The Libyan Barbary Sheep

II. Growth and Wool Traits

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ABSTRACT

Growth data on 84 Libyan Barbary lambs born at two monthly intervals throughout the year (June to May) were used to study the effect of lambing period on growth traits. Wool records of 531 sheep were taken from the University of Al-Fateh Experiment Station to evaluate wool production of the Libyan Barbary sheep. The results indicated that lambs born in the summer months (June-July) were the lightest at weaning and at monthly interval post-weaning weights. Lambs born in late Spring (April-May) were the heaviest at weaning and post-weaning weights. There were no significant differences in pre-weaning growth rates of lambs born in the first 5 periods (June-March). In post-weaning growth rates, there were no significant differences between lambs born in the first four periods (June-January). The superiority in growth traits for lambs born in the period of April-May was attributed to changes in the availability of feed, level of management and overall climatic conditions. It is conculded that the results reported here together with the results of reproductive traits and lamb survival could be utilized to improve mutton production in the country.

Wool production of the Libyan Barbay ranges from 2.6 to 3.3 kg for different ages with an average of 3.1 kg. Staple length ranges from 12.3 to 16.6 cm with an average of 14.8 cm. It is concluded that the Libyan Barbary breed could be classed as long wool and its wool production is comparable to other carpet wool breeds.

The effects of sex, type of birth, age of ewe and lamb age at weaning on growth traits and the effects of shearing year, sex and age on wool traits were also evaluated.

INTRODUCTION

The Barbary breed represent almost 95% of the sheep bred in Libya and is used primarily for mutton production. Reports on growth and wool traits of this indigenous breed are very limited. Magid *et al.* (21) presented some evidence that the Libyan Bar-

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bary is polyestrous and can be bred all year round with no differences in lamb survival at different lambing seasons. This would indicate that meat production may be improved through increasing the frequency of lambing. Information is needed, however, on the growth performance of lambs born at different seasons. It was, therefore, the purpose of this study to examine pre-weaning and post-weaning growth rates and concurrently report on some wool traits. The effects of some environmental factors on growth and wool production were also studied. Data on these aspects of production are essential for the future development of breeding plans aimed at increasing mutton production in the country.

MATERIALS AND METHODS

Source of data and experimental groups

The data reported here were derived from flocks reported by Magid *et al.* (21). In brief, lambs were born at intervals of two months throughout the year; June-July, August-September, October-November, December-January, February-March and April-May. The lambs were a result of breeding a total of 180 ewes divided into six groups and each group was mated with rams for two months throughout the year of 1981. The ewes were fed 2-3 kg of barley or wheat straw and 0.5 kg concentrate mixture per head per day. During the green season (November-March) ewes were shepherded and allowed to graze for about 3 hours daily.

Ewes and lambs were vaccinated against enterotoxemia and sheep pox, drenched and dipped once a year to control internal and external parasites. All lambs were reared naturally on their dams till weaning at approximately 120 days of age. After weaning, the lambs were fed a daily allowance of 200g of concentrate mixture containing about 14-16% protein. The daily allowance was increased gradually till it reached 500-600 grams per head per day and about 2 kg of barley and wheat straws.

All lambs were indentified, ear-tagged and weighed within 12 hrs of birth. They were not docked nor castrated. Live weights were recorded at birth, weaning and at intervals of one month over a period of three months post-weaning. W1, W2, and W3 were the weights of lambs at 30, 60 and 90 days after weaning.

The wool data used in this study were obtained from the flock raised at Al-Fateh University Sheep Experiment Station. The sheep were mechanically shorn during April of 1983 and 1984. The greasy fleeces were weighed and three lock samples were obtained from the side, the back and the shoulder areas of each fleece for measurements to estimate staple length.

Statistical procedures:

The least squares procedures for data with unequal subclass numbers was used for the analysis of growth and wool traits (14). The statistical model for analysis of growth traits included the main effects of group (lambing period), sex of lambs, type of birth and age of ewe. Age of lambs at weaning was also included as a continuous variable. The statistical model used for the analysis of wool traits included the main effects of shearing year, sex and age of the animal. Tests of significance for differences between individual means were also estimated (9). Interactions between the different factors in the models were found to be of little importance and were excluded. Very few signifi-

cant interactions were reported in the literature and they were usually small compared with the main effects.

