MEAT PRODUCTION AND PROCESSING IN INDIA - PRESENT STATUS AND FUTURE PROGRAMME

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Introduction.

Economic and industrial progress of a developing country like ours will almost result in increased use not only of processed food but also nutritionally rich items like quality meat. In modern civilization the level of meat consumption is perhaps clearly associated with the standard of living, the degree of prosperity and general economy of the nation. With the industrial progress, people are changing their traditional food habits and eschewing social taboos and consequently the demand for meat and meat products is increasing year after year. In Japan, per capita meat consumption per year has increased from 4.3 kilograms (1961) to 11.4 kilograms (1967) whereas per capita meat consumption in our country is less than 2 kilograms per person per year, although only 33 per cent of the Indian population are vegetarians. The diet of the Indian people are deficient in animal protein and per capita animal protein consumption per day is 6.4 grams. If Indian people are to have a balanced diet, apart from increasing production of cereals, pulses, vegetables and fruits, we will have to increase our meat, fish and poultry production by 120 per cent in the coming year. The increasing importance of animal production has recently been brought into focus in our national planning more than in the past, and a few figures would suffice to illustrate this. For animal husbandry (including dairying), the plan allocation was about Rs. 160 millions ($ 1.00 = Rs. 7.42) in the first five year plan, Rs. 330 millions in the second, Rs. 77 millions in the third and Rs. 1,360 millions in the current fourth Five year plan.

Meat production and live stock population:

The meat for human consumption in India is mainly derived from goats, sheep, cattle, pigs and poultry. According to latest livestock census, there are in India 175 millions of cattle, 51 millions of buffaloes, 60.9 millions of goats, 40.2 millions of sheep and about 5-9 millions pugs and poultry 114.3 millions. India possesses about 19 per cent of world's cattle, 18 per cent of world's goat and 4 per cent sheep and more than half of the world population of buffaloes. The total meat production in the country is estimated to be 554 thousand tonnes (Table 1) which is far below the target of 10 million tonnes.

Table 1. Production of Beef, Pork, Sheep and Goat from slaughtered animals in India in organised sectors.
(1,000 tonnes)

Animals slaughtered	Years				
	1963	1964	1965	1966	1967
Beef, Buffalo	160	160	162	162	163
Mutton, Goat	359	360	366	366	367
Pork	24	24	24	24	24

Only about 12 per cent of the total livestock population of the country is slaughtered for meat.

Meat Processing Industries:

Meat processing and packaged marketing on commercial scale are of recent origin. Hardli there are about a dozen meat processing units in the organised sector which handled about 3000 tonnes of processed meat (Table 2.). At the end of the IV Five Year Plan, it is expected to reach the target of 10,000 tonnes.

Table 2. Production of processed meat in India+

Year	Production in tonnes
1963	1800
1964	2500
1965	3000

+ India - Hand Book of Commercial Information Vol. II, 1964

Pork and pork products:

The demand for good quality pork and pork products is increasing. Recently seven modern bacon factories have been started under public sector in different parts of the country to cater to the meed of growing population in industrial and urban areas. Government has also set up an intensive breeding programme to rear pig on scientific lines.

Sheep and goat:

The largest source of meat in India is sheep and goat amounting to 55 per cent of the total meat produced in the country (Table 3); 15.3 million sheep skins are utilized by the leather industry annually.

Table 3. Approximate percentages of the meat animals slaughtered in India

Type of animals	Percentage of animals slaughtered for meat	Percentage of meat produced by different meat animals in total meat production
Cattle	0.9	19.6
Buffaloes	1.4	15.2
Sheep	32.5	23.1
Goats	36.8	32.1
Pigs	22.0	4.9
Others including poultry	-	5.1

Earnings from livestock:

Livestock and live stock production are estimated to contribute Rs. 30,000 million per annum to our national economy. Their foreign exchange earnings were about 880 million of rupees in 1967-68. This is 29 per cent of the foreign exchange earnings of the important agricultural products and 8 per cent of the country's foreign exchange earnings. In 1966-67, export of meat and meat products totalled 870 tonnes valued nearly a million of rupees.

