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BODY CONFORMATION WITH DAILY MILK YIELD RELATIONSHIP ON BUFFALOES

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Abstract: The study aimed to correlate milk yield with the body dimensions of buffaloes, during lactate season 2019, a total of 25 and 47 lactate buffaloes (Bubalus bubalis) were chosen randomly from Baghdad and AL-Muthanna province (270km south of Baghdad) respectively. Parameters such as body weight (BW), heart girth (HG), body length (BDL), body height at shoulder (HAS) and daily milk Yield (DMY) were calculated. Phenotypic correlations were positive and highly significant (P≤0.01) between HG, BDL and BW with DMY, while HAS showed non-significant association with DMY. These results could be helpful in the breeding programs for Iraqi buffaloes.

Keywords: Buffaloes, Bubalus Bubalis, Body Dimension, Milk Production, Phenotypic Correlations.

1. Introduction

Buffaloes in Iraqi are varying in morphological variations, milk yield and have larger body dimensions compared to Egyptian, Indian, and Pakistani buffaloes [1]. The last estimation of Iraqi buffaloes was approximately 285,537 head, dispensed on fifteen governorates. The highest ration in Basra province about 57704 head, Missan province about 24345 head, Thi-Qar province 49283 head, and Baghdad about 47809 head [2].

Milk products are essential elements of the human regime in many Countries over the world [3]. The River buffalo (Bubalus bubalis) is the second frequent source of milk in many regions [4]. Buffalo appearance characteristics can be used to anticipate the capacity for profitable utilization and may participate to creating efficient type when implemented in buffalo selection programs [5].

Many of the body dimensions are believed to be very useful from milk yield point of view and they have been stated to be correlated with milk production [6]. The appearance characteristics of the animal is considered to have relationship with milk production traits [7]. Body dimensions of Cattle are considered as observable markers to the ability for milk yield, and they have finance and crucial advantages among dairy cattle, thus, it is substantial to estimate correlation between the animal phenotype and its capability to production [8]. All types of milk production regression upon body dimensions were significant [9] and morphometric correlation among milk production and some of the body measurements was significant (P≤0.05) [10], so the body phenotypic traits could play a vital role in the buffalo selection plan [5].

2. Materials and Methods

Location of the study: two-Seventy adult lactating buffaloes (Bubalus bubalis) were chosen randomly from Baghdad province (25 female) and (47 female) from AL- Muthanna province (270 km south of Baghdad) during one lactating season 2018/2019. Milk yield and some of the standard body measurements were recorded. A body dimensions includes body length (BDL), heart girth (HG), Body weight (BW) and body height at shoulder (HAS). The measurements were taken using the tailor's tape measure and measuring stick while the animals were on standing location [11].

Daily milk yield: Daily milk yield (DMY) was collected from individual animals every two weeks. Dams were hand-milked and milk yield was recorded after complete milking. The day milk yield was recorded by measuring the quantity of milk present in the milking pail, after completion of milking operation.

1. Body measurements: Body length (BDL): was measured as the distance from the neck end to the first tail vertebrae.
2. Body height at shoulder (HAS): was measured from the point of the withers to level ground.
3. Heart girth (HG): was measured as circumferential measurement taken around the chest behind the front legs and withers.
4. Body weight (BW): was estimated as described by [7]:

$$\text{Live body Weight (Kg)} = \frac{\text{body length} \times \text{heart girth}^2}{300} \times 0.4536$$

Statistical analysis: The mean and standard error estimates of body dimensions, BW and (DMY) were achieved. The Pearson's Correlation between body measurements and BW with (DMY) was specified [12].

3. Results and Discussion

The means of BW, HG, BDL, HAS and DMY were 529.2±116.7Kg, 205.7±13.5cm, 134.0±19.1cm, 142.7±13.5cm, and 7.0±3.0 (Liters) respectively (table 1).

BW was found to possess a positive and highly significant (P≤0.01) correlation with HG and BDL. With regard to HG, there was a positive and highly significant (P≤0.01) correlation between BDL and HAS. These findings correspond with [10] and [11] results. Nevertheless, the relationship between BW and HAS was found non-significant. While the correlation between BDL and HAS was negative and non-significant (table 2).