RESULTS AND DISCUSSION

Effects of lambing periods on growth traits

Lambing periods significantly influenced ($p < .01$) all growth traits studied. Lambs born in the summer months (June-July) were the lightest at weaning (14 kg), W_1 (16.6 kg) and W_3 (21.2 kg), while lambs born in late spring (April-May) were the heaviest at weaning (23.9 kg), W_1 (27.8 kg) W_2 (31.8 kg) and W_3 (33.7 kg) as shown in Table 1. There were no significant differences in birth weights of lambs born in June-July, August-September and April-May. There were no significant differences in weaning weight, W_1, W_2, and W_3 of lambs born in June through March (Table 1). The superiority in growth traits for lambs born in the period of April-May could be explained by changes in the availability of feed, level of management and overall climatic conditions.

Table 1 — Least squares means for growth traits by lambing period, sex of lambs, type of birth and age of ewe.

Source	No. lambs	Birth wt kg	Weaning wt kg	W_1 kg	W_2 kg	W_3 kg
μ	84	3.4	17.1	19.4	23.4	25.1
Group (lambing period)		*	**	**	**	**
1 June-July	11	3.0a	14.0a	16.6a	21.1a	21.2a
2 Aug-Sept	5	3.2ac	15.5a	17.2a	20.7a	22.0a
3 Oct-Nov	22	3.7bc	16.3a	18.1a	22.4a	24.8a
4 Dec-Jan	22	3.9b	16.4a	17.7a	20.3a	21.6a
5 Feb-March	19	2.6bc	16.5a	19.0a	23.8a	27.1a
6 April-May	5	3.3ac	23.9b	27.8b	31.8b	33.7b
Sex		*	NS	*		**
males	41	3.5	17.7	20.3	24.0	26.3
females	43	3.3	16.5	18.5	22.8	23.8
Type for birth						
singles	75	3.8	19.4	21.8	25.4	27.3
twins	9	3.0	14.9	17.0	21.3	22.8
Age of ewe		**	*	**		*
3-year old	26	3.3a	15.9a	17.6a	21.2a	24.0a
4-year old	5	3.6abc	21.0b	24.6b	29.2b	29.6b
5-year old	14	3.8b	18.3ab	20.9ab	23.3a	27.1ab
6-year old	13	3.5ab	16.5a	18.5a	23.0a	23.9a
7-year old	22	3.3ac	15.5a	17.5a	21.6a	22.9a
8 + year old	4	3.1a	15.3a	17.4a	21.9a	23.0a
bl (weaning age)		NS	*	NS	NS	NS
		0.0273	0.1243	0.0247	0.006	0.0132

* $p < .05$
** $p < .01$
abc — Those means followed by same letter do not differ significantly from each other, otherwise they differ significantly at $p < .05$.

Table 2 shows, pre-weaning and post-weaning average daily gains for lambs born at

different periods. It is worth mentioning here that there were no significant differences between lambs born in the first 5 periods (June to March) in pre-weaning average daily gain. In post-weaning daily gain, there were no differences between lambs born in the first four periods (June to January). These results together with the results of Magid's et *et al.* (21) can be utilized to increase the frequency of lambing, i. e., lambing at regular interval or 3 lamb crops each two years to increase mutton production in the country. In general, the results showed that lambs of the Libyan Barbary sheep grew at a rate of 120 g/day in pre-weaning growth and 90 g/day post-weaning. These figures are low compared with unpublished data on pre-weaning gain (Lightfoot, personal communication). The differences are due persumably to levels of nutrition and management.

Sex and environmental influences on growth traits:

Effects of sex of lambs, type of birth, age of ewe and age of lambs at weaning are presented in Table 1. Sex of lambs' effect was significant ($p < .05$) for W_1, and W_3 but not for birth weight or weaning weight. Ram lambs were 0.2 kgs heavier at birth and 1.2 to 1.8 kg heavier at weaning, W_1, W_2 and W_3 respectively than ewe lambs (Table 1). These results agree with the results reported by several workers on the effect of sex of lambs on pre-weaning and post-weaning weights. Mclaren *et al.* (22) reported a difference in birth weight of 0.27 kg due to sex in favor of male lambs. El Tawil *et al.* (11) found that sex was responsible for 1.6, 3.5 and 27.9 per cent of the total variation in weights at birth, weaning and one year of age. Similar differences at birth and weaning for male and female lambs were also reported (5, 21). Reports on the Awassi sheep of Iraq indicated that ram lambs were 0.24, 1.14 and 7.78 kg heavier than female lambs at birth, weaning and one year of age (19, 20). Aboul-Naga *et al* (1) reported similar observations on the Rahmani, Ossimi and Barki sheep of Egypt.

