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Red meat production, marketing and trade in Syria

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SUMMARY - Red meat production is an important activity of the agricultural sector in Syria where both the human and sheep population have grown at annual rates of over 3.5% and 3.3%, respectively, in the last two decades. Cattle numbers have grown at a more modest annual rate of 1.6% and goat numbers by only 0.6%. Red meat prices are affected by feed availability and climatic conditions, with a shortage of feed increasing meat prices and low rainfall reducing them. Prices also depend on consumers' preferences, with lamb having the highest price, followed by beef and then goat meat. The quantity of red meat produced annually is based on calculations made by the Ministry of Agriculture and Agrarian Reform, whereas the quality and dressing percentages of the various categories are based on information from the Ministry of Supply. Red meat production has increased during the last two decades, but this is due to the larger numbers of animals rather than to better efficiency. *Per-capita* annual consumption of red and white meat has also increased from 8 kg and 2 kg, respectively, in 1976 to 12 kg and 7 kg, respectively, in 1995. Sheep heads the list of imported and exported livestock, Awassi lambs being specially demanded from neighbouring countries. Self-sufficiency in red meat reached 95% in the late 1980s but it has probably decreased since then as the growth in domestic production has failed to keep pace with the rapid increase in the human population and in the demand for meat.

Key words: Red meat, production, marketing, Syria.

RESUME - "La production, la commercialisation et les échanges de viande rouge en Syrie". La production de viande rouge est une activité importante du secteur agricole en Syrie où les effectifs des ovins et la population humaine ont crû annuellement, durant les deux dernières décennies, de plus de 3,5% et 3,3% respectivement. Les bovins ont crû au taux annuel plus modeste de 1,6% et les caprins de seulement 0,6%. Les prix du marché sont affectés par les disponibilités alimentaires et par les conditions climatiques ; ils augmentent en cas de pénurie d'aliments et diminuent en cas de faibles précipitations. Les prix de marché dépendent aussi des préférences des consommateurs : l'agneau a le prix le plus élevé, suivi par la viande de boeuf et ensuite la viande de caprins. La quantité de viandes rouges produite annuellement est basée sur les calculs du Ministère de l'Agriculture et de la Réforme Agraire ; la qualité et le rapport poids carcasse/poids vif des différentes catégories sont déterminés par le Ministère de l'Approvisionnement. La production de viandes rouges a augmenté durant les deux dernières décennies, mais ceci est dû à l'augmentation du nombre d'animaux plutôt qu'à une efficacité plus élevée. La consommation annuelle par habitant de viandes rouges et blanches a augmenté respectivement de 8 kg et 2 kg en 1976 à 12 kg et 7 kg en 1995. Les ovins sont à la fois les plus exportés et les plus importés, les agneaux de race locale "Awassi" étant très demandés dans les pays voisins. Le niveau d'auto-suffisance en viande rouge a atteint 95% à la fin des années 1980 ; mais, ce niveau a vraisemblablement baissé depuis, car la croissance de la production locale n'a pas pu satisfaire les besoins en viande engendrés par la rapide croissance démographique.

Mots-clés : Viande rouge, production, commercialisation, Syrie.

Introduction

Many countries in West Asia and North Africa show a steady increase in the demand for red meat, driven by rapid growth in the human population and increasing purchasing power of the people. The situation in Syria fits this model (CBS, 1995). Its human population today is 14.2 million and has been growing at 3.3% during the last two decades, among the highest rates in the world (World Development Report, 1994). However, the real income of its people has grown at a modest annual rate of about 1% and in 1995 the *per capita* gross domestic product was US\$ 872 (CBS, 1995). The livestock sector accounts for 40% of the value of agricultural output which in turn contributes 32% to

the gross domestic product of Syria (Swaid, 1994). Red meat production is the main output of the sheep, goat and cattle sectors, and 77% of the total volume is from sheep (MAAR, 1995).

The sheep, goats and cattle in Syria are concentrated in different parts of the total area of 18.5 million hectares (MAAR, 1995). Numbers fluctuate, particularly after a season with low rainfall. In winter and spring, the sheep are mostly concentrated in the areas receiving less than 250-300 mm annual rainfall which includes the steppe (Thomson *et al.*, 1989). The steppe covers some 65% of the country and in many areas its condition has deteriorated sharply because of excessive grazing pressure and cultivation for barley production. Between December and March the sheep are therefore heavily dependent on hand-fed concentrates, agro-industrial by-products and cereal and legume straws, with grazing making a modest contribution. In summer and autumn they are found grazing cereal stubble and irrigated residues in the cropped area that covers 6.1 million hectares. Of this area, 4.8 million hectares are used for rain-fed crops, 0.7 million hectares for irrigated crops, the remainder being fallow. The goats tend to be found in areas receiving over 250 mm annual rainfall and the cattle are mainly confined to higher rainfall areas where adequate moisture allows sufficient production of feed.

This paper uses mainly statistical data to examine the production, marketing and trade of red meat in Syria. These issues have considerable strategic importance given the high population growth rate and slowly increasing incomes. Meat production from sheep, goats and cattle is emphasized since buffalo and camel meat production is insignificant. The paper also considers white meat production and certain aspects of the feed supply since these are pertinent to an analysis of the overall meat supply and demand situation in the country. Actual prices rather than prices adjusted for inflation are quoted in the paper.

