FACTORS AFFECTING PROLIFICACY AND FERTILITY TRAITS FOR LOCAL AWASSI SHEEP AND IRANIAN KARAKUL AND THEIR CROSSES

Murtada Abbas Hamad Al-Sharify and Hafed Mossa Ali Altaei
Agriculture College, Al-Qasim Green University, Babylon, Iraq.

Abstract

The study was conducted in one of the fields belonging to Barakat Abi Al-Fadl Al-Abbas station belonging to Al-Kafeel General Investments Company for Abbasia threshold office. in the holy Karbala province, on 120 ewes, 40 rams and 2 rams for each genetic group (local Awassi, Iranian Karakul and local Awassi x Iranian Karakul). The ages of the ewes ranged from 2-5 years during the study period from 1 May 2019 to 30 December 2019 for studying the effect of some factors, such as breed, mother age, mother weight and month of birth on the traits of fertility and prolificacy rate at birth. The breed showed a significant effect (P <0.05) on the fertility average, where the local Awassi and crossing ewes group (88.10% and 83.24%) compared to (72.54%) for Karakul ewes. The results showed a significant effect on the mother's age and recorded the highest fertility percentage for ewes at the age of 4 years. While there was no significant effect of the month birth on the fertility percentage. The breed showed a significant effect (P <0.05) on the prolificacy rate at birth where it recorded (1.14, 1.06 and 1.11), respectively. The mother age showed a significant effect (P <0.01), where the highest fertility percentage was 1.18 for ewes at 4 years, and it was found that the mother weight had a significant effect (P <0.05), where the highest average of 1.13 for ewes with a weight of 45-50 kg was recorded, while no significant effect appeared. The month of birth in prolificacy rate at birth. We conclude from this study to know the effect of both the genetic factors represented by the genetic group and the non-genetic factors represented by the mother's age, the mother's weight, and the month of birth on some traits of the reproductive performance of sheep (fertility and prolificacy rate).

Keywords: Prolificacy, fertility, local Awassi sheep, Iranian Karakul

Introduction

Awassi sheep form 58.2% of Iraq’s sheep, and they are of three-purpose breeds, producing meat, wool, and milk (Al-Barzinji and Othman, 2013). It is the main breed in the countries of the Middle East and has a high tolerance to harsh environmental conditions and its productivity and reproductive traits vary depending on the environment and the region in which you live (Salman and Abdalla, 2014). Reproductive efficiency is one of the main pillars in sheep production due to its direct impact on biological efficiency and its role in genetic improvement. As increasing them will lead to an increase in the number of lambs produced annually, which is one of the main factors and important in determining the income in the flock breeding, as well as the increase in the number of available lambs, will increase the electoral difference, which will positively reflect on the expected genetic improvement (Al-Taei, 2002). Awassi sheep breed is distinguished in the production of high-quality meat, so its breeding has spread to research centers in some European countries and Australia despite its low reproductive performance (Gursoy, 2011). They were included in genetic improvement programs for the purpose of raising their production efficiency of meat and milk, and Attempts were crossing with foreign breeds to obtain breeds Bearing desirable Awassi specification while improving its reproductive performance. As in the crossing Awassi with the East Friesian breeds to produce the Assaf breeds, however, the results of the crossing showed that the Assaf was less adaptable than the Awassi and needed to be placed in intensive breeding conditions (Epstein, 1985). The aim of the current study is to compare the reproductive performance of the local Awassi breed and the Iranian karakul and its crossing (Awassi x Karakul) represented in the studied traits (fertility and prolificacy rate) and the factors affecting them (breed, mother weight, mother's age and month of birth) on the animals under study.

Materials and Methods

Experiment animals

The study was conducted in one of the fields belonging to Barakat Abi Al-Al-Fadl Al-Abbas station belonging to Al-Kafil General Investments company for Abbasia threshold office. in the holy Karbala province for the period from May 1, 2019 to December 30, 2019. The study included (120) ewes of different types, weights and ages, divided into three groups, the first group includes (40) local Awassi ewes, (40) Iranian Karakul ewes and (40) crossing ewes between (Awassi x Karakul) and ranged in age from (2-5) years.

