

agribusiness handbook

Red Meat





**Red
Meat**

agribusiness
handbook

This handbook is part of a series of agribusiness manuals prepared by the FAO Investment Centre Division, in collaboration with FAO's Rural Infrastructure and Agro-Industries Division. It was prepared for the EBRD Agribusiness team, under the FAO/EBRD programme of cooperation. The production of the manuals was financed by FAO and by the EBRD multidonor Early Transition Countries Fund and the Western Balkans Fund. The purpose of this handbook is to help agribusiness bankers and potential investors in the Early Transition countries (ETCs) and the Western Balkan countries (WBCs) to acquire basic knowledge about the technical features of red meat processing and to become acquainted with recent economic trends in the sector around the world, with a special focus on the ETCs and the WBCs. This volume was prepared by L.J. Colby, Meat Market Consultant, and Inna Punda, FAO Agribusiness Expert, with contributions from Dr M. Palamer, MLC SL Consulting, and was reviewed by Dmitry Prikhodko, Economist, FAO Investment Centre Division, as well as by members of the EBRD Agribusiness team. Electronic copies can be downloaded from www.eastagri.org, where a database of agribusiness companies, including red meat processing companies that operate in the ETCs and the WBCs, is also available. Please send comments and suggestions for a future edition of the manual to TCI-Eastagri@fao.org.

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned. The views expressed in this information product are those of the author(s) and do not necessarily reflect the views of FAO.

All rights reserved. Reproduction and dissemination of material in this information product for educational or other non-commercial purposes are authorized without any prior written permission from the copyright holders provided the source is fully acknowledged. Reproduction of material in this information product for resale or other commercial purposes is prohibited without written permission of the copyright holders. Applications for such permission should be addressed to:

Director
Investment Centre Division
FAO
Viale delle Terme di Caracalla, 00153 Rome, Italy
or by e-mail to: TCI-Eastagri@fao.org

© FAO 2009

TABLE OF CONTENTS

INTRODUCTION	5
I. RED MEAT PRODUCTION	7
1.1 Key aspects of livestock production	7
1.2 Livestock production costs and margins	10
1.3 Livestock prices	11
2. RED MEAT SLAUGHTERING AND PROCESSING	13
2.1 Process description	13
2.2 Key processing costs	16
3. WORLD RED MEAT MARKET	21
3.1 Red meat production	21
3.2 Prices of red meat and red meat products	24
3.3 Red meat consumption	26
3.4 World trade in red meat and red meat products	27
4. THE LIVESTOCK AND RED MEAT INDUSTRIES IN THE EARLY TRANSITION COUNTRIES (ETCs) AND THE WESTERN BALKAN COUNTRIES (WBCs)	33
4.1 Livestock numbers and production	33
4.2 Red meat production	37
4.3 Red meat consumption	39
4.4 Trade in red meat and red meat products	41
4.5 Structure and investment	47
ANNEX	51

INTRODUCTION

The domestication of cattle and sheep started in about 10,000 BC but it was not until the early eighteenth century that production techniques were improved. Meat is an integral part of a healthy diet and meat consumption continues to increase steadily, while the world's producers of livestock for red meat production are finding it difficult to cope with the increase in demand.

Pig meat and then beef are the most important red meats consumed. World trade in meat has increased steadily over the years and will continue to do so in the future even though the recent commodities boom that contributed to lower livestock and meat prices and declining consumer demand for meat has ended.

Food safety concerns and the need for hygienically processed meat products have resulted in the development of modern meat processing facilities in many parts of the world, although there are still areas where slaughter facilities are very rudimentary or have not been modernized. Further investment is required in the meat processing industry, although margins in this sector are low compared with the margins in many other economic sectors, making it difficult to generate sufficient funds for investment purposes.

I. RED MEAT PRODUCTION

I.1. Key aspects of livestock production

I.1.1 Overview of livestock production

Livestock production in most livestock economies includes bovines (especially cattle), ovines (sheep and goats) and pigs. FAO statistics indicate that worldwide in 2007 there were 1,559 million bovines, 1,917 million ovines and 918 million pigs. Livestock production is extremely widespread throughout the world whether resource availability is high or low (i.e. agricultural potential of areas), with different types of livestock suited to different environments. Cattle production is especially widespread and is an important source of meat.

Livestock production in 2007 yielded 176 million tons of meat, with pig meat being the most important and accounting for 56% of total output. The production of pigs, which are produced solely for meat, is much greater than production of the other livestock species. Bovine meat accounts for 36% of total output. Ovine meat is less widely produced and only accounted for 7% of total output. Rising incomes and aspirations of consumers in developing countries are contributing to the growing demand for meat and this trend can be expected to continue. Meat is widely consumed, although for some religious groups some meats are excluded from diets.

I.1.2 Key livestock production parameters

Key parameters for livestock production include the cost and availability of feed, the availability of water, and the availability of animal health services, which in turn has an impact on the animal disease situation.

Bovines are both extensively and intensively produced. Extensive bovine production is the most important. It relies on forage and is best suited to areas where large grazing lands are available. Intensive bovine production, normally involving feedlots, is prominent only in North America and in some Far East countries such as Japan. Sheep and goats are mainly produced extensively.

Pigs are more suited to intensive production as they have a much higher feed conversion than ruminants and this in turn results in reduced feed costs. In an efficient pig production system, a pig for slaughter can put on 1 kg in live weight using less than 3 kg of feed while cattle per head can put on 1 kg in live weight using at least 5 kg of feed. So unless a high-value market is being supplied and/or feed prices are low, ruminants are best suited to forage. World pig production has now become mainly intensive with backyard production (such as in China) falling steadily in importance. Intensive pig production is

best located in grain producing areas or in proximity to ports if there is reliance on imported feed.

Disease and animal health issues play an important part in determining the location of livestock production and livestock productivity. They can also have an impact on trade as some countries may not allow meat imports from countries where certain diseases are prevalent.

Key parameters of livestock productivity include both the species of livestock, as productivity varies considerably between species, and management practices, as productivity can also vary within species. Productivity is highest where modern production practices are used. The agricultural potential of an area is another parameter. Productivity is normally lower in developing countries and in regions where agricultural potential is low.

1.1.3 Quality of livestock for red meat production

There can be large differences in the yield and quality of livestock for red meat production. Livestock yield and quality will depend upon a number of factors, including:

- the weight of the slaughter animal and hence the yield of meat;
- the degree of finish (influenced by the feeding regime) and hence proportion of lean meat; and
- the age of the animal as a younger animal will normally produce a higher quality of meat.

Such variations can be related to the breed of animal, the availability of feed and forage, and management practices. Livestock that are utilized for milk production and draft power (in the case of bovines) and for wool, and only culled at the end of their working lives, will normally have a lower commercial value than livestock utilized exclusively for meat production.

If animals are transported to the abattoir and then held there before slaughter, it is important that they are not stressed as stress has an impact on meat quality. Stress can occur as a result of transportation over long distances, food and water deprivation, and rough handling or fighting. It can result in the meat being tough or in the case of pigs, it can result in the meat being pale, soft and exudative (referred to as PSE), with a loss in muscle structure. In addition, when an animal is stressed less lactic acid is produced, resulting in a high pH value and encouraging rapid bacterial growth.

The use of grading is one means of assessing the quality of an animal. Grading can be done either when the animal is being marketed live weight (in an auction market) or once the animal has been slaughtered and the carcass

itself is assessed. Grading of the carcass is a more objective means and is practiced in countries where the marketing of meat is sophisticated. In the European Union (EU), the EUROP classification scheme is used to assess the carcasses of different animals and is based on two criteria, the fat class (the proportion of fat on a carcass) and the conformation, which gives an indication of the meat yield relative to bone. It is the yield of lean meat that is critical to the meat industry and the price of an animal is normally based on its grade, which is a means of encouraging farmers to produce according to market requirements. Bone and fat in most meat economies have only small commercial value.

1.1.4 The red meat industry and environmental issues

Environmental issues relating to livestock production have been moving up the political agenda recently and cover not only livestock production but also red meat processing and distribution.

Livestock production, and extensive livestock production in particular, of mainly bovines and ovines is a large emitter of greenhouse gases (GHG). Emissions from intensive livestock production are considered less of a problem. Methane emissions are a particular problem, followed by nitrous oxide emissions. The livestock sector can be expected to be included in future policies to reduce GHG emissions, starting with policies emanating from the December 2009 climate change conference in Copenhagen. Targets to reduce livestock emissions, if set at high levels, could well result in a reduction in the number of ruminants and an increase in meat prices to the benefit of intensive livestock production.

The meat processing sector (slaughtering and downstream processing) is a heavy user of water, especially during the slaughtering process, and energy, especially during refrigeration and further processing. The slaughtering process also generates considerable quantities of waste material that have little or no economic value. The waste is often disposed of with little or no treatment (landfill). This is particularly the case in outdated slaughtering facilities that have little or no modern equipment, a feature of the meat processing industry in many parts of the world. Such practices are increasingly unacceptable. Much of the waste could have an economic value such as use in power generation, soil improvement and even a food source if properly processed. Disposal of the residual material from slaughtering is discussed in more detail in Section 2.1.1 and in the Annex.

The transport of livestock and especially of meat (it can be transported long distances in chilled or frozen form) can also generate large quantities of GHGs. However, the emission of GHGs post-farm gate is much lower compared with emission from livestock production itself.

I.2 Livestock production costs and margins

Production costs of livestock vary considerably in different parts of the world and so do the systems of production. The pig production costs shown in Table 1 are for the United States (based on Iowa) and are budget estimates that assume average or above average levels of management. They include key technical parameters, especially the feed requirement. They illustrate the importance of feed in total costs, accounting for over 60% of total costs. The pig budgets are based on a closed system (breeding through to finishing) and on a sow producing 8.5 pigs in one litter. It is assumed that a sow has 2.2 litters per year.

Table 1: Indicative production costs per sow per litter for breeding and finishing

	Costs USD	Technical parameters
Number and live weight of finished pigs produced		8.5 @ 118 kg
Variable costs:	859	
Feed, of which:	642	
maize	399	3,339 kg
soya bean meal	152	459 kg
Labour	84	6 hours
Other (veterinary service, fuel, bedding, interest)	133	
Fixed costs:	195	
Machinery, buildings	130	
Breeding costs (boars/semen)	13	
Gilt replacements	43	
Interest, insurance	9	
Total cost	1,054	

Source: *Livestock Enterprise Budgets for Iowa, 2009. Iowa State University*

The use of feedlots is normal practice in the United States, with a yearling steer fed cereal-based concentrates to finish it in about six months (Table 2). The cost of a yearling steer is the critical variable cost, followed by the feed cost.

