

Effect of Sex and Age on Body Weight and some Morphometric Measurements of Gazelle Dorcas and Reedbuck in the Sudan

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Received: 5/11/2018

Abstract: The study was conducted on a group of 24 animals belonging to two Sudanese antelope species, 6 males and 6 females from each species, namely Gazelle Dorcas and Bohor Reedbuck. Data on body weight and morphometric measurements were collected from the two species. The main objective was to determine the effects of sex and age on body weight and measurements of the two species. Averages of body weight and morphometric traits of Bohor Reedbuck were larger than the corresponding values of Dorcas, while the opposite was true in the case of horn thickness, as it was larger in the later. Sex had a significant effect on leg length, base and mid horn thickness in Dorcas, while its effect on body weight and measurements of Bohor Reedbuck was not significant. The effect of age on all traits studied was modeled as covariance, and it was significant on body weight, body length, head length, neck length, ear length, horn length, chest girth and leg length in Dorcas and on all traits in Bohor Reedbucks, except rump height, leg length, and horn thickness at base. Least-squares means of body weight, head length, neck length and belly girth of Dorcas females were larger than the corresponding values of males, but the differences were not significant. On the other hand, Dorcas males had slightly larger least-squares means of body length, ear length, tail length, horn length, chest girth, chest height, pelvic height, belly height and hock joint height than their corresponding values of females, but the differences were also not significant. Males also had significantly larger length of hind leg and horn thickness at base and middle than the females. Regarding Bohor Reedbuck, males had slightly larger least-squares means of body weight and morphometric measurements than those of the females, but the differences were not significant. It is concluded that age seems to be an important factor, as it is a significant effect on most of the traits, while sex is not effective as compared. Further study is required on bigger data set.

Keywords: Gazelle Dorcas, Reedbuck, Sudan, morphometrics, sex, age

INTRODUCTION

Deer meat market is an emerging branch in the meat industry. Venison is not as commonly available in meat market as beef, although there is an increasing demand for venison as an alternative source to red meat. Unlike the traditional livestock species, deer is skipped in the intensive breeding system typical of nowadays meat industry. However, deer farming is increasing in popularity. In recent years, there has been a growing interest in establishing deer farming for the purpose of meat production. Some well-known examples are the highly efficient deer farming in New Zealand (mainly red deer, *Cervuselaphus*; Barry and Wilson, 1994; New Zealand Game Industry Board, 2002), the rearing of wapiti (*Cervuselaphus canadensis*) and other species in Canada (Hudson, 2000), the farming of reindeer (*Rangifer tarandus*) in Arctic areas (Kumpula *et al.*, 1998) and the farming of fallow deer (*Dama dama*), in Italy (Salghetti, 1999).

For health reasons, venison has its own advantages. It is a lean meat, high in protein and low in fat. Thus, the assessment of deer for venison production cannot be over emphasized, especially when they are raised for commercial purposes, as the availability of their end product will absolutely depend on their growth performance. Body weight and measurements are the main indicators of growth performance. Similar to livestock species, growth traits can be influenced by genetic and environmental factors (Anderson *et al.*, 1974; Feldhamer *et al.*, 1984; Terada *et al.*, 2012). Previous studies have emphasized the importance of some non-genetic factors on growth performance of different deer species.

Two antelope species, namely Dorcas (*Gazella dorcas*) and Reedbuck (*Redunca redunca*) are found in the Sudan (Ahmed, 2005; Siddig, 2014). The species are not belonging to the same genus. The distribution of both species in the Sudan is restricted to certain areas. Both species may potentially contribute to domestic food security and economic stability. Nonetheless, these wild ungulates remain overlooked as a protein source and no information exists on their production potential and meat quality in the country.

Sex and age are considered main non-genetic factors affecting growth characteristics and yields. The effect of sex and age on deer body weight and measurements was studied by some workers (Clutton-Brock *et al.*, 1982; Hewison *et al.*, 2002; Bokor, 2015). However, data on the effect of sex and age on growth traits of both species in the Sudan are not found in the literature (Ahmed, 2005). Therefore, the main focus of the present research is to determine the effect of sex and age on body weight and some measurements of the two Sudanese antelopes, Dorcas gazelle (*Gazella dorcas*) and Bohor Reedbuck deer (*Redunca redunca*).