Livestock resources in Syria

The indigenous livestock breeds of Syria are well adapted to the arid conditions in the degraded steppes, the semi-arid rain-fed cultivated areas such as Al-Djezera in the north-east, and the irrigated Euphrates and Al-Ghab valleys and the Ghoota area near Damascus. Livestock resources in order of importance in 1994 included sheep (11.2 million), goats (1.03 million) and cattle (0.72 million) (MAAR, 1995). In 1995 there were just 1,300 buffalo and 6,500 camels. However, interest in the latter species is increasing due to the need to conserve the country's indigenous animal genetic resources. Among the white meat producers, poultry are predominant (18.5 million), whereas fish make a small contribution.

Sheep

Sheep are the most important livestock resource, being found across most regions of the country. The fat-tailed Awassi is the main breed. It is famous for its meat and milk products and is known for its ability to tolerate heat, drought, cold and long treks (Epstein, 1985). The level of production is substantial considering the harsh conditions but the population also has a large amount of unexploited genetic potential. Awassi lambs grow fast and can reach 20 kg live weight at two months of age (Bahhady *et al.*, 1988). If they are fed a concentrate diet their live weight can reach 40 kg five months after birth. Ewes produce about 60 kg of milk after lambs have been weaned at 2-3 months old.

When the first livestock census took place in 1951, there were 3 million sheep in Syria (Ministry of Agriculture, 1960). From about 6.5 million in 1976, numbers increased steadily at an annual rate of 6% until 1985 and then at 0.4% annually until 1995. Today the total number is about 12 million (MAAR, 1995) (Fig. 1). However, many of the values are estimates, which are adjusted in some years following a census, for example in 1993. Also, years of well below average rainfall, as in 1985, caused high losses in the steppe.

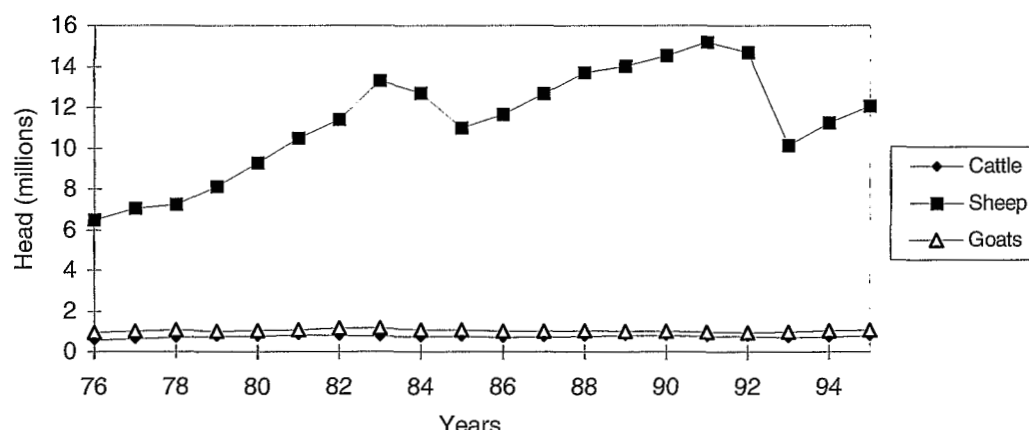


Fig. 1. Evolution of the number of head of cattle, sheep and goats. Source: MAAR (1995).

Goats

Today there is only one goat for every 12 sheep in Syria. However, since 1976 numbers increased slightly from 0.96 million to 1.03 million in 1995, an annual growth rate of 0.55%. The reason for this low number goes back to 1954 when the Ministry of Agriculture issued Decree No. 86 dated 30 September 1953, discouraging ownership of goats in mountainous areas. This is because they were perceived as destructive grazers contributing to vegetation damage and soil erosion. The relatively low numbers are also partly explained by the limited demand for goat meat which consumers rate after lamb, mutton and beef. However, the meat from kids is popular.

Goats are still found in most parts of Syria, apart from the steppe where their numbers are low. There are two breeds, the mountain and the Shami (Damascus) goat. Mountain goats are found in the mountainous west, and in the rainfed and irrigated-cropped areas. They are dual-purpose animals, raised primarily for milk, and account for 83% of the goat population. The Shami goat, on the other hand, is distributed in the Ghoota area of Damascus and other irrigated regions. It is raised for milk and used as a milk-improver breed for crossing with the mountain goat.

Cattle

Cattle numbered 0.57 million in 1976 and reached 0.72 million by 1995, a 1.6% annual rate of increase (Fig. 1). There are several breeds in Syria, the most important being the Aksi that comprises half of the total numbers. It is found along the Euphrates and Khaboor rivers and in the high-rainfall zone; it is raised for meat. Cattle of the exotic Friesian breed account for 29% of the total population. They are raised primarily for milk production. Shami (Damascus) cattle represent about 6% of the total. They are kept mainly for milk production and are found in the Ghoota area near Damascus. The rest of the cattle are a mixture of imported and local breeds.

Estimation of annual off-take

Annual red-meat production from farm animals can be derived from the number slaughtered and the average carcass weight. The estimated annual off-take is based on information issued by the Ministry of Agriculture and Agrarian Reform in its Decision No. 82 dated 26 March 1985. It describes the percentage of animals of reproductive age in a herd, fertility of females, mortality of adult and young females, "emergency" slaughters, replacement rate, as well as the average carcass weight of the slaughtered animals. The values used to estimate off-take for each species of animal are given in Table 1. Details of the slaughter age, live weight at slaughter, dressing percentage and the carcass evaluation and grading scheme for the different species of livestock are shown in Appendix Tables A1-A5.

