

PRODUCTIVE PERFORMANCE OF FATTENING SUDANESE CAMEL CALVES UNDER DIFFERENT FEEDING REGIMES

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ABSTRACT

In a fattening experiment lasted 120 day ,fifteen Sudanese camel calves (*Camelus dromedaries*) averaged 245 Kg live body weight (LBW) and aged 2-3 years were randomly divided into three similar groups to study the effect of some different feeding regimes on their productive performance. Animals were fed individually on concentrate feed mixture (CFM) at 2, 1.5 and 1% of LBW for groups 1, 2 and 3, respectively. Treated rice straw (TRS) with urea (5%) and molasses (10%) was offered *ad lib.* for all animals to decrease the feeding cost. Feed intake and live body weight were recorded weekly then daily weight gain and feed to gain ratio were calculated. At the end of the experimental period, three animals from each group were used in digestion trail to evaluate nutrients digestibility, nutritive value and nitrogen balance.

The obtained results could be summarized as follows: 1) There were significant decrease in nutrients digestibility and nutritive value (as TDN and DCP) and slight improvement in nitrogen balance was observed for camels fed R2 and R3 compared with R1. 2) There were significant decrease in both concentrate feed mixture (CFM) and total dry matter intake (TDMI) was noticed for camels fed R2 and R3 compared with R1, while, roughage intake (treated rice straw) was increased significantly in R2 and R3. On the other hand, roughage: concentrate ratios were 25:75, 33:67 and 49:51 for R1, R2 and R3, respectively. 3) There were insignificant differences in both daily gain and feed conversion (kg DMI/ kg gain) among the three tested groups, being 668, 635 and 577 g for daily gain and 9.13, 9.18 and 9.10 for feed conversion, respectively. 4) There was a decrease in feed cost, LE/ kg gain and an increase in economical efficiency were recorded for camels fed R2 and R3 compared with R1.

Conclusively, fattening Sudanese camel calves could be fed on concentrate feed mixture at 1% of live body weight plus treated rice straw with urea (5%) and molasses (10%) *ad lib.* with an improvement on productive performance and economical efficiency.

Keywords: Treated rice straw, digestibilities, performance, camel.

INTRODUCTION

Camel is the most predominate animal in arid zones and dry lands where other domestic animals can hardly survive. There are about 19 million camels in the world, of which 15million are found in Africa and Arab countries (FAO, 2004). Knoess, 1976, stated that camels offer considerable scoop for meat production in areas that would be too difficult for other species of domestic animals. Several studies concluded that the maintenance requirements of camels from energy and protein are less than other ruminants under drought conditions, which Egypt be could be involved. Moreover, its ability to decrease feed intake and metabolic rate (Wardeh and Farid, 1990; Gihad and El-Bedawi, 1992; Guerouali and Filali, 1992; Farid, 1995; El-Badawi and Yacout 1999; Hazem *et al.*, 2003 and Safinaz *et al.*,

2007). Yacout and El-Badawi, 2001 reported that camels preferred to eat concentrates as the first choice whenever it was available. Furthermore, Rutagwanda *et al.*, 1990 reported that camels are superior than the other species in selecting a better quality of plants and feeds. However, Holler *et al.*, 1986 and Lechner and Von Engelhardt, 1989 noted that camels are able to consume and utilize poor quality forages if they are forced to be fed exclusively on it. Average daily gain of camels ranges from 185 to 810 g when fed DM at 1.6 – 3.8% of body weight (Kamoun *et al.*, 1989, Wilson, 1992; El-Badawi and Yacout, 1999; Fay and El-Komi, 1999; Hazem *et al.*, 2003; Farghaly *et al.*, 2004 and Safinaz *et al.*, 2007). Treatment of straw with urea which subsequently hydrolyzed to ammonia has been investigated by many researches (Haque *et al.*, 1983; Doyle, 1984; Farghaly *et al.*, 2003 and El-Gendy *et al.*, 2008) and it has been found that urea serves as a good preservative for treatment of straw besides improving its nutritive value. It's known that sugarcane molasses consider a carbohydrate source for urea utilization by ruminants and improving the palatability (White *et al.*, 1973; Church and Santos, 1981 and Brown *et al.*, 1987).