Table 2: Indicative production costs per yearling steer for finishing

	Costs USD	Technical parameters
Live weight at sale		567 kg
Variable costs:	1,068	
Yearling steer	735	340 kg
Interest on yearling purchase cost	30	
Feed, of which:	229	
maize	156	1,304 kg
distillers grain	57	860 kg
Labour	28	2 hours
Other (veterinary service, transport, mortality)	45	
Fixed costs:	14	
Machinery, equipment, housing	14	
Total cost	1,082	

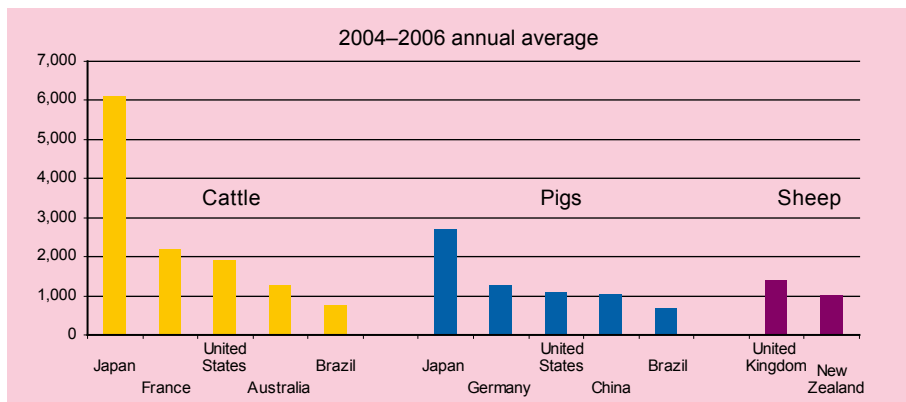
Source: *Livestock Enterprise Budgets for Iowa, 2009. Iowa State University.*

Margins vary greatly in livestock production. With the end of the world commodities boom in September 2008 and the subsequent fall in livestock prices, margins became negative for both pig production and the finishing of steers in the United States. Outside of the United States, profitability in livestock production has also come under pressure due to lower livestock prices in spite of some easing back in feed prices that is also associated with the end of the world commodities boom. Large fluctuations in margins are typical in the world's livestock industry unless prices are guaranteed (such as fixed price contracts).

1.3 Livestock prices

World livestock prices vary considerably both by species and by region and are a reflection of differences in production costs and also in government policy (such as market support mechanisms). Livestock prices are especially high in Japan and above average in the EU, followed by prices in the United States (Figure 1). Prices are lower in the Southern Hemisphere for cattle in Australia and Brazil, for pigs in Brazil and for sheep in New Zealand. This gives these countries a competitive advantage. All of them are meat exporters. Pig prices are generally lower than prices of other livestock species, given that production costs are generally less.

Figure 1: Comparison of key world livestock producer prices (USD/ton of live weight)



Source: FAOSTAT Database. © FAO 2009

2. RED MEAT SLAUGHTERING AND PROCESSING

2.1 Process description

2.1.1 Description of the red meat processing chain

The main stages in the red meat processing chain are the following:

Primary processing that involves:

- taking live animals into lairages (the resting of animals prior to slaughter) and conducting a preslaughter inspection (including sometimes recording of the live weight);
- slaughtering/dressing, which in larger plants takes place at the point where the animal is stunned and exsanguinated (bled). The carcass is then moved along a mechanized line (suspended from an overhead rail) to specific workstations at which the various processes involved in converting live animals into carcasses (together with a residual of waste products; see the “waste” section below) are undertaken. In plants that handle multispecies, there is a separate slaughter line for each species (see the slaughter process chart in the Annex);
- chilling of carcasses in refrigerators to specified deep-muscle temperatures (in the EU, the specified temperature is 7 °C for carcass meat and 3 °C for offal);
- cutting of deboned primals (chilled carcasses or half or quarter carcasses) and then vacuum packing, boxing and palletizing the products; and
- storing in refrigerators. Refrigerated storage is used for the short-term storage of the meat before sale as fresh product or before transfer for secondary processing. It is also used for the ageing/maturation of meat to improve the eating quality. For longer life, products need to be frozen.

Secondary processing that involves:

- cutting up primals into smaller, fresh cuts of meat such as consumer portions of steaks and chops. This process ends with the packing/labelling of the product for sale through either the retail sector or food services;
- preparing and dicing (PAD) and mincing meat to produce, for example, comminuted meat (packed and chilled or frozen for longer life) for sale as fresh product or for use in further processing;
- preparing fresh meat and recipe products such as burgers, sausages and reformed products, and ready-to-cook convenience meats breaded and coated, with flavourings or seasonings; and
- cooking, curing, drying/smoking or canning fresh meat to produce manufactured products that include prepared foods and ready meals for which meat is an ingredient.

In smaller, low-throughput “artisanal” plants, the whole slaughtering process is usually carried out in one small “slaughter hall” and accompanied by basic chilling (although some of the fresh meat is sent for butchering soon after slaughter), with meat products (typically dried/cured sausages) being produced in an adjoining room.

Waste

Waste is defined in the context of this paper as the by-products of animal slaughter (commonly referred to as the 5th quarter material) that are low-value materials (e.g. edible offal) or zero/negative-value materials (e.g. effluent, which is an organic mixture of water/blood and faecal material). The abattoir/meat processing plant has to pay for the disposal of these waste materials and sometimes has to make a contribution to the costs of the handling (such as transportation) of low-value materials.

It should be noted that in the EU, the disposal of “waste materials” is governed by the complex EU Animal By-Products Regulations (ABPR), which are linked to the Transmissible Spongiform Encephalopathy (TSE) legislation.

Excluding the low-value edible by-products produced from 5th quarter material (such as livers, kidneys and intestines), an abattoir/meat processing plant produces four main waste streams:

1. large volumes of residual material resulting from the slaughter of livestock that is not destined for human consumption (e.g. internal organs, hide and skin, blood and stomach and intestinal contents);
2. effluent (e.g. a mixture of blood, faecal material and wash-down water) resulting from the processes involved in slaughter, dressing, recovery/treatment of 5th quarter material and the wash-down of work areas;
3. lairage waste (e.g. faecal waste usually mixed with straw or other bedding material); and
4. packaging waste.

The low-value edible by-products can find a good market among lower income consumers or can be used in further processed products (e.g. sausages). Some of the by-products are used in pet food manufacture, while even blood can be used in further processed food products.

Waste material other than edible by-products will be disposed in three ways. It can be rendered (a pressure cooking process) to produce fats for biodiesel fuel or industrial use, and meat and bone meal (for use in animal feed if regulations allow). Otherwise, the waste is incinerated or used in landfill (however, landfill is no longer environmentally acceptable).

Wastewater effluent normally has to be treated before it can be discharged. It can have an economic value if used in anaerobic and aerobic digestion to produce methane gas for power generation, while the waste from this process can be used as a soil improver. Wastewater effluent can also be composted.

A more detailed description of the slaughter process and disposal of residual materials is contained in the Annex.

2.1.2 Conversion factors

The volume of material resulting from the slaughtering process depends in the first instance on the live weight of the animal at the point of slaughter. Live weight varies greatly, depending on production conditions. The live weight of cattle can vary between 400 and 1,000 kg, and some older oxen and large bulls are even heavier. Pigs in the United Kingdom are typically slaughtered when just over 100 kg, while in other parts of the EU they are slaughtered when more than 160 kg. While the live weight of animals can vary, the proportion of live weight to dead weight, usually referred to as the “dressing percentage”, is more stable. Table 3 shows the dead weights of cattle, lambs and pigs.

**Table 3: Comparative slaughter weight in selected countries, 2007
(kg of dead weight)**

Species	Brazil	Australia	Spain	France	United States	United Kingdom
Cattle	244	265	330	366	356	320
Lambs	n/a	17	12	19	n/a	18
Pigs	77	n/a	81	79	89	76

Source: RMIF/MLCSL Consulting, United Kingdom

The volume of material after slaughter can be divided into:

- the carcass weight after dressing; and
- the residual material, consisting of material destined for both human and non-human consumption.

Table 4 shows typical live weights, carcass weights, weights of residual material and dressing percentages in the United Kingdom of prime cattle, lambs and clean pigs, and the percentage of meat that is derived from a carcass.

Table 4: Live weight, dead weight, dressing percentage and meat yield in the United Kingdom, 2008

Species	Average live weight kg	Average carcass weight kg*	Average weight of residual material kg	Dressing percentage (2÷1x100) (rounded) %**	Average percentage weight of meat for sale from carcass %***	Average residual percentage weight of bone, fat & trim removed %
Cattle	620	338	282	54.5	69.0	31.0
Lambs	42	19	23	45.0	80.0	20.0
Pigs	101	76	25	75.0	78.0	22.0

* The slaughter weights of cattle and lambs in the United Kingdom.

** For cattle and sheep, the percentage can vary by a number of percentage points either way, depending on the breed, condition and weight of the animal.

*** Typical percentages in both the United Kingdom and the EU, where more fresh cuts of lamb and pig meat are sold with bone while beef is mostly sold boneless.

Source: MLCSL Consulting, United Kingdom

2.2 Key processing costs

2.2.1 Indicative costs of processing cattle and pigs

The total cost of slaughtering and processing meat will vary depending mainly on the size of the primary processing activity (e.g. number of animals slaughtered) but also on the additional “secondary processing activities” that are undertaken. Costs can also vary among facilities of similar size as a result of the quality of management, efficiency of operation and other special factors.

In terms of plant size, it is not uncommon, for example, for the larger integrated pig processing plants in the main producing countries of the EU to slaughter 1 to 2 million pigs a year, while in the United Kingdom the average throughput of the top ten abattoirs is under 550,000 pigs per year. In the case of cattle,

in Brazil many plants kill 300,000 head of cattle per year, while in the United Kingdom the average throughput of the top ten plants is less than 80,000 head per year. With size comes economy of scale, both in reducing the processing cost per animal and in recovering value from larger volumes of low-value material (e.g. assembling large volumes of edible offal and processing intestines for sale as sausage casings).

The analysis below focuses on “primary” production, which involves the point of animal intake, slaughter, dressing, primal cutting and chilling. Research in the United Kingdom and areas in the EU provides indicative examples of operating costs.

Because the size and scope of activity among plants varies greatly worldwide, collecting comparative data on total costs and operating costs is very difficult. However, although actual costs vary by size of plant, studies over the years have indicated that for plants with a similar type of operation, the operational costs are likely to be proportionally the same.

Table 5 shows indicative overall operating costs incurred by larger plants (single species, first and second stage primary processing). The costs are based on the average sized plant (number of stock slaughtered) servicing large supermarkets with a throughput of 48,000 head of cattle per year and 450,000 pigs per year. Table 6 shows actual costs of just the slaughtering and cutting operations.

