

River Buffalo Meat

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Buffaloes are reared for different purposes, primarily for milk and dairy products. Meat is often a secondary product and mainly derives from old animals at the end of their productive or working life. However, in recent years buffalo meat has gained increased popularity due to its nutritional properties. Therefore, a huge economic potential might arise from the development of the meat sector in buffalo breeding. This entry provides an overview of the recent advances in the knowledge on river buffalo meat, with a special focus on quality traits, and offers insights for future research aimed at improving the meat sector in this species.

river buffalo

meat

production

quality

1. Introduction

Buffaloes are reared for different purposes, primarily for milk and dairy products. Buffaloes also largely contribute to meat production, which mainly derives from old animals at the end of their productive or working life and only to a small extent from young animals. The world buffalo meat production recorded in 2019 was 4,290,212 tonnes, from 27,692,388 slaughtered head, of which more than 90% is attributable to Asia. As expected, within Asia, the main contributing countries were India (42%), Pakistan (28%), and China (17%). In the other areas, the meat production was concentrated in the single countries where buffaloes are reared.

The different breeds of origin and the different age at slaughter result in a great variation in carcass and meat traits. In addition, the general lack of breeding systems specific for meat production and proper pre- and post-slaughter technologies lead to poor quantitative and qualitative performances that often do not meet the expectations of either producers or consumers. On the other hand, buffaloes are superior to cattle in exploiting the low-quality feeds typical of many rearing areas and demonstrate a great capacity for adaptation to a wide variety of management conditions. Moreover, in recent years buffalo meat has gained increasing popularity due to beneficial properties highlighted by some studies, so much so that it has been defined as "the healthiest meat among red meats for human consumption," mostly thanks to its reduced fat and cholesterol content.

All the above considerations highlight the huge economic potential that might arise from the development of the meat sector in buffalo breeding, especially in the main producing countries, that is, India, Pakistan, China, and Egypt, which cover around 95% of global buffalo meat production, but where this potential is not efficiently exploited.

The aim of this review is to provide an overview of the current knowledge on river buffalo meat, with special focus on quality traits, and to offer insights for future research aimed at improving the meat sector.

2. Growth and Carcass Quality

According to the published literature, the carcass yield in river buffalo varies between approximately 45% and 59%, although about 2/3 of the values are below 50%. This is generally low compared to cattle, mainly due to the significantly higher proportion of head and hide in buffalo. Even lower dressing percentages (about 47%) were obtained from buffalo cows at the end of their reproductive life or culled for reproductive problems. As the age increased, slaughter and carcass weights also increased, but not dressing percentage, which tended to decrease. However, higher slaughter weight corresponded to higher meat yield, due to the lower incidence of bones. Carcass quality was affected by gender, with a significantly higher dressing percentage in males compared to females, independent of the breed.

The large influence of the farming system on carcass traits has been reported by several studies, with diet playing a major role. In fact, the limited weight gain and carcass yield in buffalo depend in part on the very poor pasture available in most of the rearing areas, and in part on the scarcity of knowledge on the nutritional requirements specific for animals intended for meat production, combined with the difficulties of the local farmers to meet the recommended requirements with the available feed. In fact, when subjected to the same feeding regime, similar performances were obtained for buffalo and cattle. Feeding costs could be contained by replacing expensive protein sources, like soybean, with other more affordable feeds, without negatively affecting the average daily gain or carcass traits. These studies demonstrate that adequate feeding strategies can help reduce feeding costs while maintaining good performance.

From the overall data, it can be concluded that the best meat performance, comparable to that of several cattle breeds, can be obtained from young males (approximately 20–36 months old) fed a diet including a period with supplementation of protein and energy, possibly provided using local by-products. However, due to the wide variety of management systems, further research taking into account the multiple aspects related to the farming activity will help identify the breeding conditions able to give the best results in the different situations.

3. Meat Quality

Similar to carcass characteristics, the quality of river buffalo meat shows a very high level of variability due to the many affecting factors, both intrinsic and extrinsic.

Meat is an important source of nutrients for the human diet. However, its composition varies across species and breeds, due to many factors of genetic and environmental origin. In general, data show that the chemical composition of the buffalo meat is roughly similar to that of the bovine meat. Buffalo meat is widely recognized to be poor in fat, which is confirmed by literature reports, with values varying approximately between 1 and 4 g/100g of meat. Moderate levels of cholesterol have been reported for buffalo meat, with most of the values around 50-60

mg/100g. The AI and TI indices, which synthesize the effect that single fatty acids can have in increasing the risk of coronary heart diseases, are quite low in comparison to the values reported for several foods. The literature data agree that meat from buffalo is richer in iron compared to the amount (1.0-2.0 mg/100 g) reported for different cuts of beef, which makes it more valuable from the nutritional point of view.

As for the technological properties, most of the values reported for the pH of buffalo meat are within the range typical for animals subjected to proper handling, a necessary condition for preventing possible negative effects on the meat quality. As the preferred colour of fresh meat is bright red, it is the darker colour usually displayed by buffalo meat compared to beef that contributes to the negative perception of its quality, because darker meat is often associated with a less fresh product, or derived from old animals, and so of lower eating quality. It has been demonstrated that the darker colour of buffalo meat depends on the myoglobin content (0.393 ± 0.005 g/100 g of tissue) and consequently on metmyoglobin. Ageing is confirmed as the most important factor that influences the meat tenderness, independently from other factors, including sex, age, breed.

The sensory quality of a product is a set of characteristics perceived by the senses, and it is the main determinant of its acceptance by the consumers. Being based on human perceptions, the sensory analysis provides information not provided by the instrumental analyses. As shown by the range of variation of the considered attributes, the sensory quality of the buffalo meat is quite variable, but this is not surprising on the basis of the many affecting factors. For most of the traits the minimum values are quite low, indicating a poor perceived quality, but, on the other hand, the highest scores of the range are often close to the best extreme of the scale, thus proving that the buffalo meat can reach a satisfactory organoleptic quality, similar if not even superior to that of beef.

4. Conclusions

There is scientific evidence that buffaloes can efficiently contribute to the quanti-qualitative production of meat, provided that the meat supply chain is specifically organised for this purpose. Although not very extensive, research done so far allows to identify the principal factors that should be considered for improving some of the meat traits in the buffalo species. However, many aspects remain to be investigated in order to gain wider knowledge for planning targeted interventions.

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