Table 1. Values used to estimate off-take (Decision No. 82, 26 March 1985, Ministry of Agriculture and Agrarian Reform)

	Sheep Awassi	Goats		Cattle (All)
		Shami	Mountain	
Reproductive females in herd (%)	65	65	68	80
Fertility (Females giving birth/100 exposed to males)	80	80	70	77
Twinning rate (live births/100 parturitions)	103	170	110	NA
Culling rate (%)	15	15	15	16-18
Mortality (%)				
Adult	3	4	4	2
Young	8	15	12	10
<i>Emergency</i> [†] slaughters (%)	2	5	5	1
Carcass weight (kg) (for cull sheep = 25 kg)	18	10	8	142
	(lamb)			

[†]Sick animals slaughtered so that they can be used for household consumption

NA: Not available

A description follows of the various categories of sheep offered for slaughter:

(i) Suckling ("wardi") lambs are slaughtered before weaning and weigh only 10-15 kg. Officially such slaughtering is prohibited; it therefore takes place privately away from slaughterhouses in February and March.

(ii) Weaned lambs are slaughtered 3-5 months after birth between March and May when they weigh 25-30 kg.

(iii) Lambs fattened with milk ("mahjoun") continue suckling until 5-6 months of age. Small amounts of concentrates are also fed. These lambs are sold between April and June when they weigh 40-45 kg. This method is more common in the steppe but it is practiced by a few flock owners in the villages.

(iv) Grazing lambs are weaned lambs offered for sale in spring by flock owners or dealers across the steppe. They are grazed on steppe pastures for periods of 3-5 months, mainly in years of above average rainfall, and sold in autumn.

(v) Fattening lambs are lambs of various ages fed on concentrates for 60-90 days, depending on the diet and the age and condition of the lambs at purchase. Daily live weight gains of 150-220 g are common. Fattened lambs are sold throughout the year.

(vi) Culled ewes and rams are sold at different times during the year, and either slaughtered immediately or fattened and then slaughtered. They yield dark, low quality, fibrous meat.

Marketing and pricing policy

The main sheep producers are the Bedouin; around 65% of all the sheep in Syria are said to be based in the steppe (Swaid, 1994). They raise and herd sheep for meat, milk, and wool production. Most of their animals are sold in city markets. Sheep, along with cattle and goats, are also raised by farmers in cropped areas, and are sold through local markets. Although there is no supporting statistical information, the highest percentage of sheep is said to pass through the fattening

cooperatives before going back to the market to be sold for export or slaughter. The remainder are either taken directly to slaughterhouses or exported.

Market prices play an important role in the decision-making process of farmers. They fluctuate from year to year due to rainfall variations (see below), but also within seasons. Thus, farmers try to sell their stock at times of the year when prices are favourable, such as before the main religious festivals ("Eid Al Fitr, Eid Al Adha") or before the new lamb crop begins to reach the markets in spring. However, their decision is often determined by the need for immediate cash, particularly in the winter when flocks are hand-fed with feed that is normally purchased at markets once farmers' own stocks are used up.

Barley grain is considered the most important and useful feed (Mazid and Hallajian, 1983; Leybourne, 1993). It determines trends in the prices of sheep and feed (Najjar, 1993). Seasonal rainfall also affects market prices. For example, in a year of low rainfall, barley yields are reduced, thus decreasing availability, and high demand from farmers pushes up prices, as in 1990 (Fig. 2). The slight decrease in barley prices after 1990 was due to the removal of controls on barley imports and exports. At the same time, low rainfall results in farmers selling stock, which lowers the price of meat.

Figure 2 also shows that the price of lamb carcasses in Aleppo slaughter house decreased somewhat after 1990, which was partly due to the importation of "lower quality" sheep. The latter has a lower retail price because consumers consider it inferior to the Awassi meat they are familiar with. In 1993 the difference in the retail price between the local Awassi and imported sheep known as "bella", which are usually thin-tailed breeds aged one year or more, was SL55/kg (SL51.00 = US\$ 1.00). But consumers are becoming accustomed to the taste of the imported meat and in 1996 the price difference was about SL30 (Fig. 2). Beef has always been cheaper than lamb since consumers considered it to have a lower quality (Fig. 3). Between the mid-1980s and 1992 the difference in the price between beef and lamb tended to increase but then narrowed somewhat.

