EFFECTS OF PARITY AND LOCATION ON BODY DIMENSIONAL MEASUREMENTS IN IRAQI BUFFALOES AT SOUTHERN: A CASE STUDY AT AL-NASIRIYAH GOVERNORATE

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ABSTRACT

This study was carried out in the AL-Nasiriyah governorate (385 km in south of Baghdad) to investigate on some morphological characteristics of buffaloes raised in southern area of Iraq. A total of 119 females from four different locations are randomly chosen over period 11/10/2011 to 16/10/2011 to be used. The overall mean for body dimension, heart girth (HG), barrel girth (BG), heart depth (HD) barrel depth (BD), body length (BDL) and slanting body length (SBDL), height at shoulder (HAS), height at tail attachment (HAT), distance between shoulder (DBS) and femurs (DBF), horn length (HL) and tail length (TL) were 215.7, 242.9, 76.7, 72.6, 231.5 and 113.1, 146.2, 142.9, 43.0, 55.6, 43.3 and 106.0 cm respectively. Parity has a highly significant effect on most of studied traits except of DBF ($P<0.05$) and there was no significance effect on TL. Results showed gradual increasing in HG, BG, BD, HAS and SBDL from calving to the fourth or fifth calving, whereas BDL and HAT was increased from first calving to the third calving. However, the most of body dimensional traits were deleterious during sixth calving onward. Location has highly significant effect ($P<0.01$) on HAS, HAT, DBF and TL and significant effect ($P<0.05$) on BDL and SBDL, while the others was not affected by location. The current findings reflect the poor feeding and management practices in southern region of Iraq due to many farmers depend mainly on marshes grasses such canes. Furthermore, the positive correlation between most dimensional traits and milk production could enhance smallholder buffalo farmers to improve their productivity via improve feeding practice and veterinary care.

Keywords: buffaloes, *Bubalus bubalis*, Iraqi buffaloes, body dimension, parity, location effect, correlation coefficient

INTRODUCTION

The total number of world buffaloes reached to 172 million heads and 98% from them they are found in Asia besides decreasing was happened in some countries in buffalo numbers such as Bulgaria, Romania, Turkey and Iran, because of the replacement of cattle by buffalo was occurred in the world (Borghese, 2009). Iraqi buffalo only used for milk production and never

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used for work and meat production came in second degree from importation for this animal, so the Iraqi buffaloes, was used for primarily dairy animals and contribute to about 8% of the output of bovine milk (FAO, 1988), and spread in 16 Iraqi governorate except to Erbil and Duhok. Prasad *et al*. (2010) found that the total milk production from buffaloes in the words approximately 12%, while India produced alone 60% from buffalo milk global and this were 100 million tons of milk, and other side, still buffalo the most neglect able domesticated animal from the world (Cockrill, 1985). The first domestication of buffaloes was appeared on seals in two regions, first in the Indus Valley (Mohenjo-Daro) and second in Mesopotamia (Ur/ Sumerians civilization) in south of Iraq from about the middle of the third millennium B.C. (Cockrill, 1985; Shalash, 1991). While some study revealed that the Iraqi buffaloes was introduced into Iraq about 13 centuries age, has adapted considerably to the prevailing environmental conditions of the country (Ashfaq, 1973). Recently, based on molecular study of Jaayid and Dragh (2014), the Iraqi buffalo have 16 alleles compared with others proved it's originated in Iraq and never imported from India.Most, if not all, milk is processing to thick butter cream named GAYMER, which it has popularity over country. Daily cream selling provide farmer with cash income annually. These merit made buffalo to be an important animal after cattle in Iraq. By the National Survey for Animal Resources which was done by Iraqi Agriculture Ministry (2008) there are number in AL-Nasiriyiah governorate was 49283 heads and this contains of the percentage 17.3% from total number of buffalo in Iraq which was distributed in seven regions with 2494 farm households (Dept. of Agriculture in Dhi-Qar, 2011), in marshes area for AL-Nasiriyiah governorate, the number of buffaloes was 33000 heads. The important of this area come from its location in the marhsres and have old history in breeding of buffaloes where greater producers are located in this area.Iraqi buffaloes are differing in colors, shapes (phenotypic variations) and milk production and have bigger body measurements comparing to Indian, Pakistani and Egyptian buffaloes (Baghdasar *et al*., 2011). Thy typical buffalo breeder in Iraq, Locally named the Ma'dan, the marshes Arabs. In recent study to Baghdasar *et al*. (2012) in Nineveh governorate, they found a highly significant effect for parity on chest and abdominal girth with chest and abdominal depth and fill length for animal beside to significant effect ($P<0.01$) for locations of study on slanting length for animal and distance between femurs and height of udder from the earth. In additions, variations in buffalo management due to climate, feeding practice, availability of land resources and seasonal feed could reflect variations in buffalo production and dimensional traits. So, the present study was conducted in southern area of Iraq, where a majority of buffaloes founded and this area was reached to 62.5% of total Iraqi buffaloes, to assess whether the bodies dimensions are differ or similar with that found in mid and north area of Iraq due to affecting parity and locations.

