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Body Measurements of Five Types of Sudanese Camel Breed in Gadarif State

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ABSTRACT

Two hundred and eighty head belong to five breed types of Sudanese camel (Bishari, Arabi, Daili, Anafi and Kenani) were randomly selected from Gadarif state. The purpose of this study was to determine the effect of breed types, sex and age group on some body measurements of these animals. Body measurements were taken using metric tape (height at wither, heart girth, barrel girth, neck length, face length, tail length, and body weight). Averages of height at wither, heart girth, barrel girth, neck length, face length, tail length and body weight were 1.85±0.02 m, 2.02±0.02 m, 2.52±0.02 m, 1.13±0.01 m, 58.84±0.28 cm, 68.60±0.42 cm and 512.30±7.84 kg respectively. The results also revealed that body measurements were significantly affected by type of camel and age group. The Kenani camel showed the highest values followed by other breed types. Regarding to the age the camels (8 to 9) years had significantly high values in all body measurements followed by those in (10 to 12) years, while the animals in the first group ≤ 4 years recorded the lowest values. Furthermore, the results showed that the sex of camel significantly affected the heart girth, face length and body weight; and the males had significantly higher ($P< 0.05$) values than those of females.

INTRODUCTION

The last estimation of camels' population in the Sudan was about 4.7million head (MARFR, 2011). Camels in Sudan are concentrated in two main regions; the Eastern region, where camels are found in the Butana plain and the Red Sea hills, and Western regions (Darfur and Kordofan) (Agab, 1993). Phenotypic characterization to assess the existing biodiversity and

differences among the Sudanese camel breed subtypes is necessary prerequisite to facilitate the conservation and utilization program in an effective and meaningful way. In spite of that Sudanese camel breed subtypes are not well classified or defined, with very limited information available (Ishag *et al*., 2010). El-Fadil (1986) mentioned that camels in the Sudan are classified as pack (heavy) and riding (light) types according to the function they perform and probably as a result of selection applied for these traits by the various camel-owning tribes. The Sudanese heavy type constitutes the majority of the camels kept by nomads in Sudan. In this group two types can be identified on the basis of conformation and tribal ownership: The Arab and Rashaidi camels. On the other hand, the riding camels are restricted to the north-east of the country between the Nile and Red Sea. Two main types are recognized, namely Anafi and Red Sea Hills (Bishari) camels.

The purpose of this study was to determine the effect of breed types, sex and age group on some body measurements of the five Sudanese breed types camel.