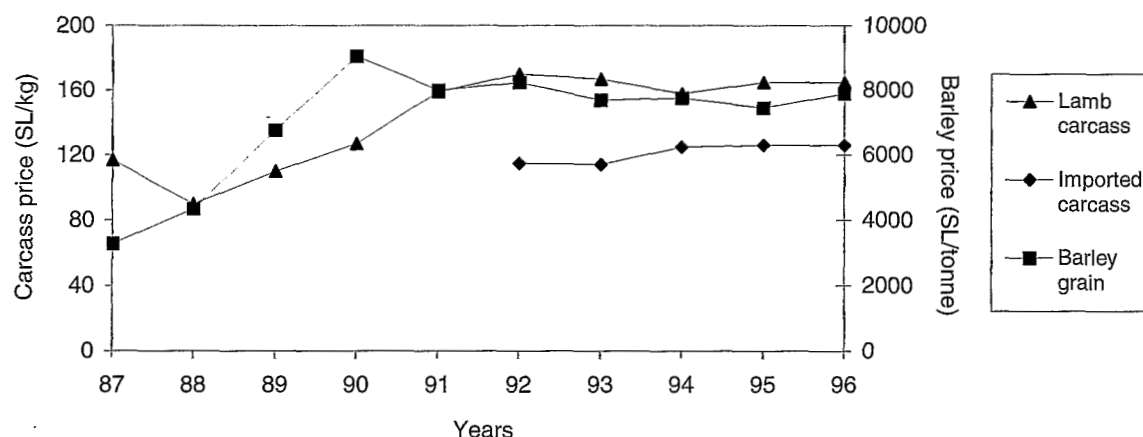


Fig. 2. Evolution of prices for lamb carcass, imported carcass and barley grain. Source: Thomson and Bahady (unpublished data); Aleppo slaughter house (unpublished data).

Red meat production and consumption

Red meat is an important source of animal protein for the Syrian people which complements the proteins from milk products (yogurt, cheese, "ghee") and food legumes (lentil, chickpea and faba bean). Its production has increased due to developments achieved during the last two decades in the livestock sector and the greater attention by the government to strengthen the research service and the private sector. In addition, permitting the import of feed has helped to stabilize feed prices in local markets, an event that has not happened for some time. This feed price stability has been reflected in the prices of red and white meat.

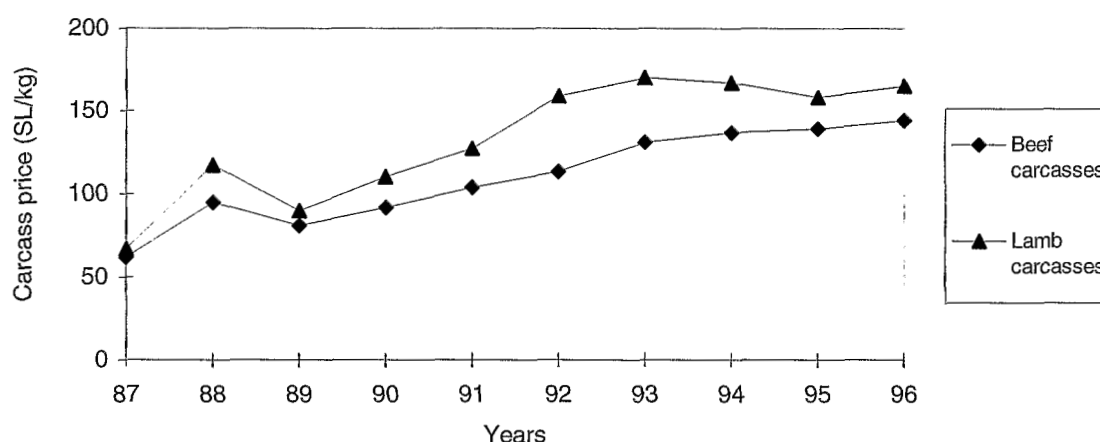


Fig. 3. Evolution of beef and lamb carcass prices. Source: Aleppo slaughter house (unpublished data).

In 1976, red meat accounted for 79% of the total meat produced in Syria (Fig. 4), (MAAR, 1995). During the next 20 years, white meat production increased at the expense of red meat, and reached 36% of total meat production by 1995. Detailed information is shown in Table 2 for the different types of meat. During the same period it is possible to estimate from the data in Table 2 that sheep meat increased from 70 to 77% of total red meat consumption, at the expense of both beef (23 to 20%) and goat meat (7 to 3%). These findings show the importance of sheep as the main source of red meat in Syria. The increase in consumption of white meat is because it is cheaper than red meat, due to government encouragement of the private poultry sector. Since 1972, many people built large poultry farms, which use intensive production systems and advanced breeding and rearing techniques.

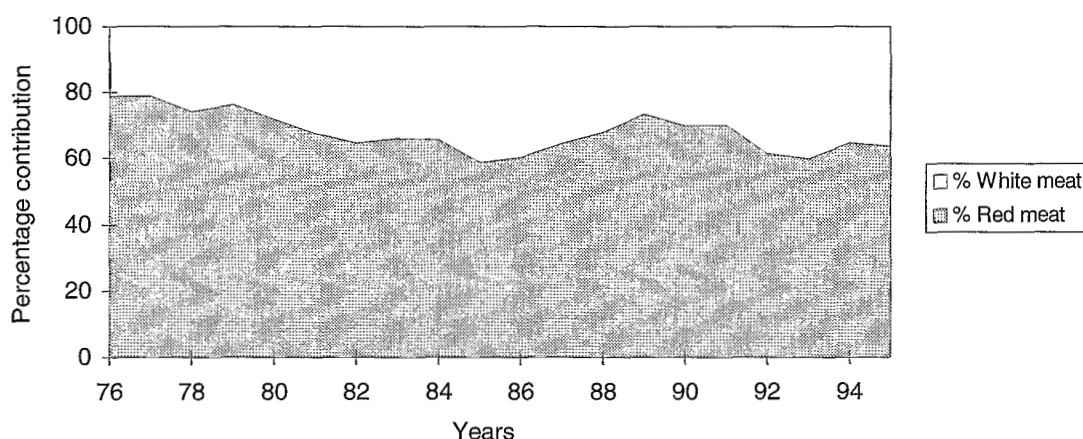


Fig. 4. Contribution of white and red meat to total meat production. Source: MAAR (1995).

