Plant Archives Vol. 20, Supplement 2, 2020 pp. 4126-4130 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

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 ewes and 2 rams for each genetic group (local Awassi, Iranian Karakul and local Awassi × 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 had 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 freeway. 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 month of birth on the studied traits:

$$Y_{ijklm} = \mu + G_i + A_j + W_k + O_l + {}^{e}_{ijklm}$$

Where:

Yij: the value of viewing m.

μ: general average for the trait.

Gi: effect of treatment i (1 = local Awassi, 2 = karakul, 3 = crossing (local Awassi*karakul,) .

Aj: effect of the age of the ewe j (2, 3, 4 and 5 years).

Wk: effect of ewe weight k (1 = less than 45 kg, 2 = 45-50 kg and 3 = more than 50 kg).

Ol: Effect of ewe month of birth (November and December).

eijklm: a random error that is normally distributed with an average of zero and a variation of σ2e

Results and Discussion

Factors affecting the percentage of fertility

(i) Genetic group

Through table (1), it was found that there was a significant effect (P <0.05) among the three genetic groups, where the two local Awassi ewes and ewes crossing were significantly excelled on Karakul ewes where they reached (88.10, 83.24 and 72.54%), respectively. The results of this study agree with Kridli *et al*. (2009) reached, where the fertility percentage for local Awassi ewes (89.7%), and similar Al-Khazragi *et al.* (2014) where the fertility percentage (88%). The results of the study showed that the fertility percentage was lower than that reached by Abdulkareem *et al*. (2014) (92.45%). The results of the study were higher than that of Al-Shammari *et al.* (2013), as the fertility percentage for local Awassi reached (69.82%). The results of the current study showed table (1) for the group of Karakul ewes less fertility than Pascal *et al*., (2009) in Romania where it reached (81.65%), and Erol *et al*. (2020) in Turkey as it reached (95.45%).The performance of the crossing ewes was close to what El-Fadili *et al*. (2000) attained in the fertility percentage, where it reached 86% for the crossing ewes D'man × Timahdit in Morocco and agree with Al-Taie (2002), as the fertility percentage in the Assaf racket reached (82.10%). The results of the study were lower than that of Kul and Kereker (2007), where the fertility percentage (97.5%) was due to crossing the two East Friesian × Awassi breeds.

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

Genetic group	Minimum squared mean ± standard error		
	Number	fertility percentage	prolificacy rate
Local Awassi	40	88.10 ± 7.32a	1.14 ± 0.07a
Karakul	40	72.54 ± 6.54b	1.06 ± 0.06b
(crossing) Karakul *local Awassi	40	83.24 ± 7.08a	1.11 ± 0.06ab
Level of significance	---	*	*
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

Age(year)	Minimum squared mean ± standard error		
	Number	fertility percentage	prolificacy rate
2	25	70.40 ± 10.61c	1.01 ± 0.10c
3	29	84.85 ±7.96ab	1.09 ± 0.07b
4	32	88.97 ± 6.99a	1.18± 0.06a
5	34	80.96 ± 8.14b	1.14 ± 0.07ab
Level of significance	---	**	**
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 several studies, including (Al-Attar *et al*., 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

Weight (kg)	Minimum squared mean ± standard error		
	Number	fertility percentage	prolificacy rate
Less than 45 kg	59	80.92 ± 6.13b	1.09 ±0.05b
45-50 kg	23	73.36 ±8.54b	1.13 ± 0.08a
More than 50 kg	38	89.60 ± 9.24a	1.09± 0.08b
Level of significance	---	**	*
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 the ewe birth month on the studied reproductive efficiency indicators

Birth Month	Minimum squared mean ± standard error		
	Number	fertility percentage	prolificacy rate
November	79	77.83 ± 4.86	1.11 ± 0.04
December	41	84.77 ± 6.59	1.09 ± 0.06
Level of significance	---	NS	NS
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 Ishaq, 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 Kiyanzad *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 postpartum (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 whose weights ranged from (45-50) kg, excelled on the two groups of ewes with a weight less than 45 and more than 50 kg, in which the ratio is (1.09 and 1.09), respectively. The results of the study showed consistency with studies (Ploumi and Emmanouilidis, 1999 and Ptacek *et al*., 2014) who indicated a significant effect of sheep weight when mating on the prolificacy rate. The increased prolificacy rate at birth in ewes with heavy weights when mating may be due to the fact that it has extensive wombs that provide a large space for the growth and development of the fetus during pregnancy, especially in the last period of it, as well as an increase in the number of cotyledons in the womb (Al-Azzawi and Al-Rawi, 1997).