MATERIALS AND METHODS

Site of study (Source of data)

This study was carried out in the southern region of Iraq at AL-Nasiriyiah governorate (385 km south of Baghdad) to be sample of southern buffalo's community.

Animals

A total of 119 females from four different

areas (1: Souq AL-Shwokh, 2: Qalat Sukar, 3: AL-Jabaush marshes and 4: AL-Aslah area) are randomly chosen over period 11/10/2011 to 16/10/2011 to estimate body dimension characteristics.

Animal husbandry

The animals in four sites were fed according to the farmer knowledge and attitude as well as Body length availability BDL of land resources and seasonal feed, however, based on input and buffaloes management in these locations three main systems feeding practice described:

1. All year-round free-grazing in the land that cropped with green fodder.

2. Feedlot on green cane that bringing from marshes which done basely women.

3. Free-range feeding on swamp and marshes green grass (cane and bardi plant, native mane).

Based on the feeding that imposed in different smallholder owner, body conditions are differing accordingly and clearly evidence that the feeding system may affect on body dimensions and consequently on milk production then after. Group 1 has good body conformations whereas, Group 3 has weak conformation and Group 2 is middle between them. The direct dialogue and question between the researcher team and owners (face to face), we get this information about the feeding systems that owners adopted. Little veterinary care was noticed due lack of official services in these area. The owners depend on their self to maintain animal surviving.

Study parameters

The parameters studied in this study were heart girth (HG), barrel girth (BG), heart depth (HD) barrel depth (BD), body length (BDL), slanting body length (SBDL), height at shoulder (HAS), height at tail attachment (HAT), distance between shoulder (DBS) and femurs (DBF), horn length (HL) and tail length (TL) as shown in Figure (1).

Briefly, the measurements were done on all animals that contributing in this study at 900 to 930 h am after recording animal's age and parity from owners. The measurements were taken using the

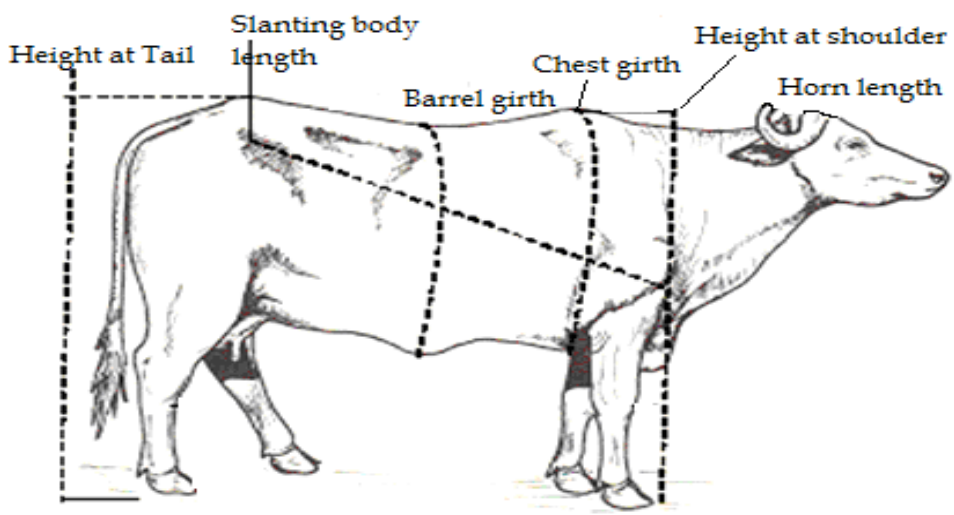

Figure 1. Meansurement of body dimension od Iraqi buffalo.

tailor's tape measure and measuring stick while the animals were on standing location, as previously reported (Baghdasar, 1990). Heart girth (HG) was measured as circumferential measurement taken around the chest behind the front legs and withers, barrel girth (BG) was measurement taken around the abdomen in middle body. Heart depth (HD) was measured as the distance from backbone at the shoulder to the brisket between the front legs. Barrel depth (BD) was measured as the distance from distal dorsal to abdomen end. BDL was measured as the distance from the base of the ear to the base of the tail. Slanting body length (SBDL) was measured as the distance from brisket between the front legs to the rump. Height at shoulder (HAS) been measured as the distance from the base of fetlock to the shoulder. Height at tail attachment (HAT) was measured as the distance from the surface of back fetlock to the base of the tail.