Table 5: Indicative operating costs of slaughtering and cutting to primal cut stage of plants in the United Kingdom and some EU countries

		Cattle		Pigs	
		Proportion of operating costs %	Indicative cost USD	Proportion of operating costs %	Indicative cost USD
Operating costs					
	Labour				
	• slaughterline and lairage	20.0	56.00	25.0	13.75
	• cutting	30.0	84.00	25.0	13.75
	Waste disposal	7.5	21.00	6.0	3.30
	Meat inspection/veterinary service	4.0	11.20	5.0	2.75
	Quality control/grading	1.5	4.20	2.5	1.38
	Other production costs	29.0	81.20	28.5	15.67
	• energy (heat, light, power)	4.5		5.5	
	• water and effluent	3.5		3.5	
	• repair of equipment and maintenance of plant building and structure	4.5		4.5	
	• cleaning, laundry	1.5		1.5	
	• packing materials	7.0		5.5	
	• selling and distribution	8.0		8.0	
General overhead*		8.0	22.40	8.0	4.40
Total (excluding local/municipal taxes and depreciation)		100.0	280.00	100.0	55.00

* The other main costs in this category are the costs involved with administration, insurance, staff recruitment, security, telephone, postage and stationary, computing, bank charges, subscriptions, audit and accountancy, and legal and professional services.

Source: MLCSL Consulting, United Kingdom, 2006/07. © MLCSL Consulting 2009

Table 6: Indicative actual slaughtering and cutting costs of plants in the United Kingdom (USD/head)

Activity	Cattle USD*/head	Pigs USD*/head
Slaughter to chiller	100–120	16–24
Primal cutting	150–190**	28–38**

* Based on GBP1=USD2, which is the average exchange rate for 2007, the year costing information was collected.

** The cost of primal cutting compared with slaughtering is higher because cutting is labour intensive.

Source: MLCSL Consulting, United Kingdom, 2006/07. © MLCSL Consulting 2009.

2.2.2 Key variable cost factors

There are three major areas of variable costs that are of crucial importance to the commercial viability of an abattoir/meat processing facility:

- **Labour.** This is a very important element of the operational cost of an abattoir/meat processing facility. It is not only the cost of the labour involved in slaughtering and cutting but also the higher cost of the more highly skilled labour involved in veterinary inspection and quality control (including carcass assessment and grading).
- **Waste disposal.** The waste material (as defined above) with commercial potential can be processed to derive a return rather than to constitute a disposal cost.
- **Energy and water.** The costs of energy and water can vary significantly from country to country but the long-term environmental objective must be to reduce these costs. Water usage per animal slaughtered can also vary considerably and in modern plants can be one-half of the normal average usage. Table 7 shows current good practice in water use by abattoirs in the United Kingdom.

Table 7: Current good practice in water use by abattoirs involved with primary production in the United Kingdom (litres)

Species	Water usage per head* litres
Cattle	700–1,000
Sheep	100–150
Pigs	160–230

* Excludes the cleaning of intestines for casings.

Source: MLCSL Consulting, United Kingdom, 2008. © MLCSL Consulting, 2009

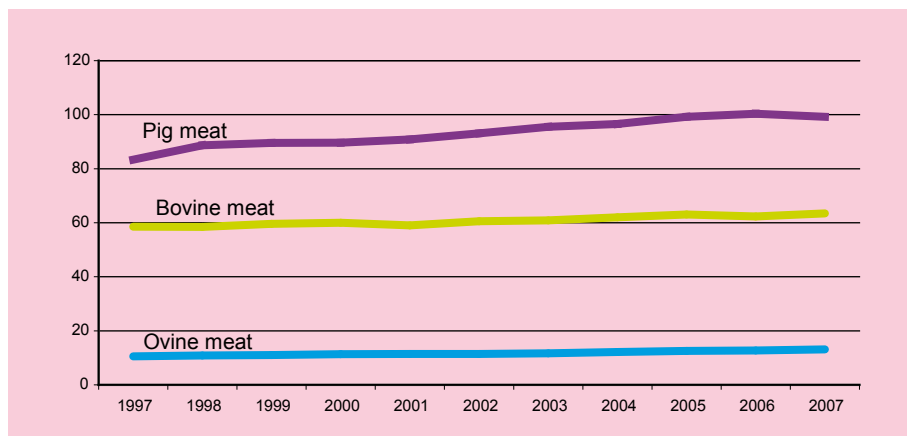
3. WORLD RED MEAT MARKET

3.1 Red meat production

Global red meat production is increasing slowly in response to a rising demand but has not increased sufficiently to match the increase in demand. In the period from 1997 to 2007, growth in production amounted to almost 1.5% per year (Figure 2), with the growth rate for the production of pig meat and ovine meat slightly greater than 1.5%.

Projections made by OECD/FAO forecast a similar rate of growth to 2018, even allowing for a smaller increase in the short term because of the impact on profitability of the world economic and financial crisis. Most of the growth will be in developing countries where increase in demand will be the highest. The growth of pig meat production is expected to be slightly higher than for the other meats. Total red meat production in future needs to grow by at least 1% per year just to offset the growth in the world population and yet in developing economies the population growth is greater than 1%. Consumer demand will also increase as world economies grow. This illustrates the current dominant issue associated with the recent global commodities boom, that of food security and the need for food production to increase further.

Figure 2: Evolution of global red meat production, 1997–2007
(millions tons)

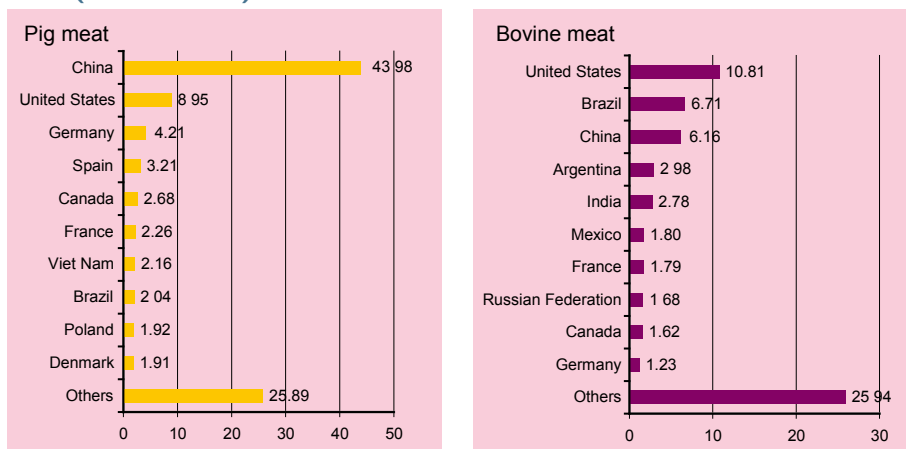


Source: FAOSTAT Database. © FAO 2009

Figure 3 shows the largest pig meat and bovine meat producing countries in 2007. China dominates global pig meat production, accounting for 44% of total production, and has also been by the far the main contributor to global growth in production during the last ten years. The United States accounts for 9% of total production and is an important consumer country and exporter. Pig meat is the most important meat produced in the EU. The EU accounts for 23% of global production, with Germany and Spain being the largest EU producers. Pig meat production has increased in Canada during the last ten years and is helped by a growing export demand.

The United States is the largest bovine meat producer, accounting for 17% of global production. The industry is very much based on intensive production. The domestic market is substantial and the country is both a major importer and exporter. Brazil is the second largest producer of bovine meat, accounting for 11% of global production, and together with Argentina, is also a major exporter. However, production in both Brazil and Argentina is currently in decline given the downturn in the cattle cycle, which in part is the result of a switch to crop production. Chinese production has increased steadily over the years. China is the third largest producer, with a 10% share of global output. In India, over 50% of bovine production is in the form of buffalo meat. The largest EU bovine meat producer is France and the EU as a whole accounts for 13% of the world's bovine meat output.

Figure 3: The largest pig meat and bovine meat producing countries in 2007 (millions tons)



Source: FAOSTAT Database. © FAO 2009

World ovine meat production is dominated by China, which accounts for 29% of total production. India is the world's second largest ovine meat producer mainly because of the importance of goat meat, which accounts for 70% of national meat production. Australia and New Zealand are the world's two largest exporters and they account for 5% and 4%, respectively, of global production. China, Australia, New Zealand as well as Iran each exceed an annual ovine output of 500,000 tons. The EU accounts for 8% of the world's ovine production, with the United Kingdom and Spain being the main producers.

The structure of the world's meat industry has been assessed by the International Meat Secretariat¹. The secretariat indicates that few meat companies are international, with the exception of Cargill and JBS. Most meat companies are national. The other feature of the global meat industry is the degree to which vertical integration is limited, with the exception of the pig meat industry. Acquisitions, especially acquisitions on other continents, have been cautious and mainly made by American and Brazilian companies. JBS, the leading Brazilian beef processor, has acquired companies in the United States, Australia and now Italy. It is now the world's largest beef processor and the world's second largest meat company based on volume. Tyson-IBP is the world's largest meat company.

The current downturn in the global economy is resulting in the retreat of some international companies as they sell off assets in some countries. Financial pressures on the meat industry have been such that some companies have declared bankruptcy or have entered into administration.

In the EU to date, only VION, the largest meat company based in the Netherlands, and Danish Crown, based in Denmark, have made acquisitions in other EU countries but they have not gone outside of the EU to make acquisitions. VION has invested in Germany and the United Kingdom, and Danish Crown has invested in the United Kingdom, Sweden and Poland. Both companies are focused on the pig meat sector, with limited activity in the beef sector. Other major EU companies are national companies and have not made cross-border acquisitions. Then there is a large number of small companies. In the EU, the market share for further processed products is highly fragmented, with no company having a market share of more than 5%, partly due to the major differences in regional consumption patterns. The two largest companies are VION and Danish Crown, and Campofrio (a Spanish company) is the third largest company.

