



Carcass characteristics and meat quality in mithun (*Bos frontalis*) fed on tree leaves based ration in comparison to local cattle (*Bos indicus*)

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Mithun (*Bos frontalis*) is an important animal of North-eastern hilly region of India. It is primarily reared as meat animal and is highly preferred among the tribal people of North-eastern India. This animal is reared exclusively under free grazing condition. It thrives browsing basically on the jungle forages, tree fodders, shrubs, herbs and other natural vegetations in natural condition. Farmers in general do not provide any additional feed except common salt, especially at the time of restraining for different purposes. The owner of the animals sometimes produces a sound out of the musical instrument made of mithun horn and hearing it, mithun comes from jungle in search of common salt. The mithun has lots of similarity with Tho-tho cattle (*Bos indicus*) which inhabits in the same geo-environmental condition in the state of Nagaland, and has been recognized as a cattle breed as per recommendation of the National Bureau of Animal Genetic Resources (NBAGR), Karnal, India. Both mithun and cattle thrive on similar types of feed and fodder depending on their availability in this region (Das *et al.* 2006, 2010) and meat of both the species of animals are consumed by the local tribes. A comparison between 2 species of animals for carcass characteristics and meat quality will provide valuable information for future studies on these 2 species of animals and also improve the awareness among farmers for future livestock production.

The experiment was conducted in the Mithun farm located at Medziphema, Nagaland. A total of 8 male mithun (*Bos frontalis*) and 8 Tho-tho cattle (*Bos indicus*) aged 1.5 year were individually penned and fed on tree leaves/shrubs (*Quercus polystachya*, *Lagerstroemia speciosa* and *Ficus hirta*, chaffed and mixed incorporating equal parts on fresh basis) with paddy straw (2:1 ratio on fresh basis) along with concentrate mixture as per the requirement. Approximately 50% of DM requirement was met by concentrate and rest by including roughage. The water was available at all times.

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The composition of concentrate mixture was maize 30 parts, wheat bran 15 parts, rice polish 20 parts, mustard cake 33 parts, mineral mixture 1 part and salt 1 part. The feeding was continued for 1 year of age after which 4 animals in each group were slaughtered to assess body confirmation, carcass characteristics and meat quality

Animals were transported to the slaughter house one day prior to slaughter and were given free access to water, without any feed. Body weight of animals was recorded one day before slaughter and on the day of slaughter to find out the shrinkage %. Slaughtering was done by conventional method by jugular vein puncture. Immediately after slaughter body parts like head, tail, and feet (fore and hind) were separated and measurement of each part was taken. Similarly, body organs like liver, kidney, spleen, heart, lungs with trachea were separated and weight of each organ was taken. Edible portions were separated from inedible portions and carcass weight of each animal was recorded to find out the dressing %. Fat thickness was measured at the 12th rib perpendicular to the outside fat at a point three-fourths the length of the ribeye muscle and then calculated for adjusted fat thickness (AFT). Dissectable fat was recorded after separation of visible fat for each animal. Rib eye muscle was separated and measured at the 12th rib to record rib eye area. Carcass length was taken by using a measuring tape as per standard procedure. In addition, organoleptic evaluation was done by a 10 member sensory panel on an 8 point scale after cooking the meat of each animal as per the method of Keeton (1983). The statistical analyses were done as per Snedecor and Cochran (1980) to determine mean, standard error and t-test was used to compare the difference in performance between mithun and cattle.

Body confirmation and organ weight: The body confirmation of mithun and cattle is presented in Table 1. Four numbers of each mithun and cattle were slaughtered after 1 year of feeding experiment and it was observed that the measurement of body parts like head weight, horn length, horn circumference, limbs weight and tail length were significantly higher ($P < 0.05$) in mithun than cattle. Higher

Table 1. Body confirmation of mithun and cattle

Items	Mithun	Tho-tho cattle
Live weight (kg)	367.7 ^a ±10.91	352.7 ^b ±10.68
Head with horn (kg)	25.23 ^a ±0.22	15.73 ^b ±0.77
Horn length (cm)	26.56 ^a ±1.23	8.300 ^b ±0.51
Horn circumference (cm)	35.68 ^a ±0.65	15.20 ^b ±0.58
Feet(fore +hind) with hooves (kg)	9.20 ^a ±0.20	6.80 ^b ±0.20
Tail length (cm)	91.10 ^b ±1.69	114.0 ^a ±1.36

Different superscripts within each row differ (P<0.05).

body size of mithun than cattle may be due to better genetic potential for growth of mithun which is related to nutrition. Higher intake of nutrients in mithun than cattle was responsible for higher body weight gain (Das *et al.* 2009a). In the comparison between buffaloes and cattle, similar results were reported (Robles *et al.* 1971). Horn length and circumference were more in mithun and this phenomenon is a special characteristics of the mithun by which it is well distinguished from other species. Interestingly, the tail length was more in cattle than mithun, which is the important characteristic of Tho-tho cattle. Organ weight of mithun and cattle during the slaughter experiment is presented in Table 2. Body organs like liver, kidney, spleen, heart, lungs with trachea and skin were separated and weight of each organ was taken. There was no statistical difference between different organs except skin weight which was significantly more (P< 0.05) in mithun compared to cattle. High quality leather products can be prepared from mithun hides (Das *et al.* 2009b) and higher weight of mithun skin compared to cattle skin in this experiment may be one of the explanations for preparation of quality leather products in mithun.

