Effects of age at fattening on male Butana camels performance and some blood parameters in the Sudan

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ABSTRACT

Twelve male Butana camels at 2,3 and 4 years old (four in each age group) were fattened for two month in Gadarif, Gadarif State, Sudan to study the effects of age at fattening on animals performance and some haematological factors. They were weighed at the beginning of the experiment and then weekly. Each animal was fed sorghum stover *ad lib* in two equal meals in the morning and afternoon and 2.0 kg concentrates daily. Clean drinking water was offered *ad lib*. Feeds DM digestibility was measured for seven days in the last week of the experiment. Jugular vein blood samples were collected for determination of some blood parameters. Daily sorghum stover DMI, TDMI and water intake (litres/day) increased with age at fattening and were higher at 4 years old. Dry matter digestibility increased with age at fattening and was highest at 4 years old. Initial and final body weights and mean daily and weekly weight gains increased with age at fattening. Total weight gain increased up to 3 years and then decreased and was affected with age, except between 2 and 4 years old. Feed conversion ratio was highest at 4 years old. Leucocytes count increased with age at fattening and varied between 2 and 4 years old. Red blood cells count, haemoglobin and packed cell volume increased up to three years old and then decreased. Red blood cells count and haemoglobin varied between 2 and 3 years old.

INTRODUCTION

Camels are important in the Sudan due to adaptation to harsh environments, high population (4.6 million) and socioeconomic impacts (FAO, 2009). They are mainly reared in the Butana plain and Red Sea coast in eastern Sudan forming about 25% of camels in the country in the former (Darosa, 2005). Camels are important meat producers in arid and semi-arid zones where it is difficult to rear other meat producing animals. Camel meat has high nutritive value and polyunsaturated fatty acids and low fat and cholesterol (Dawood and Al-Alkanhal, 1995) and medicinal value. Sudan camel meat production increased from 1.275 million tons in 1996 to 1.624 million tons in 2002 (Idriss, 2003). However, camel meat consumption and exports are very low compared to their population. Endogenous consumption was low because it is the least preferred meat, consumed in certain areas and is not promoted. In addition, camels are generally slaughtered at old ages and hence reduced meat quality.

Nutrition is one of the main constraints for camel production in the Sudan, as camels are mainly reared in traditional systems based on rangeland which generally deteriorated due to many factors (Hamed, 2007). Camels in the Butana area are important for improving camel meat production. However, there is no information on appropriate age at fattening and effects of age at fattening on animals performance and blood parameters which may predict performance. Therefore, this study was conducted to furnish this vital information for improving camel meat production.

MATERIALS AND METHODS

The experiment was conducted in the premises of the Animal Production Research Station in Gadarif, Gadarif State, Sudan. Gadarif State is situated between latitudes 12◦-40 and 15◦ -45 N and longitudes 33◦-45 and 36◦- 45 E. Autumn is from July to October and annual rainfall is 602 mm. Average maximum temperature is 40.7 º in April.

Animals

Twelve male Butana camels were bought from Gadarif livestock market at 2,3 and 4 years old (four in each age group) and reared in the Animal Production Research Station. They were housed in individual pens constructed from heavy steel rails with feed and water troughs. They were vaccinated against prevalent diseases and injected with Ivomet against external and internal parasites. They were weighed and allocated at random to the pens. They were weighed at the beginning of the experiment and then weekly to the end of the experiment.

Feeds

Each animal was fed sorghum stover *ad lib* in two equal meals at 8.00 am and 4.00 pm and the refusals were collected before the morning meal, weighed, sampled and stored for laboratory analysis. Each animal was also offered daily 2.0 kg concentrates. The ingredients of the concentrates were sorghum grain (50%), wheat bran (40%), groundnut cake (8%), oyster shell (1%) and salt (1%). The calculated CP and ME were 17% and 11 MJ/Kg DM.

. Clean drinking water was provided *ad lib*. The animals were fed the diets for a two weeks preliminary period before the experiment commenced and then fattened for two month.

Parameters studied

The parameters studied were feeds and water intakes, initial and final body weight, weight gain, feeds apparent digestibility and some haematological parameters.

Dry matter intake

It was measured daily for each animal as shown before.

Water intake

Water intake was measured in the first three weeks of the experiment. The offered and remained water in troughs were measured for each animal and daily water intake was calculated by difference.

Live weight gain

Camels were weighed in the morning before the morning meal using a 1000kg capacity weighing bridge. Initial, weekly and final body weights were measured.

Apparent digestibility

A digestibility trial was conducted for seven days in the last week of the experiment. Faeces were collected for each animal, weighed and representative 10% samples were taken for DM determination.

Blood sampling and analysis:

Blood samples were collected weekly in the 3rd, 4th and 5th weeks in the experiment from the jugular vein into a vacutainer containing disodium ethylene diamine tetra acetic acid as an anticoagulant. The blood samples were used for determinations of erythrocytes count, packed cell volume (PCV), haemoglobin concentration (Hb) and total leukocytes count.