Type of birth significantly influenced ($p < .05$ or $p < .01$) all growth traits studied. Single lambs were 0.8, 4.5, 4.8, 4.1, 4.5 kgs heavier at birth, weaning, W_1, W_2 and W_3 respectively than twin born lambs (Table 1). These results were in agreement with the findings of several investigators (4, 8, 11, 12). Kazzal and Abdullah (19) indicated that type of birth of Awassi sheep of Iraq had the greatest influence on body weight at all

Table 2 — Pre-weaning and post-weaning average daily gains by groups (lambing periods) of the Libyan Barbary breed.

Groups	(lambingperiods)	No.	Pre-weaning daily gain (kg)	Post-weaning daily gain (kg)
1	June-July	11	.10a	.08a
2	August-September	5	.11a	.07ac
3	October-November	22	.11a	.09ac
4	December-January	22	.11a	.06a
5	February-March	19	.12a	.12bc
6	April-May	5	.18b	.11bc
Overall average		84	.12	.09

abc — Those means followed by same letter do not differ significantly for each other; otherwise they differ significantly ($p < .05$).

ages with single born lambs being always heavier than twin born lambs.

Age of ewe had significant effects on birth weight ($p < .01$), and weaning weight ($p < .05$), W_1 ($p < .01$) and W_3 ($p < .05$). Lambs born to 4-year old ewes were the heaviest at weaning, W_1, W_2 and W_3, while lambs born to 5-year old ewes had the heaviest birth weights compared to lambs born to younger or older ages. Many workers have reported significant differences due to the effects of age of ewe in many different breeds and breed crosses of sheep (4, 6, 11, 15, 16, 22, 27). However, Juma and Farag (17) and Kazzal *et al* (20) found no differences in growth traits of Awassi sheep due to age of ewe effect.

Weaning age had significant effect ($p < .05$) on weaning weight only of the growth traits studied (Table 1). The partial regression of weaning weight on age was 0.124 kg/day. This regression approximates the average daily gain in a period of 120 days and it is lower than those reported by other workers (11, 12, 15).

Wool traits:

The effects of shearing year, sex and age on wool traits are presented in Table 3. Year of shearing significantly influenced ($p < .01$) all traits studied. Yearly variations in fleece weight and staple lengths from different areas of the fleece reflects differences in feeding, management and health of the flock. The results shown in Table 3 indicate that the Barbary sheep produced their maximum fleece weights and staple length in 1983. The results for yearly variation in wool traits are in accordance with those reported by other researchers (2, 5, 10, 13, 14).

Sex was significant ($p < .01$) for fleece weights but not for staple lengths of the different areas. Rams had heavier fleeces than ewes (Table 3). Other workers have reported rams superiority to ewes in fleece weight (13, 16, 18).

Age of the animal influenced ($p < .01$) all wool traits (Table 3). Grease fleece weight was the heaviest for 2-year old (3.33 kg) and 5-year old (3.25 kg). The differences between fleece weights at the above two ages and each of the other ages studied were found to be statistically significant. Staple length of the different areas and average staple length appeared to be highest for animals of 4 and 5 years of age. Fleece weight in Rambouillet sheep was highest at 3 years of age and then it declined gradually thereafter (7). In the Awassi sheep, the minimum weight of fleeces was obtained from the second shearing (2, 10), while Ghoneim *et al* (7) reported that the heaviest fleeces were obtained at ages of 18 months and 30 months of the same breed.

The results in Table 3 show that the wool production of the Libyan Barbary sheep ranges from 2.6 kg to 3.3 kg for different ages with an overall mean of 3.1 kg. The wool production of this breed is comparable to other carpet-wool breeds. The Awassi ewes produce an average of 1.45 kg of wool annually (2), while Eliya (10) reported fleece production average as 1.62 kg for the same breed in Iraq and concluded that the Iraqi Awassi excelled the Awassi raised in Turkey in this aspect. The Barbary sheep is better than the estimates reported for other fat-tailed breeds such as Ossimi, Rahmani and Barki (23, 24, 26).

