



Phenotypic characterization, management and performance of Belahi cattle

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Livestock is an integral part of agriculture in India. Huge farm animal genetic diversity exists in our country which needs to be characterized. Cattle genetic resources, an important component of farm animal genetic resources of India, comprises of 190.90 million cattle (37.28% of the total livestock population) and its diversity is represented by 39 well characterized breeds and Belahi is one of them (Accession No. INDIA_CATTLE_0532_BELAHI_03038). These cattle contribute in terms of nutritious milk, draught power, dung and in other agricultural operations. However, by each passing day, huge cattle genetic resource of India is either depleted or facing varying degree of threat of extinction in the absence of suitable model for genetic improvement and conservation. Depletion of cattle genetic resources is also evident from figures of 19th livestock census report (Anonymous 2014), where it is mentioned that cattle genetic resource of India has decreased by 3.14 % during 2007 to 2012, with an overall decline of 3.3 % in total livestock population. Phenotypic characterization is considered to as first step and foremost step in sustainable use and management of domestic animal diversity.

Belahi cattle are possessed by Gujjar pastoralists from North Himalayan foot hills. Belahi cattle is unique and has a distinct morphology with discrete breeding tract in North eastern parts of Haryana, Punjab and Himachal. Belahi rearing provides livelihood security to these pastoralists (Vohra *et al.* 2012, 2014). Belahi is medium sized well-built dual purpose cattle. Belahi cows are reared for their milk and draught power under pastoral system of rearing with very low input. In the present study, an attempt is made to characterize phenotypically and evaluate the growth, production and reproduction potential of Belahi cattle, so that an efficient genetic improvement program and conservation strategy could be planned with optimal utilization of available genetic variability present among this cattle breed, thus leading to more effective management of cattle genetic resources.

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Present study was conducted from October 2011 to March 2014, as per FAO guidelines (FAO 2012). Nineteen migratory herds spread in native tract were studied. Twenty two (22) physical traits and eleven (11) body biometry traits were measured in 301 animals belonging to different age groups. All the measurements were recorded once in upright animal standing on a level ground and by the same technical person to avoid between-recorder effects. Measurements were recorded by using simple tape measure. For management and performance assessment about 124 livestock keepers were interviewed through a predesigned questionnaire. Birth weight, pre-weaning (3 months) weight, production and reproductive traits were taken by enumerator, whereas adult body weights were estimated through Shaffer's formula. Milk constituent traits namely fat %, protein %, lactose, SNF and total solids were estimated across the parity, using automatic lactoscan machine. All the analysis was carried out using the SPSS (2001) statistical package for social sciences.

Native breeding tract of Belahi cattle was identified in Panchkula, Naraingarh, Yamunanagar and Ambala districts of Haryana state of India, which is spread over 4236 square kilometres with its distribution between 30° 44'N to 30° 70'N Latitude and 76° 48'E to 77° 18'E Longitude (Fig. 1). Gujjars, both from Hindu and Muslim religion, from the Himalayan foot hills of India were identified as stakeholders responsible for the rearing, breeding and conserving this breed. Belahi cattle are maintained as migratory herd. It was observed that short migratory distances were covered by Gujjar tribes rearing Belahi animal, compared to Kankrej cattle migration reared by Raika and Rebaris tribes of from Western dry regions of the country (Rajasthan state) to South-West of Haryana state (Vohra *et al.* 2011).

Belahi cattle has medium stature, reddish brown coat colour, white face and white dewlap with black coloured muzzle. Belahi animals have a symmetrical body, tight skin, straight and broad forehead with prominent poll and slender face. The horns are medium in size and sickle shaped. Hump is small to medium in size and is more prominent in males compared to females. Tail is long and fine with majority of the animals having black tail switch. Medium and round shaped properly placed udder with prominent milk vein (Fig. 2). The temperament of these animals is variable

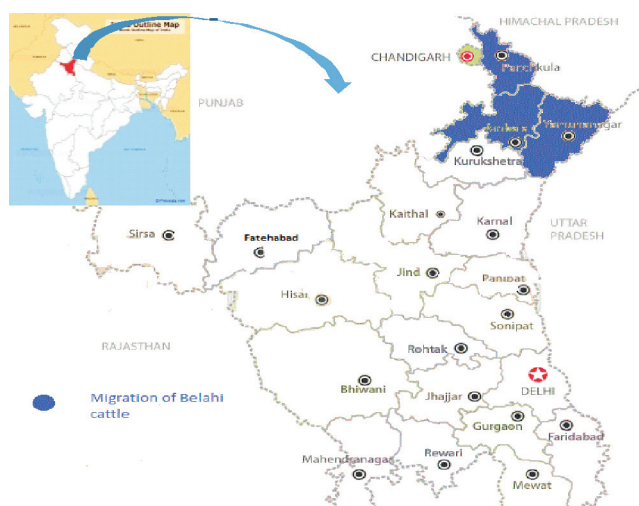


Fig. 1. Native breeding tract and migratory areas of Belahi cattle.

ranging from moderate to furious. Based on morphological comparison of Belahi cattle with other established cattle breeds from North and West India, it was revealed that animals have distinct morphology and geographic distribution.