The present study aims to compare among three different feeding regimes on productive performance and economical efficiency of fattening Sudanese camel calves.

MATERIALS AND METHODS

The present study was carried out at the Experiments Station of Animal Production Department, Faculty of Agriculture, Cairo University, Giza, Egypt.

Fattening experiment lasted 120 days using fifteen Sudanese camel calves averaged 245 kg live body weight (LBW) and aged 2-3 years. Animals were randomly divided into three similar groups to study the effect of some different feeding regimes on productive performance of Sudanese camel calves. Animals were fed individually on concentrate feed mixture at 2, 1.5 and 1% of LBW for groups 1, 2 and 3, respectively. While treated rice straw (sprayed by 5% urea and 10% molasses with 50% moisture and incubated for 4 weeks) was offered *ad lib*. Fresh drinking water was available freely.

Daily feed intake, daily body weight gain, feed conversion (g DMI, TDNI or DCPI/g weight gain) and economical efficiency were calculated. At the end of the feeding trial, three animals of each group were used in digestion trial for determining nutrients digestibility, nutritive value and nitrogen balance of the tested rations. Each animal was fed on 3.5 kg of the tested ration in the same order of the feeding trial to cover the maintenance requirements according to Wardeh and Farid, 1990 for camels. Water was available at all the time. Feces and urine were daily collected through 7 days then taken for analysis. Samples of feeds, feces and urine were analyzed according to AOAC, 1995.

Data were statistically analyzed using the general liner model procedure, SAS, 2000. Significant differences among means were tested by using Duncen's multiple range test (Duncen, 1955).

RESULTS AND DISCUSSION

Chemical composition of the feedstuffs and experimental rations is shown in Table (1) and showed that the experimental rations were almost comparable in its chemical composition except EE, CF and NFE were slightly differed. These differences may be due to the variation in roughage: concentrate ratio among rations and at the same time the variation between CFM and TRS in the content of CF, EE and NFE.

Table (1): Chemical composition of feedstuffs and experimental rations (DM basis).

Item	DM, %	Chemical composition					
		OM	CP	CF	EE	NFE	Ash
Feedstuffs:							
CFM	93.89	86.15	14.11	9.33	3.36	59.35	13.85
TRS	93.30	80.60	12.33	32.57	1.88	33.82	19.40
Experimental rations:							
Ration 1	93.74	84.76	13.67	15.14	2.99	52.96	15.24
Ration 2	93.70	84.32	13.52	17.00	2.87	50.93	15.68
Ration 3	93.60	83.43	13.24	20.72	2.64	46.83	16.57

CFM: concentrate feed mixture; 25 % un-decoricated cottonseed meal, 15% wheat bran, 10% rice bran, 45.50% yellow corn, 3% limestone, 1.2% common salt and 0.3% minerals and vitamins mixture (each kg contained Co 0.1g, Cu 8g, Fe 35g, I 0.5g, Mn. 35g, Se 0.6g, Zn 35g, vitamin A 20,000,000 IU, vitamin D3 2,000,000 IU and vitamin E 2g)

TRS: Treated rice straw.

R1: 2% concentrate + TRS *ad lib*.

R2: 1.5% concentrate + TRS *ad lib*.

R3: 1% concentrate + TRS *ad lib*.

Digestibility, nutritive value and nitrogen balance:

The effects of the experimental rations on nutrients digestibility, nutritive value and nitrogen balance are shown in Table (2).

Table (2): Digestion coefficient, nutritive value and nitrogen balance of the camels fed the experimental rations.

