



Phenotypic Characterization and Performance Evaluation of Local Indigenous Non-Descript Cattle in Mizoram, N.E India

Lalhruaipuii* • I. Shakuntala¹ • G. Kadirvel² • D. H. Beihroly¹ • B. Sailo³

¹ICAR Research Complex for NEH Region, Mizoram Centre, Kolasib-796081, India

²ICAR Research Complex for NEH Region, Umiam, Meghalaya

³ICAR Research Complex for NEH Region, Manipur Centre

ARTICLE INFO

Article history:

Received: 26th October 2021

Revision Received: 20th November 2021

Accepted: 27th November 2021

Key words: local, indigenous, non-descript, Mizoram, physical traits, morphometric traits.

ABSTRACT

The present investigation was undertaken to study the physical and morphometric characteristics and performances of local indigenous non-descript cattle of Mizoram. The data pertain to 274 indigenous non-descript cattle of different categories. The physical characteristics included colour pattern of body coat, muzzle, tail switch, hoof and hump. Body length, height at wither, chest girth, ear length and horn length were taken up for morphometric characterization. The main body coat colours of indigenous cattle are brown (85%), black (11%) and grey (41%). Horns are small, black (72%) or grey (28%) in colour. Muzzles are black (79%) and brown (21%). Morphometric characteristics data obtained were classified according to age and sex of the animal. The average body length, height at wither, chest girth, horn length, ear length and body weight of adult male or bull/bullock are 112.35±0.80 cm, 111.78±0.72 cm, 145.41±0.92 cm, 11.50±0.33 cm, 28.60±0.51 cm and 220.14±3.09 kg respectively. While the corresponding values for adult female or cow are 105.32±0.69 cm, 104.94±0.84 cm, 132.13±1.08 cm, 13.21±0.37 cm, 27.92±0.51 cm and 170.62±2.92 kg respectively. The indigenous non-descript cattle of Mizoram are comparatively smaller in size than most of the recognized breeds of cattle, however coat colour showed sizeable variation. The data generated for indigenous non-descript cattle of Mizoram would be useful to characterize them.

1. Introduction

Mizoram has a total of 45,701 cattle, out of which 24,246 (53.05%) are non-descript indigenous cattle, which the local people called “ZOBAWNG” (Zo mean high land and Bawng means cattle in native language), i.e. cattle of the hills or hill cattle (Mizoram Economic Survey 2019-20; Planning & Programme Implementation Department, Research & Development Branch, Government of Mizoram). This non-descript cattle called as “Zobawng” or “Hill cattle” is maintained by Mizo farmers in different districts of Mizoram. The cattle is reared by local tribal communities in Mizoram for meat, milk, skin, manure, draught, financial and social purposes.

Indigenous non-descript cattle experience late sexual maturity, long calving interval, short lactation length and poor milk yield and draught power, but are more disease

resistant and capable of thriving in harsh conditions (Majid *et al.*, 1992). Despite the role of these local indigenous cattle in the household and national economies, they are currently under-utilised, their productivity remains low, and populations are faced with extinction. In addition, insufficient measures are taken to secure their present and future value (Mapiye *et al.*, 2019).

The loss of indigenous breeds adversely affects community identity, structure and reduces the ability of local community to maintain their traditional lifestyles. Locally adapted breeds will continue to be valuable in the state because the state cannot afford the inputs that are required to sustain exotic breeds that have been developed in low stress, high input production systems. Keeping the utility and some important characteristics of this breed in mind, the present study was conducted with the objectives to characterize the

*Corresponding author: lhpuui@gmail.com

phenotypic and morphometric characteristics of local indigenous non-descript cattle and to determine the productive and reproductive performance of the breed under its home tract as well as under standard semi-intensive rearing system.

2. Materials And Methods

Study area, sampling pattern and data collection

A total of 274 local indigenous non-descript cattle were studied from 8 villages of Mizoram i.e. Hnahlan, Tualcheng, Lungphunlian, Khuangphah, Ngur, Phaipheng, Thingdawl and North Chawnpui of Champhai and Kolasib district of Mizoram. The study areas are the hilly regions of Mizoram, North-Eastern region of India, within 21°56' to 24°31' N latitude and 92°16' to 93°26' E longitude, which are climatically classified as sub-tropical humid in general. The state is mountainous and hilly, and has a mild and temperate climate, which ranges from 8 to 21°C in winter and 21 to 33°C in summer. The average rainfall is 2648 mm/annum (@ 1001 mm to 4462 mm/annum). The south west monsoon is the dominating factor for rains like other North-Eastern states

due to which the region receives most of its rainfall during the monsoon period. The elevation of the state ranges from 30 m to more than 1300 m msl.