Meat consumption *per capita* has steadily increased for both red and white meat. May (1961) reports that the annual *per capita* meat consumption in Syria in the early 1960s was one of the lowest in the Middle East, at only 8 kg. However, as mentioned previously, milk products were, and continue to be, a significant part of the diet (FAOSTAT/PC, 1995). By 1982 the annual *per capita* consumption of meat had increased to 23.1 kg, compared with averages of about 11 kg red meat and 9 kg poultry meat in West Asia and North African countries (FAOSTAT/PC, 1995). In 1976, the quantity of red meat produced was 63,700 tons (Fig. 5), and annual meat consumption *per capita* was 8.3 kg (CBS, 1995). By 1995 annual red meat production reached 170,400 tons (Fig. 5), and annual consumption *per capita* had increased to 12.0 kg. This amount is divided between sheep, goats and cattle in the amounts 9.2, 2.4 and 0.5 kg, respectively. Increases in living standards, due partly to oil production

and to the price-stabilizing policies of the government, are the main reasons for the increased meat consumption. *Per capita* camel meat consumption has decreased due to the fall in animal numbers during the last 20 years, and buffalo meat consumption is negligent since the population is small (MAAR, 1995).

Table 2. Percentage contribution of ruminants, poultry and fish to meat production in 1976 and 1995 (MAAR, 1995)

	Red meat (%)				White meat (%)		
	Sheep	Cattle	Goats	Total	Poultry	Fish	Total
1976	55	18	6	79	17	4	21
1995	49	13	2	64	32	4	36

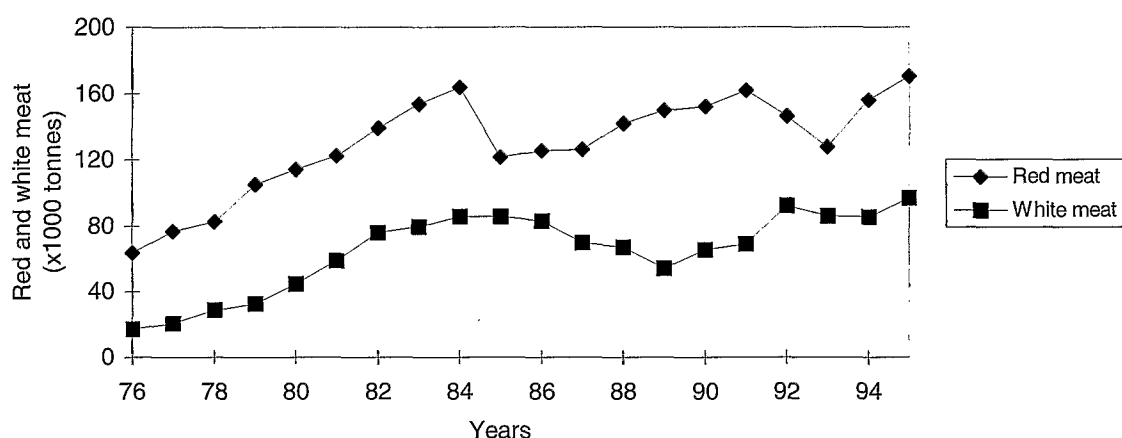


Fig. 5. Evolution of red and white meat production. Source: MAAR (1995).

In 1976, white meat production reached 17,000 tons (Fig. 5), giving an annual meat consumption *per capita* of 2.0 kg (CBS, 1995). This had increased to 97,000 tons in 1995, when annual *per capita* white meat consumption was 7 kg. The higher annual increase of white meat than red meat production made it possible to meet the increasing demand for meat, which would otherwise have been imported. Even though it has shortcomings, this statistical information suggests a noticeable improvement in meat production that largely covered domestic demand by the late 1980s. Thus, the self-sufficiency level of 86% in 1972 increased to 95% in 1988 (Asa'ad, 1990). More recent estimates of self-sufficiency are not available although it is likely to have fallen during the 1990s.

As indicated above, the substantial increase in the production of white meat was due to the availability of entrepreneurs who could invest in modern methods of production but had to import feeds for the animals, particularly soya bean meal. However, red meat production from sheep in particular is dependent on the condition of the steppe and the availability of stubble and crop residues which are themselves affected by variability in rainfall. Therefore, investing in better methods of production was, and continues to be, quite risky. The typical situation is found in a year of below average rainfall. Pastures are poor which increases the demand for feed, and feed prices rise. Initially farmers try to keep their flock intact but they sell some animals to pay for the increasingly expensive feed. An over supply of animals for slaughter results in red meat prices falling which decreases returns to farmers. Thus, farmers lose out in two ways. First, feed prices increase and second, sheep prices decrease.

Projected red meat production and consumption, 1990-2000

Red meat production is projected to reach 274,000 tons by the year 2000, assuming that the human population reaches 17 million in that year (CBS, 1995). However, based on an increase in the expected *per capita* consumption from 11.5 kg red meat in 1990 to 17 kg in 2000, total consumption would be about 290,000 (CBS, 1995). Actual red meat consumption will depend on *per-capita* income and availability, which in turn is affected by import and export policies. This analysis suggests that there could be a gradual decrease in self-sufficiency for red meat at least, as the gap widens between consumption and domestic production. The decrease may not be so great since the projected increase in *per capita* consumption is higher than is likely to be the case.