Item	Experimental rations			± SE
	Ration 1	Ration 2	Ration 3	
Digestibility, %:				
DM	68.39 ^a	64.77 ^b	61.77 ^c	1.08
OM	71.43 ^a	68.61 ^b	65.87 ^c	0.91
CP	78.10 ^a	77.03 ^b	75.82 ^c	0.31
CF	58.08 ^a	55.05 ^b	52.51 ^b	0.91
EE	76.39 ^a	73.92 ^b	73.93 ^c	0.57
NFE	72.34 ^a	68.33 ^b	64.75 ^c	1.18
Nutritive values, %:				
TDN	62.92 ^a	59.33 ^b	55.63 ^c	0.99
DCP	10.68 ^a	10.42 ^b	10.04 ^c	0.10
Nitrogen balance:				
Nitrogen intake, g/head/day	71.76	70.94	69.40	1.60
Urinary nitrogen, g/head/day	30.64	28.77	26.69	2.10
Fecal nitrogen, g/head/day	15.73	16.30	16.78	0.60
Nitrogen balance, g/head/day	25.39	25.87	25.93	0.50
Nitrogen balance, % of N-intake	35.38	36.47	37.36	1.10

a, b, c.... means on the same raw with different super script are significantly (P<0. 05) different.

The obtained results revealed that camel calves in groups R2 and R3 recorded significant lower ($P<0.05$) digestibilities of all nutrients compared with those in group R1. Therefore the nutritive values of R2 and R3 as TDN or DCP were lower ($P<0.05$) than those of R1, being 59.33 and 55.63 vs. 62.92% for TDN and 10.42 and 10.04 vs. 10.68% for DCP, respectively. These decreases in the nutritive values may be due to the low nutrients digestibility in R2 and R3 because of variation in both roughage: concentrate ratio and the content of CF, EE and NFE in these rations. Besides this variation may be due to the differences in the fiber fractions (Sirohi *et al.*, 1994 and 1995)

In spite of the reduction in nutrients digestibility and nutritive values when camel groups fed on R2 and R3 compared with R1, these results consider positive because treating rice straw with urea and molasses can be replaced for high portion of using concentrates without greatly effect on nutritive values, whereas these values decreased by 5.7 and 11.6% for TDN and 2.4 and 6% for DCP. These findings may be due to that urea plus molasses treatment reduces the strength of intermolecular hydrogen bonds that binds cellulose fiber within cell wall matrix which may be physically restrained from swelling. Similar results are obtained by Sirohi and Rai, 1994 and 1995; Farghaly *et al.*, 2003; and El-Gendy *et al.* 2008.

On the other hand, there was a slight improvement in nitrogen balance (as % of nitrogen intake) with camels fed R2 and R3 compared with those fed R1, being 36.47 and 37.36 vs. 35.38%, respectively. This improvement may be due to the high ability of camel for urea recycling which give it the advantage to utilize the marginal or poor quality feeds more efficient than the good quality feeds (Emmanuel *et al.*, 1976).

Growth performance and economical efficiency:

It's worthy to note that R2 and R3 groups consumed the determined amount of concentrate fed mixture (as feed), being 1.5 and 1%. While R1 group consumed 1.71% of LBW only.

Data in Table (3) showed that average of concentrate intake as a percentage of body weight, was significantly lower ($P<0.05$) with camels fed R2 and R3 than those fed R1, being 1.41 and 0.94 vs. 1.60%, respectively. While, the opposite trend was noticed with roughage intake, being the highest with camels fed R2 and R3 compared with those fed R1, being 0.69 and 0.91 vs. 0.53%, respectively. Roughage: concentrate ratio was higher in R2 and R3 groups than those of R1, being 25:75, 33:67 vs. 49:51, respectively causing a decrease in the total dry matter intake by 4.4 and 13.9% for R2 and R3, respectively compared with R1. These results are in comparable to that reported by several researchers such as Kamoun *et al.*, 1989; Wilson 1992, El-Badawi and Yacout 1999, El- Banna 2004 and Safinaz *et al.*, 2007. Similarly the average of daily feed intake as DM, TDN or DCP ($\text{g/kg}^{0.75}$) followed the same trend.