MATERIALS AND METHODS

Study was conducted on a group of 24 animals belonging to two antelope species, including 6 males and 6 females from each species, *i.e.* Dorcas and Bohor Reedbuck. Age was determined by dentition (<https://www.wideopenspaces.com/tell-age-deer-pics/>).

Animals belonging to Dorcas gazelle were hunted from Al Sabaloka (Jebel Al-Hassaniya) during the dry season and the experiment was performed from

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April 2018 to July 2018. Al Sabaloka (Jebel AL-Hassaniya) is a game reserve, established in 1946 and is located in the Nile River State about 82 Km north of Khartoum. It is bordered to the north by Jebel Talt, from the south west by Jebel Toubir, and from the west by Sergin and Saramid. The reserve area is about 5528 km². On the other hand, Bohor Reedbucks were hunted from the Dinder National Park (DNP) and the experiment was conducted during the period from December 2017 to March 2018. The Park is located 470 Km south east of Khartoum. It lies on both sides of the Dindir River bounded to the north by the Rahad River. The DNP was established in 1935 in an area of 6960 square kilometers. The area of the DNP was increased to 10291 square kilometers (Nimir and Abdel Hameed, 2002) and it now lies roughly between latitudes 12°-26°N and 12°-42°N and longitudes 34°-48°E and 35°-02°E.

Data on body weight and morphometric measurements were collected from Dorcas gazelle and Bohor Reedbucks during the hunting season. Body weight (BWT) was taken using a hanging scale, to the nearest 0.5 kg. The following body measurements were recorded in centimeter (cm):

- Body length (BL) was measured from the dorsal base of the head to the base of tail.
- Head length (HL) was measured from the tip of the muzzle to in-between the horns.
- Neck length (NL) was measured from behind the mandible to the first rib.
- Ear length (EL) was measured from the base of the ear to its upper tip.
- Tail length (TL) was measured from the base to the tip excluding terminal hair bristles.
- Horn length (HOL) was measured from its base to the tip.
- Horn thickness (HT) was measured at three regions, base, middle and apex.
- Chest girth (CG) was measured as circumference behind the wither and shoulders.
- Belly girth (BG) was measured as circumference at the middle of the belly.
- Chest height (CH) was measured vertically from the chest to the ground.
- Pelvic height (RH) was measured vertically from the rump to the ground.
- Hind leg length (HLG) was measured vertically from the back down to hoof of the hind limb.
- Belly height (BG) from ground was measured from the belly down to the ground.
- Hock joint height (HJH) was measured from the hock joint to the ground.

The height measurements were performed using a graduated measuring stick. The length and circumference measurements were measured with a tape ruler. All measurements were carried out by the same person in order to avoid between-individual variations.

Statistical analysis

Descriptive statistics of the studied traits were calculated using SUMMARY procedure of SAS (2004). The effect of sex and age, used as covariate, on body

weight and measurements were determined using the GLM procedure of SAS (SAS, 2004). In the case of Bohor Reedbuck, the sex effect was removed from the model because horns are present in males only.

RESULTS AND DISCUSSION

Table (1) summarizes the overall means, ranges and standard deviations of body weight and body measurements of Dorcas and Bohor Reedbuck antelopes. Obviously, averages of live body weight and morphometric traits of Bohor Reedbuck were larger than the corresponding values of Dorcas, while the opposite was true in the case of horn thickness, as it was larger in the later.

