Characterisation of the Siri breed and the Mithun cross Siri in Bhutan

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Summary

The authors describe the evolution, morphological characteristics, body weights, body measurements and production performance of three indigenous cattle breeds in Bhutan, namely the Siri, Mithun cross Siri (Jatsha for male and Jatsham for female) and first backcross hybrids (Yangka for male and Yangkum for female). The data was collected through a sample survey which was conducted in Lobesa block of Thimphu district in April/May 1995 near the Natural Resources Training Institute (NRTI). Observations were recorded from 44 Siri (22 bulls and 22 cows), 10 Mithun cross Siri (5 Jatshas and 5 Jatshams) and 8 first backcross hybrids (5 Yangkas and 3 Yangkums). The aim of this breed description is to assist in developing the future conservation strategies of the indigenous breeds in Bhutan.

Introduction

The indigenous Siri (Bos indicus) breed is the major cattle resource in Bhutan. Payne (1970) classified this breed as a stabilised indigenous crossbred evolved from the mating of the humpless Shorthorn type cattle, migrated south from Tibet, and the humped or Zebu cattle of the Indian subcontinent. The Mithun (Bos frontalis) is a bovine species indigenous to the south-eastern parts of the Himalayas and the adjacent mountain ranges in north-east India. This bovine species, which is very little known elsewhere, is believed to have originated from the Gaur (Bos gauris). Genetic analysis of the Mithun’s chromosomes by Winter et al (1984) and Gupta et al (1995) supports the view that the Gaur is the wild ancestor as both have 58 diploid (2n) chromosomes in contrast to 60 diploid (2n) chromosomes in cattle. Further, Winter et al (1984) reported similarities of haemoglobin and blood groups in Mithun and Gaur, which
supports the view that the Mithun is derived from the Gaur.

In Bhutan, the Mithun bulls were imported to the west from the indigenous Mithun breeding regions. The presence of the Mithun in Bhutan is seen from the literature, as early as 1783 from the expedition account of Samuel Turner, as published by Simoons and Simoons in 1968 in their anthropological study of the Mithun keeping peoples. Ever since then, the Mithun has been used for crossbreeding with the indigenous Siri breed. Hickman and Tenzing (1982b) stated that the crossbreeding of the imported Mithun bulls with the indigenous Siri resulted in amazingly profitable hybrid offspring. Although the female hybrids are reproductively fertile, the male hybrids have not been used successfully to breed with the pure indigenous Siri as they are mostly sterile. The sterility of the male hybrids in Mithun cross European cattle, mostly Bos taurus, was reported by Kuhn in 1885 as quoted by Simoons and Simoons (1968) and Winter et al (1984). To overcome this male fertility problem, the Bhutanese herders practise backcrossing the female hybrids to Siri bulls for four generations. This type of breeding system has been established for at least a century. The hybrids of MithunSiri crosses in each generation are phenotypically distinct and they have been given specific names. The male and female hybrids of MithunSiri crosses are called Jatsha and Jatsham respectively. The male offspring from the backcross in the first, second, third and fourth generations are known as Yanka, Doeb, Data and Thrapa, whereas, their corresponding females are called Yangkum, Doebum, Datum and Thrabum.

The characterisation of livestock breeds is paramount in order to exploit them in relation to selection and conservation. So far, no effort has been made to study the characteristics of the indigenous Siri and MithunSiri crosses either under intensive or extensive management systems. This study was, therefore, undertaken to evaluate the characteristics of these breeds and crossbreeds and suggest some guidelines for their conservation. The objective of the study was focused on the breed description of the indigenous Siri, Mithun Siri crosses (Jatsha and Jatsham) and the first backcross hybrids (Yangka and Yangkum).

Materials and methods

A sample survey was conducted near the Natural Resources Training Institute (NRTI) in Lobesa block of Thimphu district in April/May 1995, to record information of morphological characteristics, body weights, body measurement and milk yield performance of the indigenous Siri and the MithunSiri hybrids. Data was collected from 44 Siri (22 bulls, 22 cows), 10 MithunSiri crosses (5 Jatshas, 5 Jatshams) and 8 first backcross hybrids (5 Yangkas, 3 Yangkums). Information was recorded on the physical characteristics of the colours, horns, ears, head and body. Other body measurements included chest girth, withers height, body length, cannon bone girth, face length, tail length, neck circumference and milk yield.

