

## Meat Technology and the Developing Countries

R. Nilsson, B. Buch-Larsen and O. Ipsics

Animal Production and Health Division,

FAO, Rome

The larger part of animals contributing to meat production is found in the developing countries (Table 1). Of the large ruminant population 68% are found in these countries and for small ruminants and pigs the corresponding figures are 57%.

When it comes to the actual production of meat the picture is, however, reversed with only 38% of the meat produced in the developing countries (Table 2). Obviously the productivity of the animals in these countries are much lower than in the industrialized countries. The main reason for this difference is to be found in various constraints at the production level amongst others the following:

- insufficient supply of vaccines and drugs and availability of physical facilities and personnel for treatment of animals;
- scarce feed resources, overgrazing, underutilization of agricultural byproducts;
- underutilization of the possibilities of improving the productivity of indigenous animal breeds through various breeding techniques;
- improper farm management;
- insufficient extension services of various aspects of animal husbandry.

These constraints which deal with on-farm conditions are not to be discussed in this connection but they should be kept in mind. The present discussion should instead deal with what we can call after-farmgate activities where meat technology should be able to give assistance in improving the availability of meat. The main constraints in this area may fall into the following four groups:

- lack of appropriate livestock market and marketing systems;
- excessive post-harvest losses through improper practice during transport of animals to the slaughter place, subsequent slaughter and handling of meat and byproducts;
- inexperience in using meat in byproducts as raw material for further processing;
- inefficient and faulty marketing of meat and meat products.

One common characteristic for these four groups of constraints is that one of their causes is the lack of trained personnel at all levels.

Some of the constraints will be discussed in more detail below.

### Transport of Animals

Slaughter in developing countries is to a large extent carried out in the consuming areas which means that animals, as a rule, have to be transported a considerable distance. The transport is in some cases carried out on trucks or by rail. The transport often lasts several days and as in many cases fodder and even water is not available the losses in dead animals and in weight may be considerable. The larger part of the animals are however transported on hoof. This trekking can cover distances of a few hundred kilometres and as the maximum a herd can make per day is around 30 km. the time needed can be rather long. This type of transport is very pressing as it normally is done under unfavourable climatic conditions. Even if special trekking tracks are used this does mean that there is enough fodder and water in places where the animals can rest in order to reach the slaughterhouse in good condition. To the contrary there are considerable losses during the trekking, through thefts, dead and weight losses. There is little known of the size of these losses but they are thought to amount sometimes to 25% or even more. There is, therefore, a need for studies determining the effect of transport of animals under various climatic conditions and by different methods. The goal would be to work out sets of recommendations for transport both on hoof and by other means with reference to access to fodder, water, length of daily transport, and arrangement for overnight rest, etc.

The problem with transport of animals to the slaughterhouse cannot be separated from the question of which would be the preferable location for these; in the production area or in the consuming area. In industrialized countries the rule now is that slaughtering is taken place in the area of production and that the meat is transported in a chilled or frozen state to the place of consumption.

In developing countries the major part of slaughter is still taken place in the consuming areas, as mentioned above. The reason is that only in a few of these countries the transport system is developed to such a degree that it would be possible to transport meat instead of live animals. There is, however, a tendency even in these countries to locate new slaughterhouses where the production is, but it is not clear if the transport cost would decrease in the same way as in the developed countries. It would, therefore, be worthwhile to work out models which take into account price differences among markets, transportation cost and plant location for a variety of conditions. The eventual impact on employment and cash-flow into rural communities of such a transfer should also be considered.

The models should serve as guides to policy decision regarding the meat industry development. It is urgent to have this matter investigated and to be able to give recommendations and guidelines on the subject as many countries have started schemes to modernize and develop their slaughterhouse sector.

### Livestock Markets

In most developing countries the trade of live animals is in the hand of middlemen or professional traders who buy the animals on the farm or at traditional markets. The buying is usually based on the appearance of the animals as scales are seldom present. In such a situation the middleman is at an advantage as he has more experience in judging the quality of the animals than the farmer. Introduction of proper livestock markets run by municipalities or government, and which would include a payment system based on liveweight, should greatly improve the farmers position. The livestock markets could and should also be centres where extension services in various animal husbandry subjects could be obtained and various information pertinent to rural life could be disseminated.

### Slaughter Facilities and Slaughter

The constraints to the development of this sector may be gathered into the following groups:

#### Physical facilities

Slaughter facilities in developing countries may be divided into three categories:-

- a. fully mechanized, often rather large, commercial slaughterhouses with byproducts processing, chilling and freezing. Usually the export part of the product;
- b. slaughterhouses owned by private companies or by municipalities. They are of medium size (50-200 large animals per day, 200-1 000 small animals per day) and are fully or semi-mechanized. They may have byproducts processing and/or chilling facilities;
- c. slaughter slabs for town and village slaughter. Very simple facilities without mechanized equipment and often with limited supply of water.

It should also be mentioned that a considerable part of slaughtering in rural areas takes place as "bush-slaughter" or "under-a-tree slaughter".

All developing countries have a slaughterhouse sector composed of slaughter facilities belonging to categories (b) and (c). Some countries also have one or a few slaughterhouses belonging to group (a).