1. *Economic issues facing the global meat industry. Proceedings of the First IMS Economics Workshop, Wageningen, the Netherlands, 20–22 April 2009. IMS.*

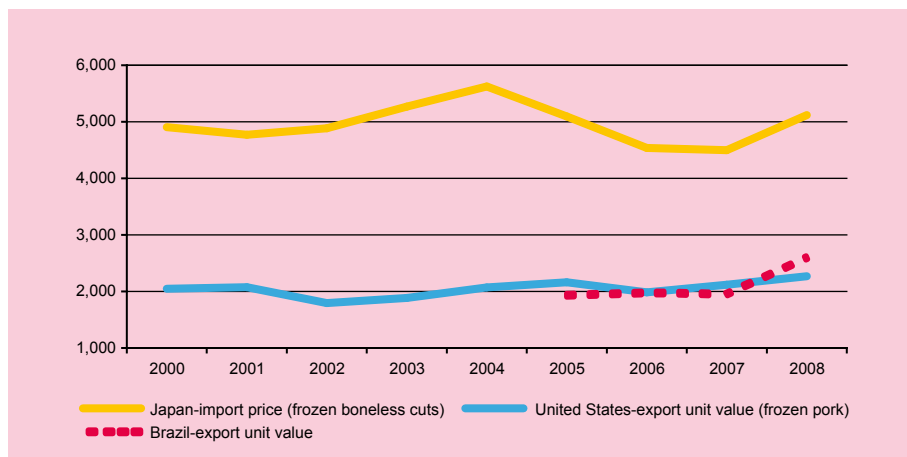
3.2 Prices of red meat and red meat products

Increased demand, especially in developing countries, together with some supply constraints pushed up international meat prices for both pig meat and beef during the current decade. Prices reached a peak in the autumn of 2008 and have subsequently fallen due to the world economic slowdown and a decline in consumer demand. By the end of the first quarter of 2009, beef prices were at least 20% below their 2008 peak and in some cases as much as 40% below their peak. In the case of pork, prices in the United States have declined by only 10% in recent months, having been helped by firm Japanese import prices. Brazil, which depends on a number of markets where demand has fallen sharply such as the Russian Federation, has experienced a decline of 35% in the average export price in recent months.

There are indications that international meat prices stabilized and even edged up in the second quarter of 2008 (Figures 4 and 5) but any further upturn is unlikely to be marked until the global economy starts to pick up.

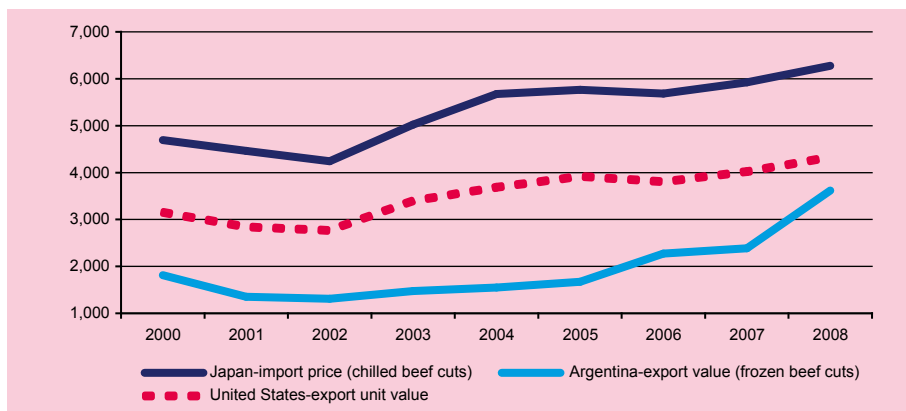
As with livestock prices, meat prices show large differences from country to country. There are differences not only in product specifications (with prices generally higher for chilled meat versus frozen meat) but also in meat quality. Unlike some commodities, meat is far from being a product with uniform characteristics. Production and processing costs as well as the level of demand influence meat prices. Beef prices are generally higher than prices of pig meat.

Figure 4: International prices of pig meat (USD/ton)



Source: FAOSTAT Database. © FAO 2009

Figure 5: International prices of beef (USD/ton)



Source: FAOSTAT Database. © FAO 2009

As for future developments, in the long term the OECD/FAO projections forecast a recovery of and further growth in meat prices but in real terms meat prices may not recover enough to surpass the price average in the period from 1997 to 2006. In the short term, beef prices are coming under greater pressure from cheaper meats, and in particular from poultry meat.

There is some very limited trade in meat between the EU and the Early Transition countries (ETCs) and the Western Balkan countries (WBCs), although there should be scope for EU imports from the regions (at present, imports mainly consist of small quantities of lamb from Montenegro). Thus, an indication of EU wholesale prices is relevant (Table 8).

Table 8: Wholesale prices for red meat in selected countries in the EU (USD/kg)

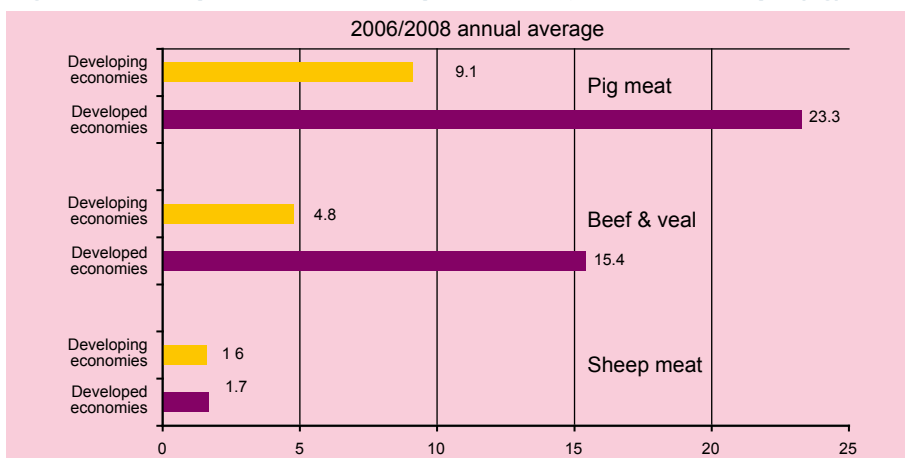
Type of meat	Year 2008—USD/kg	June 2009—USD/kg
Beef (chilled)		
France – cow forequarter	1.98	1.63
France – cow hindquarter	4.71	5.03
Italy – young bull forequarter	2.51	2.23
Italy – young bull hindquarter	5.45	5.30
Pork (chilled)		
Germany – pork shoulder	2.52	n/a
Italy – pork shoulder	2.57	2.44
Lamb (chilled)		
France – imported carcass	4.25	5.40

Source: Red Market MI, Agricultural and Horticultural Development Board, United Kingdom. © AHDB 2009

3.3 Red meat consumption

Pig meat is the most widely consumed meat, being the preferred meat in many parts of the world, including the EU, which has the highest level of per capita consumption. More than half of the pig meat is consumed in further processed form in a wide range of products, while fresh pork is normally consumed in much smaller quantities. Pig meat is the preferred red meat in both developed and developing economies but in developed countries the per capita consumption is 150% higher than per capita consumption in developing countries in spite of a high level of consumption in China (more than 25 kg per capita). Beef and veal are widely consumed in developed economies but less so in developing economies, although in areas such as South America they are the preferred meats. Sheep meat is not widely consumed except in a few areas such as Oceania, a few countries of the EU and the Gulf countries of the Middle East. Figure 6 shows per capita consumption of pig meat, beef and veal and sheep meat by major economy type.

Figure 6: Per capita meat consumption by major economy type (kg)



Source: OECD Database. © FAO 2009

World consumer demand for meat had been increasing but the slowdown in the world economy since the autumn of 2008 has affected consumer spending in most markets and now is resulting in cutbacks in consumption, with food service more affected than in-home consumption in most developed economies. In the case of pig meat, the outbreak of A/H1N1 flu is having a small impact on consumption in some markets and is causing some uncertainty in the industry.

The OECD/FAO projections forecast only a marginal increase in per capita consumption of red meat in the long term but the trend in consumption between the developed economies and developing will be different. Growth in consumption will continue to be concentrated in developing economies, where the income elasticity of demand is normally more than one (a 1% rise in incomes results in an even greater increase in demand for meat). In the short term, though, per capita consumption will decline.

In the developed economies, per capita consumption of pig meat is expected to be stable or increase slightly at the expense of per capita beef and veal consumption that could even edge down over the long term. In the developing economies, per capita beef and veal consumption is expected to edge up, while the per capita consumption of pig meat is expected to rise by almost 1% per year and to reach 10 kg by 2018. These developments are in line with historical trends. Per capita consumption of sheep meat is projected to edge down further in developed economies and edge up in developing economies.

3.4 World trade in red meat and red meat products

World trade in red meat and meat products is very diverse and has increased at a faster rate than world red meat production and consumption during the last ten years, helped by liberalization of world trade (e.g. via the World Trade Organization (WTO) and other trade agreements) and by increased demand in importing countries.

Trade in pig meat is the most important trade and this is mainly due to the high level of trade within the EU. In regional trade, such as within the EU, where distances are relatively short, most pork is traded in chilled form. Chilled pork has a shorter shelf life than chilled beef. In inter-regional trade, most pork is traded in frozen form, both bone-in and boneless. World trade in chilled and frozen pork is generally less sophisticated in terms of cuts and specifications than trade in chilled and frozen beef, with the main exception being the EU and North America. In the importing countries, most frozen pork is used in further processing for products such as smoked or cooked sausage. There is also a large world trade in further processed products. Pig meat sausages are the most important product, followed by preparations of pig meat, especially canned preparations. Trade in bacon and ham is also important.

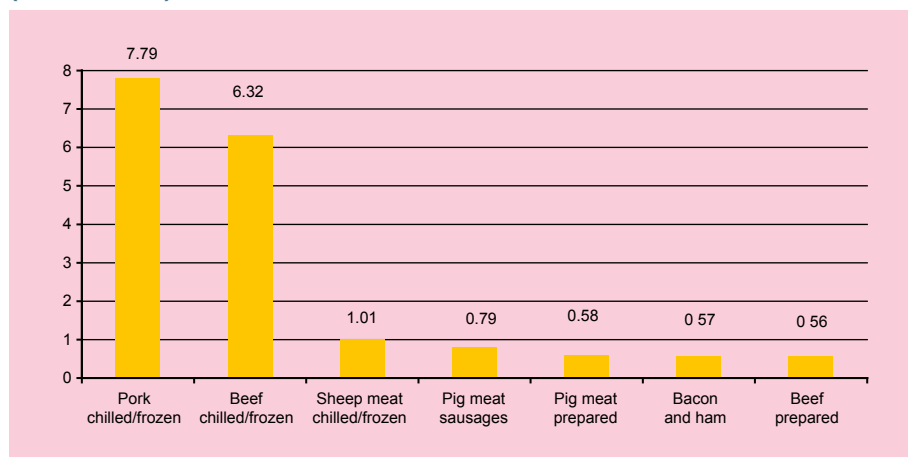
World trade in beef is mainly in the form of boneless beef because it is more economical to ship beef in this form, although for regional trade, such as within the EU, trade in bone-in beef is also important. Boneless beef also

presents fewer health risks such as foot-and-mouth disease, which can be spread though the bone. Chilled beef is normally destined for the premium end of the fresh meat market. Chilled beef is vacuum-packed as primal cuts, and retail packing and cutting take place in the importing country. Frozen beef is often destined for the lower end of the market and includes manufacturing quality beef, which is used as an ingredient in further processed products, notably burgers, in the importing country. There is also trade in processed beef products (preparations), especially canned products of prime importance such as corned beef and prepared meals as well as canned products of less importance such as frozen cooked beef (of much lower importance than chilled and frozen beef).