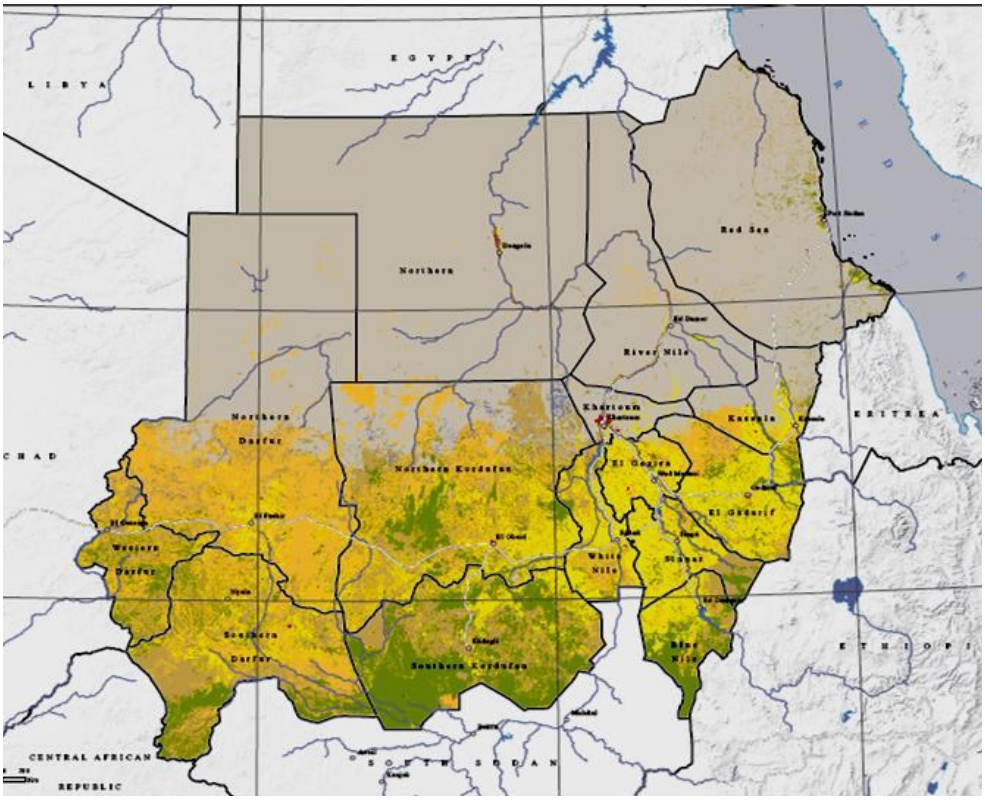

Figure 1: Sudan map showing Camel breeding area in Sudan

MATERIALS AND METHODS

Study area and animals: This study was conducted in Gadarif State, which is located in the eastern part of the Sudan between 33 – 37° E Longitudes and 12 – 16° N Latitudes with an area of approximately 78,000 km^2. It is bounded in the north by Kassala and Khartoum States, in the west by Gezira, in the south by Blue Nile State and shared boundary with Ethiopia from the east.

Two hundred and eighty head of Five types of Sudanese camel were randomly selected from Gadarif state[Bishari (n=40), Arabi (n=50), Daili (n=70),Anafi (n= 60) and Kenani (n=60)] according to, sex (males=108, females=72) and according to six age group ≤3years (n=40), 3-5years (n=40), 6-7years (n=62), 8-9 (n=61), 10-12 (n=47) and ≥12 (n=30).

Data collection: General descriptive information of different breed types of camel were obtained by using questionnaires which filled by direct interviews with camel owners.The questionnaire was designed to obtain information on general characteristics of camel.

Body measurements: Body measurements of different camels types were determined. The following measurements were taken by metric tape. The height at wither was measured from the ground level to the highest point of the wither, but the heart girth was measured immediately behind the breast pad, measuring of barrel girth was taken over the highest part of the hump, while the neck length was taken from the point of the shoulder to the base of the neck, face length was measuredfrom tip of the poll to the muzzle and the tail length was measured from the 1st cocceygial vertebra to the end of tail.Body weights of animals were estimated according to the Boue (1949) formula (P = 53 TAH, Where: P = body weight (kg), T = heart girth or chest (m), A = barrel or abdominal girth (m).H = shoulder height (m))

Statistical analysis: Complete Randomized Design was used to analyze the results obtained from this study and subjected to General Linear model (GLM)followed by Least significant difference test (LSD) using the SPSS 20.0 (2011) computer program, as 5 X 2 X 4 factorial design.

