

Genetic and Non-Genetic factors affecting body weight of buffaloes

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Abstract

The present experiment was conducted on 60 randomly selected dairy units consisting of 116 Graded Murrah, 70 Diara type and 121 Non-descript type buffalo cows utilizing the procedure of "stratified random sampling with proportional allocation (Snedecor & Cochran, 1967) in and around Patna. Genetic factors were the three different genetic groups of buffaloes viz. Graded murrah, Diara and Non-descript types prevalent in Bihar. Where as Non-genetic factors included in the study were location of herd, farming system and sequence of lactation. The average estimates of body weight of Graded murrah, Diara and Non-descript were found to be 508.972±3.36, 461.789±3.32 and 483.857±3.30 kg respectively. The three genetic groups of buffaloes differed significantly ($p < 0.05$) among themselves with respect to their body weight. Farming system and lactation order had significant ($p < 0.01$) influence on body weight. Body weight of the animals was the lowest at first parity and then increased significantly ($p < 0.05$) in subsequent parities.

Key words: buffaloes, Body weight, genetic and non genetic factors.

Introduction

Cattle and Buffaloes are the main milk producing animals in our country. Buffalo forms the back bone of India's dairy industry and is rightly considered as the bearer cheque of the rural folk. Being less than one third of the total bovine population, contributes more than 50% of the total milk production in the country. Body size and body measurement traits of an animal are associated with the productivity and have an important role in input and output relationship. Body weight depends on various genetic and non-genetic factors. Although there are some information available on buffaloes in organized farms, yet the information on buffaloes maintained under unorganized farm is very scanty, hence the work has been under taken.

Materials and Methods

Buffaloes consisting of three genetic groups namely graded murrah, Diara and Non-descript types maintained in private dairy units at farmer's door located in a radius of 15 km in and around Patna were the experimental animals for the present study.

The whole area under study was divided into three distinct zones which are as follows:

Zone – I	North West Patna
Zone – II	South West Patna
Zone – III	East Patna

The primary survey was conducted in private dairy units popularly known as Khatals located in a radius of 15 km in and around Patna. Those Khatals which consisted of atleast 2 or more buffaloes consisting of graded murrah, Diara or Non-descript buffaloes either alone or in combination were enumerated, utilizing a door to door survey method. Altogether 920 buffaloes consisting of 331 graded murrah, 221 Diara and 368 Non-descript buffaloes were enumerated from 145 dairy units located in and around Patna.

out of 145 enumerated units, only 120 units were the respondent units which provided relevant information. These respondent units consisted of buffaloes which included 275 graded murrah, 185 Diara and 308 non-descript buffaloes. Out of total 120 units, 50% i.e. 60 dairy units, consisting of 430 buffaloes of different genetic groups were randomly selected utilizing the procedure of stratified random sampling with proportional allocation (Snedecor and Cochran, 1967). Data were recorded from buffaloes of defined genetic groups, which have completed atleast one calving interval.

The experimental animals under study were classified under three genetic groups such as (i) Graded Murrah, (ii) Diara type (iii) Non-descript type. Location of herd: (i) South West Patna (ii) North West

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Patna (iii) East Patna.

Lactation order: performance records of the buffaloes were classified into four groups on the basis of sequence of lactation, such as 1st Parity, 2nd Parity, 3rd Parity, 4th parity. The enumerated dairy units were grouped according to the farming system adopted by the farmers which are as follows:

- i) Mixed farming (animal husbandry integrated with agriculture)
- ii) Only Animal husbandry.
- iii) Estimation of body weight
- iv) Body weight of the animals was estimated by utilizing the following formula based on their body measurements
- v) Weight of buffalo (in pond) = $(L \times G^2) / 300$
- vi) L = Length of animal in inch
- vii) G = Heart girth of animal in inch
- viii) 1 Kg = 2.2046 lbs

To quantify the variation due to various genetic and non-genetic factors on different economic traits, the data were subjected to least square analysis (Harvey, 1966) for which the following mathematical model was utilized.

$$Y_{ijklm} = \mu + G_i + Z_j + F_k + P_l + e_{ijklm}$$

Where, Y_{ijklm} = The value of m th individual under i th genetic group, J th location, K th farming system and l th parity.

μ = The overall population mean.

G_i = The effect of i th genetic group ($i = 1, 2, 3$).

Z_j = The effect of j th location of herd ($j = 1, 2, 3$).

F_k = The effect of K th farming system ($K = 1, 2$).

P_l = The effect of l th parity ($l = 1, 2, 3, 4$).

e_{ijklm} = The random error associated with individual which is randomly and independently distributed with mean zero and variance.

The statistical significance of various fixed effect was tested by F test where as DMRT, as modified by Kramer (1957), was applied to carry out the pair wise comparisons among least squares means at 0.05 and 0.01 levels of probability.

