Challenges and prospects of meat industry

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Liberalization of agricultural trade in the light of globalisation has created great concern in the minds of farming community. It will become fully operational by 2004 and many of the quantitative restrictions were already removed. India is facing serious challenges on the import side causing abrupt fall in the prices of several agricultural commodities. There is also growing concern about the subsidies provided to the farmers in some of the developed countries, which enable them to compete with advantages in the international market.

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The economy of our country and its socio-economic development are substantially influenced by the livestock sector, which contributes to about ten percent of its GDP. India is blessed with a major share of the global population of livestock ranking first in cattle and buffaloes, 2nd in goats, 3rd in sheep and 7th in the poultry.

With such a remarkable livestock wealth to its credit, our country has vast opportunities and prospects for economic development in the wake of the economic liberalisation and the consequent free trade. Livestock sector serves as the exclusive source for animal protein for the growing population of our country. Livestock production and animal husbandry practices provide employment to over 300 million rural people of our country and contribute enormous amount of draught power and biomass, which enrich the agricultural fields.

Though the livestock scenario of our country appears very bright, it is faced with many problems and challenges on account of the ever-increasing human population. Expansion of population, decreasing land holdings, shrinking agricultural lands and the increasing demand for food, are serious problems to be tackled in the new millennium. The animal protein consumption in our country is only 9.5 g per head per day compared to a world average of 25 g/head/day. The Indian Council of Medical Research has recommended an intake of 1-g protein per Kilogram live body weight out of which 50% should be from foods of animal origin. It is estimated that the share of developing countries in the total world meat consumption will increase from the present 47% to 63% by the year 2020. Per capita consumption of meat in developing countries is expected to increase to about 29 kg/annum compared to 110 kg in the industrialized world. The green revolution in our country has contributed to a substantial increase in the production of agricultural products But we cannot remain complacent with its achievements in the light of the growing demand for food for over a billion of our population. Therefore, it is high time for us to focus our attention to harness the livestock wealth of our country for food production.

The economic liberalisation and the GATT agreement have opened up great prospects and challenges

for export of livestock products in the international market. Thanks to the scientific reorganization of the Dairy sector and the scientific research inputs, India has become the largest producer of milk in the world. There is a steady but slow increase in the production and export of meat and meat products from India in the past.

Central Statistical Organization, New Delhi reported that a total of 1,76,320 tonnes of buffalo meat was exported from India to about 50 countries earning a total revenue of Rs.729.3 crones.

Though there is a substantial increase in the export of meat and products during the year 1995-96, and during 97-98, the annual slaughter figures show that only 6% of the cattle and 11% of buffaloes were slaughtered.

The major advantages and favourable conditions for our meat industry are:

1. In the international market, the price structure is favorable to India with beef costing highest followed by pork, mutton and chicken.
2. With the giant share of the cattle and buffalo population of the world, the prospects for production, processing and export of such meat is very promising. However, export of beef is not permitted from India
3. However, there is neither ban on export of buffalo meat nor any socio-religious taboo against the slaughter of buffaloes.
4. The absence of Bovine Spongiform Encephalopathy (Mad Cow Disease) among our cattle and buffaloes is a very favorable condition for promoting export of buffalo meat to other countries especially in the wake of reports of outbreak of the disease among European cattle.
5. The quality of buffalo meat is comparable to that of beef.
6. The leanness of the meat of Indian animals and the low fat content and low cholesterol content are advantageous factors for promoting export of Indian meat. Therefore, it is the most appropriate time for identifying the most suited breeds of buffalo for meat production and to augment the production and export of buffalo meat. The meat production potential of buffaloes can be improved by appropriate genetic improvement and breeding. Quality of buffalo meat is comparable to that of beef however; further research work is essential to elucidate its full details and to improve the carcass qualities and meat production potential. It is worth mentioning here that some of the Indian breeds of cattle (Ongole, Tharparker, and Sahiwal) have been bred to evolve the Brahman breed, which is widely used for meat production in many of the developed countries. Several meat breeds of cattle have been developed by crossing Brahman with other breeds. It is unfortunate that we have not yet exploited the potential of many of our breeds especially among buffaloes, sheep and goats.

Though we have all the above-mentioned ideal resources, we have many drawbacks in competing in the international market. Major handicaps in securing a decent share in the meat trade and export are:

1. Poor microbiological quality and low keeping quality
1. Poor eating quality
2. Unhygienic slaughter practices
3. Absence of meat inspection and certification
4. Lack of infrastructure facilities for hygienic meat production and processing.
5. Absence of disease free zones
6. Absence of meat breeds of animals

Therefore, the need of the hour is to introduce measures to improve the quality of meat and meat products.