World trade in sheep meat is much smaller. Sheep meat is generally traded in frozen form and especially in bone-in primal cuts, with only a very limited trade in chilled lamb destined for the premium end of the market in importing countries.

In the period from 1996 to 2006, trade in chilled and frozen pork increased by 7% per year compared with a 3% per year increase for chilled and frozen beef and only a 2% per year increase for chilled and frozen sheep meat (Figure 7). The OECD/FAO projections forecast that the pork and beef trade will continue to increase in the long term.

Figure 7: World trade in red meat by main type of product, 2006 (million tons)



Source: FAOSTAT Database. © FAO 2009

The export trade in chilled and frozen pork is dominated by the EU and North America. Brazil is the only other major exporter. EU countries are also major importers, while both Japan and the Russian Federation have a substantial import requirement (Figure 8).

The main import of the EU countries is pork for further processing plus limited quantities of pork for the fresh market. Almost all of the pork imported by EU countries is imported from other EU countries. Japan imports chilled pork from North America for the fresh meat market and frozen pork for further processing in Japan. The Russian Federation imports lower-quality frozen pork for further processing.

EU exporters dominate trade in the different types of further processed pig meat products, with Denmark in the lead, supplying other EU countries but also exporting to non-EU markets. The only other major exporter is China. Outside of the EU, the main importers of further processed pig meat products are Japan and China.

Figure 8: Top ten chilled/frozen pork trading countries, 2006 (thousand tons)

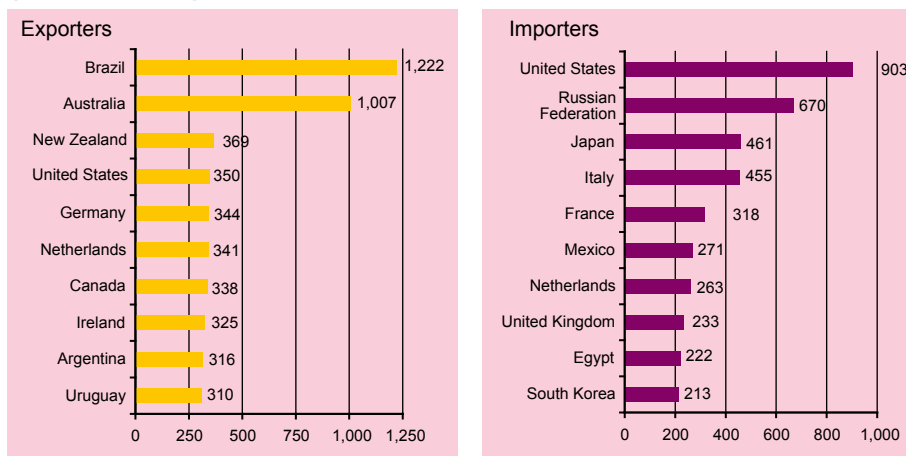


Source: FAOSTAT Database. © FAO 2009

World export trade in chilled and frozen beef is dominated by Brazil and Australia, with the trade in other exporting countries small by comparison (Figure 9). Brazil steadily increased its export trade during much of the current decade until it ran into problems of supply availability in 2008. For the EU exporting countries, trade in chilled and frozen beef is mainly intra-EU trade as the EU has largely withdrawn from exporting to outside markets due to

its current deficit in beef. Both the United States and the Russian Federation mainly import frozen beef for further processing (Figure 9). Trade in beef preparations is dominated by South American exporters, notably Brazil, which supplies a large number of markets and especially EU markets. The only other major importer of beef preparations is the United States.

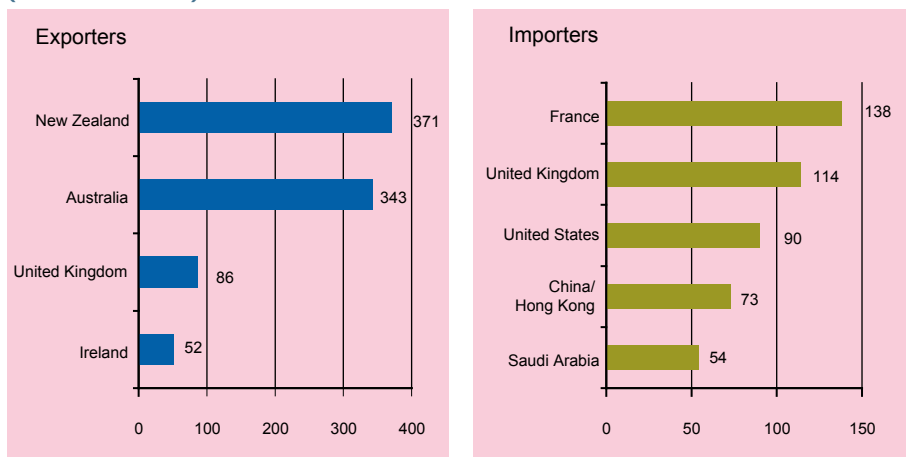
**Figure 9: Top ten countries trading in chilled/frozen beef, 2006
(thousand tons)**



Source: FAOSTAT Database. © FAO 2009

Export trade in chilled and frozen sheep meat is dominated by New Zealand and Australia (Figure 10). New Zealand is the main exporter of lamb, while Australia also exports large quantities of mutton. These two countries export to a large number of markets and especially markets in the EU, the United States and the Gulf countries of the Middle East (Figure 10). The United Kingdom and Ireland mainly export lamb to the world's largest importer, France.

**Figure 10: Main countries trading in chilled/frozen sheep meat, 2006
(thousand tons)**



Source: FAOSTAT Database. © FAO 2009

4.1 Livestock numbers and production

The livestock sectors of both the WBCs and ETCs had problems in adjusting from a largely planned economy to a market economy and some of these problems remain. In many of these countries, there was a switch from large state enterprises or cooperative livestock farms to private farms. This resulted in a large number of small-scale producers who often kept stock for their own needs rather than for the formal market. In most livestock economies in the WBCs and the ETCs, livestock are mainly raised to satisfy food security requirements. Livestock farming in virtually all of the countries suffers from a lack of investment and low productivity.

Serbia has the largest livestock-for-meat economy of the WBCs and has by far the largest pig sector of the other WBCs or the ETCs. However, it is still a small producer compared with most countries of the EU: productivity is much lower and so is the level of investment in the livestock sector. The slaughter of livestock on family farms for home consumption is a widespread practice. The livestock sector is not considered to be very competitive and if Serbia did join the EU, it would struggle without substantial investment. The livestock sector is characterized by a poor production structure with a large number of small farms, although there are also some large agricultural enterprises. Beef cattle and sheep production are both based on grazing, including in hill and upland areas.

In **Montenegro**, livestock production is also small-scale and includes subsistence production. It is based on permanent pastures, given the mountainous terrain of the country. Cattle are used for milk production rather than meat production. Montenegro also has a sheep sector.

Bosnia and Herzegovina is suited only for extensive livestock production and offers potential development of livestock production, given the great resource availability of pastures. Livestock production is based on small-scale family farming with much of it being subsistence in nature. Cattle are used for both milk production and meat production, for which some beef breeds are used, but there is a lack of high energy feeds and cattle genetics are poor.

In **Albania**, livestock production is especially fragmented, being based on small-scale family farming. It suffers from a lack of investment and non-adaptation to a market economy. The cattle industry is more important for milk production, while meat is more a by-product resulting after milk production.

Albania lacks an intensive livestock industry and the pig sector is small compared with the cattle and ovine sectors. Livestock production in the **former Yugoslav Republic of Macedonia** is based on small-scale family farming and dominated by milk production.

Of the ETCs, **Uzbekistan** has the largest cattle herd and the second largest ovine flock. Livestock production is very extensive. The large cattle herd and ovine flock reflect the large availability of pastures in the country, with both beef cattle and sheep production taking place in the more hilly and mountainous areas. There are some substantial agricultural enterprises that had previously been in the state sector but are now in the private sector as either cooperatives or private farms. In the case of ovines, 67% of the total flock is on private farms; both sheep and goat production are widespread. The output of wool and pelts in addition to meat is also important in the ovine sector. Cattle production is also mainly located on private farms, which account for 85% of the national cattle herd. Pigs do not play a significant role in the livestock-for-meat economy.

Mongolia has by far the largest ovine flock (both goats and sheep) with over 30 million head and also has the third largest cattle herd of the ETCs. The goat sector is important for the production of cashmere wool for the export market as well as for meat. Livestock production is extensive and based on natural pastures (the “steppe”) and is a key component of both the Mongolian agriculture sector and the economy in general. While some herders have large flocks and herds, a large number of herders have only small flocks, as livestock are a safety net, given the problems in the Mongolian economy, and only sold as a “last resort”. As a result, livestock productivity is low and is aggravated by a weak veterinary organization and by problems of overgrazing.

Intensive livestock production in Mongolia is not very practical because the dry climate means that forage crop production needed for intensive livestock production is not feasible. Extensive livestock production can be affected by the harsh climate and especially the “dzud”, a winter disaster associated with heavy snow and the freezing over of grazing lands, resulting in mass livestock starvation (the last dzud was in 2000/2001).

In **Azerbaijan**, livestock production is generally extensive and based on pastures. It is dominated by small-scale farmers but has rather large ovine and cattle sectors. In the previous planned economy, state and cooperative units were important but today they are no longer important. Cattle production is based more on milk production than on meat production. Productivity in the industry is generally low, given the lack of large-scale producers and lack of privately owned land (less than 5% of the land is privately owned); much

of the land is owned by the state and municipalities. Common grazing is largely practiced with no fencing to separate the herds of different producers. Production costs are high and the domestic cattle sector finds it difficult to compete with lower priced imports.

