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 ewe lamb (prolificacy), lambs born per ewe joined (lambing rate) and lambs weaned per ewe 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 ovum 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 (Guneely, 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 breed 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 Naemini rams. The information available on the reproductive performance of this breed and their crosses with local Naemini 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 Naemini 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 cornerstone in planning 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.

<table>
<thead>
<tr>
<th>Trait</th>
<th>Mating seasons</th>
<th>Overall mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of ewes joined</td>
<td>56</td>
<td>54</td>
</tr>
<tr>
<td>Number of ewes lamb</td>
<td>28</td>
<td>27</td>
</tr>
<tr>
<td>Number of lambs born</td>
<td>63</td>
<td>58</td>
</tr>
<tr>
<td>Multiple births (%)</td>
<td>78.57</td>
<td>70.37</td>
</tr>
<tr>
<td>Ewe fertility (%)</td>
<td>50.00</td>
<td>50.00</td>
</tr>
<tr>
<td>Ewe prolificacy (%)</td>
<td>225.0</td>
<td>214.81</td>
</tr>
<tr>
<td>Lambing rate (%)</td>
<td>112.5</td>
<td>107.41</td>
</tr>
<tr>
<td>Weaning rate (%)</td>
<td>68.18</td>
<td>31.82</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Trait</th>
<th>Lambing season</th>
<th>Overall mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Autumn</td>
<td>Summers</td>
</tr>
<tr>
<td>Birth weight(Kg)</td>
<td>3.64±0.12</td>
<td>3.56±0.18</td>
</tr>
<tr>
<td>Litter size:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>4.47±0.20</td>
<td>3.95±0.33</td>
</tr>
<tr>
<td>Twin</td>
<td>3.62±0.17</td>
<td>3.31±0.25</td>
</tr>
<tr>
<td>Triplet</td>
<td>2.83±0.23</td>
<td>3.42±0.40</td>
</tr>
<tr>
<td>Weaning weight(Kg)</td>
<td>17.92±0.75</td>
<td>22.16±1.48</td>
</tr>
<tr>
<td>Single</td>
<td>19.64±1.30</td>
<td>27.32±3.37</td>
</tr>
<tr>
<td>Twin</td>
<td>17.35±1.40</td>
<td>21.00±2.86</td>
</tr>
<tr>
<td>Triplet</td>
<td>16.77±1.11</td>
<td>18.17±1.57</td>
</tr>
</tbody>
</table>

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 Cheminea (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 zarai bi 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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الاء التناسلي للنواج الكيوب تحت نظام الإنتاج المكثف في الكويت

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3. الهيئة العامة للتنمية الزراعية والثروة السمكية بالكويت.

أجري هذا البحث في محطة تجارب الأغذية بالهيئة العامة للتنمية الزراعية والثروة السمكية بالكويت.

حيث استخدم ناوجي 150 ناقة كوب، مسترودة من قبائل لدرسة الآداء التناسلي في ثلاث مواسم تتبغي خلال
ستين شهر (الصيف-الخريف). وفي كل موسم تتبغي ثم تم قياس النواج في ثلاثة ملايين مع بكلاً منها 30-35
نامة. ووضع كل ناقة في مجمعة مع كل مجموعه في بداية كل موسم وفترة 15 يوم.

وتتبغي النواج بطريقة ميلاء وتربو والثروة المثلية والعلماء (عند أسرة شهرين) ووزن النواج.

ووزن النواج.

وولد ناوجي نسبة الخصوبة ومعمل الولادة وعدد الحملات المولدة لكل ناقة ونامة والثروة المثلية والعلماء (عند أسرة شهرين) الأفريقي-الأمريكية، ووزن النواج.

وقد تم استعمال ناوجي بعد ناوجي بتم ناوجي، ووزن النواج. ووزن النواج.

وفرد ناوجي عدد الناوجات، ووزن النواج.

لقد تم استعمال ناوجي بعد ناوجي بتم ناوجي ووزن النواج.

وتتعرّض الناوجات، ووزن النواج.

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وقد تم استعمال ناوجي بعد ناوجي بتم ناوجي ووزن النواج.