Mean squares of the effects of sex and age on body weight and some morphometric measurements of Dorcas and Bohor Reedbuck antelopes are presented in Table (2). Sex had a significant effect on leg length, base and mid horn thickness in Dorcas, while its effect on live body weight and measurements of Bohor Reedbuck was not significant. The effect of sex on horn thickness of Bohor Reedbuck was not modeled because the horns are absent in females. The effect of age on all traits studied was modeled as covariance, and it was significant on body weight, body length, head length, neck length, ear length, horn length, chest girth and leg length in Dorcas and on all traits in Bohor Reedbucks, except rump height, leg length, and horn thickness at base. Coefficient of determination (R^2) ranged between 7 and 78 for round and leg length of Dorcas, while the corresponding values in the case of Bohor Reedbucks ranged between 7 and 91 for leg length and body depth, respectively. As observed in Table (2), it seems that age is an important factor for determining horn length and circumference in Bohor Reedbuck males, where a large portion of variation in these traits was explained by it (R^2 values=0.90, 60, 71 and 81 for horn length and horn thickness at base, middle and tip, respectively).

Least squares means and their standard errors (SEM) of body weight and some morphometric measurements of Dorcas and Bohor Reedbuck antelopes as classified by sex are shown in tables 3 and 4, respectively. Obviously, Bohor Reedbucks had larger least-squares means of body weight and the morphometric measurements than those of Dorcas, indicating that animals of Bohor Reedbucks have larger size compared to that of Dorcas.

As shown in Table (3), least-squares means of body weight, head length, neck length and belly girth of Dorcas females were larger than the corresponding values of males, but the differences were not significant. On the other hand, Dorcas males had slightly larger least-squares means of body length, ear length, tail length, horn length, chest girth, chest height, pelvic height, belly height and hock joint height than their corresponding values of females, but the differences were also not significant. Males also had significantly larger length of hind leg and horn thickness at base and middle than the females.

Table (1): Means, ranges and standards deviations (SD) of body weight and some body measurements of Sudanese Dorcas and Reedbuck antelopes

Traits	Dorcas			Reedbuck		
	Mean	Range	SD	Mean	Range	SD
Body weight, kg	12.25	5.50	1.62	46.54	47.00	15.09
Body length, cm	50.17	12.00	3.66	77.00	24.00	6.70
Head length, cm	15.25	9.00	2.56	18.96	6.50	2.12
Neck length, cm	24.17	14.00	4.49	30.67	17.00	5.93
Ear length, cm	14.96	3.50	1.05	15.42	2.00	0.79
Tail length, cm	14.75	6.00	1.86	19.00	5.00	1.95
Horn length, cm*	17.42	12.00	3.60	27.50	36.00	14.39
Chest girth, cm	52.21	14.00	4.60	82.75	40.00	12.63
Belly girth, cm	52.92	17.00	5.11	93.00	46.00	14.54
Chest height, cm	56.17	13.00	3.76	83.00	24.00	6.89
Pelvic height, cm	62.33	9.00	2.77	88.08	18.00	4.64
Belly depth, cm	10.25	21.00	5.64	24.08	19.00	7.30
Hind leg length, cm	27.17	7.00	2.17	36.83	6.00	1.70
Horn thickness:						
base-diameter, mm	19.43	20.60	5.78	3.67	3.60	1.33
mid-diameter, mm	15.97	13.24	4.60	2.63	3.10	1.16
apex- diameter, mm	8.05	18.23	4.98	0.52	0.70	0.25
Belly height, cm	45.92	22.00	6.33	58.92	16.00	4.74
Hock joint height, cm	4.88	4.00	1.35	7.62	2.70	0.76

*Averages of horn length and thickness of reedbuck were calculated from males only, as there are no horns present in the females.

Table (2): Mean squares of the effects of sex and age on body weight and some body measurements of Sudanese Dorcas and Reedbuck antelopes.