Carcass characteristics and meat quality: Carcass characteristics and meat quality of mithun and cattle are presented in Table 2. As far as carcass characteristics are concerned, mithun had higher dressing % of meat than cattle. The dressing % of mithun was 58.82 % whereas for cattle it was 55.96 %. The dressing % of mithun was similar to that reported by Mondal *et al.* (2001). However, dressing% of

Table 2. Organ weight (kg) of mithun and cattle during slaughter experiment

Items	Mithun	Tho-tho cattle
Liver	5.37±0.28	5.53±0.14
Kidney	0.93±0.07	0.73±0.07
Heart	1.90±0.21	1.40±0.06
Spleen	1.100±0.10	1.233±0.29
Lungs with trachea	3.733±0.38	3.333±0.22
Skin	28.07 ^a ±0.70	20.37 ^b ±1.66
S.I. length (ft)	92.97±10.84	97.53±11.60
L.I. length (ft)	19.37±2.89	22.83±2.68

Different superscripts within each row differ (P<0.05).

Table 3. Carcass characteristics and meat quality of mithun and Tho- tho

Items	Mithun	Tho-tho cattle
<i>Carcass characteristics</i>		
Slaughter weight	349.3±11.59	344.8±10.08
Shrinkage %	4.96 ^a ±0.62	2.20 ^b ±0.15
Carcass length	48.50±2.02	43.50±0.50
Dressing %, meat	58.82 ^b ±0.62	55.96 ^a ±0.60
Dissectable fat (kg)	12.93 ^a ±1.89	28.47 ^b ±1.09
Adjusted fat thickness (cm)	0.26 ^a ±0.41	0.32 ^b ±0.92
Rib eye area (REA) (sq cm)	84.3±5.84	75.1±14.08
<i>Organoleptic evaluation</i>		
Colour	6.17 ^a ±0.17	5.08 ^b ±0.30
Flavor	6.25 ^a ±0.17	5.75 ^b ±0.11
Juiciness	6.92 ^a ±0.20	6.25 ^b ±0.17
Texture	5.83±0.10	5.67±0.10
Tenderness	6.08 ^a ±0.24	5.25 ^b ±0.25
Overall palatability	6.92 ^a ±0.20	6.33 ^b ±0.17

Different superscripts within each row differ (P<0.05).

meat depends on the sex, age, breed and nutritional status of animals (M'ynnek and Guliński 2007). In the present experiment, the higher dressing % in mithun meat showed that it has good opportunity to develop this animal for meat purpose. The dissectable fat in the body was higher in cattle than mithun reducing its quality and this may be because of higher efficiency of utilization of nutrients in mithun than cattle. Paul *et al.* (2003) also reported that, nutrient utilization efficiency of buffaloes was higher than cattle. Lower efficiency increased fat deposition in buffalo calves with the increase in the level of dietary energy (Baruah *et al.* 1990). The colour of the meat was not appealing in cattle meat as colour reduces the acceptability by consumers and reduces carcass value (BIF 1990). The Pearson correlation coefficient was calculated for various carcass traits. There was positive relationship of carcass weight with rib eye in both mithun and cattle. There was positive relationship of rib eye area with fat thickness in cattle whereas the relationship was negative in mithun. This showed that cut yield of muscles was better in mithun meat. This was again confirmed from the shrinkage% of the animals where the shrinkage was more in mithun compared to cattle. Organoleptic evaluation in terms of color, flavor, juiciness, tenderness and overall acceptability showed that the mithun meat had better quality (P<0.05) compared to cattle meat.

SUMMARY

The present study was conducted to assess carcass characteristics and meat quality in mithun (*Bos frontalis*) fed on tree leaves based ration with an objective of comparison with local cattle (*Bos indicus*). It was concluded that, that the measurement of body parts like head weight, horn length, horn circumference, limbs weight and tail length were significantly higher in mithun than cattle. There was no

statistical difference in weight of different organs like liver, kidney, spleen, heart and lungs except skin weight which was significantly more in mithun than local cattle. The dressing % of meat was statistically higher (58.82 % vs 55.96 %) whereas dissectable fat content was lower ($P < 0.05$) in mithun than cattle. Organoleptic evaluation in terms of color, flavor, juiciness, texture, tenderness and overall acceptability showed that the mithun meat had better quality compared to cattle meat. The present research work showed that, the carcass characteristics and meat quality were better in mithun than local cattle. So mithun rearing is beneficial in providing quality meat for the poor farmers of NEH region. This information will definitely help the research workers and farmers for exploiting the potential of mithun for better meat production.

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