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REPRODUCTIVE PERFORMANCE OF CHIOS EWES UNDER AN INTENSIVE BREEDING SYSTEM IN KUWAIT

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ABSTRACT

A total of 56 imported Chios ewes were bred with Naeemi rams in three mating seasons (summer, winter, autumn), to study the reproductive performance under Kuwait s hot and arid environmental conditions. In each mating season, ewes were joined with rams in the ratio of one ram to 18-20 ewes. The number of lambs born, lambs weaned, birth weight and weaning weight were recorded for each ewe. Lambing and weaning data were used to calculate ewes lambing per ewes joined (fertility), lambs born per ewes lambed (prolificacy), lambs born per ewe joined (lambing rate) and lambs weaned per ewes lambing (weaning rate). The overall means of fertility, prolificacy, lambing rate and weaning rate were 54.76, 219.57, 120.24 and 68.57%, respectively.

Autumn mating season produced the best values of reproductive performance among the three breeding seasons. Chios ewes showed the higher ($P<0.01$) fertility (63.79%), lambing rate (139.66%), and weaning rate (100%) in autumn season. While in summer mating season, the ewes had higher ($P<0.01$) prolificacy (225%) and multiple births (78.57%). In summer mating season, 14 ewes were examined for ovulation rate (OR) by endoscopy. Litter size (LS) was recorded and ova wastage (OW) was calculated. The overall means of OR, LS and OW were 2.93, 1.86 and 1.07, respectively. The overall means of birth weight and weaning weight were 3.61 and 19.38 kg, respectively with no significant seasonal difference at birth weight. There was a significant ($P<0.01$) effect of litter size on the birth and weaning weight. Single lambs were significantly ($P<0.01$) heavier at weaning (22.65 Kg) than twin and triplet lambs (19.15 and 16.31 kg, respectively). There was a distinct seasonal effect, with heavier weaning weights (22.61 kg) occurring in summer-born lambs and lighter weight (17.92 kg) in autumn-born lambs. In conclusion, the results of this study illustrate the potentiality of Chios as a prolific sheep breed (>2.0 lamb/ewe lambed) under intensive lamb production in Kuwait hot arid condition. The results also indicate that autumn mating season was the best in almost all traits studied.

Keywords: sheep, performance, ovulation, fertility, litter size, birth and weaning weights.

INTRODUCTION

Sheep are considered the main source of red meat in Kuwait. Increasing of lamb productivity from local sheep breeds can be achieved mainly by increasing number of lambs born per ewe lambing through crossing with one of high prolific breeds (Guney, 1990; Malik *et al.*,1996 and Marvogenis,1996).

The Arabian fat-tailed sheep in Kuwait, have a greatly extended breeding season, being practically non prolific breed.

The subtropical Chios sheep were chosen, for their higher prolificacy (Marvogenis and Chiminides, 1992; Avdi and Chemineau, 1998 and Malik *et al.*, 2000) and good ability to bred all the year round, as most of the subtropical sheep breeds (Aboul-Naga *et al.*, 1987 and Papachristoforou *et al.*, 2000). Under a crossbreeding program, Chios ewes imported from Cyprus were crossed with Naeemi rams. The information available on the reproductive performance of this breed and their crosses with local Naeemi fat-tailed sheep, under the climatic conditions in Kuwait, are limited. The weather in Kuwait is characterized by a long, hot (42-52°C), dry summer and a short winter (5-24°C).

The object of this study was to investigate the reproductive performance of imported Chios ewes and their lamb crosses at different seasons of the year corresponding to accelerating lambing system of three lambing per two years.

MATERIALS AND METHODS

This study was conducted over two years, under an accelerated lambing system (three lambings in two years) .The current study was conduct using a total of 56 imported Chios ewes at the experimental sheep farm, Animal production department, Public Authority For Agriculture Affairs and Fish Resources-State of Kuwait (28-30° N , 46-48 W).