Information on the body biometric characteristics viz. body length, chest girth or heart and height at wither and qualitative confirmation attributes, such as horn length, ear length, etc. with shapes and orientations and the body weights of 274 animals were recorded. These animals included both male and females under 7 categories. The information on feed, management and breeding practices, flock size and its structure, reproductive performance, productive performances and disease prevalence were collected through formal interviews of cattle owners using a structured questionnaire. Actual measurement of the animals was done to record the parameters for physical characteristics of the cattle.

3. Results and Discussion

Morphometric traits

Means, standard error (SE) and number of observation of different morphometric traits of the local indigenous non-descript cattle of Mizoram are shown in table I.

Table I. Age and sex wise different biometric traits (cm) in local indigenous cattle of Mizoram.

Age (Months)	Sample No.	Body Length	Height at wither	Chest Girth	Horn Length	Ear length	Body Weight (Kg)
0-6	7	73.61±0.81	72.32±2.03	83.28±3.64		15.60±0.82	47.58±3.77
6-12 (Male)	29	80.36 ^a ±0.86	81.20 ^a ±0.98	98.33 ^a ±1.39		20.10 ^a ±0.50	72.18 ^a ±2.08
6-12 (Female)	25	78.73 ^a ±0.89	80.11 ^a ±1.00	97.10 ^a ±1.58		19.91 ^a ±0.56	69.16 ^a ±2.44
12-36 (Male)	38	99.22 ^a ±1.18	98.22 ^a ±1.04	129.35 ^a ±1.34	7.95 ^a ±0.34	22.49 ^a ±0.52	154.04 ^a ±3.56
12-36 (Female)	41	98.97 ^b ±1.28	96.33 ^a ±1.03	124.30 ^b ±1.15	7.25 ^b ±0.33	22.30 ^b ±0.50	141.58 ^b ±2.84
Above 36 (Male)	69	112.35 ^a ±0.80	111.78 ^a ±0.72	145.41 ^a ±0.92	11.50 ^a ±0.33	28.60 ^a ±0.51	220.14 ^a ±3.09
Above 36 (Female)	65	105.32 ^b ±0.69	104.94 ^b ±0.84	132.13 ^b ±1.08	13.21 ^b ±0.37	27.92 ^b ±0.51	170.62 ^b ±2.92



Figure I. Measurement of Body Length



Figure II. Measurement of Chest Girth



Figure III. Bull of Mizoram Indigenous Cattle



Figure IV. Cow of Mizoram Indigenous Cattle

The local indigenous non-descript cattle found in Mizoram are small in size and short in height with cylindrical type of body. Animals are well built and compact with strong legs. The body colour varies in different colours, brown (85%), black (11%) and grey (41%). Dewlap and hump are small. Head and face are small and short. Poll is prominent and convex in shape. Ears are small to moderate in length and horizontal in orientation. Horns are small, black (72%) or grey (28%) in colour. Orientation is mostly outward, upward and then curved towards face. Hoofs are black (87%), brown and grey (13%). Muzzles are black (79%) and brown (21%). Udder is small, not well developed and milk veins are also not prominent. Sizes of fore and rear udder are small (77% and 62%, respectively). Teats are cylindrical shape (22%) and funnel (78%) type. Tips of the teats are either round (82%) or funnel (18%). Naval flap is small. Penis sheath flap is short and tucked up with body. Tail is above the hock with black (39%), brown (54%) and grey (7%) switch. They usually do not have docile temperament in almost all the cases. The above findings are in agreement with Pundir *et al.* (2015) and Saidur *et al.* (2015).

As shown in figure I and II, the body measurements of the indigenous cattle are taken manually and the average body length, height at wither, chest girth, horn length, ear length and body weight of adult male or bull/bullock (Figure III) are 112.35±0.80 cm, 111.78±0.72 cm, 145.41±0.92 cm, 11.50±0.33 cm, 28.60±0.51 cm and 220.14±3.09 kg

respectively. While the corresponding values for adult female or cow (Figure IV) are 105.32±0.69 cm, 104.94±0.84 cm, 132.13±1.08 cm, 13.21±0.37 cm, 27.92±0.51 cm and 170.62±2.92 kg respectively.

As shown in table I, within 6-12 months group of local indigenous cattles (male and female), there are no significant difference between different morphometric parameters such as average body length, average height at withers, average chest girth, average ear length and average body weight. However, except average height at withers, the average body length, average chest girth, average horn length, average ear length and average body weight of male indigenous cattle of 12-36 months age group are found to be significantly higher ($P<0.05$) than the female of the same age group. Between bull/bullock and cow (i.e. above 36 months age group), the average body length, average height at withers, average chest girth, average horn length, average ear length and average body weight of bull/bullock are significantly higher ($P<0.01$) as compared to that of indigenous cow. These findings are in agreement with Pundir *et al.* (2015).