Calculations

Daily feed intake was calculated for each animal as the difference between the offered feed and refusals on DM basis. Dry matter intake (DMI) was calculated as g/kg live weight (LW), g/kg metabolic weight ($W^{0.75}$), % BW (body weight) and % $W^{0.75}$. Daily and mean weight gain and feed conversion ratio (DMI/daily gain) were calculated.

Daily DMI and faecal DM were calculated for each animal. Dry matter digestibility was calculated from the following equation:

$$\frac{\text{DMI- faecal DM}}{\text{DMI}} \times 100$$

Laboratory analysis

Feed and faecal samples DM was determined in triplicates by drying in an oven at 100° c for 24 hrs. Blood parameters were determined using the standard methods (Walker *et al.*, 1990) .

RESULTS

Dry matter intake, water intake and digestibility

Table 1 shows DMI, water intake and DM digestibility in male Butana camels fattened at different ages. Daily sorghum stover DMI and TDMI increased with the age at fattening and were higher at 4 years old than at 2 years old. Mean stover and total dry matter intakes (kg/day) were 3.92-5.25 and 5.75- 7.05, respectively. Total DMI as g/kg LW, g/kg$W^{0.75}$ and %LW generally decreased with age at fattening and were higher at 2 years old.

Mean daily water intake (litres/day) increased with age at fattening and was higher at 4 years old. Water intake calculated on other bases generally decreased with the age at fattening. Dry matter digestibility increased with age at fattening and was highest at 4 years old.

Table 1: Effects of age at fattening on dry matter intake, water intake and dry matter digestibility in male Butana camels in Gadarif , Sudan

Parameters		Age (Years)		
Sorghum stover DMI (kg/day)		03.92	04.55	0.525
Total DMI kg/day	g/kg LW	05.75	06.35	07.05
	g/kg $W^{0.75}$	24.80	19.97	20.05
	%LW	02.45	01.97	01.95
Water intake: Liter's/day				
	Liters/Kg DMI	05.29	05.024	05.31
	%LW	13.15	10.32	10.60
	Liters kg/ LW	0.1315	0.1050	0.1065
DM digestibility		66.63	68.03	74.68

DM= Dry matter Intake, LW= Live body weight.

Camels performance

The effects of age at fattening on male Butana camels performance are shown in Table 2. Initial and final body weights, mean daily weight gain increased with age at fattening. Total weight gain increased up to 3 years old, decreased at 4 years old and varied between ages, except between 2 and 4 years old. Mean weekly weight gain generally increased with the age at fattening and was similar at 3 and 4 years old. Feed conversion ratio decreased at 3 years old and then increased.

Table 2: Mean weight gain and feed conversion ratio in male Butana camels at different ages in Gadarif State Sudan

Parameters	Age (Years)		
Initial body weight (kg)	207	287.5	324.5
Final body weight (kg)	233.0	318.5	352.5
Total weight (kg)	26.00	31.00	28.00
Daily weight gain (g)	563.5	627.0	628.5
Weely weight gain (kg)	03.94	04.39	4.39
FCR (kg DMI/kg body weight gain)	10.31	010.24	11.34

FCR= Feed conversion ratio

Haematological parameters

Table 3 shows the effects of age at fattening on some haematological parameters in male Butana camels. Leucocytes count increased with the age at fattening and varied between 2 and 4 years old. Red blood cells count, haemoglobin and packed cell volume increased up to three years old and then decreased. Red blood cells count and haemoglobin were different between 2 and 3 years old. Age had no effect (P> 0.05) on PCV.

Table 3: Some hematological parameters in male Butana camels fattened at different ages in Gadarif State, Sudan

Parameters	Age (Years)		
Erythrocytes count (× 10^3/ml)	04.35	05.29	04.79
Leukocytes count ((× 10^6/ml)	10.73	12.56	15.06
Hemoglobin (g/d1)	07.15	08.57	08.01
Packed cell volume (%)	17.77	55.27	51.63

DISCUSSION

Dry matter intake

The increased daily sorghum stover DMI and TDMI in camels with age at fattening were mainly due to increased initial and final BW and alimentary tract and gut content weight (Elimam, personal communication). Mean sorghum stover DMI in male Butana camels was within the range for poor chopped hay in stall fed camels (Maloiy, 1972) and higher than in 16 month old camels (Abdouli and Kraiem, 1990). Total DMI at 2 years old was similar to that reported by Turki *et al*. (2007) and lower than that found in camels (Eltahir *et al.*, 2011; Nasr Sayed and Fathy, 2010). The variations among workers in DMI were mainly due to variations in age, BW, feeds, environments and breeds.

Water intake

The increased mean daily water intake (litres) with the age at fattening was mainly due to the reasons stated for DMI. Daily water intake was within the range for Libyan camels (Hermas, 1990) and higher than in Saudi (Basmaeil *et al.*, 2012) and Omani (Mahgoub *et al*., 2012) camels. The variations among authors in water intake may be genetical and/ or due to variations in physiological adaptation, feeds, feeding levels, ambient temperatures, management and age.

