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Effects of Date Supplementation and Crossing with Dhofari goats on the Fattening Performance of Local Goats in the United Arab Emirates

Ghaleb A. Alhadrami

Animal Production Department
Faculty of Agricultural Sciences,
U.A.E. University, P.O. Box 17555,
Al-Ain, United Arab Emirates

ABSTRACT

Twenty-four goat kids (12 local purebred & 12 crossbreeds resulting from breeding local does with Dhofari bucks), three months of age were used in an 8-weeks trial to evaluate the effect of genotype and diet on the fattening performance and carcass characteristics when replacing 12.5% of the concentrate portion with dates. For a given genotype, goats were randomly divided into two groups; the first group was fed rhodes grass hay and pelleted concentrate; whereas the second group was given rhodesgrass hay plus a concentrate ration composed of 87.5% pelleted concentrate and 12.5% unpitted dates. Diets were similar in roughage: concentrate ratio and offered *ad libitum*. Crossbreds showed higher estimates (P<.05) for body weight (BW) throughout the trial. Diet and genotype significanty affected total dry matter intake (DMI) (P<.001). Average daily gain (ADG), feed conversion ratio (FCR) and hot carcass weight (HCW) were significnatly affected by diet (P<.05). Neither diet or genotype showed any significant effect on the physical dissection of the 9, 10, 11 ribs cut and chemical composition of the *Longissimus dorsi* muscle. Significant effects of diet were detected on empty body weight (EBW), empty digestive tract (EGIT) and spleen weight (P<.05). Whereas, genotype significantly affected EBW, full digestive tract (FGIT), EGIT, liver, heart and testes weight (P<.05). This study demonstrates that crosses of Dhofari x local had a better meat production potntial than local goats at this age and conditions. Also, the study shows that including dates in the diet did not have beneficial effect on the fattening performance of goats under an intensive fattening system.

Key Words : Date, Crossing, Dhofari, Goats, Carcass.

INTRODUCTION

Goat meat is preferred in countries where it is the normally available product such as in the Middle East (Devendra and Burns, 1983). Local goats in the United Arab Emirates are very important source of meat to the local population, where their meat is preferred and animals are often slaughtered at an early age (3-6 months). However, local animals contribute a small percentage to the country's need (less than 20%); so, large amounts of meat products are imported each year. No published research is available on the fattening performance of the local goats in U.A.E under either intensive or extensive system. Therefore, investigatins on live weight, growth performance and composition are urgently needed in order to evaluate the potentiality of local goats for meat production.

Feedstuffs are imported to U.A.E. in large quantities, particularly the cncentrate feeds. Therefore, using locally produced feed materials will be very beneficial. Approximately 23 thousand tons of dates are yearly produced in the United Arab Emirates (Aljibori, 1994). Large amounts are not processed for human consumption; therefore, using some of these amounts in replacing part of the conentrate portion of the ration is one alternative to reduce the cost of animal nutrition.

The objectives of this study were to evaluate growth performance and carcass quality in local goats and their crosses with Dhofari as affected by replacing dates for part of the concentrate of their ration under an intensive feeding system.

MATERIALS AND METHODS

Twenty-four goat kids (12 local purebred and 12 crosses resulting from breeding local does with Dhofari bucks), three months of age with an average body weight of 8.3 kg were randomly assigned into two groups (6 purebred + 6 crossbred/ group) and used in an 8-weeks feeding trial. Each group was divided into two subgroups according to goats genotype. The first group was given an *ad libitum* conventional diet of rhodesgrass (*Chloris gayana*) hay and pelleted concentrate (13% C.P.), whereas the second group received a diet of rhodesgrass hay, and concentrate ration composed of 87.5% pelleted concentrate and 12.5% of unpitted dates. Experimental diets composed of equal roughage: concentrate ratios to cover the nutrients requirements of growing goats (NRC, 1981). Chemical composition of the diets ingredient are shown in Table 1.

Table 1. Chemical composition of feedstuffs.

Nutrients	Rhodes grass hay	Concentrate pellets	Date (unpitted)
Moisture, %	5.5	6.8	10.1
Dry matter	94.5	93.2	89.9
Dry matter composition, %			
Crude protein	10.9	13.0	4.1
Ether extract	1.3	2.5	0.9
Crude fiber	32.3	8.3	5.0
N-Free extract	46.4	67.6	86.7
Ash	9.1	8.6	3.3

Animals received the experimental diets for 7 days as an adjustment period. Diets were offered once daily at 07:00. Goats were housed in individual shaded pens and the offered feed was adjusted every other dayto maintain the same roughage: concentrate ratios. Water and mineral blocks were available at all times.