Improvement of Abattoir and formulation of national standard:

Meat animals are slaughtered in the country in municipal abbattoir, whose condition is far from satisfactory. Guidelines for modern abattoir system are now available to fulfil the requirement of hygiene and sanitation. Modern abattoirs have already started coming up in big cities like Bombay, Calcutta, Delhi, Madras and a few other places. Moreover, a proper certification service under the Statute of "Meat Products Control Order" is in the offing which will be able to regulate the meat quality standards. The formulation of national standards by the Indian Standards Institution for basic requirements of abattoir meat grading, ante-mortem and post-mortem inspection of meat animals, pork, ham, bacon, sausages (canned) etc., has awakened the interest of the producers and consumers. Work is in progress to standardise other popular meat products available in the market. It has been estimated that improvement of theslaughter houses would encourage the export of meat and meat products and make the other slaughter house by-products acceptable to the developed countries. When the present slaughter houses are modernized and equipped, the principal slaughter house products can be increased to the value as indicated in Tables 4 and 5.

Table 4. Export target of meat and this by-products in future

Quantity in tonnes	Value in million rupees			
	1963 - 64		1970 - 71	
	Qty.	Value	Qty.	Value
Meat and Meat products	65,000	32.5	1,30,000	65.00
Animal Casings	370	10.7	1,037	30.00
Raw wool	11,955	76.1	20,000	120.00
Goat hair	3,119	7.9	3,896	9.8
Bones, bone grist etc.	71,322	27.5	1,06,983	41.3
Horns & hooves	2,230	1.6	4,460	3.3
Pig bristles, hog bristles etc.	178	13.6	259	20.0

Table 5. Envisaged availability targets in the IV Five Year Plan

1. Blood in the form of blood meal	1,000 tonnes
2. Useless meat in the form of meat meal	5,000 "
3. Horns and hooves	25,000 "
4. Hormones and glandular products	
(a) Adrenaline	20 kg
(b) Pancreatin	10 kg
(c) Progesterone and analogues including Methyl testosterone	100 kg
5. Enzymes	
(a) Pepsin	20 tons
(b) Pancreatin	15 tons
(c) Fungal amylase	15 tons

Research and Development:

The criteria of judging meat animals in the country upto recent past have been all empirical. There is pratically very little information available regarding quality characteristics of indigenous meat animals and means of producing it. Out of 200 sheep breeds in India, few breeds viz. "Mandya" or "Bannur", "Nellore", "Mecheri", "Bikaneri" and "Magra" are known for their meat quality. Considerable research work has now been initiated through cross breeding programme with exotic breeds such as Merino, Momney March, South Down, Cooriadale, Rambouillet, Russian Merino and Stavasoplaskaya, to evolve a technique in increasing the fertility, early maturity and fast growth rate which all lead to increased meat and woll production. The average meat production from an Indian sheep is about 10 kilograms and its dressing percentage is 45 per cent. The research in meat science has also been initiated at various Indian Councils for Agricultural Research Centres (Animal Science Research Branch) and Agricultural Universities in different parts of the country. Goat's meat (Chevon) is relished more than lamb in India. It is also a valuable source of milk particularly to the economically weaker section of the population. There are about 100 good goat breeds in India whose skin is an item for export. Annually 27.4 million of goat skins are produced in the country.

Apart from the development of meat production and processing, fundamental and applied research on meat science and technology is going on at the Central Food Technological Research Institute (CFTRI) at Mysore, India, which is the pioneer in undertaking meat research in India.

Meat Research at the CFTRI:

(i) Quality characteristics of lamb:

Research has been initiated to study the qualitative and quantitative characteristics of Bannur lamb which is said to be one of the bast quality meat sheep breeds of India. Primary observations has indicated that "Bannur" lamb meat compares favourably with the meat from choice lamb of USA.

