

FUNDAMENTAL DIFFERENCES BETWEEN ORIENTAL AND WESTERN TECHNOLOGY OF MEAT PRODUCTS

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INTRODUCTION

The early humans survived on fruits and flesh of wild animals. They ate the raw flesh until fire was discovered. Thus the history of meat processing is as old as the history of mankind itself. As the time passed by, the contribution of salt to the taste of meat and its role in the preservation of meat was known to the mankind. Even today the importance of salt and cooking in meat processing can not be underemphasized, but rather play inevitable role in meat processing. It is to thank man's intelligence and its keen observation which revealed that drying and refrigeration extended the shelf-life of meat.

Thermal processing, refrigeration, drying and use of chemical preservatives are the principal driving forces to bring the similarity in the technology of meat products in different parts of the world. Whereas, economy, education and culture are some notable factors for the development of different identity of Oriental and Western meat products.

The increased contact of people between East and West is reflected on their changing culture and food habits. The influence of Western culture in the East is, however, more pronounced than the vice versa. The influence is growing so strong that the traditional meat technology of the Orient runs the risk of going obsolete. The subject is of particular concern as scarce attention has been paid to indigenous products both by academia and R & D in the Orient.

Oriental countries especially China has long history of meat processing. Meat processing and its preservation was in practice several hundred years before the birth of Christ. There are hundreds of processing units in People's Republic of China, Mainland China and the countries in South and South East Asia. Though Chinese meat technology is most versatile and best known of all Oriental technology, the technology of meat products in South East Asian countries like Indonesia, Thailand and the Philippines does not essentially differ from Chinese technology. Nepal, a country in South Asia region has rich cultural heritage. It has its unique ways of meat preparation. *Chhoyala* and *Kachila* are typical marinated indigenous meat products Nepal's. Dry meat called *Sukuti* is perhaps most well known of all traditional Nepalese meat products.

In this paper basic features of traditional Oriental technology of meat products are examined and compared with those of West. Suggestions for the improvement of Oriental technology and product quality have been inserted wherever appropriate.

PHYSICAL STATE AND SELECTION OF MEAT

People living in the Orient are habituated to eating meat of freshly slaughtered beast. People in the Orient like and prefer fresh meat. Eating hot meat has become the tradition of the Oriental people. Many people suspect the chilled meat to be that of cadaver. Oriental people not only prefer eating fresh meat, they also prepare meat products (sausage, ham etc.) out of fresh meat.

To the contrary, people in the West are accustomed to eating chilled meat. The meat is conditioned at low temperature, and is tender and juicy with slight acidic taste. Out of hygienic reasons the meat leaves slaughterhouse after it has been adequately chilled. The chilled meat is used in the manufacture of meat products.

Oriental people even if they would choose conditioned meat they might not succeed due to the lack of refrigeration facility or the refrigeration is very expensive. Knowingly or unknowingly Oriental people benefit from the use of fresh meat, since this meat which is also called hot or pre-rigor meat possess good water holding property vital in sausage making.

Western manufactures are selective of anatomical parts of carcass when manufacturing a meat product. In the West, use of meat and fat of different anatomical regions of carcass makes up the basis of product variety. Of course, little attention is given to this fact by meat processors of the Orient. A reason to reckon with less product variety and uniform quality.

INGREDIENTS

The common ingredients used in sausage in the Orient and the West are common salt, sodium nitrite and potassium or sodium nitrate, white and black pepper, onion, garlic and monosodium glutamate. Nutmes, cinnamon, cardamom, mace, clove, capsicum and coriander are regularly used in Western sausages. Emulsion type of sausage is the most important type of sausage in the West. In this type of sausage 20-25% water is added. Fat content of this type of sausage is also high (28-35%). To bind the high moisture and fat additives which aid to binding water and fat are routinely added. For this purpose two types of ingredients are used. First type of ingredients improve water and fat binding properties of meat protein and the sausage batter by virtue of increasing ionic strength, pH and causing swelling of muscle proteins and include phosphate and sodium or calcium salts of citric and lactic acid. The second types of ingredients are purified proteins of non-meat origin such as milk protein, Soya protein, and mono and diglycerides of fatty acids and are called extenders, binders and emulsifiers. In addition to this, sometimes starchy materials such as potato, wheat flour and starch are used as fillers.