The body weights of the animals were estimated by using the Aggarwalla formula recommended in India (Payne, 1970) in which:

\[ LW = \frac{L \times G}{Y} \]

LW = Live weight in seers [1 seer = 2.03 pounds = 0.93 kg]
L = Length from the point of shoulder to pine bone in inches
G = Chest girth in inches
Y = 9.0 if G is less than 65 inches
8.5 if G is between 65 inches and 80 inches
8.0 if G is greater than 80 inches

Milk yield performance was estimated based on a sample survey of 5 lactating Siri
cows (3 cows in 2nd lactation and 2 cows in 3rd lactation). Lactation length and calving interval of the Siri, Jatsham and Yangkum were estimated through semistructured questionnaires and interview of the farmers.

Results and discussion

Indigenous Siri breed

Coat colour of Siri

The predominant coat colour observed in 44 Siri cattle in Lobesa Block was black (69%). The red colour, which varied from a dark dun to straw colour, was found in 14% of the population studied. There were also black and white (12%) and red and white (5%) with colour patterns somewhat similar to the Holstein. The white was characteristically on the face, legs, tail, under the body and the medial surface of the quarters, but there were also white stripes from the withers extending to the dorsal vertebral column. Muzzle and eyelids were usually black.

Table 1. Mean body measurements (cm) of Siri bulls (n = 22) and cows (n = 22) with standard error of means in Lobesa Block.

<table>
<thead>
<tr>
<th>Traits measured</th>
<th>Bull (n = 22) Average</th>
<th>SE</th>
<th>Cow (n = 22) Average</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Withers height</td>
<td>138 2.6</td>
<td></td>
<td>121 2.1</td>
<td></td>
</tr>
<tr>
<td>Heart girth</td>
<td>170 4.8</td>
<td></td>
<td>152 1.5</td>
<td></td>
</tr>
<tr>
<td>Body length</td>
<td>108 2.4</td>
<td></td>
<td>98 2.2</td>
<td></td>
</tr>
<tr>
<td>Cannonbone girth</td>
<td>28 1.0</td>
<td></td>
<td>19 0.7</td>
<td></td>
</tr>
<tr>
<td>Tail length</td>
<td>109 4.7</td>
<td></td>
<td>88 1.8</td>
<td></td>
</tr>
<tr>
<td>Horn length</td>
<td>33 1.6</td>
<td></td>
<td>19 0.7</td>
<td></td>
</tr>
<tr>
<td>Ear length</td>
<td>19 0.6</td>
<td></td>
<td>20 0.8</td>
<td></td>
</tr>
<tr>
<td>Face length</td>
<td>52 1.5</td>
<td></td>
<td>45 1.3</td>
<td></td>
</tr>
<tr>
<td>Neck length</td>
<td>48 0.8</td>
<td></td>
<td>30 0.6</td>
<td></td>
</tr>
<tr>
<td>Neck girth</td>
<td>82 3.5</td>
<td></td>
<td>70 1.9</td>
<td></td>
</tr>
</tbody>
</table>

Morphological characteristics of horns, ears and head of the Siribreed

The length of the horns, ears and face in the adult male and female are presented in table 1. The horns were of a small Shorthorn type with pointed ends. The ears were horizontally placed and were not drooping or pendulous. The mean face length of the males and females, measured from the point of poll to the muzzle was 48 cm.