Feed samples were taken at the beginning, middle and the end of the trial and were kept frozen at -5^{0}C until chemically analyzed according to AOAC (1986). Feed intake was recorded daily. Kids were bi-weekly weighed.

At the end of the experiment all goats were slaughtered and hot carcasses, internal organs including liver, heart, kidneys, spleen, lungs and fat deposits were weighed. Also, non-carcass components such as testes, head, skin, feet and full & empty digestive tract were weighed. Empty body weight was computed by subtracting the weight of gut contents from slaughter weight. The 9th, 10th and 11th ribs cut were taken out from the left side of each carcass and physically dissected into lean, fat and bone in order to estimate carcass composition while chemical composition of meat from *Longissimus dorsi* was done to determine moisture, crude protein, ether extract and ash content according to AOAC (1986). *Longissimus dorsi* area (LDA) was measured in the 9th rib.

Statistical analysis was done and based on the following model:

$$Y_{ijk} = u + g_i + d_j + gd_{ij} + e_{ijk}$$

Where: Y_{ijk} = an individual observation, u = overall mean, g_i = effect of i *th* genotype (local vs Dhofari x local), d_j = effect of j *th* diet

(date vs no date), gd_{ij} = effect of interaction between g x d and e_{ijk} = error term (MSTAT 4, 1987).

RESULTS AND DISCUSSION

Mean body weight of goats was consistently higher in goats fed no dates than goats feddates but differences were not statistically significant. The body weight of crossbreds was consistently and significnatly (P<.05) higher than that of local goats (Table 2).

Similarly, average daily gain (ADG) was also high in no dat's diet and in Dhofari x local kids. The differences between diets were significant for the first 4 weeks (P<.05) and for the entire period (P<.01), whereas differences between genotypes were not significant.

Dry matter intake (DMI) was significntly (P<.001) and consistently higher in no date's ration group. Also, crossbreds had significantly (P<.001) higher DMI than local breed. Goats fed date's ration showed significantly higher feed conversion ratio (FCR) values (P<.05) for the 1st 4 weeks of the trial than no date's group. However, the two genotypes had similar FCR values (8.9) measured over the whole experimental period (Table 2).

Table 2. Mean effects of diet and genotype on body weight (BW), dry matter intake (DMI), average daily gain (ADG), and feed conversion ratio (FCR) in experimental goats.

	Diet			Genotype (G)			Significance		
	No date	Date	SEM	Local	Crossbred	SEM	D	G	DxG
BW (kg)									
Initial	8.4	8.1	0.3	7.7	8.9	0.3	NS	*	NS
After 4 wks	10.5	9.7	0.3	9.4	10.8	0.3	NS	**	NS
After 8 wks	12.5	11.3	0.4	11.1	12.6	0.4	NS	*	NS
DMI (kg)									
0-8 wks	33.1	29.5	0.4	30.3	32.3	0.4	***	***	NS
ADG (g/d)									
0-4 wks	72.3	57.5	3.6	60.7	69.2	3.6	*	NS	NS
0-8 wks	72.7	56.7	3.6	62.1	67.3	3.6	**	NS	NS
FCR (kg feed/kg BW gain)									
0-4 wks	6.2	7.2	0.3	6.8	6.6	0.3	*	NS	NS
0-8 wks	8.4	9.5	0.4	8.9	8.9	0.4	NS	NS	NS

NS = Nonsignificant; * = P< .05; ** = P<.01; *** = P<.001.

Goats received no date and crossbred kids had higher hot carcass weight (HCW) 5.8 and 5.7 vs 5.1 kg respectively, but the difference was significant (P<.05) only due to diet (Table 3). Mean carcass weight of experimental goats was below that recorded by Devendra and Owen

(1983). They stated a range from 10 kg (Africa) to 14 kg (Near East) with an overall global mean of 12 kg. However, carcass weight is obviously influenced by age, breed, sex and nutrition.

Dressing percentage (DP) was numerically higher in no date's diet and local goat kids than other groups of kids. Non-carcass fat relative to empty body weight showed high values in no date's diet group and in Dhofari x local kids. Percentage of non-carcass parts (head, hide and legs) was numercally higher in date's diet and in local kids, than other groups of kids. All these differences were not significant (Tabel 3). It has been reported that there is a negative relationship between dressign percentage and non-carcass components in connection with body weight (Thonney et al., 1987; Butterfield, 1988). Our data show that dreessing percentages ranged from 45-46%, which agrees with the findings of Warmington & Kirton (1990). Also, DP increases with the increase of body weight in goats (McGregor, 1982; Devendra & Owen, 1983). Dressing percentages of 52-62% have been reported for young kids receiving their nutrition from milk and have a low level of gut fill. As kids start eating fibrous materials, they develop large gut and DP is markedly decreased.