Animal management and feeding

The animals are housed in semi-open enclosures (40% roofed and 60% open) dedicated to harboring them, where the area of the barn reaches 50m x 20m, and there are feeders and waterers along the length of 15 and 30m respectively, and the ewes are placed in their especially housed (20m x 5M), The flock is managed according to a program that includes feeding, preparing for the season of mating and preparing for the stages of pregnancy and childbirth, as well as health and veterinary care. The feeding program for animals included allowing them to graze from eight o'clock in the morning until two o'clock afternoon in the winter, but in the summer the animals graze from eight o'clock in the morning until twelve o'clock in the afternoon, then return again to the pasture at four o'clock until seven o'clock in the evening for a distance ranging from (0.5 - 3)km on available weeds and grain harvest residues and green feed available alfalfa depending on the season. It is provided with concentrated feed whose chemical composition contains (10%) Crude protein, consisting of (52%) wheat and barley bran (40%), soybean content (5%), limestone (2%), and food...
salt (1%) at an average of 250 g / Day/animal. It also provides hay to animals, with the presence of molds of salts and the presence of free water in a freewheel. The female nutritional payment was made about two weeks before the reproductive season and about four weeks before birth and during the lactation period, where the feed intake amounted to 1000 g / day/animal and divided into two morning and evening meals. The animals at the station were subjected to a health program that includes spraying the housed with pesticides for parasites or antiseptics, examining the animals periodically, and vaccination against communicable diseases, as well as dosage against liver and intestinal worms.

**Mating season**

The ewes were benefited during the reproductive season, which started from 1/6 to 21/7 (three rut cycles). All the ewes were numbered and weighed before the start of the reproductive season, then they were divided into three Genetic groups according to the breeds and two rams were inserted for each group.

**The studied traits and the factors affecting them**

**Studied traits**

1. Percentage of Fertility = number of aborted and birthing ewes/number of ewes exposed to ram x 100
2. The percentage of prolificacy at birth = number of the resulted born/number of born ewes

**Influencing factors:**
1. The breed(genetic group)
2. The mother’s weight when mating
3. Mother’s age
4. Month of birth

The Statistical Analysis System -SAS (2012) was used in data analysis to study the effect of the genetic group and some fixed factors on reproductive efficiency indicators studied according to the mathematical models below. The Least square means method was applied within the General Linear Model-GLM to compare the significant differences between the averages as well as the Duncan (1955) polynomial test. The first mathematical model: the effect of the genetic groups, the ewe age, the ewe weight and the polynomial test. The first mathematical model: the effect of the genetic groups, the ewe age, the ewe weight and the polynomial test. The first mathematical model: the effect of the genetic groups, the ewe age, the ewe weight and the polynomial test.

\[ Y_{ijklm} = \mu + G_i + A_j + W_k + O_l + e_{ijklm} \]

Where:
- \( Y_{ijklm} \): the value of viewing m.
- \( \mu \): general average for the trait.
- \( G_i \): effect of treatment i (1 = local Awassi, 2 = karakul, 3 = crossing (local Awassi*karakul).)
- \( A_j \): effect of the age of the ewe j (2, 3, 4 and 5 years).
- \( W_k \): effect of ewe weight k (1 = less than 45 kg, 2 = 45-50 kg and 3 = more than 50 kg).
- \( O_l \): Effect of ewe month of birth (November and December).

