14 & 15).

Figure 14. Evolution of the per capita consumption of poultry meat and per capita NDP (1994-2004)



Source: Elaborated from MAAR Database

Figure 15. Evolution of the per capita consumption of poultry meat and current retail price (1994-2004)



Source: Elaborated from MAAR Database

7.1.2. Domestic uses of eggs

There are two kinds of produced eggs namely: table eggs and hatching eggs.

Table eggs

The domestic demand for table eggs is divided into the intermediate consumption of the food processing sector and the final consumption of the inhabitants. However, it's difficult to determine the volume of the demand of the food processing sector because eggs are used both in many kinds of sweets and in ready-made and processed food, and there is no data available about the marketing destinations. The final consumption of the population presents the largest

share of consumption throughout the wholesale and retail markets. Table 11 shows the demand projection of the population for table eggs until 2020.

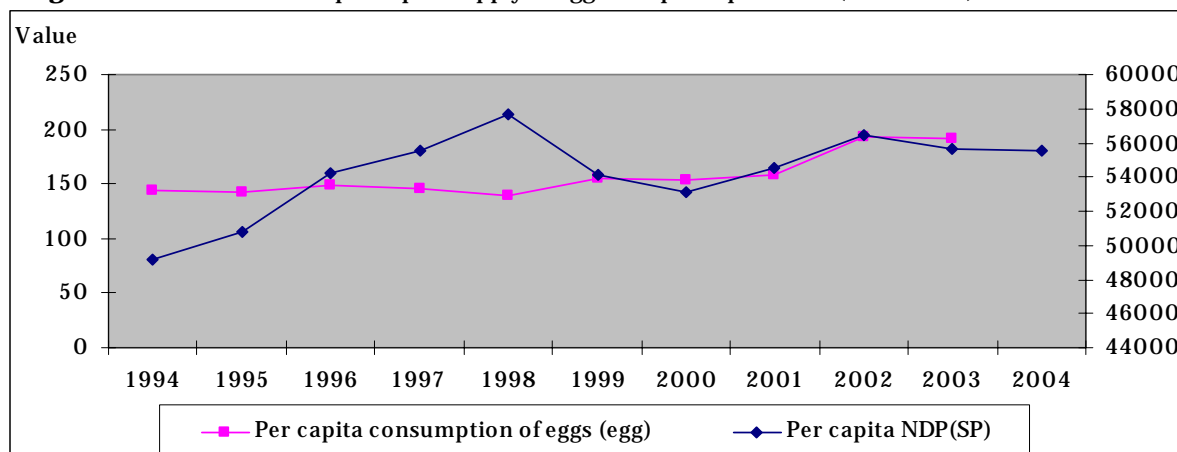
Table 11. Demand projection for table eggs 2005-2025 (million)

Item	2005	2010	2015	2020	2025
Eggs	2795	3272	3831	4485	5251

Source: MAAR- Demand estimation for agricultural commodities (unpublished data)

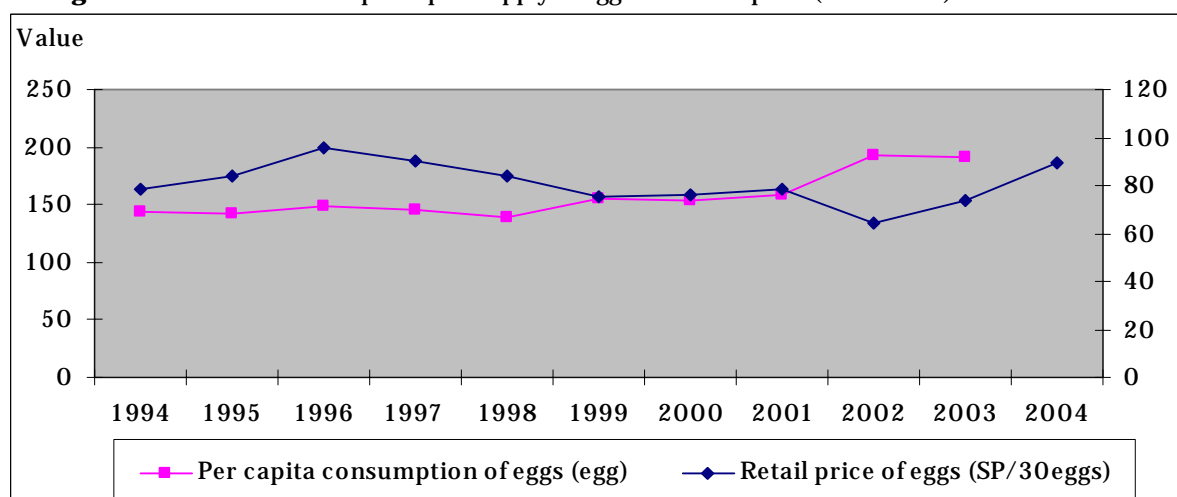
The per capita total supply of table eggs was 143 eggs in 1994 and increased to approximately 191 eggs in 2004 with an annual growth rate of 3%. Figures 16 and 17 relate the evolution of the per capita total supply of eggs to the evolution of NDP and the current retail price of eggs, respectively. Accordingly, there is a direct relationship between the per capita supply and NDP and an inverse relationship between the per capita supply and the retail price (after 2002).