RESULTS AND DISCUSSION

The data in the Table (1) and Figures (1, 2 and3) present the means and standard errors of the body measurements of five Sudanese camel breed types. The results of this study revealed that averages of height at wither, heart girth, barrel girth, neck length, face length, tail length and body weight were 1.85±0.02 m, 2.02±0.02 m, 2.52±0.02 m, 1.13±0.01 m, 58.84±0.28 cm, 68.60±0.42 cm and 512.30±7.84 kg respectively.Except values of heart girth and face length ($P<0.05$) the effect of camel breed types had high significant ($P<0.01$) on the other studied body measurements parameters. Rashaidi camel showed the lowest records in height at wither and tail length while Bishari, Arabi and Anafi camel breed types showed no significant difference ($P>0.05$) in height at wither and tail length. Kenani camel had highly significant ($P<0.01$) in height at wither, barrel girth, neck length, tail length and body weight, these findings agree with Ishag *et al.* (2011). Also Kenani showed the highest value in heart girth (2.14 m) this finding is inline with those of Ishag *et al.,* (2010). Moreover Rashaidi and Bishari ranked second and third record, while Anafi and Arabi breed types showed the lowest value in heart girth 1.97 and 1.94 m respectively and this result is in line with those of Elbashir *et al.* (2011). In barrel girth Bishari and Anafi recorded the lowest measure whereas Rashaidi and Arabi showed higher values.The sex of camel had a significant influence on heart girth ($P<0.01$), face length and body weight ($P<0.05$), while height at wither, barrel girth, neck length and tail length was insignificantly ($P>0.05$) affected by sex.The data also showed male camels had higher body measurements than females, this results are similar to that mentioned by Dioli *et al.* (1992) and Mehari *et al.* (2007), they stated that the male camels is usually taller and heavier weight than the females. The higher values of the measured parameters of male camels might be due to physiological, morphological and activities in the different sexes.The results also showed that the age of camel had high significant ($P<0.01$) effect

on each measured parameters, this finding is somewhat in agreement to those of Ishag et al. (2010) and Elbashir et al. (2011). The studied traits tend to increase from the 1st age group (≤ 3 years) to the 4th age group (8 – 9 years) and then decreased.This means that the camels reach maturity age within 8 to 9 years. Then many different measurement declined this results is inline with those of Ishag *et al.* (2013). The height at wither and body weight were significantly (P<0.01) affected by interaction between breed, sex. Also height at wither, face length, tail length and body weight were significantly (P<0.01) affected by interaction between breed and age while the interaction between sex and age ha insignificant effect on studied animals.

CONCLUSION

Generally this study concludes that the kenani camel is the largest camel breed in Gedarif state. Also it concludes that camels in (8-9 years) showed highest values in body measurements. More studies in the morphological measurements with large number of animals for camels in different sites of Sudan are recommended.