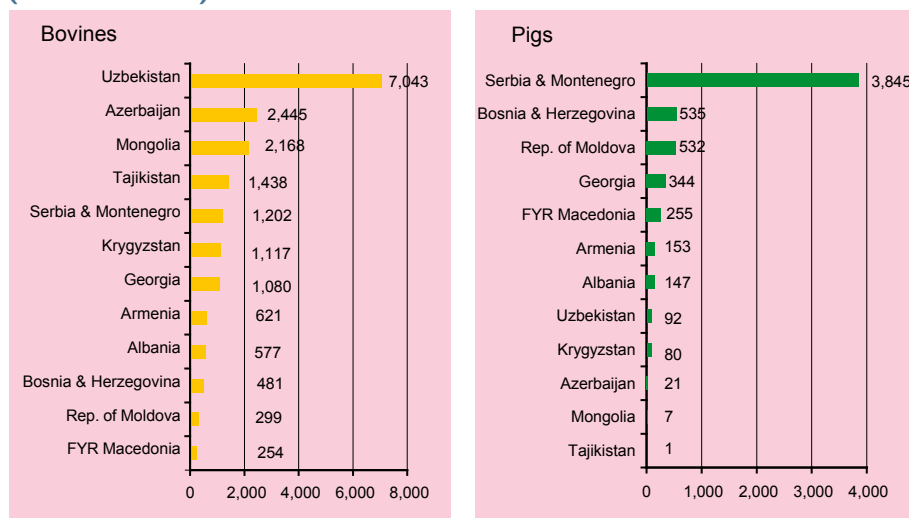
In **Kyrgyzstan and Tajikistan**, livestock production became fragmented following privatization in the early 1990s and today farmers are small-scale producers. Livestock production is extensive and based on pastures, especially in the mountainous areas. It is an important feature of the agricultural economies of the two countries, given the lack of crop production. The cattle sector is mainly devoted to milk production. Livestock productivity is low and aggravated by land degradation and overgrazing linked with communal grazing associated with state-owned lands.

In **Armenia**, the small livestock sector is based on extensive production that utilizes pastures normally in the more mountainous areas. Productivity is low. Livestock production is based on small-scale and often subsistence farming.

In **Georgia**, the livestock sector has characteristics similar to those of the Armenian livestock sector. The livestock sector in the **Republic of Moldova** has been in crisis since the severe drought of 2007, which consequently led to a severe shortage of forage crops and to the distress slaughter of livestock. Livestock production, including pig production, is concentrated on small-scale family farms that produce mainly for their own needs.

Uzbekistan accounts for as much as 38% of the total number of bovine in the WBCs and the ETCs (Figure 11). The only other countries with a major bovine herd are Azerbaijan (13% of the total number of bovine) and Mongolia (12% of the total number of bovine). Cattle are kept more for milk production than for meat production. The pig sector is much smaller than the bovine sector, given the lack of intensive livestock production in the WBCs and the ETCs with the exception of Serbia, which is the only major producer of pigs and accounts for 64% of the total output.

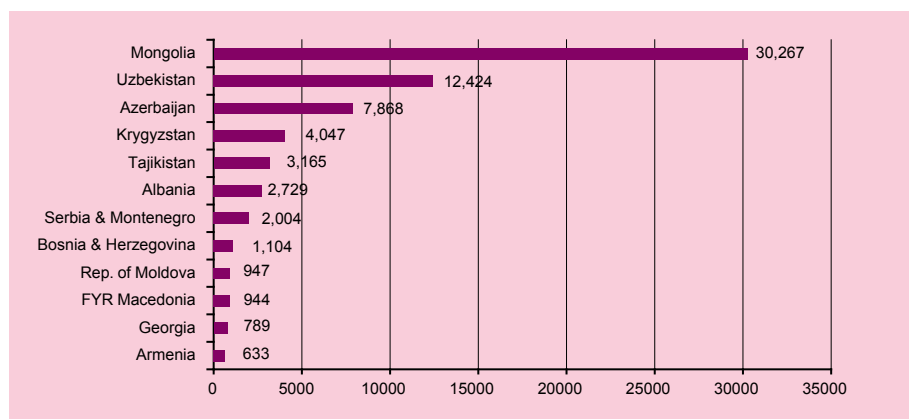
Figure 11: Number of bovine and pigs in the WBCs and the ETCs, 2007 (thousand head)



Source: FAOSTAT Database. © FAO 2009

The ovine production in the WBCs and the ETCs is concentrated in Mongolia, which accounts for 45% of the total output, followed by Uzbekistan with 19% of the total output (Figure 12). Ovine production is concentrated in the hilly and mountainous areas in all of the countries in these two regions, and while sheep meat is the most important red meat, there are large numbers of goats, particularly in Mongolia.

Figure 12: Number of ovine in the WBCs and the ETCs, 2007 (thousand head)



Source: FAOSTAT Database. © FAO 2009

4.2 Red meat production

Red meat production in the WBCs is dominated by Serbia and Montenegro and especially Serbia (Table 9). Pig meat is the most important red meat and accounts for 70% of the total output. Bovine meat is the second most important red meat produced in the WBCs and the production of ovine meat is marginal.

By contrast, bovine meat production dominates the red meat sector in the ETCs and accounts for 66% of the total output (Table 9). Ovine meat is the second most important production and accounts for 24% of total output. Uzbekistan is by far the largest bovine meat producer (63% of total output), given the importance of cattle in the country. It is also the second largest ovine meat producer, accounting for 26% of the total ovine output of the ETCs. Mongolia is the largest ovine meat producer, accounting for 33% of the total output. Pig meat production is low with the exception of production in the Republic of Moldova.

The slaughtering of livestock for meat is generally fragmented in most of the WBCs and the ETCs and much slaughtering is carried out on-farm for home consumption rather than for the formal red meat market. Many of these slaughtering facilities are old and use outdated equipment, are not very hygienic (i.e. not up to international standards) and suffer from a lack of investment. In these countries, a major part of the meat industry dealing with pigs and cattle typically tends to be concentrated in larger integrated plants that specialize in the slaughter and processing of one or more species. The plant production lines for the diverse livestock species are laid out in a similar manner.

Table 9: Production of red meat by species in the WBCs and the ETCs (thousand tons)

Country	Bovine meat thousand tons		Pig meat thousand tons		Ovine meat thousand tons	
	2007	2008	2007	2008	2007	2008
WBCs:	222	221	630	651	52	53
Albania	42	42	10	10	20	20
Bosnia & Herzegovina	25	26	11	12	2	2
FYR Macedonia	7	7	9	9	7	7
Serbia & Montenegro	148	146	600	620	23	24
ETCs:	935	966	138	141	342	350
Republic of Moldova	17	17	54	55	3	3
Armenia	36	37	10	10	8	9
Azerbaijan	76	78	1	1	46	46
Georgia	49	51	35	35	9	9
Mongolia	52	53	0	0	111	115
Krygyzstan	92	93	19	19	47	48
Tajikistan	27	27	0	0	29	31
Uzbekistan	586	610	19	20	89	90
Neighbouring countries:						
Kazakhstan	384	390	218	220	125	126
Russian Federation	1633	1586	1788	1850	160	165
Ukraine	563	499	650	618	15	15

Source: FAOSTAT Database. © FAO 2009

There have been differing trends in production of the various meats in the WBCs and the ETCs during the period 2000–2008 (Table 10). Structural adjustment and a switch to a more market-oriented economy contributed to an increase in production of most meats compared with production in the early 2000s.

From 2000 to 2008, beef and veal production was basically stable in the WBCs, apart from some decline in Serbia, but experienced steady growth in the ETCs because of developments mainly in Uzbekistan and to a lesser extent in Azerbaijan. Pig meat production in the WBCs was very much influenced by developments in Serbia, where production declined during the period 2000–2004 and increased thereafter. Sheep meat production in the ETCs increased from 2004 onwards mainly due to a recovery in output in Mongolia.

Table 10: Trends in red meat production in the WBCs and the ETCs (thousand tons)

Year	Bovine meat thousand tons		Pig meat thousand tons		Ovine meat thousand tons	
	WBCs	ETCs	WBCs	ETCs	WBCs	ETCs
2000	249	768	662	136	51	313
2001	220	722	592	125	51	290
2002	226	768	642	120	47	280
2003	230	781	600	127	49	275
2004	229	836	566	126	50	293
2005	228	853	591	119	51	310
2006	221	888	610	128	53	329
2007	222	935	630	138	52	342
2008	221	966	651	141	53	350

Source: FAOSTAT Database. © FAO 2009

4.3 Red meat consumption

Consumer purchasing power in both the WBCs and the ETCs is generally not strong and this has influenced developments in red meat consumption. Many consumers are living in rural areas and producing for their own needs rather than producing for the market economy. Most of the countries in these regions have large rural sectors and are largely dependent upon agriculture. In addition, much of the growth in the demand for meat has been for poultry meat rather than red meat. This growth has been helped by the greater focus of the poultry meat sector on meeting the needs of the market and changing consumer preferences. However, the market for red meat is still growing in the main urban centres.

In the WBCs, red meat consumption is dominated by pig meat, which accounts for 69% of total red meat consumption based on the 2006–2008 annual average (Table 11). Much of the pig meat is consumed in further processed form rather than fresh form. Serbia and Montenegro have one of the highest levels of per capita consumption of pig meat in the world, which indicates a strong consumer preference for and tradition of pig meat. With the exception of Serbia and Montenegro, bovine meat is also widely consumed in the WBCs, with per capita consumption higher than per capita consumption of pig meat. With the exception of Albania, per capita consumption of ovine meat is much lower compared with other red meats and so the size of the market is also much smaller.

Trends in consumption in the WBCs since the year 2000 indicate that the market for pig meat fell during the first half of the decade and, although it has shown some recovery since then, there has been no overall growth during the current decade. This mainly reflects developments in Serbia and Montenegro, which together account for 95% of pig meat consumption in the WBCs. The overall market for bovine meat in the WBCs has not increased and even edged down since the year 2000. This trend applies in particular to Serbia and Montenegro, which at the beginning of the decade showed a per capita consumption of 18.2 kg of bovine meat and an annual decline of 4% thereafter. By contrast, the market demand for bovine meat has grown steadily in the three other countries of the region (Albania, Bosnia and Herzegovina, and the former Yugoslav Republic of Macedonia). Ovine meat consumption in the WBCs has shown little change during the decade.

By contrast, in the ETCs the red meat market is dominated by bovine meat, which accounts for 64% of red meat consumption (Table 11). This reflects the tradition of bovine meat consumption and in some cases the prohibition of the consumption of pig meat due to religious beliefs. Ovine meat is also widely consumed in the region and especially in Mongolia and Kyrgyzstan. Only in the Republic of Moldova and Georgia is pig meat widely consumed by the local populations.

Trends in consumption in the ETCs since 2000 indicate that market demand for bovine meat has increased sharply during the current decade and is now 25% greater than in 2000. This has been influenced by developments in the largest market, Uzbekistan, where per capita consumption of bovine meat has increased by 30% since 2000. The market demand for pig meat has increased by an even greater amount, by more than 40% since 2000, spurred by developments in the Republic of Moldova. Ovine meat consumption reached a low point in 2003 but has since moved up steadily in most of the ETCs, including Mongolia which is the largest market. However, in Mongolia per capita consumption of ovine meat from 2006 to 2008 was still 15% lower than in 2000.

