APPRAISAL OF LINEAR TYPE TRAITS IN GRADED MURRAH BUFFALOES

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ABSTRACT

To define graded Murrah buffaloes, it's dairyness on the basis of linear type traits and to determine the effect of various non-genetic factors such as parity and stage of lactation on expression of these traits, 115 graded Murrah buffaloes were selected randomly to record the various linear traits and scaled / scored under 1-9 point scale as recommended by International Committee for Animal Recording, 2001. Thus graded Murrah can be defined as a breed of buffalo having stature of 141.30±0.38 cm, chest width of 30.43±0.33cm, rump angle of 10.24±0.45cm, rump width of 29.25±0.30 cm, body depth of 238.01±0.99 cm, udder depth of 9.93±0.74 cm, teat length of 8.23±0.18 cm, rear leg set (side view) of 126.37°±1.60°, foot angle of 52.46°±0.82°, rear udder height of 46.53±0.76 cm, central ligament of 2.77±0.85 cm with milk vein having length of 59.49±0.84 cm. It is having lower slope at rump and rest of the traits being intermediate. Most of the traits in graded Murrah buffalo were little behind the desirable type traits. Thus, there is further scope for improvement in all type traits of graded Murrah buffalo. The various non-genetic factors such as parity and stage of lactation do not exert any significant effect on expression of these traits.

Keywords: International committee for animal recording, linear type traits, graded Murrah buffalo, Non-genetic factors and improvement

INTRODUCTION

The type traits are the body parts of dairy cow/buffalo, which make her capable to produce milk and those traits which are directly or indirectly linked with each other are called as linear type traits (Dubey, 2010). The linear type traits are the basis of modern day classification system of animal and are used to define the dairyness of a cow (International committee for animal recording, 2001). The improvement in these traits can improve the herd life of dairy cows besides improving their milk production level (Atkins and Shannon, 2002). Moreover, these traits have been used as indirect selection criteria for improving the herd life of dairy cows (Cruickshank *et al*., 2002). However, the expressions of body traits are known to be affected by various non genetic factors such as parity and stage of lactation (Parveen, 2008). Since, up till now, no classification system has been developed

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for defining the linear body conformation of dairy buffaloes, thus, the present investigation was designed to evaluate the graded Murrah breed of buffalo, one of the valuable germplasm of Asian subcontinent, for different linear type traits along with defining it's dairyness on the basis of different linear body measurements as per the recommendations of ICAR for cattle (2001) and to determine the effect of various non-genetic factors on expression of these body conformation traits.

MATERIALS AND METHODS

In present investigation, 115 graded Murrah buffaloes at different stages of production were selected randomly to measure, scale and score various linear type traits as recommended by International committee for animal recording (ICAR, 2001). A total of 12 linear type traits were taken for consideration viz. Stature (S), Chest width (CW), Body depth (BD), Rump angle (RA), Rump width (RW), Rear leg set (RLS), Foot angle (FA), Udder depth (UD), Teat length (TL), Central ligament/Udder cleft (CL), Rear udder height (RUH) and Length of milk vein (LMV). The mean, standard error and average score point of each linear type trait and analysis of variance to determine the effect of parity and stage of lactation was calculated by using formula given by Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

Stature

The mean value for this trait was found to be of 141.30±0.38 cm. Moreover, Campanile *et al*. (2003) had observed the sacrum height of 139.2 cm in Mediterranean Italian buffalo. The observed average score point (ASP) for stature was 5.67, which indicated the presence of intermediate group in graded Murrah buffaloes (Table 1). However, Vinayak *et al*. (1993) had observed very tall stature for purebred Murrah buffaloes. The observed variation may be due to the varying genotype of an animal, which leads to differences in stature.

Chest width

The higher scoring wider chest is generally considered preferable unless associated with excessive lack of dairy character (ICAR, 2001), Moreover, animals with narrow chest width have greater chances of being culled (Sewalem *et al*., 2004). In present investigation, the average chest width of 30.43±0.33 cm had been observed with ASP of 6.33, which indicated the presence of intermediate group in graded Murrah buffaloes (Table 1). However, Vinayak *et al.* (1993) had found wider chest width and body of pure Murrah. This could be attributed to the differences in the genetic makeup between Murrah and graded Murrah buffalo. However, this finding needs to be confirmed using 9 point score system of ICAR in pure Murrah buffaloes.

Rump angle

The difference in height from ground level between hook and pin bone was recorded for this trait and denoted as rump angle. As per the recommendation of ICAR (2001) for cattle, an intermediate scoring of rump angle is considered desirable as the pins bones, at both the extremities are considered undesirable. The average value for this trait was 10.24±0.45 cm with ASP of 3.59, indicating low type of slope which is not desirable (Table 1). However, Vinayak *et al.* (1993) had observed the higher slope in Murrah buffaloes. In

cattle, a straight to moderate slope from hip to pin has been associated with less calving difficulties, few reproductive problems and great longevity. Although, such link have yet to be proved scientifically and need to be studied in buffaloes.