Quality characteristics are strongly influenced by both in life and post mortem factor. With the advance in meat research, it is now possible to significantly improve the eating quality or palatability attributes by meat processing. The farmer, therefore, can confine his attention to quantity aspects and leave the aspects of quality to the technologists and processors. Quality as perceived and appreciated by the consumer and processors depend on sensory, functional, microbiological and nutritional attributes.

In the absence of meat breeds of cattle and buffaloes in India, unproductive and aged dairy/draught animals are used for meat production. Musculature of those animals, which have attained physiological maturity, undergoes an irreversible process of aging those leads to toughening. The cross-links between adjacent collagen molecules become stronger and stable as age advances. The texture of such meat will be coarse because of thickened connective tissue strands and larger size of the muscle fibres and bundles. The connective tissue and the contractile proteins affect tenderness, which is the most important sensory attribute appreciated by the consumer. Other factors that influence the quality of meat post mortem are temperature, rigor mortis, and contraction of muscle, ultimate pH, marbling, humidity, hygienic status of the slaughterhouses and procesing.

Methods for enhancing the quality of meat and meat products can be broadly grouped into two:

1.Adoption of Quality management practices in production, processing, packing and preservation.

a) Quality system, management, assurance and cotrol.
b) Risk Analysis
i) Hazard Identification
ii) Risk assessment
iii) Risk management
iv) Risk communication

2. Adoption of post slaughter processing techniques.

a) Carcass suspension method
b) Electrical stimulation of carcass
c) Aging
d) Use of artificial tenderizers
e) Comminution
f) Blade tenderisation
g) High pressure application
h) Tumbling
i) Restructuring.

Quality Management

The most ideal method for enhancing microbiological quality and to assure food safety is the adoption of quality management procedures in production, processing, packing and preservation of meat. One of the major public health concerns is that of increasing incidence of meat borne infections and intoxications. Spoilage, low keeping quality and environmental pollution are other problems to be tackled. The goal of quality management is to meet the given standards and specifications for achieving customer / client satisfaction and for getting it right first time, avoiding reworking in the pursuit of continuous improvement process. It comprises of the overall management functions that determine and implement quality system, assurance and control to:

1.analyse what is required in terms of people, materials, equipment and information (Resource management)

2.to put the process together efficiently with safeguards(management control)

3.to communicate: to train staff, monitor inputs and outputs, correct problems and improve efficiencies (evaluation, review and improvement).

Hazard Analysis and Critical Control Point (HACCP) is a tool that has been developed to apply quality management. It is essential to identify the hazards, key control points, determine the limits for control points and to monitor them. Therefore, risk analysis and quality management is directed to achieve better results and eliminate the problems.

Every step in the production, processing, packing and preservation are monitored by adopting quality management to eliminate problems and to enhance the quality and safety.

Post slaughter-processing techniques

Carcass suspension

During suspension of carcass by Achilles tendon, some of the muscles are stretched while others are bunched up providing freedom for the muscles to contract and shorten. Shortening exerts strong adverse effect on tenderness. Research in this regard have revealed that by altering the method of suspension of carcass to hip hanging or suspension by acetabular foramen, the

freedom of major muscles to shorten is restricted and such muscles remain more tender. Another method is to apply' extenderisors" to stretch the muscles of the back and pelvic limb. These methods can be adopted by the industry to improve the quality.

Electrical Stimulation

Electrical stimulation of the carcass is done immediately after the slaughter for accelerating the onset of rigor and glycolysis. It is well known that rapid chilling or freezing of the carcass at pre-rigor stage results in severe cold shortening and consequent toughening. Electrical stimulation of the carcass not only prevents the cold shortening but also provide other beneficial effects like tenderisation by disrupting the integrity of the muscle and brightening the colour of the meat. This method is widely adopted in Australia, USA and other European countries and is regularly practiced at the Meat Technology Unit of Kerala Agricultural University.

Ageing

It is one of the most suitable methods to improve the quality of meat. During ageing, the actin filaments gets dissociated from the Z line, gap filaments are affected by the action of calcium activated neutral proteinases and the sarcoplasmic proteins are extensively proteolysed. Eating quality is found to improve by keeping the carcass, sides or packed meat at 0-5$^{oC.}$ It permits the action of the proteolytic enzymes present in meat thereby increasing the tenderness, juiciness and flavour. Major disadvantage is the refrigerated space required to hold meat for several days at the required chilling temperature. However, methods to hasten the action of enzymes at higher temperature without microbial spoilage have been developed now. Ageing is also practiced for improving the quality of products by development of flavour, fermentation, curing and drying.