The mean staple length ranged from 12.3 to 16.6 cm with an overall average of 14.8 cm. Therefore, the Barbary sheep could be classed as long wool. The same conclusion was drawn from studies on Ossimi, Rahmani and Barki breeds of sheep; and the Awassi sheep of Iraq (3, 23, 24, 25).

Table 3 — Least Sguares means for wool traits by shearing year, sex and age of the animal.

Source	No.	Grease Fleece wt, kg	Staple length, cm			
			Shoulder	Side	Back	Average
μ	531	3.06	14.1	15.6	14.7	14.8
Shearing year		**	**	**	**	**
1982	277	2.70	12.4	13.3	12.8	12.8
1983	254	3.41	15.7	17.9	16.7	16.8
Sex		**	NS	NS	*	NS
Ewes	490	2.74	13.6	15.4	14.0	14.3
Rams	41	3.37	14.5	15.8	15.5	15.2
Age		**	**	**	**	**
1 year old	97	2.62ac	11.9a	13.0a	12.4a	12.3a
2 year old	118	3.33bc	14.7bc	16.2bc	15.3bc	15.3bc
3 year old	78	3.20ac	14.8bc	16.7bc	16.1bc	15.9bc
4 year old	38	3.07ac	15.3b	17.1b	16.3b	16.2b
5 year old	37	3.25bc	16.0b	17.5b	16.0b	16.6b
6 year old	46	3.13 ac	14.0bc	16.1bc	14.4bc	14.8bc
7 year old	65	3.05ac	13.5bc	14.8bc	14.4bc	14.2bc
8 year old	38	3.08ac	13.6bc	15.1bc	14.5bc	14.4bc
9 year old	14	2.78ac	12.7ac	13.8ac	13.1ac	13.2ac

NS - Not significant
* $p < .05$
** $p < .01$
abc — Those means followed by same letter do not differ significantly from each other; otherwise they differ significantly - ($p < .05$).

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أغنام البربري الليبية

2 ـ معدل النمو وخصائص الصوف

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المستخلص

استعملت سجلات الحملان المولودة من نعاج دراسة الصفات التكاثرية وكان عددها 84 سجلاً. وكانت هذه الحملان مولودة بستة مواسم ولادة مختلفة: كل موسم مدته شهران على مدار السنة (يوليو ـ مايو) وذلك لدراسة تأثير موسم الولادة على معدل النمو قبل الفطام وبعده. كما استعملت أيضاً سجلات الصوف من قطيع محطة أبحاث الأغنام التابع لكلية الزراعة، لدراسة خصائص الصوف بالأغنام الليبية.

وقد دلّت النتائج على أن الحملان المولودة في شهور الصيف (يونيو ـ يوليو) كانت أخف وزناً عند الفطام وبعد الفطام، بينما كانت الحملان المولودة في أواخر الربيع (أبريل ـ مايو) ذات أوزان عالية عند الفطام وبعده. ولم تكن هناك فروق معنوية في معدل نمو الحملان المولدة بالفترات الخمس الأولى (يونيو ـ مارس) قبل الفطام، أما بعد الفطام فلم توجد أية فروق معنوية بين الحملان بالفترات الأربع الأولى (يونيو ـ يناير). وقد عزي تفوق الأوزان في موسم الربيع إلى توافر الأعلاف وكفاءة الإدارة وملاءمة الظروف البيئية.

ويستخلص من هذه الدراسة أنه يمكن الاستفادة من هذه النتائج إضافة إلى

نتائج دراسة الصفات التناسلية والتكاثرية السابقة لتحسين إنتاج اللحم بالأغنام الليبية، بالنسبة لإنتاج الصوف من الأغنام الليبية فقد تراوح وزن الجزة من 2.6 إلى 3.3 كجم بمتوسط قدره 3.1 كجم، أما طول الخصلة فتراوح من 12.3 إلى 16.6 سم بمتوسط قدره 14.8 سم. وقد استنتج أن الأغنام الليبية يمكن أن تصنف على أنها من أغنام الصوف الطويل وإن إنتاجها من الصوف يعتبر مضاهياً لسلالات أغنام صوف السجاد الأخرى. وقد تم أيضاً تقييم تأثير الجنس، نوع الولادة وعمر الأم وعمر الحملان عند الفطام على معدلات النمو، وكذلك تأثير سنة الجز، الجنس وعمر الحيوان على صفات الصوف.