Table 11: Consumption of red meat by species in the WBCs and the ETCs (in thousand tons and kg)

Country	Bovine meat		Pig meat		Ovine meat	
	Total thousand tons	Per capita kg	Total thousand tons	Per capita kg	Total thousand tons	Per capita kg
WBCs:	253		673		51	
Albania	51	15.6	35	10.7	21	6.5
Bosnia & Herzegovina	34	8.0	18	4.2	3	0.6
FYR Macedonia	24	11.6	19	9.1	4	1.9
Serbia & Montenegro	144	13.7	601	57.2	23	2.2
ETCs:	985		210		340	
Republic of Moldova	17	4.1	74	17.4	2	0.5
Armenia	44	14.6	19	6.3	8	2.8
Azerbaijan	81	9.2	7	0.9	46	5.2
Georgia	69	14.0	50	10.0	9	1.8
Mongolia	48	17.5	1	0.2	111	40.4
Kyrgyzstan	94	17.4	33	6.2	47	8.7
Tajikistan	47	7.3	4	0.6	29	4.5
Uzbekistan	584	21.1	23	0.8	88	3.2
Neighbouring countries:						
Kazakhstan	401	26.2	247	16.1	124	8.1
Russian Federation	2,535	18.1	2,539	18.2	172	1.2
Ukraine	535	11.4	702	14.9	15	0.3

Note: Figures are based on an annual average of the years 2006–2008.

Source: FAOSTAT Database. © FAO 2009

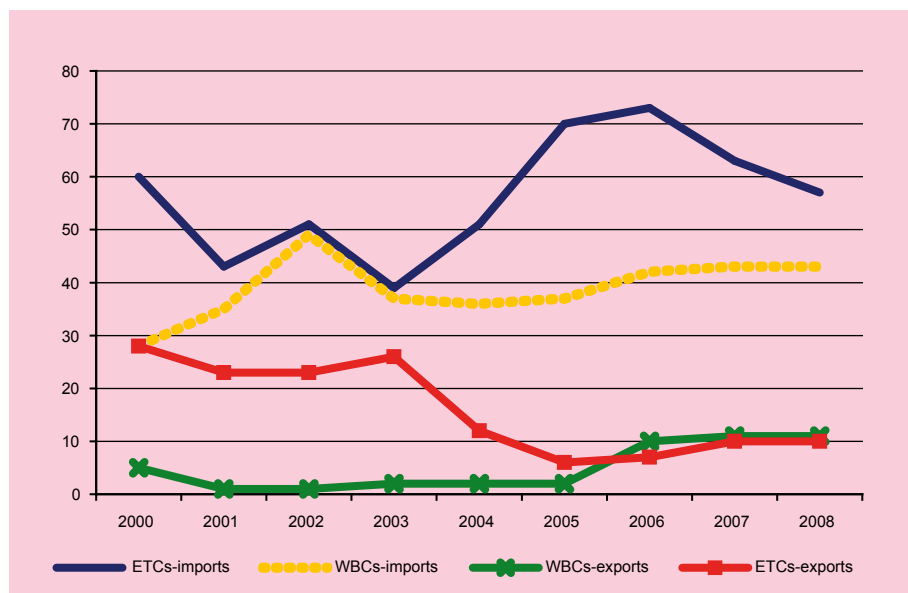
4.4 Trade in red meat and red meat products

Both the ETCs and the WBCs are net importers of red meat and the situation has shown signs of deteriorating during the current decade. This would indicate that the domestic red meat industry, with the exception of the ovine meat sector, has been unable to meet domestic meat requirements and to develop an export industry. By contrast, the ovine meat sector has been able to meet domestic requirements, although it has a negligible export industry. The main imports consist of low-value commodity meat (bought at the cheapest price) mainly in frozen form. This low-value meat is used by the local processing

industry to manufacture further processed products rather than sold as chilled or frozen meat. There is very little trade in red meat within the two regions.

Bovine meat imports into the ETCs and the WBCs amount to about 100,000 tons per year. A peak of 115,000 tons of imported bovine meat was reached in 2006. The export performance of the ETCs has been particularly disappointing. Although there has been slight growth in exports from the WBCs, exports remain at a low level.

Figure 13: Total bovine meat traded in the WBCs and the ETCs (thousand tons)



Source: FAOSTAT Database. © FAO 2009

The major former bovine meat importing WBCs are Albania, Bosnia and Herzegovina, and the Former Yugoslav Republic of Macedonia (Table 12). They all have a large deficit in chilled and frozen beef that is mainly supplied by Brazil and to a lesser extent by the EU. Of the ETCs, Georgia and Armenia have the largest import requirement and the main trade consists of buffalo meat from India. The main exporting countries of bovine meat are Serbia and Mongolia (Table 13) as the other countries have not developed an export industry. The export performance of Mongolia has deteriorated during the current decade, while the export performance of Serbia has improved.

Table 12: Chilled and frozen beef and veal imports into the WBCs and the ETCs (tons and thousand USD)

Country	Main partners	2007		2008	
		tons	thousand USD	tons	thousand USD
WBCs:					
Albania	Brazil, Paraguay, United States	6,705	9,558	5,429	10,101
Bosnia & Herzegovina	EU, Brazil, Croatia	4,215	10,871	5,404	19,457
FYR Macedonia	EU, Brazil, Serbia	14,462	35,890	11,438	37,139
Serbia	n/a	6	43	51	239
ETCs:					
Republic of Moldova	Brazil	716	644	2,131	2,218
Armenia	India	6,064	6,829	15,367	21,595
Azerbaijan	India	4,695	5,513	5,218	5,948
Georgia	India	8,327	11,170	7,665	11,895
Mongolia	n/a	7	71	n/a	n/a
Kyrgyzstan	China	1,190	1,050	n/a	n/a
Tajikistan	n/a	n/a	n/a	n/a	n/a
Uzbekistan	n/a	n/a	n/a	n/a	n/a

Source: © United Nations Commodity Trade Statistics Database.

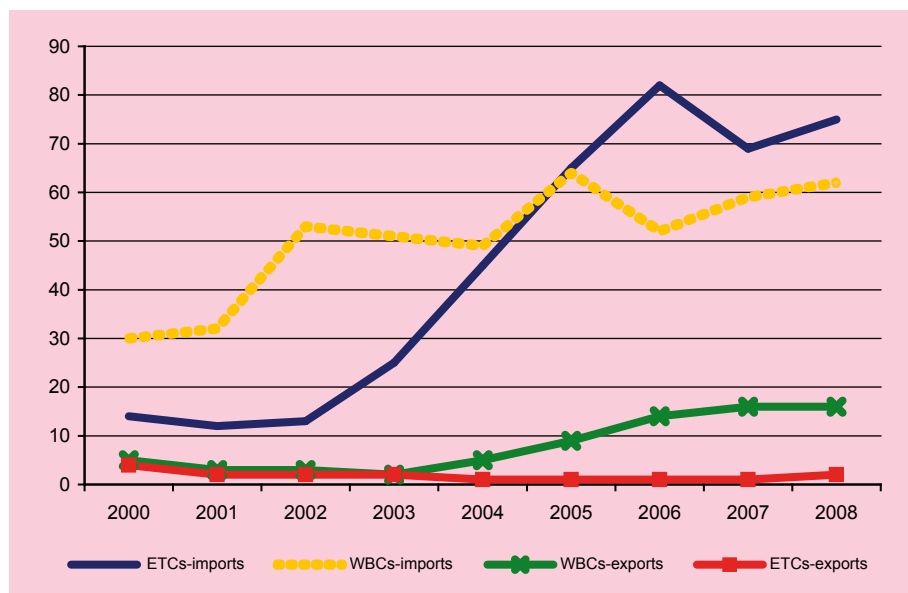
Table 13: Chilled and frozen beef and veal exports from the WBCs and the ETCs (tons and thousand USD)

Country	Main partners	2007		2008	
		tons	thousand USD	tons	thousand USD
WBCs:					
FYR Macedonia	n/a	12	22	n/a	n/a
Serbia	EU, Montenegro, FYR Macedonia	9,158	38,790	5,580	30,596
ETCs:					
Republic of Moldova	Russian Federation	1,216	2,587	61	296
Armenia	Georgia (re-export)	854	1,214	397	756
Georgia	Armenia	168	238	243	303
Mongolia	Russian Federation	3,847	6,213	n/a	n/a
Kyrgyzstan	n/a	13	44	n/a	n/a

Source: © United Nations Commodity Trade Statistics Database

Pig meat imports have increased considerably into both the WBCs and the ETCs during the current decade, while pig meat exports have remained negligible with the exception of exports from Serbia (Table 14). There has been a particularly large increase of imports into Georgia, Kyrgyzstan and Albania during the current decade.

Figure 14: Total pig meat trade in the WBCs and the ETCs (thousand tons)



Source: FAOSTAT Database. © FAO 2009

All of the WBCs import chilled and frozen pig meat (Table 14). Albania and the former Yugoslav Republic of Macedonia have the largest requirements. The main suppliers are Brazil and the EU. Of the ETCs, the key import markets are the Republic of Moldova, Armenia and Georgia. Chilled and frozen pig meat exports are negligible with the exception of small quantities from Serbia (Table 15).

Table 14: Chilled and frozen pig meat imports into the WBCs and the ETCs (tons and thousand USD)

Country	Main partners	2007		2008	
		tons	thousand USD	tons	thousand USD
WBCs:					
Albania	Brazil	15,139	20,003	11,563	19,028
Bosnia & Herzegovina	EU, Croatia	2,547	8,257	3,864	14,597
FYR Macedonia	EU, Canada, United States	7,303	18,701	9,452	26,250
Serbia	EU, FYR Macedonia	1,296	3,903	4,670	14,799
ETCs:					
Republic of Moldova	EU, Brazil, Canada	3,628	4,043	11,276	13,427
Armenia	Brazil, Canada	2,589	5,152	7,543	20,733
Azerbaijan	n/a	118	305	181	264
Georgia	Brazil, Canada, EU	5,663	9,918	7,426	16,519
Mongolia	n/a	56	97	n/a	n/a
Kyrgyzstan	China	7,929	7,435	n/a	n/a

Source: © United Nations Commodity Trade Statistics Database

Table 15: Chilled and frozen pig meat exports from the WBCs and the ETCs (tons and thousand USD)

Country	Main partners	2007		2008	
		tons	thousand USD	tons	thousand USD
WBCs:					
Albania		22	27	0	0
Bosnia & Herzegovina		3	12	13	52
FYR Macedonia		10	17	0	0
Serbia	Montenegro, FYR Macedonia	2,268	6,316	1,030	4,118
ETCs:					
Republic of Moldova		15	58	13	76
Armenia		0	1	0	1
Georgia		48	115	26	53

Source: © United Nations Commodity Trade Statistics Database

There is no trade in ovine meat by the countries in the region with the exception of the former Yugoslav Republic of Macedonia, which exports about 3,000 tons of sheep meat per year almost entirely to the EU.