Chios ewes were bred over three mating seasons, summer (May-June). winter (Jan.-Feb.) and autumn (Sept.-Oct.). In each mating season ewes were joined with Naeemi rams, in the ratio of one ram to 18-20 ewes. Mating continued for 45 days in each season. The sheep were housed in partial enclosed shed. Rams and ewes offered 1 kg /head/day concentrate feed (14% CP) and 600 g alfalfa hay and had a free access to fresh water and blocks of mineral salt. Before mating, all ewes were treated against internal and external parasites. During the first month of the breeding season, the ewes were flushed by feeding 250g concentrate/day. The ewes in the last six weeks of pregnancy were offered 1.25 kg/head/day concentrated feed. In summer mating season 14 ewes, were chosen randomly from the herd, and examined for ovulation rate (OR) by endoscopy on day 7 to 12 following estrous. OR was measured as number of corpora lutea (CL) according to procedures described by Oldham and Lindsay (1980). Ova wastage (OW) was calculated as the difference between number of CL at conception and litter size (LS) at lambing.

Lambs born were weaned at 8 weeks of age. The number of lambs born, lambs weaned, birth weight and weaning weight were recorded for each ewe. Lambing and weaning data were used to calculate ewes lambing per ewes joined (fertility), lambs born per ewe lambing (prolificacy), lambs born per ewes joined (lambing rate), lambs weaned per ewes lambing (weaning rate) and ewe lambing multiple births.

The data of birth weight, litter size and weaning weight were statistically analyzed using SAS (1989) and the General Linear Models procedure.

RESULTS AND DISCUSSION

Improving the reproductive performance of sheep in the desert countries is a corner stone in planing for a food security strategy. The results of the reproductive performance of Chios ewes under an accelerated lambing system (three lambing in two years) are summarized in Table (1). autumn mating season (September-October), produced the best reproductive performance among all breeding seasons studied. The Chios in the present study showed the highest ($P<0.01$) fertility (63.79%) and lambing rate (139.66%) in autumn mating compared with summer (50.0 and 112.5%) and winter (50.0 and 107.41%) seasons, respectively. While in summer mating season, the Chios ewes had a higher ($P<0.01$) prolificacy (225%) and multiple lambs per ewe lambing (78.57%).Chios ewes in Cyprus, had reproductive cycles covering most time of the year with a cyclic periods during spring and summer (Papachristoforou *et al.*, 2000). However, the overall lambing performance of Chios ewes in the present study was lower than this under Cyprus conditions (Marvogenis and chiminides, 1992). This may be due to the hot weather in Kuwait and the small number used in the study. In winter lambing season (Feb.-March) the ewes had a significantly ($P<0.01$) higher weaning performance (100%) than those in summer and autumn lambing seasons (31.82 and 68.18%, respectively). This may be due to the low adaptability of Chios ewes to the hot conditions in summer and partly due to the lower average birth weight in higher births found in the present study. However, this is in accordance with the results reported by Forgarty and Hall (1995). The mortality rate of the lambs before weaning was highest in the humid season (Mourad *et al.*, 2001). An increase in the litter size frequency leads to a decrease in the survival of the lambs managed on pasture (Dalton *et al.*, 1980 and Gama *et al.*, 1991).

Table (1). Reproductive performance of imported Chios ewes.

Trait	Mating seasons			Overall mean
	summer May-June	Winter Jan.-Feb.	Autumn Sep.-Oct.	
Number of ewes joined	56	54	58	168
Number of ewes lambed	28	27	37	92
Number of lambs born	63	58	81	202
Multiple births (%)	78.57	70.37	70.27	72.83
Ewe fertility (%)	50.00	50.00	63.79	54.76
Ewe prolificacy (%)	225.0	214.81	218.92	219.57
Lambing rate (%)	112.5	107.41	139.66	120.24
Weaning rate (%)	68.18	31.82	100.0	68.57

