

Buffalo calf: an emerging meat source in India

Abstract

In India, male buffalo calves are considered as burden and left as such as stray animals. The meat from such animals if reared properly has great export potential. In India, buffalo meat is a major export commodity contributing to nation's GDP to a great extent. The buffalo meat is considered as a by-product of dairy sector. Such meat obtained from spent buffalo is quite tough and is not of uniformed quality which sometimes affects the consumers' preference. Thus issue can be resolved by rearing male calves and utilizing their meat.

Keywords: buffalo calves, meat, slaughter rate, meat production, sausages

Volume 5 Issue 3 - 2017

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Received: April 28, 2017 | **Published:** December 11, 2017

Introduction

In India, buffalo meat has gained importance in the recent years because of its domestic usage and export potential. India ranks first in buffalo with 105.34million population contributing 58% of world's buffalo population. Their slaughter rate is 10.6% with annual meat production of 1.64million tons.¹ Buffalo meat has registered a growth of 27% in export during the financial year 2012-13.² The buffalo meat sector, therefore is one of the important sectors in Indian economy and shares 31.1% of India's total meat production.¹ Buffalo meat comes from spent dairy buffalo after full utilization of their productive life. Such meat is a by-product and the average carcass yield varies from animal to animal. Spent buffalo meat is dark, coarse and tough in texture and has poor organoleptic and processing characteristics.^{3,4} This issue can be resolved by using meat of male animals of lower age (below 18months) with more collagen solubility.³ As animals get older the collagen cross links become stabilized and the collagen is much less soluble.⁵ This will solve the dairy farmers' problem of raising male buffalo calves. Raising and utilizing such calves for meat production would further potentiate the employment and income generation. Moreover, increased availability of quality meat may help in overcoming the problem of malnutrition in the country and enhance the export potential of this commodity.

Further, it has been observed that in India every year about 10millions of male buffalo calves are removed or killed from the production system by farmers due to their intentional negligence in the management practices with a view to save on mother's milk and feed resources incurring loss of about US\$ 11million per annum in the country.⁶ These calves could be salvaged for meat production, which will not only improve the economic condition of the farmers but also would increase meat production for domestic consumption and export market. Such conditions have necessitated the development of technology which would not only aid in stimulating the taste buds of consumers towards calf meat but also result in healthier, nutritious and value added finished products. This will provide better return to farmers which in turn would improve the managerial practices and lower the calf mortality rate, which may give the country a much needed quantum jump in the meat production sector.

Buffalo male calf meat

The good quality meat from male buffalo calves is available after about 10-12months of restricted sucking period.^{7,8} The dressing percentage of buffalo carcass of 130 to 500kg bodyweight has been found to range between 50 and 55%.^{9,10} Meat of properly fed buffalo calves, having no religious taboo, is lean and tender in quality and is relished by most of the sections of population. Buffalo calf meat is brighter than beef but the amount of meat pigments do not differ significantly. Although, buffalo muscles are slightly tougher than corresponding beef muscles due to greater contribution of connective tissue components to toughness of meat, yet emulsified products like sausages, patties, loaf and nuggets etc. can be very well prepared from buffalo meat.¹¹ The physico-chemical and processing properties of buffalo calf meat are briefly described below:

Physico-chemical characteristics of buffalo male calf meat

pH and moisture: The meat obtained from male buffalo calves is reported to be more suitable for preservation by freezing, when evaluated on basis of pH and thawing loss.¹² The pH of the meat from young male buffaloes has been found to be in the range of 5.54-5.57.^{13,14} The pH is highly related to other meat processing parameters like water holding capacity and emulsifying capacity, whereas, the moisture present in meat determines the binding ability of the meat to some of the binders and fillers added during processing of meat products. It has high correlation with the fat content of the meat. It is also related with the shelf stability of the processed products since it has relationship with the water activity of the meat for the microbial growth. Moisture content of the meat has direct relationship with juiciness of the processed meat products, which is one of the important sensory attributes.¹⁵ The meat from intensively reared young male buffaloes showed a significantly ($P \leq 0.05$) higher moisture content than the meat from spent male and female buffaloes.¹⁴ The moisture content of buffalo meat decreases as the age of the animal increases which is probably associated with an increase in fat content.¹⁶

Tenderness: The meat obtained from young male calves is tenderer than that from higher age. Connective tissue in the buffalo meat had a bigger contribution to toughness.¹⁷ Chronological age was

significantly related to the collagen content in the muscle. The collagen content increased significantly with advancing age of the male Murrah buffaloes.¹⁸ A hydroxyproline content of 0.12% was recorded in high protein diet fed young male buffaloes.¹³ The muscles from young buffaloes of 1 to 2 years showed less collagen (0.91 to 1.71g/100g) than from 12-year-old buffaloes (1.16 to 2.23g/100g).¹⁹ As animals get older the collagen cross links are stabilized. After cooking, the collagen cross links weaken but do not break, so contributing to the toughness of meat from old animals.²⁰

Shear press value: It provides basic information on tenderness, WHC and texture of the meat. Shear press value was reported to have positive and higher correlation with fibre diameter, hydroxyproline content and toughness of the meat and negatively correlated with the sarcomere length of the meat. The buffalo meat obtained from young males showed a significantly ($P \leq 0.05$) lower shear press value than the other groups.¹⁴ Intensive feeding decreased the press force value of the meat.²¹

Processing characteristics

Water holding capacity: Among the functional parameters, the inherent ability of the meat to hold its own water and its ability to bind with water added to it separately or as a constituent present in non meat additives in a product formulation is the most important factor in deciding suitability of the meat for processing into products. It is directly related to emulsion stability and juiciness of the meat products.¹⁵ A water holding capacity of 20.61ml/100g was recorded in meat obtained from young male buffaloes fed with high protein diet.¹³ Meat from intensively reared young male buffaloes had significantly ($P \leq 0.05$) higher water holding capacity than the meat from spent female buffaloes.

