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PHENOTYPIC CHARACTERIZATION OF NON-DESCRIPT BUFFALOES IN RAIGAD DISTRICT OF KONKAN REGION IN MAHARASHTRA

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ABSTRACT

This study aims to characterize the non-descript, an undocumented buffalo phenotypically during the time of survey period in Raigad district of Konkan region in Maharashtra. The data were collected from 400 non-descript buffaloes, through interview from the farmers with the help of pre-form questionnaire. The average head length, ear length, horn length, circumference at the base of horn, neck length, height at wither, chest girth, body length, body weight (kg), hind leg length tail length and switch length of non-descript male and female buffaloes recorded in different age group were found to be 43.72±0.66 and 33.37±0.97 cm, 20.99±0.32 and 18.53±0.75 cm, 50.60±1.38 and 29.97±4.19 cm, 17.22±0.57 and 10.66±0.93 cm, 41.04±0.74 and 37.87±2.02 cm, 113.7±0.91 and 93.52±4.36 cm, 161.9±0.88 and 117.34±6.61 cm, 111.76±0.68 and 87.04±5.12 cm, 363.70±3.71 and 238.35±6.27 kg, 103.62±0.34 and 86.10±2.24 cm, 62.06±0.34 and 46.72±1.22 cm and 9.95±0.32 and 8.75±0.33 cm, respectively in Raigad district. Male buffalo was comparatively heavier than female buffalo. The phenotypic character and behaviour indicated that non-descript buffalo of Raigad district might be medium type. For identifying the actual breed characteristics of non-descript buffalo in this region.

Keywords: *Bubalus bubalis*, buffaloes, non-descript buffaloes, body measurements, medium type, Raigad district

INTRODUCTION

The buffalo plays an important role in farmer's economic life. The domestic buffalo (*Bubalus bubalis*) belongs to family *bovidae*, sub-family *bovinae*, genus *bubalus* and species *bubalis*. Buffalo namely classified into two types. River buffalo (chromosome No. 50) and swamp buffalo (chromosome No. 48) type. India possesses the best buffalo breeds of the world. It is observed from the record that a large segment of buffalo population (about 20.5%) in the country is considered to be non-descript because these animals do not fulfil the phenotypic attributes to any specific breeds.

Total livestock population in the India is about 535.78 million showing an increase of 4.6% over livestock census 2012. Total bovine population is about 302.79 million in 2019 which is increase of 1.0% over previous census 2012. In India, buffalo

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population has been recorded at about 109.85 million buffaloes. (Anonymous, 2019). In the country, there are 17 recognized buffalo breeds and several non-descript buffaloes. Which have regional importance and add to economic value of the community. (NBAGR, 2020).

The vast majority of buffaloes is non-descript. These vary largely in size, weight and general features. These breeds reared specific to the regions where they are inhabited. Characterization of these isolated buffalo groups should not be undertaken to identify, whether these populations might have developed adaptive and specific characters and hence requires greater attention. (Sonawane, 2015).

Buffaloes are the important species in the tropical as well as subtropical countries of the world for their uses in agricultural sector. The farmers are keeping buffaloes for milk and traction their cultivable land. Buffaloes are the second largest ruminants, reared extensively in this country and a vital part of the national economy. But limited scientific research had taken place upon the non-descript buffalo/indigenous of Konkan region. Hence, it shows the greatest interest to obtaining some primarily phenotypic characteristics about the non-descript buffalo.

MATERIALS AND METHODS

Study area

Raigad district in Maharashtra state (18.5158°N and 73.1822°E) with an area of 7148 km^2 bounded by the terrain is hilly, undulating and characterized by lateritic type of soil. The climate of Raigad district is warm and humid. The average minimum temperature is about 26.2°C, maximum temperature is about 41.7°C, humidity about 70 to 80%, sunshine- 6.7 h, and wind speed is about 4.9 km/h.