Data concerning the effect of experimental rations on camel's fattening performance and economical efficiency are shown in Table (4). There were insignificant ($P<0.05$) differences in the daily body weight gain (g) and feed conversion as kg DMI/kg gain among R1, R2 and R3, being (668

and 9.13), (635 and 9.18) and (577 and 9.10), respectively. These results are in agreement with findings of Kamoun *et al.*, 1989 and Safiznaz *et al.*, 2007.

Table (3): Feed intake of the experimental rations:

Item	Experimental rations			± SE
	Ration 1	Ration 2	Ration 3	
DM intake, kg/head/day:				
Concentrate feed mixture	4.581 ^a	3.91 ^b	2.67 ^c	0.24
Roughage (treated rice straw)	1.517 ^c	1.92 ^b	2.58 ^a	0.13
Total	6.098 ^a	5.830 ^b	5.250 ^c	0.19
Roughage: concentrate ratio	25:75	33:67	49:51	-
DM intake, % Body weight:				
Concentrate feed mixture	1.60 ^a	1.41 ^b	0.94 ^c	0.07
Roughage (treated rice straw)	0.53 ^c	0.69 ^b	0.91 ^a	0.04
Total	2.13 ^a	2.10 ^b	1.85 ^c	0.03
DM intake, g/ kg w^{0.75}:				
Concentrate feed mixture	66 ^a	58 ^b	39 ^c	3.07
Roughage (treated rice straw)	22 ^c	28 ^b	37 ^a	1.72
Total	88 ^a	86 ^b	76 ^c	1.50
TDN intake:				
kg/head/day	3.837 ^a	3.459 ^b	2.921 ^c	0.16
g/ kg w ^{0.75}	55 ^a	51 ^b	42 ^c	0.58
DCP intake:				
g/head/day	651 ^a	608 ^b	527 ^c	25.50
g/ kg w ^{0.75}	9.35 ^a	8.93 ^b	7.62 ^c	0.21

a, b, c.... means on the same raw with different super script are significantly (P<0. 05) different.

Table (4): Productive performance of fattening camel calves fed the experimental rations.

Item	Experimental rations			± SE
	Ration 1	Ration 2	Ration 3	
Body weight changes:				
Initial live body weight, kg.	246.2	239.8	250	8.13
Final live body weight ,kg	326.4	316	319.2	9.34
Total body weight gain, kg.	80.2	76.2	69.2	0.40
Daily body weight gain, g.	668	635	577	28
Feed conversion:				
kg DMI/ kg gain.	9.13	9.18	9.10	0.36
kg TDNI / kg gain.	5.74	5.45	5.06	0.35
g DCPI/ g gain.	0.98	0.96	0.91	0.05
Economical efficiency:				
Feed cost, LE/head/day.	8.46	7.50	5.68	-
Feed cost, LE/kg gain.	12.66	11.81	9.48	-
Relative feed cost, LE/kg gain, %*	100	93	78	-
Gain price, LE/head/day.	10.02	9.53	8.66	-
Profit, LE/head/day.	1.56	2.03	2.98	-
Relative profit, %**	100	130	191	-

The prices were, concentrate feed mixture, 1600, treated rice straw, 400 LE/ton and 15 LE/kg of LBW.

* Relative feed cost, LE/kg gain % = feed cost, LE/kg gain (R2 or R3) / R1.