The gap could be reduced by increasing red meat production using two approaches. First, by increasing the number of livestock. This depends on the amount of rainfall, which cannot be controlled, the condition of the steppe, which is difficult to improve, and forage production, which is being promoted. The second is the introduction of feeding practices that improve the productivity of local breeds, and improving the local breeds themselves. Alternatively, white meat production could, and probably will, fill the gap, although this would result in still higher imports of feeds.

Import and export of red meat and live animals

The Awassi breed is famous for its high-quality products, specially the quality and taste of its meat. For many years Syria has supplied the Arabian Peninsula, Lebanon and Jordan with Awassi lambs and fattened kids because prices in these countries are higher due to the better incomes of many of the people. To compensate for the large numbers exported, Syria imported sheep from Turkey until 1993, but today imports sheep from Eastern Europe.

With the exception of 1993, imports of fresh and frozen red meat were low and usually below 10,000 tons each year (Fig. 6). They reached 53,000 tons in 1993 because of policy changes, then fell back. Again with the exception of 1993, red meat is seldom exported.

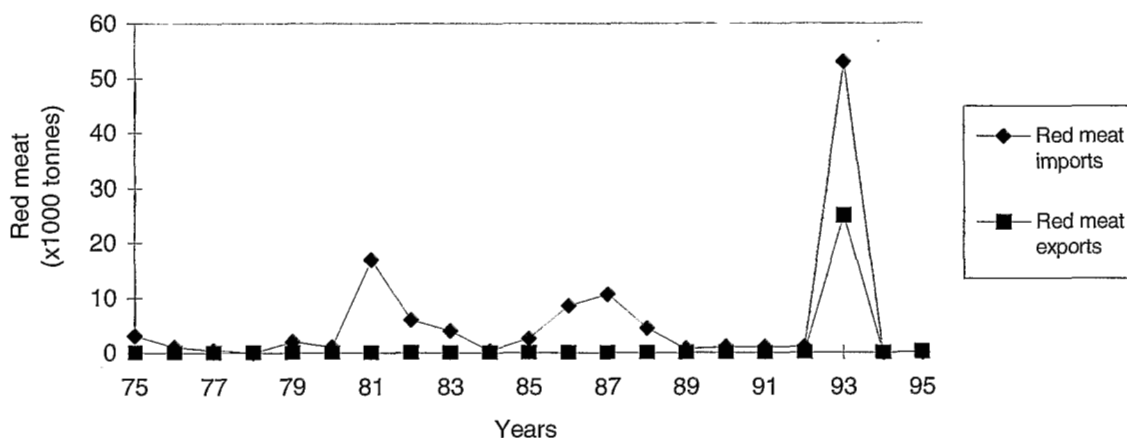


Fig. 6. Evolution of red meat imports and exports. Source: MAAR (1995).

Most of the imported and exported live animals are sheep (Fig. 7). Exports and imports are supervised either by the General Meat Company or by allowing traders to export a limited number of sheep after obtaining a license from the Ministry of Economics. Traders have to abide by certain rules such as importing twice as many sheep as they export. Export policy is also dependent on the climatic conditions, with more exports being permitted in years of drought. The number of sheep exported annually during 1991-93 exceeded one million heads, whereas the number imported peaked at over two million heads in 1993 (Fig. 7).

Goats are not imported for two reasons (Fig. 7). First, there are sufficient animals to meet the limited demand, and second, their meat, at least from adults, is not popular with consumers. As a result there is export to neighbouring countries and numbers were substantial between 1990 and 1995, reaching 200,000 head in 1990. However, there are large annual variations. Cattle, mostly pregnant Friesian heifers, are imported to be raised mainly for milk production. Their numbers reached about 23,000, 10,000 and 20,000 in 1984, 1987 and 1994, respectively, but were otherwise very low. Cattle are not exported because their numbers are few. The value of exported live animals of all species was estimated to be about 12-35% of Syria's total agricultural exports in the years 1989-1994 (Table 3). Sheep accounted for the major part of these exports.

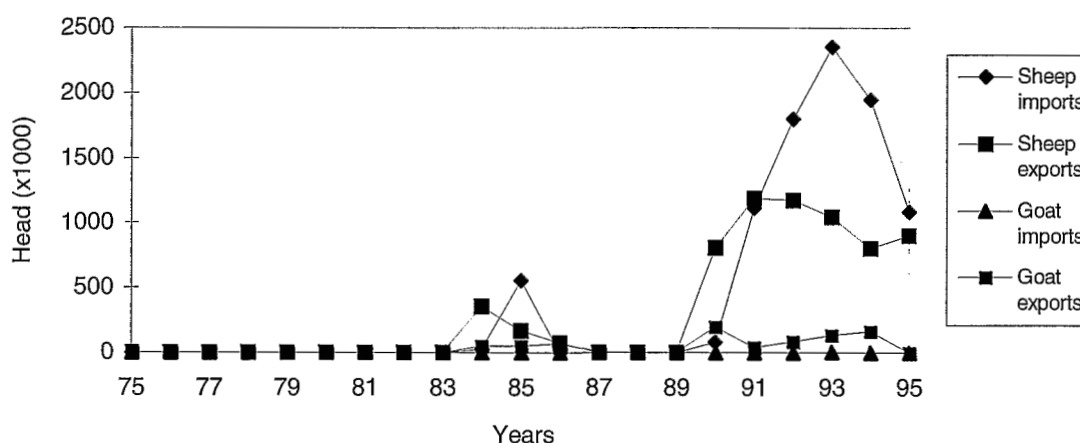


Fig. 7. Evolution of imports and exports of sheep and goats. Source: MAAR (1995).