When it comes to technical assistance to this sector our experience is that many of the group (a) plants have the permanent staff needed for proper

running, including maintenance and development.

Concerning categories (b) and (c) there is in most countries a need for assistance in development and improvement. In particular, assistance and advice are needed on the following subjects.

- establishment of basic criteria for slaughter facilities of small medium size;
- standard layouts for small and medium sized slaughterhouses which could be adopted to various local conditions;
- proposals on the use of locally available building materials;
- drawings of simple equipment and instructions on how to manufacture them locally;
- proposals on how to solve waste water and other pollution problems.

#### Slaughter process

The technical and hygienic standard of the work carried out in slaughterhouses and slaughter slabs is often rather low. The result is meat of an inferior hygienic quality and unnecessarily high "post harvest losses" both in meat and in various byproducts. The way out of this is improved physical facilities as indicated above, but this has to be combined with increased professional skill of the workers, supervisors and management. It means that a number of training activities should be initiated. What meat technology can contribute in this context is the preparation of guidelines, manuals and other teaching material on the level and sophistication needed for various situations in developing countries.

The following subjects would be of interest:

- slaughter techniques for various types of animals;
- practical microbiology - personal hygiene;
- Cleaning and sanitation;
- proper collection and handling of byproducts (hides, skins, casings, blood, etc.);
- waste water treatment - pollution control.

#### Operation and management

In most developing countries slaughter and meat handling is carried out by a number of slaughtermen teams hired by butchers or others who are paying a fee for the use of the slaughter house. This system makes it virtually impossible to supervise the slaughter in a proper way and to reinforce rules necessary to keep the technical and hygienic standard on an acceptable level. In order to obtain this it would be necessary to introduce an operating system based on a permanently employed staff of skilled workers,

supervised by foremen and a production manager and/or general manager. The live animal should be delivered at the entrance of the plant and the carcasses could be collected the same or next day at the despatch area. The byproducts should be retained by the slaughterhouse and paid for according to standard rates.

The introduction of such a system is, however, usually strongly opposed by the Butchers' Societies, who often have a very strong political influence, and progress in this field is slow. The main reason for this attitude is the conviction that the system, particularly in connection with establishment of new slaughter houses, will decrease the employment. This conviction may also be one reason why so many new slaughterhouses in developing countries are grossly underutilized and old slaughterhouses at the same time are working far in excess of their capacities.

Having these points of view in mind it seems to be worthwhile to make a socio-economic study of what happens when an old slaughterhouse run according to traditions is replaced by a modern one run according to commercial principles.

However, a modern slaughterhouse sector needs personnel on a managerial level which at the moment is available only to a restricted extent in developing countries. Also, in this field extensive training activities would be needed, particularly in the following subjects:

- personnel policy
- accounting
- maintenance

#### Meat processing

Most of the meat in developing countries is consumed without any further processing. This is understandable under conditions when meat consumption is only a few kg per caput per year. Under such conditions there is little need to transfer the fresh meat into products with longer keepability. It should also be realized that every process will increase the cost of the product and subsequently make the meat less available.

In some parts of the world some meat processing has been going on for centuries; for example preparation of dried meat in Brazil, West Africa and India, etc. The manufacturing of these products seems to be increasing, but the technology behind the processes is, however, not fully known judging by the uneven quality of the products. Modern meat technology should be used to standardize the processes for various dried meat products and to develop suitable equipment, in particular, for small-scale manufacturing.

Even if the main part of the meat is consumed fresh there is an increasing market for processed meats, such as ham, bacon and sausages. This should be encouraged if it could be used to increase the employment in rural areas and increase the flow of cash into these areas. To facilitate this methods for manufacturing these types of products in small-scale should be worked-out, together with layout for suitable plants and equipment.

### Meat marketing

In the previous sections a scenario for the improvement of the meat industry sector has been described. This scenario is, however, not complete without also dealing with the last link in the chain from the producer to the consumer, that is if it is not dealing with the marketing aspects.

A large part of the meat is sold on stalls in the market places under real unhygienic conditions, or in shops where the conditions are not much better. The transport from the slaughterhouse is also carried out under unsatisfactory conditions, in open trucks and on bicycles, etc. Meat technology should assist in this context by giving guidelines on how to arrange proper transport and and for market stalls or shops to maintain acceptable hygienic standards.

A number of constraints to the development of the meat industry have been given above and some proposals of how to overcome them. It is hoped that the following discussion will provide us with additional information on how modern meat technology would be able to assist the developing countries in this respect.

Species	Million head		
	Total	Developed Countries	Developing Countries
Cattle & Buffalos	1 331	426	905
Sheep & Goat	1 825	779	1 046
Pig	779	336	443
Poultry	6 481	3 094	3 387

Table 1. Number of domestic animals in the world (FAO Production Year Book, 1980)

Species	Thousand ton		
	Total	Developed Countries	Developing Countries
Total	142 500	88 000	54 500
Bovine	46 700	31 000	15 600
Sheep & Goat	8 100	3 500	4 600
Pork	55 100	32 800	22 300
Poultry	30 100	19 700	10 400
Other meats	3 600	1 800	1 800

Table 2. World production of meat (FAO Production Year book 1980)