Sampling pattern

The study was conducted in Raigad district about 400 non-descript buffaloes (98 male, 32 heifer and 270 female) were randomly selected in different Age group 0-1, 1-2, 2-3, 3-4 and more than 4 years from Mahad, Mangoan, Roha, Poladpur and Tala of Raigad district. The data were collected directly face to face interview from farmers with the help of pre-form questionnaire. The body measurements of non-descript buffalo were taken by own self with the help of a measuring tape and body measurements were taken for the head length (distance from poll to upper edges of muzzle), ear length (base of ear to the end of ear or tip of ear), horn length (distance from base of horn to the tip of horn flowing its curvature), circumference at the base of horn (diameter at the base of horn), neck length (lower jaw to body crest of the animal), height at wither (vertical distance from ground to the highest point of wither), chest girth (around the circumference of chest just behind the point of elbow), body length (distance from point of shoulder to pin bone of the animal), body weight (kg), Body weight was calculated by Shaffer's formula cited by Sonwane (2015).

$$BW = \frac{\text{Chest girth (inch)} \times \text{Body length (inch)}}{8/8.5/9}$$

Where,

8 = if girth is over 80 inches,

8.5 = if girth is between 65 to 80 inches,

9 = if girth is less than 65 inches.

RESULT AND DISCUSSION

Head length

It could be seen from data of (Table 1). that the head length of non-descript male buffaloes recorded in 0-1, 2-3, 3-4 and more than 4 years Age groups were 21.41±0.17, 49.17±0.71, 50.48±0.55 and 53.82±1.20 cm and female buffaloes recorded in 0-1, 1-2, 2-3, 3-4 and more than 4 years were 20.50±0.40, 22.26±1.01, 33.69±2.08, 42.10±1.24 and 48.28±0.13 cm, respectively. The average head length observed in male and female non-descript buffaloes were 43.72±0.66 and 33.37±0.97 cm, respectively in Raigad district. The overall results of head length were almost similar with the findings of Rahman *et al*. (2015) studied that head length of male and female buffalo at Sylhet district recorded was 48.78±3.17 and 42.70±2.66 cm, respectively in Indigenous buffalo. As well as Thalkar *et al.* (2016) observed that the average head length from pole to muzzle was (54.028 cm) higher than present study. Head length was increased continuously from 4 to 5 years Age group to Older ge group in Ellichpuri strain of Nagpuri buffaloes. Sahu *et al.* (2017) studied that the mean for head length was found to be 50.73±0.36 cm in the Sambalpuri buffalo of India.

Ear length

The perusal of data given in (Table 1). indicated that the ear length of non-descript male buffaloes recorded in 0-1, 2-3, 3-4 and more than 4 years Age groups were 14.24±0.24, 22.58±0.24, 23.46±0.38 and 23.70±0.42 cm and female buffaloes recorded in 0-1, 1-2, 2-3, 3-4 and more than 4 years Age groups were 15.67±0.44, 16.70±0.44, 18.13±2.14, 19.39±0.60 and 22.78±0.14 cm, respectively. The average ear length of non-descript male and female buffaloes was recorded as 20.99±0.32 and 18.53±0.75 cm, respectively. The results were almost similar with Rahman *et al*. (2015) observed that ear length of male and female buffalo at Sylhet district recorded was 25.35±2.20 and 22.41±2.08 cm, respectively in Indigenous buffalo.

Horn length

In non-descript buffaloes, average male and female horn length recorded of the animals in Raigad district have been summarized in Table 1.