Statistical analysis

Data were subjected to two-way analysis of variance. The following model was used:

$$Yijk = \mu + Pi + Lj + eijk$$

Where, Yijk the individual observation; μ=The overall mean; Pi=The parity effect (i=6); Lj=The location effect (j=4) (1: Souq AL-Shwokh, 2: Qalat Sukar, 3: AL-Jabaush marshes and 4: AL-Aslah area); eijk=The random error associated with experimental unit (NID, σ^2e). Duncan's multiple range tests was used to compare the differences among treatment means. All statistical analysis by General Linear Models (GLM) procedure was carried out by SAS (2001) program.

RESULTS AND DISCUSSION

The owners in this study were chosen as a volunteer to give information about their herds. The owners of buffalo in Iraq followed district feeding practice that depend mainly on owners financial support where some of those able to feed animals on forage and green fodder whereas others depend on free range feeding on Bardi and cane in the marshes area. Owners household had have about fifty heads or lower and little or not veterinary care was noticed due lack of official services in these area.

The overall mean for body dimensions, heart girth (HG), barrel girth (BG), heart depth (HD) barrel depth (BD), body length (BDL) and slanting body length (SBDL) were 215.7, 242.9, 76.7, 72.6, 231.5 and 113.1 cm respectively. The overall mean for each of height at shoulder (HAS), height at tail attachment (HAT), distance between shoulder (DBS) and femurs (DBF), horn length (HL) and tail length (TL) were 146.2, 142.9, 43.0, 55.6, 43.3 and 106.0 cm respectively (Table 1).

Effect of parity

Table (1) summarized the effect of parity on body dimension of Iraqi buffalo. Parity had highly significant ($P<0.01$) effect on all body dimension measurements, except tail length (TL). Results showed gradual increasing in HG, BG, BD and HAS from first calving to the fourth or fifth calving. HG increased from 202.3 to 225.0 cm, BG increased 222.8 to 250.7 cm, BD increased from 70.9 to 79.6 cm, HAS increased from 141.0 to 149.1 cm whereas, BDL and HAT was increased from first calving to the third calving. BDL increased from 214.3 to 238.1 cm and HAT increased from

139.8 to 145.51 cm. SBDL was increased from first calving to sixth calving, from 107.5 to 116.0 cm. However, the most of body dimensions were deleterious during sixth calving onward. These findings are confirmed the results obtained by Al-Jamas (1997) and Baghdasar *et al*. (2011, 2012) for their studies on buffaloes at Baghdad and Mosul governorate. It can be noticed that the body dimensions are increased with age till the six calving where the parameters reduce significantly. The results that obtained on Indian buffalo are similar present results as reported by McDowell (1972).

Effect of location

Location had highly significantly (P<0.01) effect on HAS, HAT, TL and DBF and significant (P<0.05) for BDL and SBDL. Whereas, the other studied traits was not affected by location (Table 1). The greater value of HAS was noticed in site four (AL-Aslah area; 150.8 cm) followed by sites one (Souq AL-Shwokh; 146.3 cm), two (Qalat Sukar, 145.0) and three (AL-Jabaush marshes; 142.4 cm). Furthermore, the greater value of BDL and HAT was recorded in site one (Souq AL-Shwokh, 235.3 and 145.4 cm) respectively, and the lowest value was recorded in site three (AL-Jabaush marshes, 225.1 and 140.4 cm) respectively. These body dimensions revealed that the buffaloes founded in marshes region could be from swamp and marshes buffalo as which found in china other south-east countries. But the Iraqi southern buffalo is similar his counterparts in mid and northern region of Iraq. This result is consistent previous results that obtained by Baghdasar *et al*. (2012). The reason of differences in body dimensions due different locations may due to the management practices (availability of land resources and green fodder, veterinary care and farmer knowledge and attitude). Idris *et al*. (2007) found the Iraqi buffalo respond well to improvement of feeding quality, where, replace the rations that depend on cane, rice hulls and flour mill by product to concentrate diets achieved difference in milk output and body dimensions as well.