Figure 16. Evolution of the per capita supply of eggs and per capita NDP (1994-2004)



Source: Elaborated from MAAR Database

Figure 17. Evolution of the per capita supply of eggs and retail price (1994-2004)



Source: Elaborated from MAAR Database

Hatching eggs

Hatching eggs formed approximately 9% of the total egg production during the last ten years, divided between the private and public sectors⁷. Most of the hatching eggs are used to produce broiler and layer chicks in both sectors accompanied with low export percentage. There are only very few numbers of producers and wholesalers who manage, produce, and distribute the hatching eggs and breeding chickens for the purpose of production.

7.1.3. Marketing of poultry products

Wholesale marketing

The wholesalers are considered as the most important agents of the marketing chain for both meat and eggs. Poultry products are gathered from broiler-chicken and layer farms all over the country by the wholesale traders after signing acceptable contracts. Then these products are distributed directly to the retailers inside or outside the Governorates, especially in large cities.

Regarding the products of the GEP (broiler after cleaning), they are frequently and directly distributed to the public sector institutions like hospitals, army (in addition to his own farms) and other institutions or exported.

Retail marketing

The retail marketing differs between broilers and eggs. Poultry retailers are specialized only concerning poultry meat.

Retailers of poultry meat sell either live broiler, where they clean the product on request before the buyer, or packed unfrozen broilers. Recently, the trade of broiler parts is spreading out complying with both the consumer new needs and purchasing power.

On the contrary, retail marketing of table eggs is a general trade not specialized; this means the wholesalers distribute this product to multi purpose retailers all over the country.

7.1.4. Prices of poultry products

The Ministry of Economy and Trade (MET) annually forms a committee including representatives of the MAAR, the Party and the Peasant Union to determine the poultry prices. These prices, however, are considered indicative and not always adopted by traders. Therefore, the supply and demand forces play the most important role in price determination of these products. Table 12 presents the retail prices of poultry and other products during 2000-2005.

Table 12. Evolution of the retail prices of poultry and meat products 2000-2005 (SP/kg)

Item	2000	2001	2002	2003	2004	2005	Growth rate (%)
Table eggs (30 eggs)	75	78	65	74	94		5.8
Live poultry meat	67	72	63	68	73	72	1.4
Boned sheep meat	154	188	191	202	230	245	9.7
Boned calf meat	129	142	155	157	170	194	8.5

Source: Elaborated from MAAR Database (NAPC and Directorate of Agricultural Economics)

It can be noticed from Table 12 that the poultry price is substantially lower and more stable than that of red meat during 2000-2005. Over this period, the annual growth rate of the retail price of poultry meat was 1.4% while it was 9.7% & 8.5% for sheep and calf meat, respectively. This explains the increasing demand for poultry meat especially for consumers with low income compared with the other meats. So, the aggregate demand for poultry meat is expected to increase significantly if the red meat prices are still at their current level. However, in spite of

⁷ MAAR- The Annual Agricultural Statistical Abstract

the stability in the prices of poultry meat and table eggs, the monthly prices are subject to vacillation along the year (table 13).

Table 13. Monthly prices of poultry meat and table eggs in 2004 (SP/kg)

Item	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Poultry meat	68	72	74	75	75	66	65	75	73	78	77	67
Table eggs	104	93	82	88	92	86	84	91	95	102	99	107

Source: MAAR- Directorate of Agricultural Economics

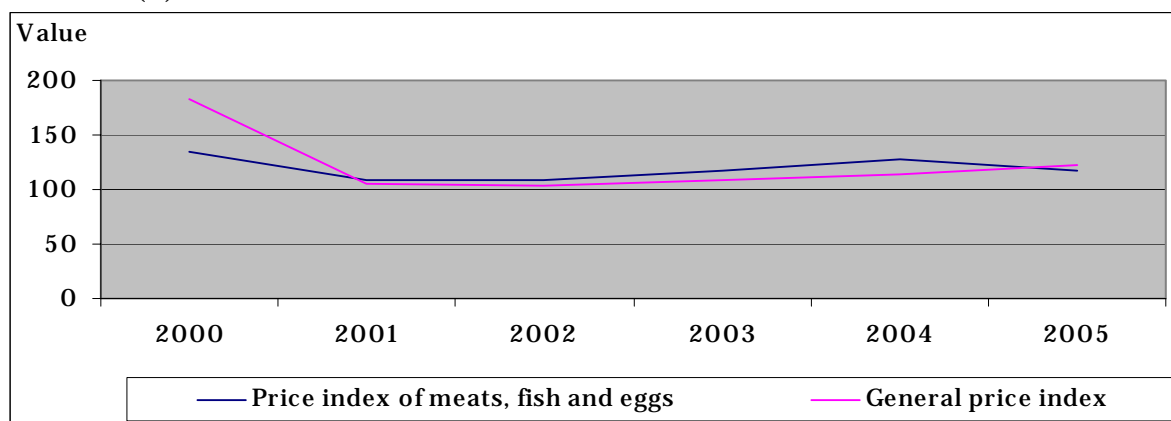
In general, the price index of meats, fish and eggs was lower during 1990-2000 than the general price index by considering 1990 as base year (figure 18).