Table 3. Total value of exported and imported live animals, 1989-94 (US\$, million) (FAO, 1995)

	1989	1990	1991	1992	1993	1994
Imports	44.5	41.7	74.5	121.7	70.0	72.4
Exports	161.4	230.3	123.2	116.1	87.9	82.5

Obstacles to red meat production

Concentrate feeds account for a major proportion of the costs of red meat production. Government mills produce most of the agro-industrial by-products such as cottonseed cake, cottonseed hulls, wheat bran and sugar-beet pulp. Grains such as barley and feed-quality wheat, which are produced by the private sector, are controlled and marketed by two government agencies, the Cereal Bureau and the General Organization for Feed. The price of most feeds, therefore, is determined by the government. Indeed, a major cost of the different meat production systems is associated with a pricing policy determined by the government, which, therefore, indirectly controls the production costs.

The price of live animals sold by the producer is determined by market supply and demand, and there is no fixed price because the government is not responsible for the marketing of live animals. Fattening cooperatives are also not involved in the marketing of animals. The price of live animals received by the producer is usually less than what they feel it should be. This is the case in most countries. On the other hand, consumers usually pay more than the official price determined by the Ministry of Supply. Therefore, there is reputedly a wide margin between the 'farm gate' price of live animals sold by producers and the retail price of meat paid by consumers. The market dealers, also known as middlemen, agents or intermediaries who are the link between the producer and butcher,

are said to make good profits at the expense of the producers. Research is needed on this whole subject to quantify the wholesale and retail margins.

Until 1994, a large number of sheep and, to a lesser extent other species, were slaughtered by small dealers away from the official Aleppo slaughter house but close to butchers. Butchers purchased these animals at a somewhat lower price than from the slaughterhouse and thereby increased their profit margin. Such animals were not given a health inspection. In 1994 the provincial government introduced a regulation whereby small dealers could use the facilities of the city slaughterhouse at no charge but the carcasses and offals would be inspected and given a stamp before being sold. Evidence that this new regulation is popular can be seen in the large increase in the number of sheep slaughtered at Aleppo slaughterhouse in 1994 (Fig. 8).

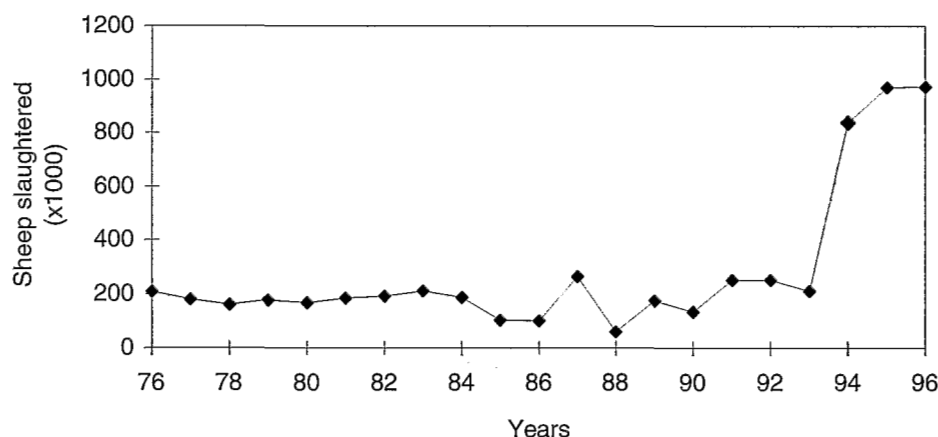


Fig. 8. Evolution of number of slaughtered sheep. Source: Aleppo slaughterhouse (unpublished data).

The raising of red meat producing animals in Syria is affected by many factors, which are outlined below:

(i) *Polices*: Range cooperatives were established in the steppe during the 1970s and 1980s to increase sheep off-take, improve the pastures and divide the steppe between the different sheep-owners irrespective of traditional tribal boundaries (Nygaard *et al.*, 1982). In addition, the cooperatives planted fodder shrubs over wide areas of the steppe, yet the grazing lands still deteriorated. In most cases sheep owners were not convinced about the benefits of the shrubs and the plantations were mismanaged and the plants died. Another problem has been the decrease in the number of lamb fattening and finishing units, which took animals to a higher, live weight at slaughter than other operators. As a result more lambs are now slaughtered at an earlier age which reduces red meat off-take.

(ii) *Economic*: Private investment for improving animal resources and increasing red meat production is very low compared with that in the industrial sector. The General Meat Company is only responsible the marketing of red meat, rather than promoting a more efficient red meat industry as a whole.

(iii) *Environment*: Climatic variability and years of drought cause fluctuations in pasture production which in turn affects the stability of agriculture and animal production.

(iv) *Technical*: Poor management results in the low fertility of local and Damascus cattle breeds, which ultimately reduces off-take. Feeding practices applied by farmers need to be improved by strengthening the capacity of the extension service.

(v) *Marketing*: The low profits made by livestock owners are partly due to the price fluctuations which are exploited by the dealers. This leads to a decrease in the attractiveness of investing in

private projects aiming to develop animal resources. The restricted responsibility of the General Meat Company indicated above adds to the marketing problems.