Body biometric measurements were recorded in randomly selected animals from their breeding tract. The age wise and sex wise estimates of biometric traits are presented in Table 1. These morphometric traits in Belahi cattle were moderately high estimates and are comparable to Red Sindhi, Sahiwal and Mewati.



Fig. 2. Adult female Belahi cattle with calf.

Body weights of Belahi cattle at the time of birth and pre-weaning state were recorded for both the sexes (Table 2). The birth weight varied from 16 to 19 kg in male and 14 to 17 kg in females, adult body weights estimated were 304.8 kg in male and 266.74 kg in female. The estimates of birth weight and adult body weight in Belahi cattle were comparable to in Malnad Gidda cattle (Singh *et al.* 2008) and were lower than those reported by others (D'Souza *et al.* 1978, Nivsarkar *et al.* 2000, Manoj *et al.* 2012) in Gir, Red Sindhi and Sahiwal cattle. The best way of knowing

Table 1. Average body biometry traits (cm) recorded among different age groups and sex in Belahi cattle (N=301)

Trait	Milk Teeth		Two Teeth		Adult	
	Female	Male	Female	Male	Female	Male
Height at withers	85.75 ± 1.26	81.33 ± 0.99	104.20 ± 2.56	97.33 ± 7.84	120.33 ± 4.58	131.13 ± 5.48
Body length	77.0 ± 1.81	72.5 ± 1.26	97.0 ± 2.39	87.33 ± 4.67	116.67 ± 1.80	124.52 ± 1.83
Chest girth	92.63 ± 2.11	85.33 ± 2.17	120.3 ± 3.94	107.33 ± 8.37	157.17 ± 3.69	162.71 ± 6.30
Paunch girth	90.0 ± 2.14	82.83 ± 2.39	117.7 ± 4.18	102.67 ± 6.94	159.33 ± 1.65	161.85 ± 3.56
Face length	29.13 ± 0.72	27.17 ± 0.48	34.2 ± 1.13	33.33 ± 3.18	43.33 ± 0.57	43.99 ± 0.91
Face width	11.13 ± 0.52	10.17 ± 0.17	13.0 ± 0.39	12.67 ± 1.33	14.17 ± 0.28	14.54 ± 0.12
Horn length	-	-	3.4 ± 0.87	6.0 ± 3.0	25.4 ± 2.26	27.2 ± 3.12
Ear length	18.38 ± 0.38	18.17 ± 0.40	22.9 ± 0.74	21.0 ± 1.53	27.5 ± 0.40	28.2 ± 1.02
Hip bone	19.75 ± 0.65	17.5 ± 0.43	25.9 ± 1.49	22.33 ± 2.6	34.5 ± 1.09	32.4 ± 5.10
Pin bone	8.13 ± 0.48	6.5 ± 0.34	10.9 ± 0.86	8.33 ± 1.2	15.0 ± 0.41	16.5 ± 1.14
Tail length	58.13 ± 4.10	51.0 ± 2.25	68.0 ± 2.09	63.0 ± 5.57	110.67 ± 3.47	117.7 ± 4.72

Table 2. Body weights (kg) in Belahi cattle

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	17.6 ± 0.51	16–19	5	15.2 ± 0.58	14–17	7
Pre-weaning	31.6 ± 1.22	20–44	25	33.75 ± 1.42	20–45	24
Adult weight	304.8 ± 1.35	213–331	32	266.74 ± 2.15	226–305	200

Table 3. Production performance traits in Belahi cattle

Parameter	First Lactation			Pooled Lactation		
	Average	Range	N	Average	Range	N
Daily milk yield (kg)	3.45 ± 0.29	0.59–6.59	23	3.25 ± 0.15	0.5–9.5	79
Peak milk yield (kg)	5.5 ± 0.32	1.8–9.0	23	5.21±0.16	1.8–9.5	79
Days to reach peak	39.34 ± 4.53	11–81	23	41.64 ± 2.85	8.0–105	79
Lactation length (days)	227.30 ± 12.33	133–299	23	231 ± 5.89	115–300	78
305 day milk yield (kg)*	1071.6 ± 90.72	182.1–2010.6	22	1014.4 ± 45.46	182.1–2092.2	79

*Estimates after extending the part lactation.