Emulsifying capacity: The amount of myofibrillar proteins present in meat and their ability to emulsify added fat is an important criterion for emulsion stability and better product characteristics in terms of binding and texture. The emulsifying capacity of the meat from young male buffaloes was significantly ($P \leq 0.01$) lower than spent male buffaloes but not spent female buffaloes.¹⁴

Conclusion

The buffalo calf meat palatability is almost similar to buffalo meat. Further, the processing characteristics of buffalo calf meat are superior to that of spent buffalo in terms of tenderness. Thus on one side the buffalo calf meat will combat the issue of nutritional security and on other side will enhance the export potential of the country. The rearing of these calves will further reduce the farmers' burden and will improve the socio-economic status of the farmers.

Acknowledgements

The first authors sincerely express gratitude to the Department of Science and Technology, New Delhi, India for the award of Inspire fellowship to pursue Ph.D. Programme.

Conflict of interest

The author declares no conflict of interest.

References

1. DAHDF. Basic Animal husbandry statistics-part 2. *Department of Animal Husbandry Dairying and Fisheries*. New Delhi, India; 2013. p. 1–165.
2. APEDA. *Agriculture and processed food export development agency*. APEDA agri exchange; 2012.
3. Kandeepan G, Anjaneyulu ASR, Kondaiah N, et al. Effect of age and gender on the processing characteristics of buffalo meat. *Meat Sci*. 2009;83(1):10–14.
4. Naveena BM, Kiran M, Reddy KS, et al. Effect of ammonium hydroxide on ultra structure and tenderness of buffalo meat. *Meat Sci*. 2011;88(4):727–732.
5. Maltin CA, Sinclair KD, Warriss PD, et al. The effects of age at slaughter, genotype and finishing system on the biochemical properties, muscle fibre type characteristics and eating quality of bull beef from suckled calves. *Ani Sci*. 1998;66(2):341–348.
6. Ranjhan SK. Male buffalo calf production for meat. *Nation symposium on Safe meat for good health and environment held on July 4-5*. Bangalore, India; 2008.
7. Pathak NN, Ranjhan SK. A preliminary study on the effect of ad lib urea molasses liquid feeding with restricted oat forage and fish meal on the performance of buffalo calves (*Bubalus bubalis*). *Indian J Anim Sci*. 1976;46:773–775.
8. Pathak NN, Ranjhan SK. *Protein and NPN utilisation in ruminants*. Karnal: India: National Dairy Research Institute; 1979. p. 74–78.
9. Tilakaratne N, Matsukawa T, Buvanendran V, et al. Growth, feed conversion and carcass characteristics of cattle and buffaloes fed grass and concentrates. *Ceylon Vet J*. 1978;24:9–12.
10. Rosa A, Creta V, Dzic G. Results obtained in intensive fattening of young buffaloes. *Lucrari Stiintificeale Institutuni de Cercetari pentru Cresterea Taurinelor-Corbeanca*. 1980;6:161–170.
11. Sharma DD, Sehgal IP, Sillghai KK, et al. *Fattening of growing male buffalo calves for quality meat production*. Project report of NDRI -AI-Kabeer Consultancy Project, Division of dairy cattle nutrition. Haryana, India: National dairy research institute (ICAR) Karnal; 1995.
12. Tateo A, De Palo P, Quaglia NC, et al. Some qualitative and chromatic aspects of thawed buffalo (*Bubalus bubalis*) meat. *Meat Sci*. 2007;76(2):352–358.
13. Anjaneyulu ASR, Sengar SS, Lakshmanan V, et al. Meat quality of male buffalo calves maintained in different levels of protein. *Buff Bull*. 1985;4:44–47.
14. Kandeepan G, Anjaneyulu ASR, Kondaiah N, et al. Effect of age and gender on the processing characteristics of buffalo meat. *Meat Sci*. 2009;83(1):10–14.
15. Kandeepan G, Mendiratta SK, Shukla V, et al. Processing characteristics of buffalo meat- a review. *J Meat Sci Technol*. 2013;1(1):1–11.
16. Lawrie RA. *Lawrie's Meat Science*. 6th ed. Cambridge, England, UK: Woodhead Publishing Ltd; 1998. p. 1–461.
17. Robertson J, Ratcliff D, Bouton PE, et al. A comparison of some properties of meat from young buffalo (*Bubalus bubalis*) and cattle. *J Food Sci*. 1986;48(3):686–690.
18. Yadav BS, Singh LN. Age related changes in chemical composition of buffalo skeletal muscles. *Indian J Anim Sci*. 1985;55(4):272–277.
19. Syed Ziauddin K, Mahendrakar NS, Rao DN, et al. Observations on some chemical and physical characteristics of buffalo meat. *Meat Sci*. 1994;37(1):103–113.
20. Warriss PD. *Meat science: an introductory text*. CAB International, Wallingford, UK: CABI Publishing; 2000;23:25–27.
21. Shiba N, Matsuzaki M, Isuneishi E. Effects of preslaughter nutritional condition on intramuscular collagen solubility, pyridinoline cross links and meat tenderness in aged goats. *Anim Sci J*. 2004;75(4):319–324.