Oriental sausages are basically non-emulsion type, That is water is not added in the sausage and hence binders, extenders and emulsifiers, and chemicals aiding water and fat binding are used in the sausage. However, there are some exceptions. Rice and potato have been used in Korean and Nepalese sausage made for consumption in the family.

It is interesting to observe that liberal amount of sugar and monosodium glutamate is used in the Chinese style of sausages. Use of wine and Soya sauce is also characteristic of Chinese sausage.

In the countries where dry meat is traditional product, common salt, nitrate and or nitrite are the common ingredients of dry meat. In some countries, for example, Nepal meat is dried without adding salt and other ingredients.

PRODUCT TECHNOLOGY

There are wide varieties of meat products in the West and each product has its systematic technology. Dry meat and dry sausage constitute the important varieties of processed meat in the Orient followed by semi-fermented meat. Hence, the following comparison mostly applies to these type of products.

TECHNOLOGY OF DRY MEAT

The Orient has long tradition of dry meat. Sundrying, roasting and drying with fire, firewood or charcoal oven drying are the usual and traditional methods of drying meat. Pan roasting of pieces or shreds of cooked meat is another method of drying of meat in the Orient viz., meat floss in Malaysia and wooly meat in Thailand.

Chinese dry meat is prepared by following three main types of process:

- (1) Meat is cut into thin slices which are dried by hot air followed by roasting over burning charcoal.
- (2) Chunks of meat are cooked in water which are then dried by hot air.
- (3) cooked meat is torn manually and the meat shreds are dried by stirring in hot pan.

Curing before drying is the common process for the preparation of dry meat in China and the west. Chinese cured-dry meat is mainly dry cured, such as La Rou bacon and Ho Tui ham. Typically Nepalese dry meat is unsalted and uncured product. Meat is cut into long and thin strips which are then dried or heat of burning wood. The meat can be dried by air or hot smoking (Mainali, 1990). Meanwhile sukuti making has grown into commercial processing (Subba, 1997). The meat for drying is cut into pieces and flattened and dried by wood fired brick oven.

In the West there are three main steps in the preparation of dry meat. The meat is cured, matured or ripened and then dried.

There are some characteristic differences in drying meat between East and West. In the Orient the drying formula is high temperature and short time. The meat is dried in some hours or a couple of days at the most. Reverse is the case in the Western process. There the meat is dried by low temperature air or smoke which takes several days or weeks. In fact, the total process is carried out at low temperature.

TECHNOLOGY OF DRY SAUSAGE

In the West, meat and fat are always ground with mechanical meat mincer/grinder to the particle size of as small as 2-3 mm. Almost always the meat is further very finely cut in chopping bowl. Care is taken to give a beautiful cross-section of the sausage without fat smearing but an even distribution of meat and fat particles. For this reason meat and fat are frozen prior to processing.

In the traditional method of preparation of Oriental sausage meat and fat are coarsely chopped with knife on chopping board. The meat and fat are not frozen.

Western dry sausages are strictly fermented products as opposed to Oriental dry sausage. In the Orient the batter containing meat, fat, salt, nitrate and spices is stuffed in casing made from pork intestine, and after tying and linking the sausages are hung over burning charcoal or similar arrangement till the product becomes adequately dry. Western dry sausages are lactic fermentation products. In most cases lactic starter and sugar (usually glucose) are added in the sausage batter, and the sausage is allowed to undergo fermentation. Dry sausages in the West are generally prepared at low temperature and under controlled conditions of relative humidity and air velocity, though, exceptions do exist.