Table 4. Milk constituent traits in Belahi cattle

Parameter	First lactation (N=30)			Pooled lactation (N=68)		
	Mean ± SE	Minimum	Maximum	Mean ± SE	Minimum	Maximum
Fat %	5.04 ± 0.29	3.03	7.89	5.25 ± 0.18	2.37	7.89
Protein %	3.33 ± 0.05	2.87	3.90	3.45 ± 0.04	2.87	4.02
Lactose %	5.02 ± 0.07	4.32	5.85	5.20 ± 0.06	4.32	6.10
SNF %	9.07 ± 0.13	8.00	10.58	9.39 ± 0.10	7.80	10.98
Freezing point	−0.52 ± 0.01	−0.62	−0.45	−0.53 ± 0.01	−0.63	−0.45
Total solids %	14.12 ± 0.37	10.90	18.29	14.38 ± 0.24	10.90	18.29

Figures in parenthesis indicate number of observations.

the milk production potential of an animal is to record the milk yield at every milking, throughout the lactation. Such an approach is limited to only few organized and institutional herds in our country. The task becomes daunting when one has to record the dairy performance in animals under migration, nevertheless, daily production data was collected by employing enumerators and it revealed that average first lactation milk yield was 1071.66 kg with average peak yield of 5.5 kg. The variation in lactation milk yield, peak yield, days to attain peak yield, lactation length for first and pooled lactations are shown in Table 3. The average daily milk yield in Belahi cattle were recorded as 3.25 kg, which is higher than the national average daily milk yield (2.14 kg) reported for indigenous cattle. Moreover, average lactation milk yield estimates in Belahi cattle is comparatively higher than Malvi, Mewati, Deoni, and Hariana cattle (Joshi *et al.* 1995, Nivsarkar *et al.* 2000). Estimates for different milk constituent traits were obtained for first lactation and pooled lactation (Table 4). The average fat percentage varied considerably among the individual cows, this high variation could be attributed to that randomness of the milk samples collected from the field. The average fat percentage was 5.25% (pooled) and it varied considerably among the individual cows and it ranged from 2.37 to 7.89. The average protein percentage, lactose, SNF and total solid estimates were moderately higher in Belahi cattle.

During winter (November to February) in their native villages' cows are housed in well-built house (83.33%). Majority of the animals are housed as a part of residence

(86.67%) and without proper drainage (96.66%) system. Animals were reported to be vaccinated in majority households against diseases like haemorrhagic septicaemia (HS), black quarter (BQ) and foot and mouth diseases (FMD), deworming is also practiced. Bull is raised and reared along with the cows in a single herd; no special management is done for bulls. Calves are maintained on mother's milk up to few months (weaning is not practised). All the young calves born in a herd are kept under temporary housing in closed barbed enclosures with temporary roof, so as to protect them from other stray animals. During summer months, Belahi animals graze purely on grasses with little chaffed fodder and *bhusa* given prior to milking in the morning. Feeding and watering is not done during night time. Very little of feed about 0.5 kg/animal is given to lactating and sick. Belahi pastoralists were not having knowledge regarding value addition of the livestock produce. However declining pastures and fast declining water bodies in the region were identified as their prime concern. Moreover, there was lack of organizational support (cooperatives, self-help group, and breeder's society) to these migratory herders besides lack of credit facilitating institutions in the region. Milk produced usually has a local market and is sold at an INR 30/kg. The cost of milk may vary according to seasonal and availability of milk. There is no problem related to marketing of milk.

SUMMARY

Belahi cattle are medium sized dual utility migratory breed maintained and primarily conserved by Gujar

community in India. The average first lactation milk yield recorded was about 1,071 kg with average daily milk yield and peak yield of 3.45 and 5.5 kg, respectively which is higher than the national average of indigenous cattle. Milk constitutes traits were estimated in pooled milk as 14.38% total solids, 5.25% fat, 3.45% protein and 5.20% lactose, indicating good quality of the milk. However, planned efforts for their genetic improvement are needed to improve gains. Our findings suggests that Belahi cattle has a good milk potential on low input, dual purpose utility, has high socioeconomic relevance and can immensely contribute to the livelihood security of Gujjar pastoralists of the sub Himalayan region. We recommend that these herds should be associated with Progeny Testing program/Open Nucleus Breeding System to explore their full milking potential. Further we recommend, long pending, strong policy support for such migratory groups, as they immensely contribute in economy of the state and in conservation of indigenous cattle genetic resources.

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