Trait	Mean squares							
	Dorcas				Reedbuck			
	Sex	Age	Error	R ² (%)	Sex	Age	Error	R ² (%)
Body weight, kg	0.75	10.75**	0.76	76	67.69	2064.03**	41.45	85
Body length, cm	0.33	78.13*	7.69	53	33.33	351.13**	12.17	78
Head length, cm	0.75	32.00*	4.39	45	1.69	19.53*	3.11	43
Neck length, cm	16.33	91.13*	12.69	48	5.33	338.00**	4.81	89
Ear length, cm	0.02	9.03**	0.35	74	0.08	4.50**	0.26	66
Tail length, cm	6.75	0.50	3.44	19	0.33	18.00*	2.63	44
Horn length, cm ⁺	4.08	78.13**	6.75	58	.	930.25**	26.31	90
Chest girth, cm	2.52	162.00**	7.58	71	52.08	1378.13**	36.00	82
Belly girth, cm	18.75	2.00	29.57	7	48.00	1860.50**	46.17	82
Chest height, cm	16.33	40.50	10.98	37	12.00	338.00**	19.11	67
Pelvic height, cm	16.33	21.13	5.25	44	14.08	50.00	19.20	27
Belly depth, cm	6.75	21.13	35.82	8	4.08	528.13**	6.08	91
Hind leg length, cm	12.00*	28.13**	1.28	78	0.33	2.00	3.26	7
Horn thickness:								
base-diameter, mm	198.37**	17.29	16.83	59	.	5.29	0.89	60
mid-diameter, mm	104.90*	10.28	13.10	49	.	4.84**	0.48	71
apex- diameter, mm	40.85	8.14	24.89	18	.	0.25**	0.01	81
Belly height, cm	2.08	120.13	35.41	28	2.08	21.13 ^{ns}	24.86	9
Hock joint height, cm	4.69	5.28	1.12	50	0.03	3.65**	0.30	57

*Error degrees of freedom equal to 11, except for the horn length and thickness in the case of reedbuck which equal to 5, R² is the coefficient of determination, *significant at P<0.05, **significant at P<0.01

Regarding Bohor Reedbuck, males had slightly larger least-squares means of body weight and morphometric measurements than those of the females, but the differences were not significant (Table 4).

Information on body weight and measurements of Dorcas and Reedbuck or factors affecting these traits

are scarce, or even not found in the literature. It should be noted that both species are not belonging to the same genus, therefore, the discussion herein is focusing on each species separately and it is not intended to compare the results of both species per se.

Table (3): Least-squares means of sex effect and their standard errors (SEM) on body weight and some body measurements of Gazelle Dorcas

Traits	Male	Female	SEM
Body weight, kg	12.00	12.50	0.36
Body length, cm	50.33	50.00	1.13
Head length, cm	15.00	15.50	0.86
Neck length, cm	23.00	25.33	1.45
Ear length, cm	15.00	14.92	0.24
Tail length, cm	15.50	14.00	0.76
Horn length, cm	18.00	16.83	1.06
Chest girth, cm	52.67	51.75	1.12
Belly girth, cm	51.67	54.17	2.22
Chest height, cm	57.33	55.00	1.35
Pelvic height, cm	63.50	61.17	0.94
Belly depth, cm	11.00	9.50	2.44
Hind leg length, cm	28.17 ^a	26.17 ^b	0.46
Horn thickness, mm:			
Base	23.50 ^a	15.36 ^b	1.67
Middle	18.93 ^a	13.01 ^b	1.48
Apex	9.89	6.20	2.04
Belly height, cm	46.33	45.50	2.43
Hock joint height, cm	5.50	4.25	0.43

Means with different superscripts in each row differ significantly at $P < 0.05$

Table (4): Least-squares means of sex effect and their standard errors (SEM) on body weight and some body measurements of Bohor Reedbuck

Traits	Male	Female	SEM
Body weight, kg	48.92	44.17	2.63
Body length, cm	78.67	75.33	1.42
Head length, cm	19.33	18.58	0.72
neck length, cm	31.33	30.00	0.90
ear length, cm	15.50	15.33	0.21
tail length, cm	19.17	18.83	0.66
horn length, cm	27.50	.	2.09
Chest girth, cm	84.83	80.67	2.45
Belly girth, cm	95.00	91.00	2.77
Chest height, cm	84.00	82.00	1.78
Pelvic height, cm	89.17	87.00	1.79
Belly depth, cm	24.67	23.50	1.01
Hind leg length, cm	37.00	36.67	0.74
Horn thickness:			
base-diameter, mm	3.67	.	0.38
mid-diameter, mm	2.63	.	0.28
apex- diameter, mm	0.52	.	0.05
Belly height, cm	59.33	58.50	2.04
Hock joint height, cm	7.57	7.67	0.22