4.5 Structure and investment

There has been little foreign investment in the red meat industry in the WBCs and the ETCs and virtually both of the entire regions are struggling from a lack of investment. There is little evidence, for example, that any major investment has been made by international meat companies. In the case of red meat processing, there is a lack of modern export approved facilities and many of the countries are looking for outside investment. Financial problems in the processing sector are aggravated by the fact that plants often work at less than full capacity and some large-scale processing is still undertaken by the state.

It is apparent that the red meat processing sector in particular (both slaughtering and secondary processing) requires considerable modernization to bring it up to international standards. Modern processing facilities would meet the needs of both domestic and export markets and also environmental requirements (including more efficient usage of water and energy and better utilization of waste products). It is also clear that much of the farming sector also requires modernizing, given its fragmented nature and low productivity. The red meat sector has been unable to meet domestic market requirements in most of the WBCs and the ETCs as reflected by the steady increase in imports during the current decade. The export performance of the sector, in spite of livestock being a major, if not the major, agricultural resource in many of these countries, has been poor. Yet, the long-term trend in global demand for red meat is one of steady rise.

In the case of investment in the WBCs, the livestock and meat sectors should benefit from eventual accession to the EU. The Former Yugoslav Republic of Macedonia is a candidate for accession and Albania, Bosnia and Herzegovina, Montenegro and Serbia are potential candidates for EU membership.

The EBRD has invested in meat processing projects in Armenia, which involve the company NatFood CJSC, and in Montenegro, which involve Mesopromet DOO, a meat producer. The Russian Federation has invested in meat processing in Uzbekistan. Matimex, an Austrian firm, which manufactures meat processing additives, announced in March 2009 that it will open production facilities in Uzbekistan. In Serbia, a British fund, Ashmore Global Special Situations Fund 3, has invested in Carnex a.d., and a company from

Cyprus has invested in Neoplanta a.d. Recent investments in some of the WBCs and the ETCs are summarized in Table 16.

There has been some development of the meat processing sector in Albania with the help of USAID technical assistance. Assistance includes help with the development of business strategies, improvement of marketing and production standards, quality management and procurement of financing. It also includes help with the procurement of meat processing equipment to make the red meat industry more competitive in both domestic and export markets. Assistance is available to TONA CO, a producer of processed meats and fresh meat, Meat Master and Roaafa Kaci. In Georgia, USDA-Georgia has assisted in modernizing the red meat slaughtering industry and in establishing new plants.

To take an example, Serbia, which has a large meat processing sector, has considerable potential for development once it has been fully privatized (this has been taking place in recent years as state companies are being sold off) and additional funds have been generated for investment purposes. It has suffered from under-investment and the use of outdated equipment and facilities. There is a problem of overcapacity in the slaughtering industry that in turn has contributed to under-investment. Serbia has a long tradition of high-quality processing and a competitive export industry. However, the largest meat processing company, Agroziv a.d., was in financial difficulty until it reorganized in 2008.

There is considerable need of investment in the meat processing sector in Mongolia, another country with large processing operations. There is a problem of plant overcapacity for much of the year as the marketing of ovines and bovines for slaughter is very seasonal and concentrated in a period of four months when stocks are in good condition and fit for slaughter. This in turn reduces availability of funds for investment purposes.

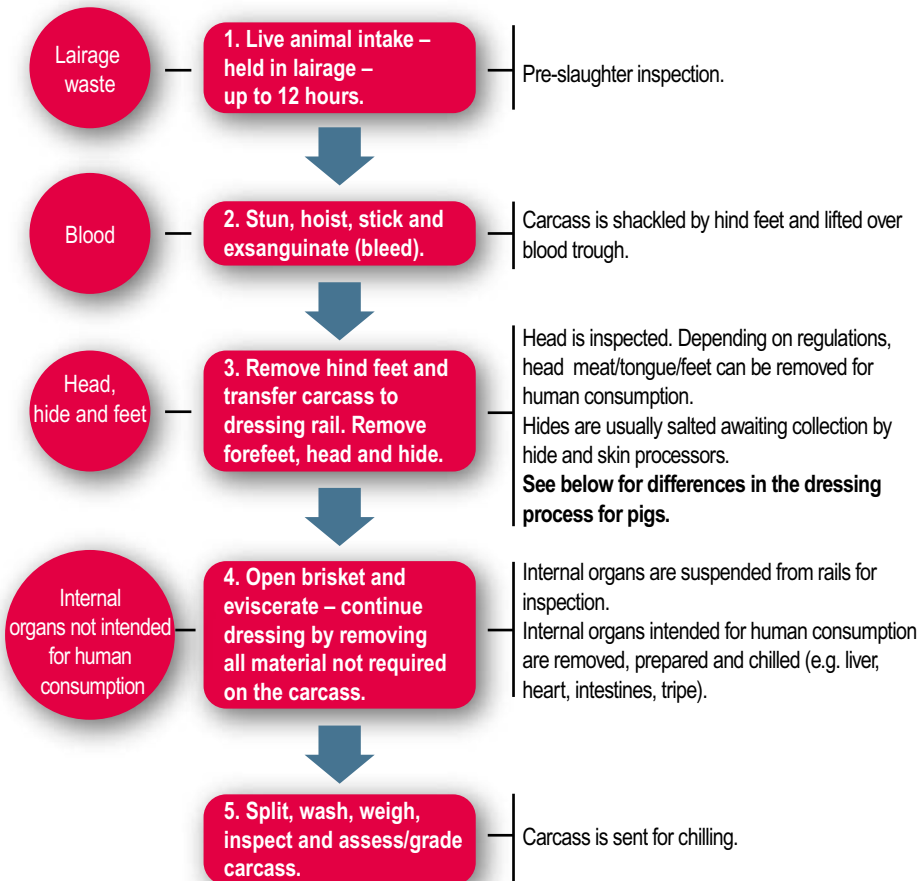
In Mongolia, there are slaughtering plants for the distribution of fresh cuts and facilities for the further processing of meat to produce sausages and canned meats. Some of these products, especially canned meats, are for the export market. The company Khatan Suikh is the major supplier of canned meats to the domestic market and Hun-Od is the second major supplier. Makhimpex, which was owned by the state until 2000, Tsast and Munkhlin Bolor are other major companies.

Table 16: Recent investments in some of the WBCs and the ETCs

Country	Year	Investment
Armenia	2008	The EBRD acquired a 28.3% stake in NatFood CJSC, a leading meat producer in Armenia. Funds are being used for new processing facilities that will be up to international standards.
Montenegro	2008	Expansion of the retail network and new further processing facilities at Mesopromet DOO, financed with an EBRD loan of EUR 5 million. Mesopromet DOO is the largest meat producer and processor in Montenegro. The EBRD loan also provides for improvement in environmental standards.
Serbia	2003	Upgrading of slaughterhouse and meat processing facility for cattle and pigs by Imes. A feasibility study was conducted by a Dutch consortium to ascertain what further investments are needed.
	2007	Expansion and rehabilitation of Carnex a.d., a leading meat processor, costing EUR 25 million. Meat production expanded from 20,000 to 40,000 tons per year, feed production capacity expanded from 24,000 to 72,000 tons per year and pig production capacity expanded from 70,000 to 140,000 pigs per year. The company is vertically integrated.
	2009	Investment by Agroziv a.d., the largest meat processing company holding 40% of the market share, in new production equipment that is intended to double production capacity at its Agroziv-Yuko abattoir.

ANNEX. THE SLAUGHTER PROCESS FROM LIVE ANIMAL INTAKE TO CHILLING: CATTLE AND PIGS

The slaughtering process requires that a potable water supply be available to wash the carcass and that provision be made to sterilize knives used in the process of sticking (severing the carotid artery terminating blood supply to the brain) and after slaughter of “dressing” the carcass. Dressing involves removal of the hide, head, feet and internal organs and should be done in such a way as to prevent contamination of the carcass by faecal material, and gut and stomach contents.



Differences in the dressing process for pigs

- The process for cattle and pigs differs after bleeding, when pig carcasses are then subjected to thorough additional treatment to clean and remove the bristles from the skin. In larger plants this process involves immersing the carcass in a tank of very hot water or in a steam chamber to scald the skin and soften the bristles, which are then removed with rotating scrapers. The carcass is then singed (passing it by flame jets) to remove any surplus bristles and finally polished (by softer rotating paddles). If the skin is to be removed, it will be done at this point before evisceration (usually by machine).
- In some small, low throughput plants, carcasses are sometimes only washed and the bristles are shaved off.
- In addition, the head and feet of pigs are usually left on the carcasses.

Disposal of residual material

The non-carcass material harvested for use for human consumption will vary depending on legal requirements (e.g. in the EU, the TSE regulations mean that cattle intestines and some other material – classified as Specified Risk Material under the ABPR – cannot enter the human or animal food chain and have to be disposed of) and cultural attitudes (e.g. more of the population in the ETC and the WBC eat tripe, processed from stomachs, than in the United Kingdom). Blood, for example, can be used to manufacture food products or treated for use as fertilizer.

Many plants will harvest the edible fats that are removed from the carcass during dressing (and later during primal and retail cutting), which will be used for either adding to manufactured products (e.g. sausages) or rendering into high quality oil.

Some of the material not used for human consumption can be utilized for pet food, although in the EU all such material has to be certified fit for human consumption even though it is not destined for humans (e.g. typically, the pet food sector will process livers, hearts, lungs and trachea, tripe).

The remaining material will be disposed of in one of three main ways:

1. Rendering. This is a pressure cooking process that produces fats (typically for industrial use or even for conversion to biodiesel) and meat and bone meal. Both meat and bone meal, if produced from material not prescribed by regulation, can be added to animal feed rations; otherwise, it has to be disposed of by incineration or landfill.

2. Incineration. This process reduces material to a fine ash that has some industrial uses (e.g. it can be added to building materials) but if derived from material not prescribed by regulation, the ash will usually be sent to landfill.
3. Landfill. This way of disposal is seen today as environmentally unsound. Landfill is the last resort.

Wastewater effluent usually requires treatment before it is allowed into conventional sewerage systems or discharged into natural watercourses.

Other options exist for some of the waste material and residual material described above. Some of the options that are becoming more commonly chosen are:

1. Anaerobic and aerobic digestion. This method is typically used to dispose of material from abattoirs and meat processing plants such as lairage material, effluent concentrates and sludge, blood, stomach and gut contents, and comminuted material. It produces methane gas that can be used for power generation and digested material that can be used as a soil improver.
2. Composting. This method typically uses material from abattoirs and also produces material that can be used as a soil improver.



European Bank
for Reconstruction and Development



**Food and Agriculture
Organization of
the United Nations**