The overall mean of birth weight was 3.61±0.09 kg with no significant differences between the three seasons studied (Table 2). There was a significant ($P<0.01$) effect of litter size on the birth weight of Chios x Naeemi lambs. Litter size, season of birth and birth weight were significantly affected the weaning weight of lambs (Donald and Russell, 1976 and Malik *et al.*, 1996). In the present study single lambs were significantly ($P<0.01$) heavier

at weaning (22.65±1.20 kg) than twin and triplet lambs 19.15±1.13 Kg and 16.31±0.75 Kg, respectively. There was a distinct seasonal effect, with heavier weaning weights (22.16±1.48 kg) occurring in summer-born lambs and lighter weights (17.92±0.75 Kg) in autumn-born lambs. This may be due to the effect of high ambient temperature on feed intake in June-July (40-50° C), immediately before autumn lambing season. Cartwright and Thwaites, (1976) reported that lambs from heat-stressed ewes were significantly smaller than lambs from thermoneutral ewes.

Table (2). Means (SE±) of birth weight and weaning weight at different lambing seasons.

Trait	Lambing season			Overall mean
	Autumn	Summers	Winter	
Birth weight(kg)	3.64A0.12	3.56A0.18	3.69A0.11	3.61A0.09
Litter size:				
Single	4.47A0.20	3.95A0.33	4.52A0.20	4.31A0.14
Twin	3.62A0.17	3.31A0.25	3.50A0.19	3.48A0.12
Triplet	2.83A0.23	3.42A0.40	3.06A0.18	3.10A0.16
Weaning weight(Kg)	17.92A0.75	22.16A1.48	18.08A0.67	19.38A0.54
Single	19.64A1.30	27.32A3.37	21.15A1.18	22.65A1.26
Twin	17.35A1.40	21.00A2.86	19.10A1.18	19.15A1.13
Triplet	16.77A1.11	18.17A1.57	14.00A1.11	16.31A0.75

Average value of OR in Chios ewes in summer mating season was 2.93±0.37. Almost similar value (2.85±1.07)was obtained for the same breed of spring mating season in Greece, by Avdi and Chemineau (1998). The OR obtained is higher than those obtained for several tropical and subtropical sheep breeds by several authors (Gabr *et al.*, 1989; Schoenian and Burfening, 1990). This discrepancy might be related to breed and environmental differences. Frequency distribution of ovulation in the present study, showed that the ewes had double, triple and quadratic ovulations were 43, 36 and 14% respectively (Fig. 1). The overall means of LS and OW in summer mating season were 1.86±0.40 and 1.07±0.28 respectively. This indicates the potentiality of Chios as a prolific breed. Single ovulation ewes did not found between the Chios ewes under this study. However ewes having triple or more ovulations lost markedly more ova than those having double ovulations. Ova wastage for triple ovulations was almost two times that of double ovulations (60% v 33.3%). Generally, the increase in ovulation rate frequently leads to increase in ova wastage (Fig. 1).

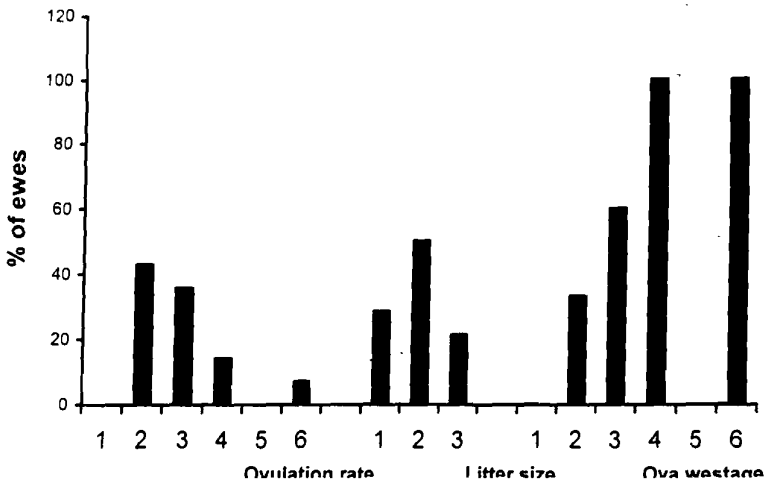

Fig.(1). Frequency distribution of ovulation rate, litter size and ova wastage

Quirke (1985), in fat-tailed sheep and crosses by Aboul-Ela *et al.* (1988) and in zaraibi goat by El-Nakhla *et al.* (2000).