On Ponwar breed of cattle, Gaur *et al.* (2004) reported shorter body length of bullock/bull (102.5±0.5 cm) and cow (97.1±0.5 cm). However, they reported higher height at withers (bullock/bull: 115.6±0.4 cm and cow: 108.9±0.4 cm) and larger chest girth (bullock/bull: 158.8±0.9 cm and cow: 140.6±0.5 cm). Pundir *et al.* (2015) also reported the average

body length, height at withers and chest girth of adult male or bull/bullock as 109.03±1.39 cm, 106.90±0.84 cm and 139.52±1.59 cm respectively and the corresponding values for adult female or cow as 103.70±1.01 cm, 103.60±0.62 cm and 132.22±1.05 cm respectively on local indigenous non-descript cattle of Mizoram. The average chest girth (132.22±1.05 cm) of adult female or cow is similar to the findings of Pundir *et al.* (2015). Pundir *et al.* (2015) also reported the lower average body weight of adult male or bull/bullock (200.29±6.19 kg) and comparatively similar average body weight in adult female or cow (169.5±3.74 kg).

Saidur *et al.* (2015) also reported average body length, height at withers and chest girth of adult local indigenous non-descript cattle of Mizoram as 121.44±0.90 cm, 108.42±0.73 cm and 133.15 ±0.62 cm respectively.

Reproductive traits

The local indigenous non-descript cattle are mainly mated through natural service. Since, they are allowed to graze or free-range for the whole day so, it is sometimes difficult to maintain clear breeding records of the females as well as the male breeders. Moreover, since the semen for local indigenous non-descript cattle is not available like other exotic/crossbred cattle, artificial insemination is not performed in local indigenous cattle in field conditions. However, there has been a report of using improved semen for artificial insemination in local indigenous cattle with good results through survey at farmers' field.

The average age at first estrus and first service in local indigenous non-descript female cattle in Mizoram are 31.45 months and 32.65 months respectively. The age at first calving ranges from 28 to 42 months, with average calving interval of 638 days (12-24 months in range). The average gestation length is 296.19 days. The average service period is 121 days, which ranges from 90 to 121 days. The average lactation length is 232.68 days and the dry period range from 120 to 150 days (132 days average). The average herd life span is from 15 to 20 years. Gaur *et al.* (2004) reported that Ponwar cows produced little milk about 0.5 to 2.5 kg per day for 8 to 10 months. Average lactation milk yield was 462.5±12.1 kg, age at first calving ranged from 40 to 60 months and the inter-calving period averaged 12.6±0.1 months. The service period in Ponwar cattle varied from 60 to 100 days and the cows remained dry for an average of 110.0±2.6 days.

Productive traits

Due to lack of scientific management, poor feeding management as well as smaller size and inferior genetic or inherent composition, they are not well-developed and unpreferred in terms of production, reproduction and performance traits as compared to that of exotic or cross-bred cattle. However, because of difficulty in transportation and

import of superior breeds of cattle and good quality feeds in many remote parts of the state, many tribes and local people of Mizoram still prefer rearing of indigenous and low productive cattle in many regions. These local indigenous non-descript cattle are employed to a very less extend for human consumption and usage. In majority of the regions, cows are milked only 2 or 3 times in a month, which may be the reason for their comparatively low milk yield as compared to other cows that are milked almost at least once a day. However, the average daily milk yield of these local indigenous non-descript cow is 1.61 litre milk per day, with daily average peak milk yield of 2.44 litre milk per day. The average fat % and SNF % of indigenous cow milk are 2.135 % and 9.12 % respectively as shown in Table II. In agricultural lands, these local indigenous bullocks are used for ploughing lands upto about 0.5 acres of land in 5-6 hours. They are also sold or slaughtered for extra income and financial support. The average daily milk yield obtained in the study was higher than the Tripura cows (Pundir *et al.*, 2014) and Uttarakhand cows (Pundir *et al.*, 2013). The estimated daily milk yield was lower than the national average for indigenous cows as 2.36 kg (Anonymous 2014). The average daily milk yield was lower than the Malnad Gidda cattle (Singh *et al.*, 2008).

Managerial practices

Housing system

As shown in figure V, VI and VII, these local indigenous non-descript cattle are mainly reared semi-intensively and also by extensive method in many areas. Bamboo and wood are commonly used as housing material with soil as flooring. The sheds are usually not elevated. There are also some farmers who shelter the animals under their living house. Aluminium or steel feeding and water trough are commonly used.