**Table 1:** Comparison of the genetic groups of sheep studied in the indicators of reproductive efficiency

<table>
<thead>
<tr>
<th>Genetic group</th>
<th>Minimum squared mean ± standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>Local Awassi</td>
<td>40</td>
</tr>
<tr>
<td>Karakul</td>
<td>40</td>
</tr>
<tr>
<td>(crossing) Karakul *local Awassi</td>
<td>40</td>
</tr>
</tbody>
</table>

The averages that have different letters within one column differ significantly among between them (P <0.05)*, NS: not significant

**(ii) Mother's age**

The results in Table (2) showed that the mother's age had a significant effect (P <0.01) in the fertility percentage, where the ewes that were 4 years old (88.97%) excelled on the ewes at the age of 2 and 5 years (70.40% and 80.96%), respectively, in the proportion Fertility and mathematically excelled on the ewes at the age of (3) years, whose fertility percentage was (84.85%). These results were consistent with the findings of (Al-Rawi et al., 2002), who indicated that the fertility percentage increases with the age of the sheep and that the highest fertility percentage is at the age of (4-5)
years. Al-Shammari et al. (2013) found that the highest fertility percentage of (74.05 and 82.45%) was recorded at ages (3 and 4) years, respectively. The current study did not agree with the findings of (Al-Khazragi et al., 2014; Trabzon and Ozturk, 2019) who found no significant effect on the mother’s age on fertility.

**Table 2: Effect of ewe age on studied reproductive efficiency indicators**

<table>
<thead>
<tr>
<th>Age(year)</th>
<th>Minimum squared mean ± standard error</th>
<th>prolifacit rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>fertility percentage</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>70.40 ± 10.61c</td>
</tr>
<tr>
<td>3</td>
<td>29</td>
<td>84.85 ± 7.96ab</td>
</tr>
<tr>
<td>4</td>
<td>32</td>
<td>88.97 ± 6.99a</td>
</tr>
<tr>
<td>5</td>
<td>34</td>
<td>80.96 ± 8.14b</td>
</tr>
<tr>
<td>Level of significance</td>
<td>---</td>
<td>**</td>
</tr>
</tbody>
</table>

The averages that have different letters within one column differ significantly among between them (P <0.01)**

The mother’s weight when mating

The mother’s weight when mating had a significant effect (P <0.01) (Table 3) on the fertility percentage, where the ewes, whose weights reached more than 50 kg (89.60%), were significantly excelled on ewes with weights less than 45 kg and 45-50 kg (80.92), 73.36%, respectively. The results of the study were convergent to the findings of studies, including (Al-Attar, 2001 and Al-Sayegh et al., 2002), who indicated a direct relationship between body weight when mating and fertility. Abdurasulov et al. (2018) also explained that the fertility percentage increases with the ewe weight when mating and the best fertility percentage was at a weight of (50-55) kg and the lowest fertility percentage at a weight of (40-45) kg. The higher fertility percentage of ewes, whose weights reached more than (50) kg, is due to their ability to feed transformation efficiency, which led to the recovery of their weights, the improvement of the body's condition, and its association with increasing the rate of ovulation and fertilization with increasing their weights (Abdel Rahman, 1996). The results of the study were not consistent with (Fukui 2010 et al.), which indicated that there was no significant effect of ewe weight when mating in its fertility.

**Table 3: The effect of sheep ewe weight when mating of the studied reproductive efficiency indicators**

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Minimum squared mean ± standard error</th>
<th>prolifacit rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>fertility percentage</td>
</tr>
<tr>
<td>Less than 45 kg</td>
<td>59</td>
<td>80.92 ± 6.13b</td>
</tr>
<tr>
<td>45-50 kg</td>
<td>23</td>
<td>73.36 ±8.54b</td>
</tr>
<tr>
<td>More than 50 kg</td>
<td>38</td>
<td>89.60 ± 9.24a</td>
</tr>
<tr>
<td>Level of significance</td>
<td>---</td>
<td>**</td>
</tr>
</tbody>
</table>

The averages that have different letters within one column differ significantly among between them. (P<0.05)* , (P <0.01) ** , NS: non significant.

(iv) Month of birth

The differences were not significant between the two months of birth on the fertility percentage. Table (4). The results showed that the fertility percentage during the month of November was (77.83%).