Artificial Tenderizers

Proteolytic enzymes derived from bacteria; fungi and plants are used for improving tenderness of meat. The plant enzymes like Ficin, Papain and Bromelin are more commonly used since they act both on actomyosin and connective tissue proteins. They are applied as dips, through forkholes, pumping and as pre-slaughter injection. The action of the enzyme is during cooking which breaks down the connective tissue proteins to soluble hydroxyproline containing molecules.

Comminution

The process of particle size reduction brings out favourable tenderizing effect by disruption of the tissues. Passing the meat through a coarse grinder can do it. Spices and salt can also be added during this process to improve the flavour and quality.

High Pressure application

Application of high pressure for short periods ranging from 2 to 4 minutes renders the meat more tender. A combination high pressure and heat is found to produce substantial reduction in shear force value ($150MNm^{-2}$).

Tumbling

It is a process, which accelerates the extraction of meat proteins on to the surface of meat pieces, muscles or muscle strips. It improves tenderness, accelerates the process of curing and loosens the structure of meat. Salt and phosphates are added before tumbling to improve the flavour and quality.

Restructuring

Restructuring of meat is an appropriate technology, which can be adopted in India for improving the quality of meat. It comprises of 1. Chunking and forming, 2.Flaking and forming and 3. Tearing and forming. Chunking and forming is done by passing the meat through a coarse grinder plate or by dicing to reduce the size of meat into chunks of not larger than 1.5 inch. Salt, phosphates and other seasonings are added before mixing or tumbling to extract myofibrillar proteins. It is then shaped to desired forms by stuffing into casings or molds under pressure. Flaking and forming is similar to the above except that the meat is sliced into thin

slices or flakes. It is then mixed with salt, spices and phosphates and stuffed under vacuum in plastic bags, frozen and tempered. The stuffed and tempered meat is pressed to desired configuration. Tearing and forming is a new method, which causes less membrane damage and is less susceptible to oxidation. Restructured meats are generally preferred over ground meat or cuts of meat from aged animals, because of its improved quality. Such processing will improve the quality and add value to the product. Processing of meat into products add variety, flavour, convenience and value.

Now, the major concern is about, who will monitor the quality and certify it's wholesomeness? How best, the industry and government can utilize the opportunities?

Should we encourage public sector undertakings or private sector to set up meat processing plants?

It is a known fact that the productivity under public sector undertakings is lower than that in the private sector. It is essential to increase the productivity, improve and ensure quality and ensure competitive prices for the products in order to enhance the export of meat and meat products. The export of meat and meat products is under OGL and hence it is essential to discourage unscrupless traders exporting poor quality meat to other countries which, in the long run will affect the export potential of our country. At the same time it is essential to encourage honest entrepreneurs to set up meat processing plants with good scientific infrastructure and produce meat products of good quality and value. We should adopt the systems that operate in many of the industrialized nations regarding production and processing of meat products and quality assurance. I would like to emphasize the need to encourage private sector in the production, processing and marketing of meat and meat products. However, The quality assurance and monitoring has to be done by governmental agency.

Therefore, I suggest that a Meat Board may be established by the government to monitor and certify the quality of meat and meat products. The Board may also be entrusted with the responsibility of making available the funds and schemes of the central government for setting up modern abattoirs and carcass utilization plants and to monitor its implementation. Policy decisions like introducing meat animals, establishing disease free zones, monitoring the farming, movement, and slaughter of animals and ensuring the meat inspection may be vested with the Board. The Board should establish quality control laboratories with facilities for species identification and detection of adulteration.

FOOT AND MOUTH DISEASE DISRUPTS EUROPEAN UNION TRADE

The spread of foot and mouth disease in Europe has disrupted grain trade between European union and North African countries. Importers report that they required to prove and certify that any cereals from U.K. were from areas free of Foot and Mouth disease and were transported in trucks or railcars, which either did not pass through Foot and Mouth areas, or were disinfected before loading.

-World grain

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Veterinarians can adopt 200 to 300 households in a locality and provide technical inputs for livestock farming. He should be a guardian of their economy. They should come to worship him as a person who is working hard to improve their life style. Our motto should be increase production per animal, reduce cost of production, ensure good marketing and improve the quality of life of the farmer. This is a challenge for the profession.