Body weight of the Siri

The estimated body weights of the adult bulls and cows were around 260-360 kg and 212-307 kg, respectively. Payne (1970) reported a range of live weight of 318-544 kg and 318-408 kg for males and females at maturity. The Domestic Animal Diversity Information System (DAD-IS) recorded 453.5 kg and 362.9 kg for male and female respectively, which were even heavier than Payne (1970). The lower body weights recorded in this study, compared to the information available in the literature, could be hypothesised to be due to the fact that the Siri population reported here was recorded under the dry subtropical zone, where the pure Siri breed is not reputed to thrive well. Although the Siri breed is found between 200 m to 3 000 m of altitude, the efficiency in productivity of individual Siri was claimed to be better between 800 m to 2000 m elevation. There were no birth weights recorded in this study as the calving did not coincide with the study period. Information available in the literature gave 23 kg and 18 kg (Payne, 1970) and 21.2 kg and 19.9 kg (DADIS) for male and female as live birth weights.
Body measurements of the Siri

The mean body measurements of the mature Siri bulls and cows are presented in table 1. The mean withers height of the bulls and cows were 138 ± 2.6 cm and 121 ± 2.1 cm. Payne (1970) reported the withers height at maturity ranging from 122-137 cm in males and 107-127 cm in females. This is in agreement with the present study. DADIS gave much higher values, of 190 cm in adult males and 180 cm in adult females.

The mean body measurement of all traits as shown in table 1 were all greater in bulls than cows, although the differences were not significant. The length of the tails were long enough to touch the ground in this Siri breed.

Mithun cross Siri Jatsha and Jatsham

Coat colour of Jatsha and Jatsham

The Jatsha and Jatsham derived from the cross of the Siri cow and the Mithun bull were predominantly black with brown hair over the thoracic ridge to the mid point. There were also piebald and complete grey coat colours in both male and female hybrids. The body coats were more similar to those of pure Mithun than the Siri cattle. This coat colour and the dorsal brown stripe are also seen in Bali cattle (Bos banteng).

Morphological characteristics of horns, ears and head of Jatsha and Jatsham

The mean horn lengths of Jatsha and Jatsham are shown in table 2. The shape

Photo 1. Jatsha (male) with prominent cervicothracic ridge, massive horn base and length.
and size of the horns were more similar to the Mithun than the Siri breed. They were broad at the base with a sharp curve, pointed ends and significantly longer (p < 0.05) than the Siri horns. The orientation of the ears were not different from the Siri breed. Similarly, the face lengths were within the range 40-59 cm, but they were much broader and flatter.

Body weights of Jatsha and Jatsham

The body weight of the adult Jatsha and Jatsham averaged 458 kg and 380 kg, respectively. Their body weights were intermediate between the Siri and the Mithun. Information on the body weights of the Mithun in the literature ranged from 400-500 kg (Gupta et al. 1996) to as heavy as one tonne (Winter et al. 1984). The Jatshas were heavily built and powerful draft animals and the Jatshams were a little lighter than their male counterparts. The withers height of Jatsha averaged 136 ± 2.1 cm. The Jatshams were a few centimetres shorter in withers height compared to their male counterparts. They averaged 129 ± 2.6 cm and were not significantly different from the Siri.

First backcross hybrid Yangka and Yangkum

Coat colour of Yangka and Yangkum

The first backcross progeny Yangka and Yangkum still possess the similarity of coat colour to the F₁ hybrids but the dorsal ridge brown stripes were less distinct. All shades of coat colour seen in Jatsha and Jatsham were also observed in this genotype.
Morphological characteristics of horns, ears and head in Yangka and Yangkum

The length and size of the horns were a little shorter and smaller compared to the Jatsha and Jatsham, but they were still significantly longer (p < 0.05) than the Siri horns (see table 3). Ear lengths ranged from 19 ± 0.7 cm in males to 18 ± 0.4 cm in females, and the ears were horizontally placed. The broadness of the faces was slightly reduced and distinct from the F₁ hybrids of the Mithun Siri crosses.

Body weights of Yangka and Yangkum

The mean body weights of Yangka and Yangkum were lighter than the F₁ hybrids.

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Table 2. Means and standard error of means of some body measurements in Jatsha (n = 5) and Jatsham (n = 5) in Lobesa Block.