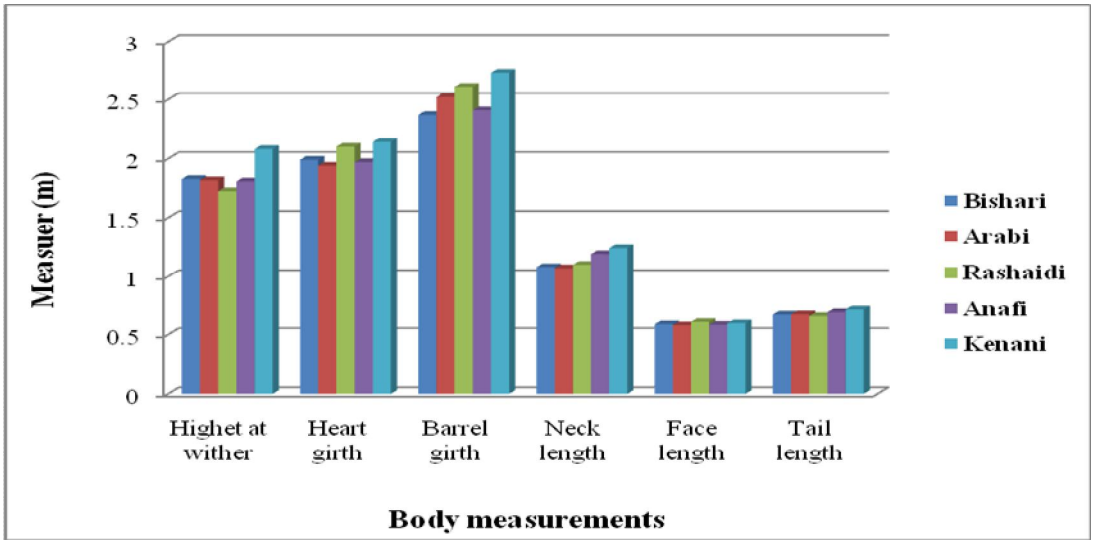

Figure 1: Effect of five Sudanese camel breeds type on some body measurements

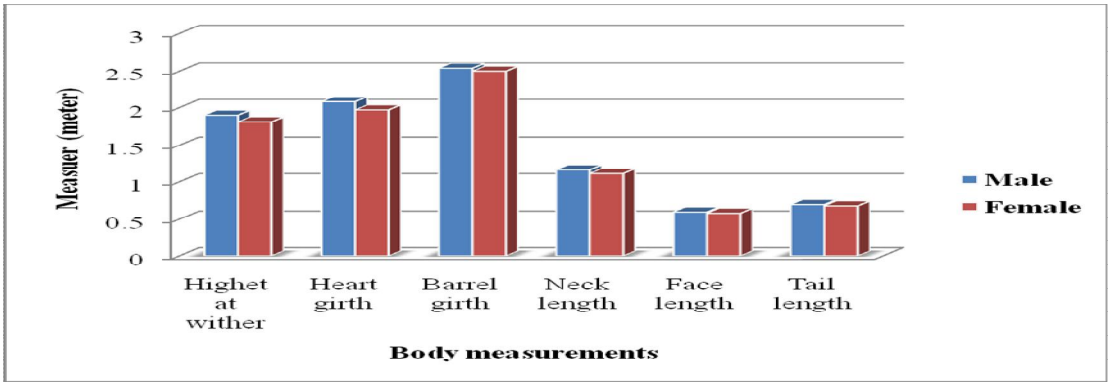

Figure 2: Effect of sex on some body measurements of five Sudanese camel breeds type

Table1: The means and standard errors of height at wither (HW), heart girth (HG),barrel girth (BG),) neck length, (NL), face length (FL), tail length (TL) and body weight (BW) for camel in Gedarif state

Main effect	No.	HW(m)	HG (m)	BG (m)	NL (m)	FL(cm)	TL (cm)	BW (kg)
Breed		**	*	**	**	*	**	**
Bishari	40	1.83±0.04^{b}	1.99±0.04^{b}	2.37±0.06^{c}	1.08±0.03^{bc}	58.58±0.67^{ab}	67.58±1.02^{b}	459.13±18.97^{bc}
Arabi	50	1.82±0.03^{b}	1.94±0.04^{b}	2.52±0.06^{b}	1.07±0.03^{c}	57.74±0.64c^{b}	67.79±0.97^{b}	492.04±18.04^{b}
Rashaidi	70	1.72±0.03^{c}	2.10±0.03^{a}	2.61±0.05^{ab}	1.10±0.03^{bc}	60.58±0.54^{a}	66.26±0.82^{b}	504.85±15.16^{b}
Anafi	60	1.81±0.03^{b}	1.97±0.03^{b}	2.41±0.05^{c}	1.19±0.03^{b}	58.17±0.57^{b}	69.56±0.87^{b}	464.83±16.11^{c}
Kenani	60	2.08±0.04^{a}	2.14±0.04^{a}	2.73±0.06^{a}	1.24±0.03^{a}	59.44±0.66^{a}	71.91±1.01^{a}	658.09±18.70^{a}
Sex		NS	**	NS	NS	*	NS	*
Male	108	1.90±0.03	2.08±0.03	2.54±0.04	1.16±0.02	59.73±0.47	69.54±0.71	541.95±13.28
Female	172	1.81±0.02	1.97±0.02	2.50±0.03	1.11±0.02	58.05±0.32	67.75±0.48	485.68±8.91
Age group		**	**	**	**	**	**	**
≤ 3years	40	1.59±0.02^{d}	1.67±0.03^{d}	2.11±0.04^{d}	1.01±0.04^{b}	52.18±0.86^{c}	60.23±0.96^{d}	301.78±12.74^{d}
3-5yrs	40	1.76±0.03^{c}	1.85±0.05^{c}	2.44±0.06^{c}	1.11±0.02^{a}	58.85±0.44^{b}	67.33±0.72^{c}	423.96±17.39^{c}
6-7yrs	62	1.83±0.03^{bc}	2.02±0.02^{b}	2.53±0.05b^{c}	1.14±0.02^{a}	60.08±0.38^{ab}	68.84±0.70b^{c}	497.40±13.59^{b}
8-9yrs	61	1.90±0.03^{ab}	2.10±0.02^{ab}	2.70±0.03^{a}	1.15±0.02^{a}	60.21±0.33^{a}	71.34±0.64^{a}	554.00±16.02^{a}
10 – 12 yrs	47	1.85±0.03^{bc}	2.09±0.02^{ab}	2.69±0.04^{ab}	1.14±0.02^{a}	60.09±0.45^{ab}	70.49±0.73^{ab}	552.98±15.14^{a}
≥12 yrs	30	1.84±0.05^{bc}	2.05±0.05^{a}	2.64±0.04^{ab}	1.13±0.04^{a}	60.03±0.32^{b}	69.67±0.94^{bc}	550.24±26.58^{a}
Breed X sex		**	NS	NS	NS	NS	NS	**
Breed X Age		**	NS	NS	NS	**	**	**
Sex X Age		NS	NS	NS	NS	NS	NS	NS
Over all		1.85±0.02	2.02±0.02	2.52±0.02	1.13±0.01	58.84±0.28	68.60±0.42	512.30±7.84