**Relative profit, % = profit, LE/head/day (R2 or R3) / R1.

The lowest feeding cost, LE/ kg gain was observed with feeding camels on R2 and R3 compared with those fed R1, being 11.81 and 9.48 vs. 12.66. Thus, the relative feed cost, LE/ kg gain were 93 and 78 vs. 100%. Accordingly, the profit was increased, being 2.03 and 2.98 vs. 1.56 LE/head/day. In other words the relative profit was improved with R2 and R3 groups compared with R1, being 130 and 191 vs. 100%

So, fattening Sudanese camel calves could be fed on concentrate feed mixture at 1% of live body weight plus treated rice straw with urea (5%) and molasses (10%) *ad lib*. With an improvement on productive performance and economical efficiency.

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الأداء الإنتاجي لعجول الجمال السوداني المسمنة تحت نظم تغذية مختلفة.

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في تجربة تسمين لمدة ١٢٠ يوماً، قسم عشوائياً عدد ١٥ من عجول الجمال السوداني بمتوسط وزن حي ٢٤٥ كجم وعمر ٢-٣ سنوات لثلاث مجموعات ممتثلة، لدراسة تأثير بعض نظم للتغذية المختلفة على أداؤها الإنتاجي. غذيت الحيوانات فردياً على مخلوط العلف المركز بمستوى ٢، ١،٥، ١٠% من وزن الجسم الحي للمجموعات الأولى والثانية والثالثة على الترتيب بالإضافة إلى قش الأرز المعامل باليوريا (٥%) والمولاس (١٠%) للشعب، لخفض تكاليف التغذية. تم تسجيل كمية المأكول اليومي ووزن الجسم الحي إسبوعياً ومن ثم تم حساب معدل الزيادة اليومية ومعامل التحويل الغذائي. وفي نهاية فترة التجربة تم استخدام ثلاثة حيوانات من كل مجموعة في تجربة هضم لتقدير معاملات هضم المركبات الغذائية والقيمة الغذائية وميزان الأزوت لنفس العلائق التجريبية الثلاث.

ويمكن تلخيص النتائج المتحصل عليها على النحو التالي:

- ١- انخفاض معنوي في معاملات هضم المركبات الغذائية والقيمة الغذائية في صورة مركبات غذائية كلية مهضومة (TDN) وبروتين خام مهضوم (DCP)، وكذلك تحسن طفيف في ميزان الأزوت لمجموعتي الجمال المغذاة على العليقتين الثانية والثالثة مقارنة بالمجموعة الأولى.
 - ٢- انخفاض معنوي في كل من كمية المأكول اليومي من مخلوط العلف المركز والمادة الجافة الكلية لمجموعتي الجمال المغذاة على العليقتين الثانية والثالثة مقارنة بالمجموعة الأولى. بينما لوحظ زيادة معنوية في كمية المأكول اليومي من مادة العلف للخشنة المحسنة (قش الأرز المعامل) في كلتا المجموعتين، حيث سجلت نسبة المادة الخشنة: المركزة ٢٥:٧٥، ٣٣:٦٧، ٤٩:٥١ للمجموعات التجريبية الأولى والثانية والثالثة على الترتيب.
 - ٣- عدم وجود فروق معنوية في كل من معدل الزيادة اليومية ومعدل التحويل الغذائي بين المجموعات التجريبية الثلاث، حيث كانت القيم للمرحلة كالتالي: ٦٦٨، ٦٣٥، ٥٧٧ جرام بالنسبة لمعدل الزيادة اليومية و ٩،١٣، ٩،١٨، ٩،١٠ بالنسبة لمعامل التحويل الغذائي على الترتيب.
 - ٤- انخفاض تكلفة الكيلوجرام من الزيادة في الوزن وارتفاع الكفاءة الاقتصادية لمجموعتي الجمال المغذاة على العليقتين الثانية والثالثة مقارنة بالمجموعة الأولى.
- يستخلص من هذه الدراسة، إمكانية تسمين عجول الجمال السوداني على مخلوط العلف المركز بمستوى ١% من وزن الجسم الحي بالإضافة إلى قش الأرز المعامل باليوريا (٥%) والمولاس (١٠%) للشعب مع تحسن في الأداء الإنتاجي والكفاءة الاقتصادية.