Literature on body weight and measurements of Dorcas is scarce or even not found and the articles found are very old. For example, Brouin (1950) reported a value of 20 kg for body weight of Dorcas raised in Niger. Later in 1974, Oboussier noted that the average value of body weight of Dorcas raised in Chad could reach 19 kg. In general, Yom-Tov *et al.* (1995) reported an average value of body weight equals to 16 kg, ranging between 14.6 to 18.2 kg. In this study the corresponding value was lower than that reported by them; accounting for 12.25 kg, but the range was higher in our study accounting for 5.5 kg.

Also, these authors reported averages of head and body length of *G. dorcas* from Sinai and the Sudan equal to 95.5 cm, ranging between 89.0 and 101.4 cm in males and 95.2 cm, ranging between 88.5 and 101.0 cm in females. They stated that the tail length of Dorcas was about 11-16% of the length of head and body in Sinai, 17.5-17.7% in Niger, and 21.2-21.5% in Chad. These results disagree with the findings of our study where we obtained lower values of head and body length accounting for 15.00 and 15.50 cm for head length and 50.33 and 50.00 for body length of males and females, respectively. Yom-Tov *et al.* (1995) stated that the ear seems to be longer in the Sahara (14.8-17.7% of the head and body length, compared to 14.0-15.8% in Sinai). Generally, the results reported by these authors disagree with our results. The disagreement may be attributed to the different geographic areas under which the subspecies of Gazelle Dorcas are raised, according to Yom-Tov *et al.* (1995).

Groves (1981) stated that the horn length of females Dorcas averages about 62% of that of males in Somalia, but nearly 80% in the Sahara. According to Yom-Tov *et al.* (1995), the horns of Dorcas vary from 20.1 to 26.6 cm depending on the geographical region in which the animal is living. These figures are lower than those reported in the present study. In our study horn length was 18.00 and 16.83 cm for males and females, respectively, and the average horn length of females is about 93% of the average of horn length of males. These results are in disagreement with what observed by Groves (1981) and Yom-Tov *et al.* (1995).

Another species belonging to the same genus is *Gazella subgutturosa*. Working on this species, Groves and Harrison (1967) reported means body weights of female and male to be 23.2 kg (17.5–33.2) and 27.4 kg (22.0–33.8), respectively. Heptner *et al.* (1988) reported body weights of female and male ranging between 18 and 33 kg and between 20 and 43 kg in both sexes, respectively. However, body weights of gazelles raised in Turkey were 8-12 kg for females and 18 kg for males as reported by Demirsoy (2003). Recently, Gürler *et al.* (2015) have studied body weight and some morphological characteristics of gazelle (*Gazella subgutturosa*) in Turkey. They reported statistically significant higher values for body weight and measurements in adult males than females, except ear and tail lengths. Body weight averages were 13.86 and 19.39 kg for females and males, respectively and the difference was significant. They also reported average

values of chest circumference, ear length, neck circumference, head length and tail length for males equal to 63.19, 14.06, 28.08, 22.69 and 19.54 cm, while those of females were 59.50, 13.86, 23.42, 21.67 and 18.75 cm. Mean horn length of adult males was 34.89cm; ranging between 28.5 to 46.0 cm. In their study, significant differences between young females and males for body weight and chest circumference were observed, while differences for other traits including ear length, tail length and horn length were in favor of males but not statistically significant. These results are higher than the findings reported in our study. The disagreement may be due to the size of *Gazella subgutturosa* that has been reported to be larger and heavier than *G. dorcas* and *G. gazelle* (Güldenstaedt, 1780; IUCN, 1998).