The horn length of non-descript male buffaloes recorded in 0-1, 2-3, 3-4 and more than 4 years Age groups were 6.84±2.16, 62.10±1.39, 66.63±2.23 and 66.84±1.75 cm and female buffaloes recorded in 0-1, 1-2, 2-3, 3-4 and more than 4 years Age groups were 8.67±1.38, 11.1±4.45, 31.20±10.57, 37.54±4.13 and 61.33±0.41 cm, respectively. The average horn length of non-descript male and female buffaloes were 50.60±1.38 and 29.97±4.19 cm, respectively in Raigad district. These differences might be attributed to sex, age and nutritional factors. The mean values of horn length in the present study are lower than those reported by Rahman *et al*. (2015) observed that horn length of male and female buffalo at Sylhet district recorded was 53.70±4.60 and 46.58±2.14 cm, respectively in Indigenous buffalo. Thalkar *et al.* (2016) recorded that average length of horn of Purnathadi was 50.672±0.748, 63.660±0.738, 66.031±0.449, 70.432±0.280 cm in the animal under the groups 4-5, 5-7, 7-9, 9-11 years, respectively. As well as average length of horn of Ellichpuri was 51.262±0.748, 62.510±0.758, 67.259±0.510, 73.030±0.068 cm in the animal under the groups 4-5, 5-7, 7-9, 9-11 years, respectively.

Circumference at the base of horn

It could be seen from data of Table 1.

that the circumference at the base of horn of non-descript male and female buffaloes recorded in 0-1, 2-3, 3-4 and more than 4 years Age groups and recorded in 0-1, 1-2, 2-3, 3-4 and more than 4 years Age groups were 4.50±0.15, 18.60±1.03, 22.4±0.47 and 23.40±0.63 cm and 5.10±0.58, 6.07±1.87, 9.90±1.42, 10.37±0.64 and 21.88±0.14 cm, respectively. The average circumference at the base of horn observed in male and female non-descript buffaloes were 17.22±0.57 and 10.66±0.93 cm, respectively in Raigad district. The result was closely related with Thalkar *et al.* (2016) reported that the average circumference of horn of Purnathadi was 15.370±0.214, 16.201±0.269, 18.262±0.866, 19.784±0.010 cm, in 4-5, 5-7, 7-9, 9 to 11 years Age group, respectively.

Neck length

The perusal of data given in Table 1. indicated that the neck length of non-descript male buffaloes recorded in 0-1, 2-3, 3-4 and more than 4 years Age groups were 19.67±0.31, 47.64±1.09, 48.29±0.40 and 48.57±1.18 cm and female buffaloes recorded in 0-1, 1-2, 2-3, 3-4 and more than 4 years Age groups were 20.2±1.18, 35.40±1.07, 40.49±1.65, 45.77±5.87 and 47.51±0.34 cm, respectively. The average neck length of non-descript male and female buffaloes was recorded as 41.04±0.74 and 37.87±2.02 cm, respectively in Raigad district. The length of neck increased progressively with increasing in age of buffalo in Age group more than 4 years of age. The present findings are in agreement with Thalkar *et al.* (2016) observed that average neck length of Purnathadi was 37.100±0.5620, 40.530±0.252, 40.809±0.673, 49.820±0.063 cm in Age group of 4-5, 5-7, 7-9, 9 to 11 years, respectively. The average neck length was 44.017±0.442 cm and observed that average neck length of Ellichpuri was 37.100±0.5620, 40.530±0.252, 40.809±0.673, 49.820±0.063 cm in Age group of 4-5, 5-7, 7-9, 9 to 11 years, respectively.

Height at wither

The data pertaining to height at wither of non-descript buffaloes recorded in different years are furnished in Table 2. The height at wither of non-descript male buffaloes recorded in 0-1, 2-3, 3-4 and more than 4 years Age groups were 72.00±0.43, 124.40±0.90, 125.71±1.24 and 130.57±1.10 cm and female buffaloes recorded in 0-1, 1-2, 2-3, 3-4 and more than 4 years Age groups were 72.53±1.12, 72.77±1.36, 90.73±14.73, 104.61±4.41 and 126.95±0.18 cm, respectively. The average height at wither of non-descript male and female buffaloes were 113.7±0.91 and 93.52±4.36 cm, respectively in Raigad district. Which supports the study of Yeasmin *et al.* (2016) observed that height at wither of mature buffaloes at Bangladesh Livestock Research Institute (BLRI) farm it was 124.35±1.12 cm, On the other hand at Lal Teer Livestock farm it was 132.19±0.77 cm, respectively. Sahu *et al.* (2017) observed that the overall least square means for height at wither was found to be 125.50±0.46 cm in the Sambalpuri buffaloes of India.