There is a positive and highly significant correlation (P≤0.01) between heart girth (HG) and daily milk yield (DMY) with (r = 0.37) (Table 3), meaning that the increase in (HG) achieves a significant increase in the rate of (DMY). Thus, the selection of female buffaloes for the purpose of improving milk production through the (HG) is feasible according to the results of the current study, especially since this measurement represents one of the most important indicators of Body Condition Score (BCS) in dairy animals, the increase in (HG) reflects the animal's ability to breathe efficiently, and this correlates with the animal's productive traits [13]. Phenotypic correlations were positive and highly significant (P≤0.01) between BDL and BW with DMY, the BW had the highest phenotypic association with daily milk yield (0.52), while HAS showed non-significant association with DMY (Table 3), these outcomes get along with that of [9] and [10]. Previous studies [1], [14]–[16], determined positive and significant correlations between body conformation and milk yield. Buffalo appearance characteristics can be used to anticipate the capacity for profitable utilization and may participate to creating efficient type when implemented in buffalo selection programs [5]. Larger buffalos produce high milk yield as a result of their ability to consume larger amounts and reserve more fat in their body [17].

Conclusion: The phenotypic association between milk production and body conformation traits was positive and highly significant. The BW had the highest phenotypic association with daily milk yield (0.52). Phenotypic correlations of body conformation with milk yield in the current study point out that selecting for body weight (BW), body length (BDL), and heart girth (HG) may improve the milk production of Iraqi buffaloes. These estimations likewise could be utilized as indirect selection criteria for enhancing milk yield in Iraqi buffaloes beside the daily milk records. Anyway, this new data related to body estimations will be useful for future conceiving and planning a selection program for Iraqi buffalo.

Table 1. Mean ± S.D and range of various Body Measurements, body weight and daily milk yield.

Variables	No. of Animals	Mean(cm)±S.D	Range
DMY (Liters)	72	7.0±3.0	3 - 14
BW(Kg)	72	529.2±116.7	314 - 797
HG	72	205.7±13.5	170 - 240
BDL	72	134.0±19.1	100 - 167
HAS	72	142.7±13.5	109 - 190

S.D = standard deviation, HG = heart girth, BDL= body length, HAS = body height at shoulder, BW= body weight, DMY= daily milk yield.

Table 2. The correlation coefficient among body measurements and body weight.

Parameters	W(Kg)	HG	BDL	HAS
BW(Kg)	1	0.78**	0.83**	0.20 NS
HG		1	0.31**	0.36**
BDL			1	-0.03 NS
HAS				1
**** (P≤0.01), NS: Non-Significant.**				

HG= heart girth, BDL= body length, HAS= body height at shoulder, BW= body weight.

Table 3. Correlation coefficient between body measurements and body weight with daily milk yield.

Parameters	Correlation coefficient-r with DMY	Level of Sig.
HG	0.37	**
BDL	0.48	**
HAS	0.06	NS
BW(Kg)	0.52	**
**** (P≤0.01), NS: Non-Significant.**		

HG= heart girth, BDL= body length, HAS= body height at shoulder, BW= body weight DMY= daily milk yield.

4. Conclusions

The phenotypic association between milk production and body conformation traits was positive and highly significant. The BW had the highest phenotypic association with daily milk yield (0.52). Phenotypic correlations of body conformation with milk yield in the current study point out that selecting for body weight (BW), body length (BDL), and heart girth (HG) may improve the milk production of Iraqi buffaloes. These estimations likewise could be utilized as indirect selection criteria for enhancing milk yield in Iraqi buffaloes beside the daily milk records. Anyway, this new data related to body estimations will be useful for future conceiving and planning a selection program for Iraqi buffalo.

Supplementary Materials:

No Supplementary Materials.

Author Contributions:

A. R. Alkhateeb and W. I. Ibrahim; methodology, writing—original draft preparation, A. A. E. Taha; writing—review and editing. All authors have read and agreed to the published version of the manuscript.

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The authors declare no conflict of interest.

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