PRINCIPLES OF PRODUCT PRESERVATION

In the West, combination of two and more food preservation principles are frequently used for the preservation of meat and meat products and include thermal destruction of micro-organisms, heat plus asepsis, low storage temperature, low pH, low reduction potential (vacuum or inert gas packaging), low water activity and chemical preservatives like nitrite, smoke and salt. Refrigeration (low temperature) is used to extend shelf-life of almost every finished product (except canned products). A review of the type of Oriental products and the study of principles applied to their preservation reveal clearly that the stability of most of the products is dependant on their low moisture content. That is, most of the traditional meat products of the Orient are dry type. It should be mentioned that preservatives like salt and nitrite, and though mildly effective spices do contribute to shelf life extension of the products. In sweet meat products like Indonesian Dendeng high among of sugar is very important for preservation. There are a few varieties of fermented meats in the Orient. The products taste somewhat sour and they preserve by virtue of low pH, for example, Nham in Thailand and Tapa in the Philippines. However, their shelf life is very limited at ambient conditions.

PROCESS SIMPLICITY AND PRODUCT PRICE

Traditional meat products of the Orient are manufactured in unsophisticated manner at home or in small scale. Oriental technology is far simpler than Western technology in terms of equipment, operation and energy expenditure. The processing equipments are simple and in many cases they are primitive. Oriental processes are short-cut and highly energy saving. Due to unbroken cold

chain used in the West for shelf-life extension of the meat products the price of Western meat products is undoubtedly very high.

PRODUCT QUALITY

SENSORY QUALITY

As regards the taste characteristic of meat product there is some distinct difference in the taste of Oriental and Western meat products. Consumers' perception of taste of meat product is not alike in the East and West. Sweet, salty, sour and sweet-sour products are made in the Orient. For example, Nham (salty-sour pork in Thailand), Tapa (salty-sour beef in Philippines), Dendang (sweet meat in Indonesia) and Tocino (sweet meat in the Philippines) (Anonym, 1986). Sweetness is a characteristic of a number of Oriental meat. In China, preference to salty and sweet taste varies according to geographical regions. Northerner Chinese prefer salty taste whereas Southerners like sweet taste.

In the West, salty and sour taste are common but sweet tasting meat products are virtually non-existent.

Unappealing colour and tough texture are serious problems of Oriental meat products of shelf stable type. Tenderness is weighted to be the most important organoleptic quality of meat. Texture of majority of the Oriental dry meats is rated low. High processing temperature and protein-lipid interactions are the causes of unappreciable texture of dry meat. A technical difficulty of the meat processors in the Orient is to choose between highly dry product with tough texture and intermediate moisture product with short shelf-life. Western raw dry meats are tender and can be sheared easily with teeth. The tenderness is due to protein autolysis and hydrolysis during long maturing process carried out under low temperature.

Juicy meat is obtained from well nourished animals of young age. Since old and feeble animals are slaughtered in the Orient the dry meat product lacks juiciness.

HYGIENIC QUALITY

Hygienic quality of meat and meat product is the main concern in the Orient. Modern slaughterhouses are lacking in many of the Asian countries. In the Orient, animals are not raised for meat purpose. Meat is produced from old, diseased, feeble and wasted animals. Neither animals are inspected for disease and sickness nor the carcass after slaughter is examined. Unhumane and unhygienic practice of animal slaughtering and meat production and sale is common picture of most of the developing countries. The conditions are extremely objectionable. Quality of product made from such unhygienic and unwholesome meat is definitely unacceptable. Quality control is a rare thing to be noticed in processing units. Production hygiene (raw material and other supplies, personnel, equipment and processing room) is very poor. These HACCP related problems have been often

addressed (Subba, 1989, 1997). Considering the poor hygienic condition of meat production the meat products are safe to eat only after proper cooking.