Results and Discussion

The overall least squares mean for body weight in buffaloes consisting of three different genetic groups namely Diara, Graded Murrah and Non-descript types in and around Patna was estimated to be 484.875 ± 1.98 kg (Table). The average estimates of body weight at maturity in Murrah buffaloes were reported to be 513.4 ± 1.7 kg by Jawarkar and Johar (1975), 561.8 ± 7.6 kg by Sreedharan (1976) and 509.0 ± 6.8 kg by Saini and Gill (1991). The average estimates of body weight at maturity in Murrah and Mehsana buffaloes were reported to be 461 and 533 kg respectively (Taneja, 1999). The average body weight at maturity in Surti, Bhadawari and Mehsana buffaloes were reported to be ranged from 319-413 kg, 346-467

kg and 335-567 kg respectively (Taneja, 1999).

Genetic group had highly significant ($P < 0.01$) effect on body weight and its contribution to the total variation in body weight was reckoned to be 19.95%. As evident from table-5, the Graded Murrah was the heaviest (508.972 ± 3.36 kg) followed by Non-descript (483.857 ± 3.30 kg) and the lowest body weight (461.798 ± 3.32 kg) was recorded in Diara buffaloes. The Diara buffalo had significantly ($P < 0.05$) lesser body weight than the Graded Murrah and Non-descript types in and around Patna by 47.174 and 22.059 kg respectively, and Graded Murrah was significantly ($P < 0.05$) heavier than the Non-descript types by 25.115 kg. Sinha (2006) conducted the study on buffaloes in and around Barh, a sub-division of Patna district in Bihar and reported the average estimates of body weight in three genetic groups viz. Graded Murrah, Diara and Non-descript buffaloes to be 497.95 ± 6.79 , 447.50 ± 6.35 and 473.23 ± 6.12 kg respectively which were very close to the estimates recorded in this study.

As evident from table the average body weight was highest (488.708 ± 3.30 kg) in the animals located in South West Patna of the study area followed by the animals in North East Patna (484.493 ± 3.18 kg) and lowest in East Patna (481.426 ± 3.57 kg). The least squares analysis of variance revealed non-significant effect of location on body weight and contribution of location effect to the total variation for this trait was only 0.46%. Reports were not available in the literature to substantiate the findings of the present study.

The farming system had significant ($P < 0.01$) influence on body weight and its contribution to the total variation for this trait was 14.06% (Table-6). The animals managed in the units integrated with agriculture framing were significantly ($P < 0.05$) heavier (496.352 ± 2.82 kg) in comparison to those maintained in the units dairying alone (473.399 ± 2.68 kg). The results obtained in the findings of this study are in agreement with the findings of Johari and Bhat (1979) and Nautiyal and Bhat (1979) who also observed significant effect of farm on body weight in buffaloes. Difference in body weight under different farming system might be attributed to the difference in the availability of feeds and fodder resources and management practice adopted in different framing systems.

The lowest average body weight pooled over three genetic groups viz. Graded Murrah, Diara and Non-descript type buffaloes was estimated to be 420.847 ± 3.54 kg at the first parity. The growth and body weight of buffaloes was found to be increased linearly and significantly ($P < 0.05$) upto third parity and then started declining at fourth parity. The animals at second, third and fourth parity were significantly ($P < 0.05$) heavier than those at second parity by 54.958

and 46.92 kg respectively. Though the animals at third parity were heavier than those at fourth parity but did not differ significantly. Significant increase in body weight as observed in the present study was also reported by Singh et al. (1995c) in Mehsana buffaloes. The average estimates of body weight at first, second and third parities were reported to be 442.5±10.0 kg, 464.5±12.6 kg and 542.2±11.7 kg respectively. Significant increase in body weight upto third parity as observed in the present investigation revealed that skeletal maturity in buffaloes pertaining to this study is achieved at third parity when the animals are nearly 6-7 years of age.

Conclusion

The average estimates of body weight of graded murrah, diara and non-descript types were found to be 508.972+3.36, 461.798+3.32 and 483.857+3.30 kg respectively. The three genetic groups of buffaloes differed significantly ($p<0.05$) among themselves with respect to their body weight, and diara buffaloes had significantly ($p<0.05$) lower body weight than the graded murrah and non-descript types.

Farming system and lactation order had significant ($P<0.01$) influence on body weight. The animals maintained under mixed farming system were significantly ($P<0.05$) heavier than those managed in the units involved dairying alone. Like morphometric traits the average body weight of the animals was the

lowest at first parity and then increased significantly ($P<0.05$) in subsequent parities. The animals achieved highest body weight at third parity indicating that skeletal maturity of the animals attained at this age when animals are in third parity.

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