Gazella subgutturosa Marica is another species from the same genus of Gazelle. In Saudi Arabia, Cunningham *et al.* (2011) estimated body weight of female and male *Gazella subgutturosa* Marica equal to 16.6 kg and 19.5 kg, respectively. Approximately equal values were reported by Wronski *et al.* (2010) for body weights of female and male *G. s. marica* accounting for 17.4 kg (11–24 kg) and 19.6 kg (15–28kg), respectively. Marked morphological differences between *G. subgutturosa* populations raised in eastern and western regions in Iran reported by Karami *et al.* (2002). These findings mentioned previously indicate considerable variation in body weight and body measurements between species of the genus *Gazelle*, as well as between the sub-species belonging to the same species, depending on the distribution areas in which of the subspecies populations are living. When the values of body weight and other body measurements were considered together, the results suggest that the *Gazella dorcas* had smaller body size than both *G. marica* and *G. subgutturosa*, as the values of our findings were lower than those reported in the literature for *G. marica* and *G. subgutturosa*. In the present study, differences for body weights between sexes were not statistically significant. These results were not in accordance with those of Kings Wood and Blank (1996) and Cunningham *et al.* (2011), who reported the presence of sexual size dimorphism in gazelles. Blank *et al.* (2012) reported sexual dimorphism for body size such that males had a body size larger than females by up to 30%. Wronski *et al.* (2010) stated that significant differences existed between sexes for BW in *G. s. marica*, *G. gazelle*, and two different phenotypes of *G. dorcas*. The authors reported that BW, NC, and SH of females were 88%, 76% and 95% of those of males in *G. s. marica*, respectively. In accordance with the results of Wronski *et al.* (2010), the BW, NC and SH of adult females were 71%, 83% and 88% of those of adult males, and a marked sexual dimorphism also exists in gazelles examined in the present study. In the present study no significant differences were observed between sexes for body weights or morphometric measurements (Table 2). On the other hand, age was observed to be an important factor affecting body weight and some measurements including BL, HL, NL, EL, HOL, CH and HLG (Table 2).

Mean horn lengths of adult male *G. subgutturosa* have been reported by different researchers, to be 30.0-41.3 cm (Groves and Harrison, 1967; Kings wood and Blank, 1996; Karami *et al.*, 2002), while those of *G. s. marica* have been reported as 29.05-33.4 cm (Wronski *et al.*, 2010; Cunningham *et al.*, 2011; Cunningham and Wronski, 2011) depending on the population considered. Therefore, the mean horn length measured in this study (34.89 cm) was within the range of values reported in the literature for both *G. s. subgutturosa* and *G. s. marica*.

The smaller body sizes of the gazelles might also be due to unsuitable feeding in captivity (Schulz *et al.*, 2013).

Turning to Bohor Reedbuck, Abdel Hameed (1985) reported that body weight of Sudanese Reedbuck (*R. redunca*) could vary between 36 and 80 kg, a range which is approximately equal to the range observed in this study (47.00 kg) in Table (1). Nowak (1999) reported averages of head and body lengths equal to 110 to 160 centimeters, and these values are considerably larger than the findings obtained in this study for both traits in Reedbucks. The results found in the literature for the horn length varied between 20 to 41 cm, and the tail length ranged between 15 to 44 cm, as reported by Robert and Burton (1986); Abdel Hameed (1985); Nowak (1999) and Newell (1999). Later, Ahmed (2005) reported body length ranged between 104-114 cm for males and 80-110 cm in females. The horn length ranged between 28-35 cm, the girth ranged between 25-35 cm in males and 24-27 cm in females. The ear length was between 13-17.5 cm in the males and 13-15 cm females. The body weight was 37-58 kg in males, and 19-35 kg. The females were smaller than the males in length and in body weight.