The correlation coefficients between the all body dimensions measurements are presented in Table 2. HG was positively significant correlation with BG (r=0.596 P<0.01), HD (r=0.513, P<0.01), BD (r=0.532, P<0.01), BDL (r=0.408, P<0.01), SBDL (r=0.388, P<0.01), HAS (r=0.380 P<0.01), HAT (r=0.27, P<0.05), DBS (r=0.386, P<0.01), DBF (r=0.248, P<0.05) and HL (r=0.435, P<0.01). The significant positive correlation was also noticed between BG and all traits mentioned above with values ranged from 0.278 to 0.632. BDL was also positively correlated with SBDL (r=0.457, P<0.01), HAS (r=0.493, P<0.01), HAT (r=0.422, P<0.01), DBS (r=0.445, P<0.01) and HL (r=0.444, P<0.01). Furthermore, most traits tend to be positive and significant. Positively significant correlation between HG and BG was also reported by Baghdasar (1990); Juma (1997). The dimensional traits could be used as predictable tools to milk production since positive correlation between milk production and HG or BG. Several studies (Asker and El-Itriby, 1956; Manik and Nath, 1981; Saini and Gill, 1987; Baghdasar, 1990) found positive correlation between dimensional body measurements and milk yield.The high positive correlations that obtained from this study may refer to the importance of body dimensional traits as predictable tools to assess 1) whether buffalo belonging to the river or swamp type buffalo, 2) the availability of feed (quality and quantity), 3) select the females that have good body conditions to be parent of next generations.

Table 1. Effect of parity and loctation on body dimensional traits in Iraqi buffaloes (Mean± SEM).

Factors	No.	HG	BG	HD	BD	BDL	SBDL	HAS	HAT	BDS	DBF	HL	TL
Overall mean	119	215.7 ±1.2	242.9 ±1.5	76.7 ±0.5	72.6 ±0.4	231.5 ±1.4	113.1 ±0.5	146.2 ±0.6	142.6 ±0.5	43.0 ±0.4	55.6 ±0.7	43.3 ±0.9	106.0 ± 0.9
Parity													
1st Par.	19	202.3 ±2.3^{c}	222.8 ±2.5^{c}	70.9 ±1.0c	67.6 ±0.8^{c}	214.3 ±5.0^{b}	107.5 ±1.1^{b}	141.0 ±1.2^{c}	139.9 ±1.2^{b}	38.9 ±1.0^{b}	51.0 ±1.3^{b}	33.3 ±1.3^{c}	104.0 ±3.0
2nd Par.	21	213.1 ±2.4^{b}	236.1 ±3.2^{b}	75.3 ±1.1^{b}	71.5 ±1.1^{b}	230.5 ±3.2^{a}	112.6 ±0.8^{a}	144.6 ±1.2^{b}	142.4 ±1.0^{a}	44.0 ±1.3^{a}	55.5± 1.2^{ab}	36.8 ±1.5^{c}	106.9 ±2.6
3rd Par.	19	219.0 ±2.6^{ab}	250.0 ±2.7^{a}	77.2 ±2.5^{ab}	73.8 ±0.8^{ab}	238.1 ±1.4^{a}	115.7 ±1.4^{a}	147.5 ±0.9^{a}	145.5 ±0.8^{a}	44.4 ±7.5^{a}	56.0± 1.6^{ab}	43.1 ±1.3^{b}	108.3 ±2.2
4th Par.	26	218.2 ±1.8^{ab}	250.7 ±3.0^{a}	78.6 ±0.8^{a}	73.5 ±0.7^{ab}	237.8 ±2.0^{a}	115.1 ±1.3^{a}	142.4 ±1.1^{a}	142.4 ±1.1^{a}	43.4 ±0.5^{ab}	55.5 ±16^{ab}	47.1 ±1.5^{ab}	104.0 ±2.0
5th Par.	15	225.0 ±4.5^{a}	249.2 ±3.4^{a}	79.6 ±1.5^{a}	75.7 ±1.4^{a}	236.^{4} ±3.7^{a}	114.7 ±1.2^{a}	144.7 ±1.9^{a}	144.7 ±1.9^{a}	44.4 ±1.1^{a}	55.5 ±1.2^{ab}	48.5 ±2.9^{a}	110.0 ±1.5
≥ 6th Par.	19	218.3 ±2.7^{ab}	247.7 ±2.8^{a}	78.4 ±0.9^{a}	73.6 ±1.1^{ab}	235.1 ±2.8^{a}	116.0 ±1.5^{a}	143.4 ±1.5^{a}	143.4 ±1.5^{a}	42.8 ±0.7^{a}	59.9 ±2.4^{a}	51.5 ±1.6^{a}	104.3 ±2.0
Level of significant		**	**	**	**	**	**	**	**	**	*	**	NS
Lactation													
Souq AL-Shwokh	30	214.6 ±2.3	239.0 ±3.4	75.8 ±1.1	72.7 ±1.0	235.3 ±2.3^{a}	114.1 ±1.3^{a}	146.2 ±0.9^{b}	145.4 ±1.3^{a}	42.9 ±0.8	58.5 ±1.9^{a}	41.9 ±2.0	100.9 ±2.0^{a}
Qalat Sukar	30	219.1 ±2.5	243.6 ±2.2	76.8 ±0.9	73.8 ±0.8	231.7 ±3.8^{b}	112.6 ±1.0^{a}	145.0 ±0.8^{b}	143.8 ±0.7^{ab}	42.8 ±0.6	57.7 ±1.2^{a}	46.0 ±1.8	105.8 ±1.6^{ab}
AL-Jabaush marshe	28	211.6 ±2.4	240.0 ±3.5	76.1 ±0.9	71.5 ±1.0	225.1 ±3.1^{b}	111.3 ±1.1^{b}	142.4 ±1.0^{a}	140.4 ±1.2^{b}	42.8 ±0.6	52.7 ± 1.2^{a}	52.7 ±0.9	106.9 ±1.8^{a}
AL-Aslah area	31	217.4 ±2.4	248.6 ±2.6	78.0 ±0.9	72.2 ±0.6	233.5 ±1.8^{a}	114.2 ±0.9^{a}	150.8 ±1.1^{a}	141.9 ±0.7^{b}	43.9 ±0.9	53.3 ±1.0^{b}	53.3 ±1.0	110.3 ±1.7^{a}
Level of significant		NS	NS	NS	NS	*	*	**	**	NS	**	NS	**