<table>
<thead>
<tr>
<th>Traits</th>
<th>n</th>
<th>Average</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Withers height (cm)</td>
<td>Bull 5</td>
<td>136</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>Cow 5</td>
<td>129</td>
<td>2.6</td>
</tr>
<tr>
<td>Liveweight (kg)</td>
<td>Bull 5</td>
<td>458</td>
<td>17.7</td>
</tr>
<tr>
<td></td>
<td>Cow 5</td>
<td>380</td>
<td>13.5</td>
</tr>
<tr>
<td>Horn length (cm)</td>
<td>Bull 5</td>
<td>40</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>Cow 5</td>
<td>22</td>
<td>1.2</td>
</tr>
<tr>
<td>Ear length (cm)</td>
<td>Bull 5</td>
<td>19</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Cow 5</td>
<td>20</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Table 3. Means and standard error of means of some body measurements of Yangka and Yangkum in Lobesa Block.

<table>
<thead>
<tr>
<th>Traits</th>
<th>n</th>
<th>Average</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Withers height (cm)</td>
<td>Bull 5</td>
<td>130</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Cow 3</td>
<td>126</td>
<td>0.6</td>
</tr>
<tr>
<td>Live weight (kg)</td>
<td>Bull 5</td>
<td>402</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td>Cow 3</td>
<td>343</td>
<td>8.6</td>
</tr>
<tr>
<td>Horn length (cm)</td>
<td>Bull 5</td>
<td>38</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Cow 3</td>
<td>33</td>
<td>6.0</td>
</tr>
<tr>
<td>Ear length (cm)</td>
<td>Bull 5</td>
<td>19</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>Cow 3</td>
<td>18</td>
<td>0.4</td>
</tr>
</tbody>
</table>
The adult bulls and cows weighed 402 kg and 343 kg, respectively. They were heavier compared to the indigenous Siri breed and the males were still stronger and powerful draft animals. The adult withers height in Yangka measured 130 ± 1.5 cm, whereas the Yangkum averaged 126 ± 0.6 cm. Most of the other body measurements were not recorded in this study.

Production performance

The mean daily milk yield performance observed from the sample of 5 Siri cows was 2.5 ± 0.11 kg. This was estimated from a population at various stages of lactation, therefore should fairly represent the daily milk yield in the Siri cow. The questionnaire report on 12 Siri cows, 5 Jatshams and 4 Yangkums recorded mean daily yields of 1.5 ± 0.14 kg, 2.2 ± 0.25 kg and 1.9 ± 0.24 kg respectively. The differences in milk yield were not attributable to any obvious reasons in this study. To establish the average milk yield performance per lactation, it requires examination of full lactations of a larger representative sample of animals. Payne (1970) reported a maximum of 1905 kg milk production per lactation with the normal range of 454-1361 kg in the Siri breed. This is a little higher than the values recorded in the present study.

The estimated mean lactation length of the Siri, Jatsham and Yangkum were 284, 288 and 308 days in this study, with a calving interval ranging from 14 to 20 months in all three breeds. The calving interval was in agreement with the literature figures, which reported 12-20 months (Payne, 1970). A systematic study of the reproductive performance is required in a larger population, which was not possible in this study.

Conclusion

The predominant coat colour of the Siri

Photo 3. Yangkum (female), first backcross progeny of Jatsham to Siri bull.
breed was black. Other coat colours of red
to straw, black and white, and red and
white were also observed. The phenotypic
characteristics of the Jatsha (male) and
Jatsham (female) and Yangka (male) and
Yangkum (female) were more similar to the
Mithun than the Siri breed. The mean body
weights of the Siri were lighter than these
crossbreds. It was also observed that the
estimated milk yield of Jatsham and
Yangkum was higher than the Siri cow.

There is, however, a clear need to collect
further data on the production and
reproduction traits to substantiate the
characterisation of the indigenous cattle
breeds. It is recommended that more
systematic studies be conducted to compare
the performance of production and
reproduction traits of all these indigenous
breeds. Further, it is also suggested that an
analysis of the productive and reproductive
traits of the pure Mithun breed be carried
out to aid the understanding of the possible
heterosis and complementarity effects in
crossbreeding programmes.

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