Future prospects and research needs

This mainly statistical study indicates how Syria has a rich endowment of livestock resources and that these largely cover the meat demands of its people. The current level of self-sufficiency is only possible because of a thriving private poultry industry, which is partly dependent on imported feed. This makes it vulnerable to fluctuations in world prices. Efforts to increase domestic poultry feed production, such as from maize and soya bean, are likely to intensify since Syria is now self-sufficient in wheat which will therefore receive less attention.

To sustain a high level of self-sufficiency in the coming decades, annual domestic meat production will have to expand by at least 3.3% at constant *per capita* consumption, just to meet the demand from the rapidly increasing human population. However, *per capita* consumption is likely to increase as peoples' incomes improve. This additional demand will only be met from domestic production if there is an improvement in the productivity of the existing population of ruminants, particularly from sheep, which supply about 77% of the red meat. It is already known that the local breeds have considerable genetic potential. To realize this potential will require a substantial effort to make available to farmers genetically improved stock and an improved extension service that advises farmers about better nutrition, health care and management of their animals.

In addition, strengthening the expertise of the extension service is needed to promote the growing of forage legumes by farmers and thereby enhance the domestic feed supply. A collaborative project between the International Centre for Agricultural Research in the Dry Areas and the MAAR near El Bab north-west of Aleppo has shown that these forage legumes can increase feed production, partly because they interrupt the barley monoculture that results in pests that reduce yields.

The overall goal of future policies will be to increase the efficiency of red meat production so that imports of meat and feeds are minimized and pressure on the degraded steppe pastures is reduced. Formulation of these policies will require a more detailed understanding of the functioning of the red meat sector. Thus, detailed studies are needed on the efficiency of the marketing chain between the producer and the consumer, including questions about the returns made by producers, marketing agents and butchers.

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Appendix Tables

Table A1. Age and live weight at slaughter and dressing percentage for Awassi sheep (Decree No. 158 dated 19 July 1989, Ministry of Supply)

	Age at slaughter (years)	Live weight at slaughter (kg)	Dressing percentage	Level of concentrates use
Fattened lambs	<1	45-55	50-53	High
Non-fattened lambs				
Milk fattened	0.5	40-45	55	-
Grazing	0.5	35	49-52	-
Yearling males				
Intensively fattened	1-2	55-65	50-53	High
Partially fattened	1-2	40-45	50-53	Medium
Rams (for <i>Eid Al Adha</i>)	2-5	60-75	45-47	Variable
Female lambs [†]	<6	30	50	Variable
Female yearlings [†]	1-2	35-40	50-52	Variable
Ewes [†]	>2	45-65	50	Variable

[†]Except in exceptional circumstances, female sheep are not usually slaughtered according to Decree No. 649, dated 26 June 1974 issued by the Ministry of Supply, and Decree No. 1464, dated 14 July 1974 issued by the Ministry of Agriculture and Agrarian Reform

Table A2. Age and live weight at slaughter and dressing percentage for goats (General Meat Company, 1985)

Age category	Age at slaughter (months)	Live weight at slaughter (kg)	Dressing percentage
Male kids (older kids)	4 (6-12)	<25 (40-50)	50
Adult males	3-4	50-70	47-50
Female kids	NA	35	50
Adult females	>2	35-45	45-49

NA: Not available

Table A3. Age and live weight at slaughter and dressing percentage for cattle (General Meat Company, 1985)

Breed	Age at slaughter (years)	Live weight at slaughter (kg)	Dressing percentage	Comments
Friesian [†]	0.75	500	55-60	6 months fattening
Shami	0.5-1	350-400	46-50	
Aksi	1.5-2	250-350	46-50	0.5-1 years fattening
Culled cows	7-8	<400	-	

[†]Unpublished data from the Syrian-Libyan Company, located in Daraa

Table A4. Carcass grading scheme for fattened Awassi sheep (General Meat Company, 1985)

	Age (years)	Dressing percentage	Fat tail [†] (%)	Bone [†] (%)	Lean meat [†] (%)	Meat tenderness
Lambs	<2	50-52	>15	12-18	40-45	Excellent
Rams	2-4	45-47	15-20	18-21	35-40	Average
Yearlings	<2	50-52	15-17	12-18	38-40	Very good
Ewes	>5	42-46	15-18	18-21	35-38	Average

[†]In carcass

Table A5. Carcass evaluation scheme for fattened calves of different cattle breeds (General Meat Company, 1985)

	Age (years)	Fat [†] (%)	Bone [†] (%)	Lean meat [†] (%)	Meat tenderness
Friesian	<1	5-13	9-21	53-64	Excellent
Shami	<1	5-10	15-20	48-50	Very good
Aksi	<3	2-7	15-25	45-48	Good
Cows	<8	15-20	25-30	48-50	Average

[†]In carcass

The estimated age at slaughter of buffaloes is 15-18 months and with light concentrate feeding their live weight may reach 200-250 kg. The dressing percent is 50%. Adult females may weigh 400-500 kg, whereas adult males weigh 500-550 kg depending on the availability of feed and the supply and demand for other meat.

The meat of the young camel is tender but the tenderness decreases with age. The young animals are slaughtered at 6-12 months of age at a live weight of 100-150 kg. The dressing percentage is 50. Adult camels are slaughtered at four years of age or more when they have a live weight of 400-600 kg.