Dry matter digestibility

Dry matter digestibility in male Butana camels was within the range (Mohamed *et al.*, 2009) and higher than in camels (Maloiy, 1972; Nasr Sayed and Fathy, 2010). The variations among authors in DM digestibility could be due to variations in breeds, feeds, feeding level, age, physiological stages, environments and management.

Camels performance

The increased initial and final BW with age in male Butana camels was due to increased BW and proportional growth. The increased final BW with age was also found by Nasr Sayed and Fathy (2010). Male Butana camel initial and final body weights were lower than that reported by

Nasr Sayed and Fathy (2010). The variations in weight among authors were mainly due to breeds, age, nutrition and management.

Weight gain

The increased mean daily weight gain and generally increased mean weekly weight gain with age at fattening were mainly due to increased initial and final BW and feed intake with age at fattening. The increased final weight and weight gain with age reflected increased nutrients requirements and DMI with age at fattening. The increased total weight gain up to 3 years old was mainly due to increased initial and final body weights and was similar to that reported by Tandon *et al.* (1988). Male Butana camels daily weight gain was within the range for Sudanese (Eltahir *et al*., 2011) and

Saudi (Mutairi, 2009) camels. Male Butana camels daily weight gain at 3 years old was higher than in animals at 0-1 and 10-11 years old (Tandon *et al.*,1988). It was higher than in pastures and within the range in controlled conditions (Field, 1984). It was higher than in camels fed concentrates pellets with roughages (Bakkar *et al.*,1999). It was lower than in camels at 2 years old (Turki *et al*., 2007) and 7-8 years old (Tandon *et al.*, 1988) and in camels fed concentrates and roughages (Bakkar *et al.*, 1999).The variations in daily weight gain among authors could be due to many factors including age, breeds or subtypes, feeds, feed composition, feeding levels, environments and management.

Feed conversion ratio

The least feed conversion ratio at 3 years old showed that camels were more efficient at this age with increased total weight gain up to 3 years old. Male Butana camels feed conversion ratio was close to that in Sudan

(El-Badawi and Yacout, 1999). It was lower than that reported by Eltahir *et al*. (2011) and higher than that reported in camels (Turki *et al*., 2007; Nasr Sayed and Fathy (2010).

Haematological paramers:

Total leucocytes and Hb in male Butana camels were similar to that reported by McGrane and Kenyon (1984). Total erythrocytes were lower than that reported in camels (McGrane and Kenyon, 1984; Higgins and Cock, 1986). Packed cell volume was higher than that recorded by Higgins and Cock (1986). The results highlighted the scarcity in camel haematological data and the need to link it to camel performance.

CONCLUSIONS

Daily sorghum stover DMI, TDMI, water intake (litres/day), DM digestibility, initial and final BW, mean daily and weekly weight gain increased with the age at fattening. Total weight gain increased up to 3 years and decreased at 4 years old. Feed conversion ratio was least at 3 years old. Leucocytes count increased with age at fattening and red blood cells count, Hb and PCV increased up to three years old and then decreased.

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أثر العمر عند التسمين على الأداء وبعض صفات الدم في ذكور ابل البطانة في السودان

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الخلاصة

تم تسمين 12 من ذكور أبل البطانة بأعمار 2، 3 و4 سنوات(أربعة في كل مجموعة عمرية) لمدة شهرين في القضارف بولاية القضارف في السودان لدراسة أثر عمر التسمين على الأداء وبعض صفات الدم. وزنت الحيوانات عند بدء التجربة ثم أسبوعياً. أعلف كل حيوان يومياً تبن الذرة الرفيعة حسب الرغبة في وجبتين متساويتين صباحاً وبعد الظهر و2 كجم عليقة مركزة وقدم ماء نظيفاً حسب الرغبة. نم فياس هضمية المادة الجافة لمدة سبعة أيام في الأسبوع الأخير للتجربة. جمعت عينات دم من الوريد الودايجي لقياس بعض مكونات الدم.. زاد التبن المأكول والعلف الكلي المأكول وماء الشرب (لتر) يومياً بزيادة عمر التسمين وكانت أعلى بعمر 4 سنوات. زادت هضمية المادة الجافة بزيادة عمر التسمين وكانت اعلى بعمر4 سنوات. زاد الوزن المبدئي والنهائي ومتوسط الوزن المكتسب اليومي والاسبوعي بزيادة عمر التسمين وكانت أقل بعمر عامين. زاد الوزن المكتسب الكلي حتى عمر 3 سنوات ثم انخفض وتأثر بالعمر. إلا بين عامين وأربعة أعوام. كانت كفاءة تحويل العلف أعلى بعمر 4 سنوات. زاد عدد كريات الدم البيضاء بعمر التسمين واختلف بين عمر عامين وأربعة اعوام. زاد عدد كريات الدم الحمراء والهمقلوبين وحجم الخلايا المضغوطة حتى عمر3 سنوات ثم انخفض. تباين عدد كريات الدم الحمراء والهمقلوبين بين عمر عامين وثلاثة أعوام.