Table 3. Effects of diet and genotype on hot carcass weight (HCW), dressing percentage (DP), non- carcass fats (KPC/EBW), and offals percentages (HHL/EBW) in experimental goats.

	Diet			Genotype (G)			Significance		
	No date	Date	SEM	Local	Crossbred	SEM	D	G	DxG
HCW (kg)	5.8	5.1	0.2	5.1	5.7	0.2	*	NS	NS
[1]Dressing (%)	46.3	45.0	0.6	46.0	45.3	0.6	NS	NS	NS
[2]KPC fat/EBW (%)	2.7	2.3	0.2	2.3	2.6	0.2	NS	NS	NS
[3]HHL/EBW (%)	20.9	21.6	0.3	21.6	20.9	0.3	NS	NS	NS

NS = Nonsignificant; * = P<.05.
[1]Dressing = HCW/BW.
[2]KPC fat = Kidneys + Pelvis + Channel fats.
[3]HHL = Head + Hide + Legs; EBW = Empty body weight.

Physical dissection of the rib cut and *Longissimus dorsi* area (LDA) are commonly used to predict carcass composition (Berg & Butterfield, 1976; Nigm et al., 1993). Table (4) shows that the LDA was not significantly different between diets or genotypes. Devendra and Owen (1983) reported values ranging from 4 cm^2 for New Zealand feral and unfattened Sudan desert goats to 9 cm^2 for Mexican Criollo goats. Lean percentage was slightly high for date's diet and crossbred

kids, while fat and bone percentages had an opposite trend (Table 4). These differences were not significant (Table 4). Mean values of lean percentage fall within the normal values of carcass muscle content ranging from 56% (Owen et al., 1983) to at least 68% (Fehr et al., 1976). The muscle content of goat carcasses are higher than those normally found for sheep, which are commonly reported to have 48-60% muscle in their carcasses (Owen et al., 1978; Kirton et al., 1985). Nigm et al., (1993) found that lean percentage was 46.3 & 47.0% in Merino and Turkish sheep, respectively. Mean carcass fat (by dissection) in goats could reach up to 18% (Anjaneyulu et al., 1985) which is lower than the values obtained in the present study. The reported bone content of goat carcasses ranges from 43.6% (young unfattened desert goats; Gaili et al., 1972) to 15.9% (yearling Malawi male goats; Owen, 1975). As the proportion of fat in the goat carcass increases, the proportion of bone decreases (Gaili et al., 1972; Owen 1975). Chemical composition is believed to have more accuracy than physical dissection due to the fact that there are amounts of water being carried by fat deposits which, in turn, would be hard to be detected by physical means (Berg & Butterfield, 1976).

Results showed that percentages of moisture and crude protein were higher but not significantly different in no dates and crossbred kids (Table 4). On the contrary, percentages of ether extracts were lower but the differences were not significant. These findings show that the fat is likely to be deposited intramuscularly, within the lean meat (marbling), where no subcutaneous fat was traced in those animals. The ether extract in meat (fat and muscle) of unfattened and fattened Sudan desert goats ranged from 5.5-30% and for similar age groups of sheep from 9-45% (Gaili et al., 1972). Ash content was the same in the two dietary groups, and was significantly higher in crossbreeds (Table 4).

Estimates of non-carcass parts of the goats showed that animals in no date's diet had always higher values but were only significant for empty digestive tract (1.1 vs. 0.9 kg) with ($P<.01$); empty body weight (11.1 vs. 9.8 kg) with ($P<.05$), and spleen weight (20.0 vs. 15.3 g) with ($P<.01$). On the other hand, Dhofari x local kids showed higher values in all traits but were significant ($P<.05$) for full digestive tract, empty digestive tract, empty body weight, liver, heart and testes weight. The increase in liver weight in the Dhofari x local kids could be attributed to the fact that the liver has been regarded as a highly metabolically active organ (Ferrell et al., 1986) which may explain its marked change in weight during the relatively faster growth in crossbred kids.

Table 4. Effects of diet and genotype on physical and chemical composition of *Longissimus dorsi* muscle in experimental goats.