Chest girth

The means with standard error of chest girth of non-descript buffaloes recorded in different yrs have been tabulated in Table 2.

The chest girth of non-descript male and female buffaloes recorded in 0-1, 2-3, 3-4 and more than 4 years Age groups and recorded in 0-1, 1-2, 2-3, 3-4 and more than 4 years were 81.74±0.24, 187.63±1.76, 187.96±0.62 and 190.27±0.90 cm and 80.5±0.61, 82.17±0.82, 107.83±23.78, 128.88±7.57 and 187.34±0.28 cm, respectively.

The average chest girth observed in male and female non-descript buffaloes were 161.9±0.88 and 117.34±6.61 cm, respectively in Raigad district. Similar conformation traits were reported by Pawar (2012) studied that chest girth of buffaloes were as 78.11±0.38, 93.91±1.02, 118.06±1.24, 140.68±1.41,176.18±3.05 and 174.47+0.48 cm, respectively in Marathwadi buffalo at 0 to 3 months, 4 to 12 months, 13 to 24 months, 25 to 36 months, breeding bull and more than 36 months age. Rahman *et al.* (2015) reported that chest girth of male and female buffalo was 196.50±6.02 and 192.06±4.90 cm, respectively in Indigenous buffalo at Sylhet district. Thalkar *et al.* (2016) studied that the average of chest girth of Purnathadi was found to be 184.8226±0.80968 cm. They also studied that the average of chest girth of Ellichpuri was found to be 182.340±0.905 cm (Figure 1).

Body length

The perusal of data given in Table 2 indicated that the body length of non-descript male buffaloes recorded in 0-1, 2-3, 3-4 and more than 4 years Age groups were 63.22±0.43, 127.03±0.43, 128.25±0.84 and 128.53±1.04 cm and female buffaloes recorded in 0-1, 1-2, 2-3, 3-4 and more than 4 years Age groups were 57.63±1.80, 65.87±1.44, 82.77±16.97, 100.81±5.30 and 128.13±0.11 cm, respectively. The average body length of non-descript male and female buffaloes was recorded as 111.76±0.68 and 87.04±5.12 cm, respectively in Raigad district. These findings are similar to the Farate (2012) observed that the body measurement in Marathwadi buffalo at 0 to 3 months, 4 to 12 months, 13 to 24 months, 25 to 36 months, breeding bull and more than 36 months age for body length were as 64.72+0.42, 76.09+0.65, 98.56+0.44, 107.67+0.84, 129.83+0.71 and 126.07+0.29 cm, respectively. Tariq *et al.* (2013) reported that body length was 130±19.2 cm of *Nili-Ravi* Buffaloes. Rahman *et al.* (2015) observed that body length of male and female buffalo at Sylhet district recorded was 121.88±5.15 and 115.56±4.24 cm, respectively in Indigenous buffalo.

Body weight

The data pertaining to body weight of non-descript buffaloes recorded in different years are furnished in Table 2.

The body weight of non-descript male buffaloes recorded in 0-1, 2-3, 3-4 and more than 4 years Age groups were 91.87±0.66, 449.50±2.62, 454.01±6.99 and 459.44±4.59 kg and female buffaloes recorded in 0-1, 1-2, 2-3, 3-4 and more than 4 years Age groups were 82.51±3.16, 96.18±1.60, 243.68±22.97, 316.90±2.75 and 451.88±0.85 kg, respectively. The average body weight of non-descript male and female buffaloes were 363.70±3.71 and 238.35±6.27 kg, respectively in Raigad district. Body weight increased progressively with the age. However, Tekale (2012) reported that in buffalo at 0 to 3 month, 4 to 12 month, 13 to 24 month, 25 to 36 months, breeding bull and more than 36 months age, the body weight were 28.94+0.53, 42.3+0.48, 94.35+1.62, 176.62+2.04, 400.60+14.25, 363.15+3.12 kg, respectively in Marathwadi buffaloes. Rahman *et al.* (2015) observed that body weight of male and female buffalo at Sylhet district recorded was 447.83±42.27 and 426.68±31.79 kg, respectively in Indigenous buffalo (Figure 2A and 2B).