$^{a-d}$ Mean within same column have different superscript differ significantly (P<0.05). [1]All traits are measured in centimeter unit (cm), HG= Heart girth, HD= Heart depth, BDL= Body length, HAS= Height at shoulder, DBS= Distance between shoulder, HL= Horn length, BG= Barrel girth, BD= Barrel depth, SBDL= Slanting body length, HAT= Height at tail attachment, DBF= Distance between femurs, TL= Tail length.

* (P<0.05), ** (P<0.001), NS: Non-significant.

Table 2. Correlation coefficient between parameters in this investigate.

	BG	HD	BD	BDL	SBDL	HAS	HAT	BDS	DBF	HL	TL
HG	0.596**	0.513**	0.532**	0.408**	0.388**	0.380**	0.280*	0.383*	0.248*	0.435**	0.091^{NS}
BG		0.632**	0.504**	0.502**	0.393**	0.480**	0.278**	0.484**	0.221*	0.485**	0.127^{NS}
HD			0.655**	0.531**	0.448**	0.516**	0.360**	0.419**	0.181**	0.582**	0.134^{NS}
BD				0.393**	0.250**	0.360**	0.376**	0.317**	0.191^{NS}	0.430**	0.201*
BDL					0.457**	0.493**	0.422**	0.445**	0.166^{NS}	0.444**	0.096^{NS}
SBDL						0.372**	0.278**	0.341**	0.227*	0.322**	0.022^{NS}
HAS							0.530**	0.245**	0.190^{NS}	0.367**	0.216*
HAT								0.256**	0.358**	0.288**	0.109^{NS}
BDS									0.178^{NS}	0.222^{NS}	0.095^{NS}
DBF										0.159^{NS}	0.038^{NS}
HL											0.044^{NS}

[1]All traits are measured in centimeter unit (cm), HG= Heart girth, HD= Heart depth, BDL= Body length, HAS= Height at shoulder, DBS= Distance between shoulder, HL= Horn length, BG= Barrel girth, BD= Barrel depth, SBDL= Slanting body length, HAT= Height at tail attachment, DBF= Distance between femurs, TL= Tail length.

* ($P<0.05$), ** ($P<0.001$), NS: Non-significant.

CONCLUSION

The low dimensional traits that obtained from this study concise with poor milk production reflect the poor management practices in southern region of Iraq due to many farmers depend mainly on marshes grasses due to lack of pastures. Furthermore, the positive correlation between most dimensional traits and milk production could enhance smallholder buffalo farmers to improve their productivity via improve feeding practice and veterinary care. On the other hand, cytological studies are needed in southern area of Iraq for local buffaloes (like **AL-Nasiryia** governorate) to prove whether its belonging to the river an origin having 50 chromosomes or to swamp buffalo that lives in China and South East Asia countries having 48 chromosomes.

ACKNOWLEDGEMENT

The author gratefully acknowledges the Directorate Animal Resource at Ministry of Agriculture for financial support and provided all facilities that helped authors to collect experimental data.

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