Western cured meats such as ham and dry sausage require no cooking since they are prepared by strictly following HACCP, and are as such digestible.

MICROBIOLOGICAL QUALITY AND PRODUCT SHELF-LIFE

Mold growth is the major microbiological problem of meat products of shelf-stable type. Oriental meat products are found to greatly vary in their aW values (0.65-0.9). Products with higher aW values are reported to be spoiled by molds. Storage temperature and humidity are other factors influencing the shelf-life of dried meats. The shelf-life of meat products in the tropical and subtropical regions of the Orient is limited by high storage temperature and humid climate. Loose packaging of meat products is common in the Orient. The shelf-life would be longer, were the products either vacuum packed or fungistatic chemical preservative used. Vacuum packaging of meat and meat products is uncommon in the Orient.

CHEMICAL SPOILAGE

Another major quality problem of the Oriental meat products of shelf-stable type is rancidity. Rancidity is a very important factor limiting the shelf-life of Oriental shelf-stable meat. A 30-40% of Chinese meat products of shelf-stable type are rejected due to rancidity (Leistner, 1988). High processing and storage temperature and loose packaging are responsible for rancidity type of spoilage. Cooking and drying (sun drying and drying over burning charcoal) processes themselves effect development of rancidity. Simultaneous smoking and drying can check the development of rancidity as phenols of smoke exert antioxidative effect. Else, antioxidant may be used during preparation of meat for drying. Vacuum cum opaque packaging are recommended to solve this shelf-life problem. Quality and shelf-life problems of Oriental meats have been described by Chuah et.al. (1988).

LEVEL OF TECHNOLOGICAL KNOW-HOW

Oriental technology of meat products is based on empirical principles. The technology is crude and developed through long experience. In the West, product development is research based. Raw material, process, shelf-life etc. every aspect is well studied. Research in the Orient is virtually non-existent.

CONCLUSION

The existing Oriental technology runs the risk of going obsolete. Oriental meat technology is being gradually replaced by Western technology. Owing to variety and quality Western meat products are increasingly dominating Oriental meat products in the market.

Though principally not inferior the existing Oriental technology badly needs corrections and improvement. As yet only superficial signs of improvement have been seen. Only through technological modernisation and research the product identity of Oriental meat products can be saved and prospered. More attention to this subject and more of the research on carcass characteristics, meat quality,

hygiene, product technology, preservation and packaging is needed to foster meat technology in the Orient.

Furthermore, production must rise from home and small scale to industrial scale. The organized sector should be more involved in this business.

WORKS CITED

Chuah, E.C., Yeoh, Q.L. and Hussin, Abu Baker H.J. (1988), *Traditional Malaysian Low and Intermediate Moisture Meat Products*. (Eds.), Food Preservation by Moisture Control (C.C. Seow, T.T. Teng and C.H. Quah, Elsevier Applied Science, p. 149.

Leistner, L (1988) *Shelf-Stable Oriental Meat Products*. (Proceedings of 34th International Congress of Meat Science and Technology), Part B., Brisbane, Australia.

Mainali, P. (1990), *Proceedings of FAO Seminar on Meat Development and Low Cost Preservation Methods in Asia and the Pacific*. 24-28 October, 1990, Rome: Food and Agriculture Organisation.

Saono, S., R.R. Hull and B. Dhamcharee (Eds.), Anonym (1986), *A Concise Handbook of Indigenous Fermented Foods in the ASCA Countries*. Canberra: The Government of Australia.

Subba, D. (1989), "Nepalma Mashuko Bech-Bikhanko Anmel Sthiti Ra Yashko Samadhan" (Nepali). Dharan Campus: *Annual Bulletin*, pp. 9-11.

-----, (1977), "Nepalma Pashu-Panchi Janya Udhyogko Bikas" (Nepali). NEFOSTA, *Newsletter*, Vol. 3, No. 1, 2 & 3.