Hind leg length

The data pertaining to hind leg length of non-descript buffaloes recorded in different yrs are furnished in Table 3.

The hind leg length of non-descript male buffaloes recorded in 0-1, 2-3, 3-4 and

Table 1. Average age wise body measurements of head and neck region parts of non-descript buffaloes in Raigad district.

Age of animals (Years)	No. of animals		Head length (cm)		Ear length (cm)		Horn length (cm)		Circumference at the base of horn (cm)		Neck length (cm)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	female
0-1	70	3	21.41±0.17	20.50±0.40	14.24±0.24	15.67±0.44	6.84±2.16	8.67±1.38	4.50±0.15	5.10±0.58	19.67±0.31	20.2±1.18
1-2	0	3	-	22.26±1.01	-	16.70±0.44	-	11.1±4.45	-	6.07±1.87	-	35.40±1.07
2-3	3	23	49.17±0.71	33.69±2.08	22.58±0.24	18.13±2.14	62.10±1.39	31.20±10.57	18.60±1.03	9.90±1.42	47.64±1.09	40.49±1.65
3-4	14	3	50.48±0.55	42.10±1.24	23.46±0.38	19.39±0.60	66.63±2.23	37.54±4.13	22.4±0.47	10.37±0.64	48.29±0.40	45.77±5.87
More than 4	11	270	53.82±1.20	48.28±0.13	23.70±0.42	22.78±0.14	66.84±1.75	61.33±0.41	23.40±0.63	21.88±0.14	48.57±1.18	47.51±0.34
Overall average (%)	98	302	43.72±0.66	33.37±0.97	20.99±0.32	18.53±0.75	50.60±1.38	29.97±4.19	17.22±0.57	10.66±0.93	41.04±0.74	37.87±2.02

Table 3. Average age wise body measurements of hind region of non-descript buffaloes in Raigad district.

Age of animals (Years)	No. of animals		Hind leg Length (cm)		Tail length (cm)		Switch of tail length (cm)	
	Male	Female	Male	Female	Male	Female	Male	Female
0-1	70	3	60.95±0.22	53.7±2.51	32.60±0.26	30.87±0.84	8.02±0.15	7.60±0.26
1-2	0	3	-	58.03±2.26	-	31.73± 0.57	-	8.20±0.72
2-3	3	23	117.5±0.55	90.01±5.78	71.2±0.47	47.86±3.01	9.99±0.15	8.33±0.28
3-4	14	3	117.76±0.22	110.93±0.63	71.59±0.30	52.87±1.39	10.61±0.38	8.83±0.28
More than 4	11	270	118.27±0.37	117.82±0.05	72.87±0.32	70.27±0.27	11.20±0.60	10.80±0.10
Average (cm)	98	302	103.62±0.34	86.10±2.24	62.06±0.34	46.72±1.22	9.95±0.32	8.75±0.33

Table 2. Average age wise measurements of body region parts and body weight of non-descript buffaloes in Raigad district.

Age of animals (Years)	No. of animals		Height at wither (cm)		Chest girth (cm)		Body length (cm)		Body weight (Kg)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0-1	70	3	72.00±0.43	72.53±1.12	81.74±0.24	80.5±0.61	63.22±0.43	57.63±1.80	91.87±0.66	82.51±3.16
1-2	0	3	-	72.77±1.36	-	82.17±0.82	-	65.87±1.44	-	96.18±1.60
2-3	3	23	124.40 ±0.90	90.73±14.73	187.63±1.76	107.83±23.78	127.03±0.43	82.77±16.97	449.50±2.62	243.68±22.97
3-4	14	3	125.71±1.24	104.61±4.41	187.96±0.62	128.88±7.57	128.25±0.84	100.81±5.30	454.01±6.99	316.90±2.75
More than 4	11	270	130.57±1.10	126.95±0.18	190.27±0.90	187.34±0.28	128.53±1.04	128.13±0.11	459.44±4.59	451.88±0.85
Overall average	98	302	113.17±0.91	93.52±4.36	161.9±0.88	117.34±6.61	111.76±0.68	87.04±5.12	363.70±3.71	238.35±6.27