In conclusion, the results of this study illustrate the potentiality of Chios as a prolific sheep breed (>2.0 lamb/ewe lambed) under intensive lamb production in Kuwait hot arid condition. The results also indicate that autumn mating season was the best in almost all traits studied.

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الأداء التناسلي للنعاج الكيوس تحت نظام الإنتاج المكثف في الكويت

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أجري هذا البحث في محطة تجارب الأغنام بالهيئة العامة لشئون الزراعة والثروة السمكية بالكويت. حيث أستخدم عدد ٥٦ نعجة كيوس مستوردة من قبرص لدراسة الأداء التناسلي في ثلاث مواسم تلقيح خلال سنتين (الصيف-الشتاء-الخريف). وفي كل موسم تلقيح تم تقسيم النعاج الي ثلاثة مجا ميع بكل منها ١٨-٢٠ نعجة ووضع كبش نعيمي محلي مع كل مجموعة في بداية كل موسم ولمدة ٤٥يوم.

وتم تسجيل عدد النعاج الوالدة وعدد الحملان المولودة والمفطومة (عند عمر شهرين) ووزن عند الميلاد ووزن عند الفطام.

تم حساب نسب الخصوبة ومعدل الولادات وعدد الحملان المولودة لكل نعجة والدة ونسبة الحملان المفطومة وحجم الخلفة (فردي-توائم-ثلاثي) وأوزانها عند الميلاد وعند الفطام وذلك في المواسم الثلاثة. وقد تم فحص عدد ١٤نعجة ملقحة في موسم الصيف (مايو-يونيو) بالمنظار الضوئي لقياس معدل التبويض وعدد المواليد ومن الفرق بينهما تم حساب معدل فقد البويضات. وتم تحليل البيانات إحصائيا وكانت النتائج كما يلي:

كان المتوسط العام لنسب الخصوبة وعدد الحملان المولودة لكل نعجة والدة ومعدل الولادات ومعدل الحملان المفطومة للنعاج تحت الدراسة هي ٥٤,٧٦، ٢١٩,٥٧، ١٢٠,٢٤، ٦٨,٥٧% علي التوالي. وكانت النتائج المتحصل عليها في موسم تلقيح الخريف تمثل أفضل القيم حيث أظهرت النعاج الكيوس وبشكل معنوي أعلي نسبة في الخصوبة (٦٣,٧٩%) ومعدل الولادات (١٣٩,٦٦%) ومعدل الفطام (١٠٠%). بينما في موسم تلقيح الصيف أظهرت النعاج وبشكل معنوي أعلي نسبة في عدد الحملان المولودة لكل نعجة والدة (٢٢٥%) ونسبة النعاج الوالدة أكثر من اثنين (٧٨,٥٧%). وكان معدل التبويض ومعدل المواليد ومعدل الفقد في البويضات للنعاج تحت الدراسة ٢,٩٣، ١,٨٥، ١,٠٧ علي التوالي. وكان المتوسط العام لوزن الميلاد ووزن الفطام ٣,٦١، ١٩,٣٨كجم علي التوالي وبدون اختلافات معنوية بين المواسم الثلاثة في وزن الميلاد. وكانت الحملان المولودة فردي أثقل معنويا عند وزن الفطام (٢٢,٦٥كجم) عن الحملان المولودة توائم أو ثلاثية (١٩,١٥، ١٦,٣١كجم) على التوالي. وكان هناك تأثير واضح للموسم حيث كانت أثقل وزن فطام (٢٢,٦١كجم) في الحملان المولودة موسم الصيف وكان أخف وزن ميلاد (١٧,٩٢كجم) في الحملان المولودة في موسم الخريف.

توضح النتائج مقدرة نعاج الكيوس المستوردة علي إنتاج أكثر من اثنين حمل تحت نظام الإنتاج المكثف في بيئة الكويت الحارة وأن موسم تلقيح الخريف كان الأفضل في معظم القياسات تحت الدراسة.