Figure 18. Evolution of the general price index and the index of meats, fish and eggs during 1990-2000 (%)

Source: Central Bureau of Statistics (CBS)- The Annual Statistical Abstract- various issues

During 2000-2004, however, the price index of meats, fish and eggs was higher than the general price index by considering 2000 as base year, then it decreased to be lower in 2005 as illustrated in figure 19.

Figure 19. Evolution of the general price index and the index of meats, fish and eggs during 2000-2005 (%)



Source: CBS- The Annual Statistical Abstract- various issues

Tables 14 and 15 show the degree of correlation among Governorates concerning the retail prices of poultry meat and eggs, respectively. Table 14 indicates weak market integration (correlation coefficients below 0.5 or negative) among Governorates pointing out to a market segmentation and the presence of marketing opportunities among the various Governorates. Table 15, however, points out to a strong market integration (correlation coefficients greater than 0.5 and close to one) indicating that the law of one price is working fairly well.

Table 14. The deflated retail price correlation matrix among Governorates for poultry meat (1990-2004)

Governorate	Idleb	Al-Hassaka	Al-Rakka	Al-Sweida	Al-Quneitra	Lattakia	Aleppo	Hama	Homs
Idleb	1								
Al-Hassaka	0.2	1							
Al-Rakka	0.2	-0.5	1						
Al-Sweida	0.4	0.3	0.2	1					
Al-Quneitra	-0.2	-0.3	0.3	-0.3	1				
Lattakia	0.4	0.3	0.0	0.8	-0.5	1			
Aleppo	0.3	0.4	0.0	0.5	-0.4	0.3	1		
Hama	0.4	0.3	-0.1	0.8	-0.4	0.7	0.4	1	
Homs	0.3	-0.4	0.6	0.7	-0.2	0.6	0.2	0.5	1
Dar'a	0.5	0.0	0.3	0.5	-0.3	0.3	0.7	0.4	0.5
Damascus	0.4	0.7	-0.2	0.6	-0.5	0.5	0.5	0.7	0.1
Dair-Ezzor	0.5	0.2	0.5	0.8	-0.3	0.6	0.6	0.5	0.7
Tartous	0.3	0.5	0.0	0.8	-0.3	0.6	0.6	0.6	0.4

Source: Elaborated from MAAR Database

Table 15. The deflated retail price correlation matrix among Governorates for table eggs (1990-2004)

Governorates	Idleb	Al-Hassaka	Al-Rakka	Al-Sweida	Lattakia	Aleppo	Hama	Homs
Idleb	1.0							
Al-Hassaka	0.9	1.0						
Al-Rakka	0.7	0.8	1.0					
Al-Sweida	0.9	0.9	0.7	1.0				
Lattakia	0.5	0.7	0.8	0.7	1.0			
Aleppo	0.6	0.7	0.7	0.8	0.9	1.0		
Hama	0.5	0.7	0.7	0.7	0.8	0.9	1.0	
Hom	0.5	0.7	0.9	0.7	0.9	0.9	0.9	1.0
Dar'a	0.6	0.8	0.9	0.8	0.9	0.9	0.9	0.9
Damascus	0.6	0.8	0.9	0.7	0.9	0.8	0.8	0.9
Dair-Ezzor	0.9	1.0	0.9	0.9	0.7	0.7	0.7	0.7
Tartous	0.7	0.7	0.8	0.8	0.9	0.8	0.9	0.9

Source: Elaborated from MAAR Database

Finally, It's worth to note that eggs are distinguished from poultry meat by their ability to be stored and easy transported taking into account that Syrian consumers prefer unfrozen poultry meat. Furthermore, the advancement in communication and transportation technologies will lead to an efficient information and marketing process among Governorates.

7.2. Storage

There is no available information about the stored amount of poultry meat and eggs. The GEP uses the governmental freeze and storage units in all Governorates for a short period in case of

marketing crisis or export (mainly eggs); also the private sector can use these units for the same purpose.

7.3. Export

Syria was exporting few irregular quantities of poultry meat until 1998, then there has been no export. At the same time, Syria has been exporting eggs reaching a peak of 5,329 tonnes valued 144 million SP in 2003. The GEP exports two kinds of eggs namely table and hatching eggs (table 16). Table 17 traces the evolution of egg export from 2000 to 2004.

Table 16. GEP exports of eggs during 2000-2005 (Quantity: 1000 package, value: 1000 \$)

Item	2000		2002		2003		2004	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Table eggs	59	733	61	759	79	1,131	72	1,148
Hatching eggs	869	110	2773	337	2952	392	8	405
Total		883		1,096		1,549		1,553

Source: Elaborated from GEP

Table 17. Evolution of the aggregate Syrian export of eggs (2000-2004)

Item	2000	2001	2002	2003	2004
Exports quantity (ton)	2299	763	3041	5329	2379
Export value (000 SP)	100505	22468	85602	143724	68820

Source: Elaborated from NAPC Database

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