Rump width

The rump width on either side of extreme is associated with reproductive ailments (ICAR, 2001). It may be an important parameter which indicates the good fertility in females (Buranakarl *et al*., 2013). In present investigation, the average value for this trait was found to be 29.25±0.30 cm, whereas, Campanile *et al*. (2003) had observed the ischium width of 24.8 cm in Mediterranean buffalo. The observed ASP for rump width was 5.22, indicating presence of intermediate rump width (Table 1). However, Vinayak *et al.* (1993) observed much wider width of pelvic area for Murrah buffaloes. This might be due to change in the genotype of the animal which caused decrease in rump width of graded Murrah buffaloes.

Body depth

In present investigation the average Body depth of 238.01±0.99 cm was observed in graded Murrah buffaloes with ASP of 5.35, indicating the presence of intermediate body depth in graded Murrah buffaloes (Table 1). This trait denotes the food digestion and assimilation capacity of animal, thus, the deeper body is generally considered preferable, unless associated with excessive lack of dairy character. This finding was in accordance with Vinayak *et al.* (1993), where they had observed similar food digestion and assimilation capacity of purebred Murrah buffaloes. Moreover, it can be concluded that the aforesaid trait are breed independent and does not shows variability among different breed.

Udder depth

The average depth of udder for graded Murrah buffaloes was 9.93±0.74 cm, whereas Campanile *et al*. (2003) had observed the udder depth of 19.5 cm in Mediterranean buffalo. The observed ASP for udder depth was 6.56 (Table-1), indicating intermediate depth of udder. However, Vinayak *et al.* (1993) had observed udder floor clearly above the hock for Murrah buffaloes, which may be attributed due to the genetic differences between both breeds. The udder with shallow depth is most desirable, since such udders are less prone to injuries, besides providing ample spaces for alveolar tissues of udder.

Teat length

In present investigation, the average value for this trait was 8.23±0.18 cm, whereas Campanile *et al*. (2003) had observed the nipple length of 6.11 cm in Mediterranean buffalo. The observed ASP for teat length was 4.70, indicating the presence of intermediate length of teat (Table-1). As per the recommendation of ICAR (2001), teat with intermediate length is considered preferable in cattle because long teats are more easily damaged due to increase susceptibility to injury, thus, increasing the chances of infection and disease like mastitis while short teats cause problem for milking machines.

Length of Milk Vein

Although this trait is not an approved standard trait recommended by ICAR (2001), yet it may proved to be one of the important trait as its characteristic features are directly associated with milk production potential of an animal. In present investigation the average value for this trait was 59.49±0.84 cm with ASP of 4.12, indicating

the intermediate Length of milk vein (Table 1). Although, it is one of the important for dairy animals, however, due to lack of information on its utility, it was difficult to draw any conclusion in present investigation.

Rear leg set-side view

In present investigation, an average value of 126.37°±1.60° with ASP of 4.51, indicating the presence of intermediate hock angle in graded Murrah buffaloes (Table-1). Moreover, Vinayak *et al*. (1993) had also observed moderate hock angle in purebred Murrah buffaloes. Similar results were also observed by Mitra *et al.* (1998) in Karan-Fries breed of cattle. This result showed that Rear leg set (side view) is a trait which is independent of species and breed variation.

Foot angle

In present investigation, average value for this trait was 52.46°±0.82° with ASP of 5.27, indicating intermediate foot angle (Table 1). In cattle, as per recommendation of ICAR (2001), very steep foot angle is considered preferable which keeps the heel and pastern off the ground, thus enabling the cow to cope better with uneven and stony ground. Moreover, Vinayak *et al.* (1993) had also observed intermediate type of Foot angle in Murrah buffaloes. Thus, both of these results are in accordance with Mitra *et al.* (1998), who observed the intermediate type of Foot angle in Karan-Fries breed of cattle. Thus, it shows that this trait is also independent of species and breed variation.

Central ligament/ Udder cleft

In present investigation, the average value for this trait was 2.77±0.85 cm with ASP of 5.09, indicating the presence of intermediate definition of udder cleft (Table-1). As per the recommendation of ICAR (2001) for dairy cattle, central ligament with deep definition is considered preferable. Vinayak *et al.* (1993) had also reported intermediate definition of central ligament in Murrah buffaloes. In Karan-Fries breed of cattle, as reported by Mitra *et al*. (1998), central ligament with deep definition has been observed. This difference in cattle and buffaloes may be due to species variation. Further, it may also be due to the fact that, in general, the milk production potential of cattle is greater than that of buffaloes. Thus, to bear the weight of more amount of milk the nature has developed strong central ligament in cattle as compared to buffaloes.

Rear udder height

In present investigation, the average value for this trait was 46.53±0.76 cm, however, Campanile *et al*. (2003) had observed the rear udder height of 15.5 cm. in Mediterranean buffalo. The observed ASP for this trait was 4.72, indicating presence of intermediate height for rear udder (Table-1). As per recommendation of ICAR (2001), the high rear udder height is considered as better than other groups, since it provides more space area available for secretory tissues which are known to synthesize milk. Besides this Vinayak *et al*. (1993) had also observed intermediate height for rear udder in purebred Murrah buffaloes.