Bokor (2015) found that the effect of sex on the body parameters (body weight, girth, hip width, head length and head width) in farmed red deer was significant ($P < 0.05$). Her results are in disagreement with the results of our study, where the differences between sexes were not significant. The physical and morphological characteristics of red-fronted gazelles (*Gazella rufifrons kanuri* Gray 1846) were determined by Nchanji and Amubode (2002), including body weight, body length, ear length, head length, horn length, hip height, shoulder height and tail length. Mean body weight of red-fronted gazelles ranged from 7.8 kg for the young to 29.7 kg for the adult, while shoulder height varied from 38.7 cm in the young to 68.7 cm in the adult. Irrespective of age and sex, the shoulder height was lower than hip height by a fixed ratio of c. 1.04. The relationship between body weight and body length and horn length were significantly ($P < 0.05$, $r = 0.8$) positively correlated. Wura (2003) stated that Dorcas gazelle is one of the smallest of all gazelles. The height at shoulder is only 53-76 cm: Body length: 90-110 cm. Tail length: 15-20 cm. Weight: 15-20 kg. The horns of the females are smaller, thinner, shorter, rounder, more upright, more slender and straighter, with few and weak ridges and length of 15-25 cm. In males horns grow up to 15-38.4 cm.

CONCLUSION

In this study, the effect of sex and age on live body weight and some morphological measurements were determined. The results indicated that sex has no effect on most of the traits studied, while age was considered an important factor.

Further studies are required based on larger set of data are required

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تأثير الجنس والعمر علي وزن الجسم وبعض مقاييس الجسم لغزال الدوركاس و غزال البشمات في السودان

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أجريت هذه الدراسة في السودان علي بعض سلالات الغزال السوداني لمعرفة تأثير الجنس والعمر علي وزن الحيوان وبعض مقاييس الجسم. تم اختيار عدد ١٢ غزال من سلالة الدوركاس (*Gazelle dorcas*) و ١٢ غزال من سلالة البشمات (*Redunca redunca*) Bohor Reedbuck، ٦ ذكور و ٦ إناث من كل سلالة. وجمعت بيانات علي وزن الجسم ومقاييس الجسم بغرض معرفة تأثير الجنس والعمر علي وزن الجسم ومقاييسه. كان متوسط وزن الجسم والصفات المورفومترية من Bohor Reedbuck أكبر من القيم المقابلة لها في سلالة Dorcas، بينما العكس كان ظاهراً في حالة سمك القرن، حيث كان أكبر في الدوركاس عن البشمات. كان للجنس تأثير كبير علي طول الأرجل الخلفية وسماكة قاعدة ومنصف القرن في الدوركاس ($P < 0.05$)، في حين لم يكن تأثيره علي وزن وقياسات الجسم في سلالة Bohor Reedbuck معنوياً. تم دراسة تأثير العمر علي جميع الصفات التي تم دراستها في صورة عامل تغاير، وكان تأثيره معنوياً علي وزن الجسم، طول الجسم، طول الرأس، طول الرقبة، طول الأذن، طول القرن، وعمق الصدر وطول الساق في الدوركاس وعلي جميع الصفات في Bohor Reedbucks، باستثناء ارتفاع الكفل، طول الأرجل الخلفية، وسمك القرن عند القاعدة. كان متوسط وزن الجسم وطول الرأس وطول الرقبة ومحيط البطن في إناث الدوركاس أكبر من القيم المقابلة للذكور، ولكن الاختلافات لم تكن معنوية. من ناحية أخرى، تفوقت ذكور الدوركاس في طول الجسم وطول الأذن وطول الذيل وطول القرن ومحيط الصدر وارتفاع الصدر وارتفاع الحوض وارتفاع البطن وارتفاع عظمة العرقوب عن الإناث، بدون فروق معنوية. كما تفوقت الذكور أيضاً في طول الساق الخلفية وسماكة القرن عند القاعدة والمنتصف عن الإناث. فيما يتعلق بسلالة Bohor Reedbuck، كان وزن الجسم والقياسات المورفومترية أكبر في الذكور مقارنة بمثيلتها في الإناث، ولكن الاختلافات لم تكن معنوية. ونستنتج من هذه الدراسة أن العمر قد يكون عامل هام في تأثيره علي صفات الجسم مقارنة بتأثير الجنس، إلا أننا نحتاج لدراسات أخرى علي عدد أكبر من البيانات.