Different superscript lettersmeans within the same column are significantly different at (P<0.05)

**: Significance different P<0.01

*: Significance different P<0.05

NS: No significant

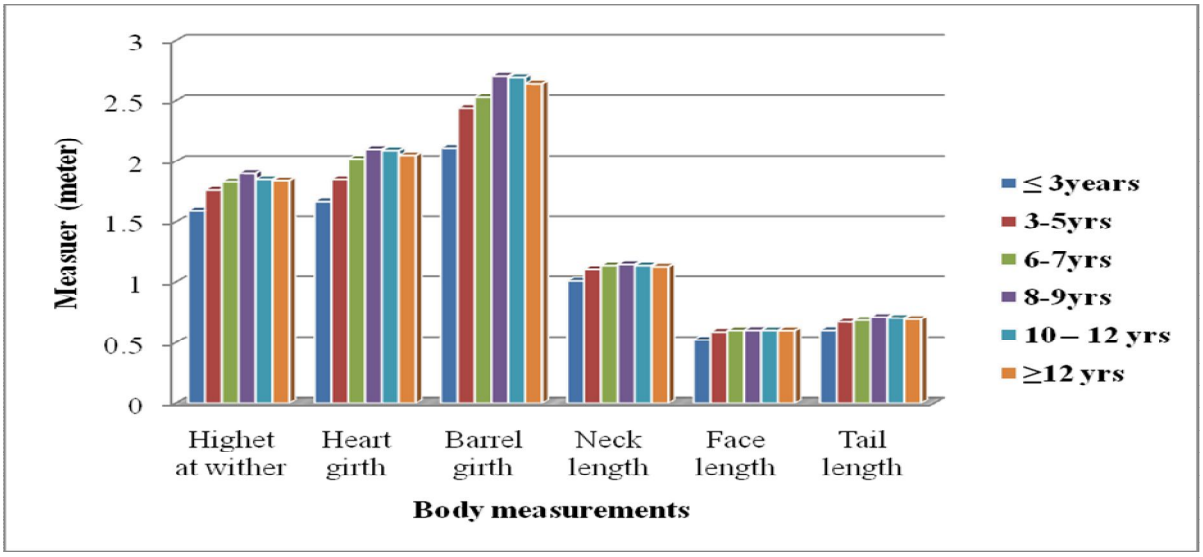

Figure 2: Effect of age group on some body measurements of some Sudanese camel breeds type

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