Feeding system

The local indigenous non-descript cattle are managed solely on grazing and are allowed to graze for the whole day. They are usually not supplemented with concentrate mixture, minerals or vitamins, and no extra ration is given to the animals. Common fodders that the animals consume are cowpea, broom grass, jackfruit leave, taro plants, etc.

Health Care and Management

As shown in table II, local indigenous cattle are vaccinated with Foot and Mouth Disease and Brucellosis under NADCP, and deworming is also done occasionally and irregularly. Common diseases reported are Foot and Mouth disease, parasitic infestation, food poisoning, etc. Dead carcass of the animals is usually disposed through burial.

Table II. Health Care and Management

Sl No	Health care practices of indigenous cattle	Practices
1	Vaccination	-Majority
	Frequency of Vaccination	-Occasionally, only when Veterinary Department arrives
	Diseases for which vaccine is given	-Foot and Mouth Disease and Brucellosis
2	Major Diseases affecting indigenous cattle	-Foot and Mouth Disease
		-Parasitic infestation
		-Food Poisoning
3	Deworming of cattle	-Irregular and occasionally
4	Diagnosis of disease in indigenous cattle	-Veterinarian
		-Veterinary Field Assistant
		-Local experienced farmers
	Mode of consultation	-Phone call
		-Physical observation and inspection
5	Treatment of disease in indigenous cattle	-Allopathic drugs and Traditional Method
6	Post-mortem	-Yes (where veterinary dispensaries are present)
		-No or occasionally (in remote areas and villages)
7	Disposal of dead carcass	-Buried



Figure V. Semi-intensive Rearing of local indigenous non-descript cattle



Figure VII. Extensive Rearing of local indigenous non-descript cattle in forest lands



Figure VI. Rearing of local indigenous non-descript cattle under living house

4. Conclusion

Local indigenous non-descript cattle of Mizoram have a deep and long relationship with the Mizo local culture and society. Even though cows are poor milkers resulting in lower productive qualities, they play a very important role in providing many products to the farmers as well as the entire Mizo population such as meat, milk, manure, draught purpose, etc.

Particularly in case of local non-descript indigenous cattle of Mizoram, we need careful documentation and management of genetic information so that we not only conserve but also make profitable to the farmers. Further research may be undertaken to analyse their genetic markers in order to provide valuable information for

conservation decisions. Selection and conservation programme of local cattle of the state may be initiated for upgrading the local germplasm at the farmers' level for betterment of the stock which is vital for the state.

5. Acknowledgement

The authors are deeply thankful to the Director, ICAR Research Complex for NEH Region, Umiam, Meghalaya for providing necessary facilities to conduct the project.

6. References

- Anonymous (2014). Animal Husbandry Statistics, Department of Animal Husbandry and Dairying, MoA, GOI, New Delhi.
- Gaur GK, Singh A, Singh PK, Pundir RK (2004). Morphometric characteristics and present status of Ponwar cattle breed in India. *Animal Genetic Resources/ Recursos généticos animales/ Recursos genéticos animales*. 34: 17-25.
- Majid MA, Nahar TN, Jalil MA (1992). Breeding for cattle improvement in Bangladesh. *Proceeding Fourth National Conference, Bangladesh Animal Husbandry Association*. pp 169-181.
- Mapiye C, Chikwanha OC, Chimonyo M, Dzama K (2019). Strategies for sustainable use of indigenous cattle genetic resources in Southern Africa. *Diversity*. 11(11): 214.
- Mizoram Economic Survey, 2019-20. Planning and Programme Implementation Department, Research and Development Branch, Government of Mizoram.
- Pundir RK, Singh PK, Neelkant, Sharma D, Singh CV, Prakash B (2013). Uttara- A new cattle germplasm from Uttarakhand hills. *Indian J. Anim. Sci.* 83(1): 51-58.
- Pundir RK, Malik S, Singh PK, Sharma D, Sadana DK (2014). Indigenous cattle of Tripura- Characterisation and Performance Evaluation. *Indian J. Anim. Sci.* 84(9): 974-977.
- Pundir RK, Singh PK, Sadana DK, Dangi PS, Lalhraipuii, Vanlalpeka LK, Laldinthara F, Singh NM, Andrew L (2015). Characterisation of mizoram native cattle of indian origin. *J. Appl. Anim. Res.* 5(4): 801-806.
- Saidur R, Girin K (2015). Morphometric, productive and reproductive traits of local cattle (Zobawng) of Mizoram. *Int. J. Livest. Res.* 5(7): 50-57.
- Singh PK, Pundir RK, Manjunath VK, Rudresh BH, Govindaiah MG (2008). Features and status of miniature indigenous germplasm of cattle - Malnad Gidda. *Indian J. Anim. Sci.* 78(10): 1123-1126.