(ii) Physico-chemical measurement of goat and sheep muscle:

With a view to improving the quality of meat, pH, buffering capacity, percentage transmission of muscle pigments, loose water number (lw), water binding capacity and soluble protein nitrogen were determined in the goat and sheep muscle. Also the water holding and water binding capacity of the muscle are different from sheep muscle.

(iii) Colour and flavour problem of Ham & Bacon from indigenous pigs:

Different curing techniques have been tried to develop good quality ham and bacon with good colour, flavour and texture characters from indigenous cross breed pigs. The product developed was found extremely desirable from the consumer's acceptance point of view. It is observed that hard cured ham and bacon are suitable for Indian condition as it extends the shelf life of the product in non-refrigerated handling, transport and storage conditions. It is further observed that even at low nitrite level (40.2 ppm), desired colour of the bacon could be developed by proper processing technique. Chemical studies on the oxidative deterioration of animal fats under different storage conditions are underway.

Table 6. Nitrite content of Bacon in ppm at different days of curing, smoking and ageing under different curing techniques.

Curing treatment	0-day	10-days	14-days	+	++
Dry cure	-	22	49	34	40
Pickle cure	-	18	40.5	29	34.5

\+ After washing, smoking and ageing
++ After frying the finished product at 170°C for 10 minutes

(iV) Sausage type products from mutton:

The objective of this study is to stretch the supply of animal protein to the human population. It takes the advantage of the surfeit of lysine in meat proteins by diluting it with vegetable proteins deficient in lysine so that the resulting level of lysine matches the FAO reference pattern of amino acids. A basic composition for ready-to-serve mutton, beef and pork sausages have been standardised with 45 per cent lean meat, fat, vegetables, spices and binders. Any regional preference could be incorporated into it to suit the consumer's demand.

(v) Dehydrated meat foods:

A number of products based on meat were formuled and processes for their production were developed for use especially for convenience as emergency food items for inclusion in Army rations. Some of these products are precooked, dehydrated ready-to-eat viz. (a) mutton flavoured with vegetable broth and spices and (b) spiced mutton and rice, pré-cooked mutton, rice and beans canned mutton curry and the Army has shown interest to some of these products.

(vi) Meat based baby foods:

Standardization of the methods of preparation, development of blends of chicken with cereals, pulses and vegetables and determination of the nutrient composition

of the products prepared in the laboratory were undertaken.

(vii) Meat Powder:

Work is being carried out with a view to standardise and make comparative evaluation of processing aspects of a few methods that have been indicated for the production of meat powder. A comparative study of the nutritional qualities, microbial status, storage behaviour and organoleptic acceptability of the meat powder processed in four different ways were studied.

(viii) Meat Soup Cubes:

The production of soup cubes, particularly from chicken is under investigation. Meat extract of broth and meat hydolysates form the base while the flavour is imparted by onion, carrot and leaves of coriander and mint.

(ix) Microbial examination of market meat:

This study has been undertaken by this Institute with the object of carrying out an exhaustive microbial survey of market meat under the prevailing conditions of slaughtering, transport and sale in the market. Based on such a survey for the entire country, suitable standards of market meat sanitation could be formuled. This survey would also help to study the processing time and temperature that would be required to maintain the "commercial sterility" of the canned meat products produced in different meat packing plants. Some samples exmined gave typical reactions for salmonella on triple sugar iron agar; taxonomy of the pure cultures of different types of organisms isolated are now being studied.

In conclusion, it may be added that like other technologically developed countries, animal production is also developing in our country as an industry with the growth of animal science research. Keeping with the varied and farreaching technological advantages which are affecting our society our way of living and thinking, the meat industry however small it might be, is rapidly undergoing fast changes which will provide a look quite unlike traditional image of meat processing by trial and error method. The industry as well as the consumers no longer put up with the variability in materials and products as a necessary evil but are finding ways to minimising or eliminating it.