While the percentage showed (84.77%) during the month of December and the results were consistent with what was reported by studies (Yavuzer, 2005 and Abd-Allah et al., 2011) which indicated that there was no significant effect between the months of birth and the fertility percentage.

**Table 4: The effect of ewe birth month on the studied reproductive efficiency indicators**

<table>
<thead>
<tr>
<th>Birth Month</th>
<th>Minimum squared mean ± standard error</th>
<th>prolifacit rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>fertility percentage</td>
</tr>
<tr>
<td>November</td>
<td>79</td>
<td>77.83 ± 4.86</td>
</tr>
<tr>
<td>December</td>
<td>41</td>
<td>84.77 ± 6.59</td>
</tr>
<tr>
<td>Level of significance</td>
<td>---</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS: non-significant

Factors affecting prolificacy

(i) Genetic group:

Table (1) indicates the presence of a significant effect (P <0.05) of the genetic group on the prolificacy percentage at birth, where the local Awassi ewes group significantly excelled on the prolificacy traits of 1.14 births/mother ewes on the group of Karakul ewes 1.06 births/mother ewes and computationally with the crossing ewes group 1.11 Mother/ewe, noting that the striking ewe group is mathematically excelled in this trait to the Karakul ewe group. The results of the current study of the local Awassi group were convergent to its findings (Ajil and Isqaq, 2013 and Al-Sayegh et al., 2015). The prolificacy rate for the Karakul ewes group was convergent to their findings (Florea et al., 2015 and Florea et al., 2017). The results of the crossing ewe group were convergent to those of Kiyazad et al. (2003). The reason due to the excelled of the prolificacy trait of the local Awassi ewes is its ability to reproduce throughout the year (Al-Wahab et al., 1982) as well as its ability to repeat births (Al-Attar, 1978) in addition to its adaptation to the prevailing environmental conditions in Iraq.
and to the frequent selection of the flock on several years. Which reflected positively on the increase in the prolificacy rate compared to the two groups of Karakul and genetics crossing.

(ii) Mother’s age

It was found in Table (2) that the age of the ewe when mating was a significant effect (P <0.01) on the prolificacy rate, where it reached the highest prolificacy rate (1.18) in favor of ewes at 4 years old and the lowest rate in favor of ewes at 2 years (1.01) and the prolificacy rate for ewes 3 and 5 years old (1.09 and 1.14), respectively. The results of the study were consistent with what some researchers indicated that there was a significant effect of the age of the sheep in the prolificacy rate at parturition (Al-Shammari et al., 2013; Al-Khazraji et al., 2014). The reason for the high prolificacy rate in ewes at the age of (4-5) years is due to the complete maturity of the animal and the size of the abdomen and uterus in these ewes to the maximum level (Al-Essawi, 2010 and age, 2017).

(iii) The mother’s weight when mating

Table (3) indicates that the weight of the ewe when mating has a significant effect (P <0.05) on the prolificacy rate, where the fertility percentage reached (1.13) for ewes mating has a significant effect (P <0.05) on the prolificacy rate at birth, Table (4). The results showed consistency with what some researchers indicated that there was a significant effect of sheep weight when mating on the prolificacy rate at birth, Table (4). The results showed that the prolificacy rate during the month of December showed the results agreed with what indicated by studies (1.11), while the ratio (1.09) during the month of November that the prolificacy rate during the month of November that the prolificacy rate at birth, Table (4). The results showed consistency with what some researchers indicated that there was a significant effect of sheep weight when mating on the prolificacy rate at birth.

(iv) Month of birth

The month of birth did not have a significant effect on the prolificacy rate at birth, Table (4). The results showed that the prolificacy rate during the month of November (1.11), while the ratio (1.09) during the month of December showed the results agreed with what indicated by studies (Moura et al., 2014 and Banah et al. (2020) where they did not notice any significant effect between the months of birth and the prolificacy rate at birth.

References


Factors affecting prolificacy and fertility traits for local Awassi sheep and Iranian karakul and their crosses