Figure 1. Measurement of chest girth in non-descript buffaloes.

Figure 2A. Measurement of body length in non-descript.

Figure 2B. Measurement of body length in non-descript.

more than 4 years Age groups were 60.95±0.22, 117.5±0.55, 117.76±0.22 and 118.27±0.37 cm and female buffaloes recorded in 0-1, 1-2, 2-3, 3-4 and more than 4 years Age groups were 53.7±2.51, 58.03±2.26, 90.01±5.78, 110.93±0.63 and 117.82±0.05 cm, respectively. The average hind leg length of non-descript male and female buffaloes were 103.62±0.34 and 86.10±2.24 cm, respectively in Raigad district. This finding was supported by Rahman *et al*. (2015) noticed that leg length of male and female buffalo at Sylhet District recorded was 76.66±2.80 and 70.36±2.42 cm, respectively in Indigenous buffalo and Melo *et al.* (2018) observed that hind leg length was 130.80 cm, in Murrah crossbred buffaloes.

Tail length

The means with standard error of tail length of non-descript buffaloes recorded in different years have been tabulated in Table 3.

The tail length of non-descript male and female buffaloes recorded in 0-1, 2-3, 3-4 and more than 4 years Age groups and 0-1, 1-2, 2-3, 3-4 and more than 4 years Age groups were 32.60±0.26, 71.2±0.47, 71.59±0.30, and 72.87±0.32 cm and 30.87±0.84, 31.73±0.57, 47.86±3.01, 52.87±1.39 and 70.27±0.27 cm, respectively. The average tail length observed in male and female non-descript buffaloes were 62.06±0.34 and 46.72±1.22 cm, respectively in Raigad district. The result was partially similar with Thalkar *et al.* (2016) observed that the average tail length of this buffalo was 73.308±0.408 cm in Purnathadi strain of Nagpuri buffaloes and also studied that the tail length of Ellichpuri strain was the average of tail length of this buffalo was 75.424±1.660 cm. Sahu *et al.* (2017) observed that the overall least square means for tail length was found to be 81.33±0.90 cm in the Sambalpuri buffaloes of India.

Switch of tail length

The perusal of data given in Table 3 indicated that the switch of tail length of non-descript male buffaloes recorded in 0-1, 2-3, 3-4 and more than 4 years Age groups were 8.02±0.15, 9.99±0.15,

10.61±0.38, and 11.20±0.6 cm and female buffaloes recorded in 0-1, 1-2, 2-3, 3-4 and more than 4 years Age groups were 7.60±0.26, 8.20±0.72, 8.33±0.28, 8.83±0.28 and 10.80±0.10 cm, respectively. The average switch of tail length of non-descript male and female buffaloes was recorded as 9.95±0.32 and 8.75±0.33 cm, respectively in Raigad district. The results finding in accordance with Rahman *et al*. (2015) noticed that switch of tail of male and female buffalo recorded was 8.32±0.08 and 11.6±0.9 cm, respectively in Indigenous buffalo at Sylhet district. Sahu *et al.* (2017) observed that the means for switch of tail length was found to be 8.04±0.34 cm in the Sambalpuri buffaloes of India.

Conclusion

This indicates that non-descript buffaloes of Raigad district might be medium size and better milk and reproduction performance. All measuring parameter of male was higher than the female. Further studies will require immediately for identifying the actual breed characteristics of non-descript buffalo in this region.

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