Effect of parity and stage of lactation on expression of linear type traits

As shown in Table 2 and Table 3, the analysis of variance revealed that the effect of parity and stage of lactation was not significant on expression of different linear type traits. Since, the graded Murrah buffaloes studied in present investigation were purchased from different markets and they were not grown in the farm. Moreover, all the buffaloes under study have crossed the age of

Table1. Mean, ASP and Interpretation of different type traits in Graded Murrah buffaloes (n=115).

Type traits	Mean	Score point range			ASP	Interpretation	By Vinayak & coworkers	Desirable
		1-3	4-6	7-9				
ST	141.30±0.38	Short	Intermediate	Tall	5.67	Intermediate	Very Tall	Tall
CW	30.43±0.33	Narrow	Intermediate	Wide	6.33	Intermediate	Wide	Wide
RA	10.24±0.45	Low slope	Intermediate	High	3.59	Low slope	Higher slope	Higher slope
RW	29.25±0.30	Narrow	Intermediate	Wide	5.22	Intermediate	Wide	Wide
BD	238.01±0.99	Shallow	Intermediate	Deep	5.35	Intermediate	Intermediate	Deep
UD	9.93±0.74	Below Hock	Intermediate	Shallow	6.56	Intermediate	Shallow	Shallow
TL	8.23±0.18	Short	Intermediate	Long	4.70	Intermediate	-	Long
LMV	59.49±0.84	Short	Intermediate	Long	4.12	Intermediate	-	Long
RLS	126.37±1.60	Straight	Intermediate	Sickle	4.51	Intermediate	Intermediate	Sickle
FA	52.46±0.82	Low	Intermediate	Steep	5.27	Intermediate	Intermediate	Steep
CL	2.77±0.85	Weak	Intermediate	Strong	5.09	Intermediate	Intermediate	Strong
RUH	46.53±0.76	Low	Intermediate	High	4.72	Intermediate	Intermediate	High

Table 2. Effect of different parity of animals at the time of measurement (n=115).

Type traits	d.f	Mean sum of square	F - value	S.E.
S	3	10.656±0.533	0.630 (NS)	0.533
CW	3	9.281±0.464	0.732 (NS)	0.464
RA	3	19.688±0.622	0.862 (NS)	0.622
RW	3	7.356±0.427	0.684 (NS)	0.427
BD	3	116.415±1.388	1.024 (NS)	1.388
UD	3	92.317±1.388	1.024 (NS)	1.388
TL	3	3.219±1.022	1.499 (NS)	1.022
LMV	3	112.931±1.164	1.413 (NS)	1.164
RLS	3	91.731±2.253	0.306 (NS)	2.253
FA	3	100.319±1.145	1.298 (NS)	1.145
CL	3	0.199±0.097	0.363 (NS)	0.097
RUH	3	38.829±1.066	0.579 (NS)	1.066

Table 3. Effect of stage of lactation of animals at the time of measurement (n=115).

Type traits	d.f	Mean sum of square	F - value	S.E.
S	2	13.743±0.423	0.826 (NS)	0.423
CW	2	9.456±0.368	0.747 (NS)	0.368
RA	2	56.495±0.488	2.549 (NS)	0.488
RW	2	15.028±0.337	1.419 (NS)	0.337
BD	2	30.743±1.112	0.267 (NS)	1.112
UD	2	35.219±0.822	0.560 (NS)	0.822
TL	2	0.113±0.199	0.031 (NS)	0.199
LMV	2	23.545±0.937	0.288 (NS)	0.937
RLS	2	552.503±1.762	1.910 (NS)	1.762
FA	2	37.272±0.919	0.474 (NS)	0.919
CL	2	5.883E-02	0.107 (NS)	0.077
RUH	2	4.234±0.850	0.063 (NS)	0.850

maturity. As age of all the buffaloes under study ranged between 40 to 100 months, hence, effect of parity on the linear measurements was non-significant. Further, the effect of stage of lactation and all linear measurements were also negligible and non-significant.

CONCLUSION

In conclusion, the graded Murrah buffaloes can be defined as an indigenous dairy breed of buffalo having stature of 141.30 cm, chest width of 30.43 cm, rump angle of 10.24 cm, rump width of 29.25 cm, body depth of 238.01 cm, udder depth of 9.93 cm, teat length of 8.23 cm, milk vein with length of 59.49 cm, rear leg set (side view) of 126.37^{o}, foot angle of 52.63^{o}, central ligament of 2.77 cm with rear udder height of 46.53 cm. It is having lower slope at rump angle with rest of the traits being intermediate. Most of the traits in graded Murrah buffalo were little behind the desirable type traits. Thus, there is further scope for improvement in all type traits of graded Murrah buffalo. Since, the effect of different non-genetic factors such as parity and stage of lactation was non-significant and heritability of most of the linear type traits were found to be moderate to high (Dubey, 2010), thus, it could be expected that little effort is required to improve these traits can make these buffaloes, an ideal dairy buffaloes.

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