	Diet			Genotype (G)			Significance		
	No date	Date	SEM	Local	Crossbred	SEM	D	G	DxG
[1]LDA (cm^2)	8.9	8.9	0.8	8.7	9.0	0.8	NS	NS	NS
Physical composition (%)									
Lean	61.0	62.4	1.4	62.5	60.0	1.4	NS	NS	NS
Fat	20.8	20.5	1.3	20.2	22.0	1.3	NS	NS	NS
Bone	18.2	17.1	0.9	17.3	18.0	0.9	NS	NS	NS
Chemical composition (%)									
Moisture	73.4	73.2	0.4	72.8	73.8	0.4	NS	NS	NS
Crude Protein	82.6	80.2	1.5	80.3	82.5	1.5	NS	NS	NS
Ether Extract	8.3	11.0	1.9	10.3	9.0	1.9	NS	NS	NS
Ash	4.1	4.1	0.1	4.0	4.2	0.1	NS	NS	NS

NS = Nonsignificant.
[1]LDA = *Longissimus dorsi* area.

In conclusion, crosses of Dhofari x Local showed a better meat production potential than local goats at this age and under these experimental conditions. The inclusion of dates to replace 12.5% of the concentrate portion did not have beneficial effect on the performance of goats under intensive fattening system. However, marbling was higher in goats fed diet containing dates.

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مجلة الإمارات للعلوم الزراعية (١٩٩٦) ٨ : ٦٣-٧٢

تأثيرات إضافة التمر إلى العليقة والخلط مع الظفاري على كفاءة التسمين في الماعز المحلية بدولة الإمارات العربية المتحدة .

غالب الحضرمي
قسم الإنتاج الحيواني - كلية العلوم الزراعية - جامعة الإمارات العربية - ص.ب : ١٧٥٥٥ العين - الإمارات العربية المتحدة .

ملخص :

إستخدم في هذه الدراسة ٢٤ من صغار ذكور الماعز (١٢ محلي نقي ، ١٢ خليط بين الإناث المحلية وتيوس الظفاري) عمرها ٣ شهور. آستمرت التجربة لمدة ٨ أسابيع لتقدير تأثير السلالة (التركيب الجيني) والعليقة على كفاءة التسمين وعلى خصائص الذبيحة حينما تم إستبدال ١٢.٥٪ من العليقة المركزة بالتمر.

قسمت الماعز في كل سلالة إلى مجموعتين : الأولى غذيت حتى الشبع بدريس حشيشة الرودس وعلف موحد كعليقة مركزة ، بينما غذيت المجموعة الثانية على دريس حشيشة الرودس وعليقة مركزة تكونت من ٨٧.٥٪ علف موحد + ١٢.٥٪ تمر غير منزوع النوى، وكانت نسبة الدريس إلى العليقة المركزة ثابتة في المجموعتين وقدمت العليقة للشبع .

ولقد أظهرت النتائج أن الماعز الخليطة كانت ذات وزن جسم أكبر معنويا (أقل من ٠.٠٥) طوال فترة التجربة ، كما كان للعليقة والسلالة تأثير معنوي (أقل من ٠.٠٠١) على كمية المادة الجافة المأكولة . أما متوسط الوزن اليومي (ADG)، نسبة تحويل الغذاء (FCR) ووزن الذبيحة الدافيء (HCW) فلقد تأثرت معنويا (أقل من ٠.٠٥) بالعليقة . ولم يكن للعليقة أو السلالة تأثير معنوي على تشريح قطعيات الضلوع ٩، ١٠، ١١ أو على التركيب الكيميائي للعضلة العينية .كما أوضحت النتائج وجود تأثير معنوي (أقل من ٠.٠٥) للعليقة على وزن كل من الجسم الفارغ (EBW)، القناة الهضمية الفارغة (EGIT) والطحال ، بينما كان للسلالة تأثير معنوي (أقل من ٠.٠٥) على وزن كل من الجسم الفارغ ، القناة الهضمية ممتلئة وفارغة ، الكبد ، القلب والخصيتين .

يستنتج من هذه الدراسة أن خليط الظفاري مع المحلي ذات قدرة إنتاجية للحوم أفضل من الماعز المحلي عند العمر والظروف المذكورة سابقا ، أما إضافة التمر إلى العلائق فلم تؤد إلى تحسن ملحوظ في أداء الماعز تحت نظام التسمين المكثف .

كلمات مفتاحية : تمر ، خلط ، ظفاري ، ماعز ، تصافي .