(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 Baneh *et al*. (2020) where they did not notice any significant effect between the months of birth and the prolificacy rate at birth.

References

Abd-Allah, M.; Abass, S.F. and Allam, F. M. (2011). Reproductive performance of Rahmani and Chiose sheep and their lambs under Upper Egypt conditions. J. Anim. Feed Res., 1: 121-129.

Abdul Rahman, F.Y.A. (1996). Genetic parameters of some traits of reproductive performance in Awassi sheep. PhD thesis. College of Agriculture and Forestry. University of Al Mosul.

Abdulkareem, T.A.; Eidan, S.M.; Al-Maliki, L.A. and Mahdi, M.R. (2014). Reproductive performance of Iraqi Awassi ewes owned by sheep owners and extension farms in response to flushing and estrus synchronization regimes. The Iraqi Journal of Agricultural Sciences, 45(3): 328-334.

Abdurasulov, A.K.; Salykov, R.S.; Mamaev, S.S.; Gosteva, E.G. and Lakota, E. . (2018). The Influence of Various Factors on the Fertility of Multiparous Kyrgyz Sheep. Pharm. Sci. & Res., 10(7): 1795-1797.

Ajil, H.M. and Ishaq, M.A. (2013). The reproductive traits of local and Turkish Awassi sheep in semi-intensive breeding conditions. Iraqi Agricultural Science Journal, 44(5): 615-623.

Al-Attar, S.A.H. (1978). A study of more than one birth a year in Awassi ewes. Master Thesis. faculty of Agriculture. Baghdad University.

Al-Azzawi, W.A. and Al-Rawi, A.A. (1997). Repeatability estimates of some economic productive traits in Awassi: Sheep. IPA. J. Agric. Rec., 7(1): 78-86.

AL-Barzinji, Y.M.S. and Othman, G.U. (2013). Genetic polymorphism in FecB gene in Iraqi sheep breeds using RFLP-PCR technique. IOSR J. of Agri. and Vet. Sci., 2: 46–48.

Al-Essawi, A.A. (2010). A Study of Sex Chromatin Traits and Its Relation with Productive and Physiological Performance in the Awassi Sheep. M.Sc. Thesis, Coll. of Al-Musaib Technical.

Aleumr, A.; Rakbi, M.; Sultan, A. and Dibba, A. (2017). Some factors affecting the rate of twins in the Syrian Awassi sheep. Syrian Journal of Agricultural Research. 4(3): 29-37.

Al-Khazragi, W.J.; Al-Samurai, W.I. and Ajil, H.M. (2014). The effect of some genetic and genetic factors on the fertility and growth traits of Awassi sheep. Iraqi Agricultural Science Journal, 45(3): 268-263.

Alrawi, A.A. and Shujaa, T.A.L. (2002). The reproductive efficiency of ewes and ewes with their mixture under the system of repeated deliveries. Iraqi Agriculture Journal. 7(6): 73-84.

Al-Sayegh, M.N.; Al-Jalili, Z.F. and Haidar, F.N. (2002). Evaluation of the reproductive performance of Awassi female lambs using some hormonal systems. Al-Qadisiyah Journal of Veterinary Science. 1(2): 45-51.

Al-Sayegh, M.N.; Mansour, A.R. and Khalaf, S.S. (2015). The effect of melatonin hormone insertion on reproductive performance in Iraqi local ewes. Anbar Journal of Agricultural Sciences. 13(1): 174-183.

Al-Shammari, H.R.; Al-Dulaimi, M.K. and Al-Ghazali, B.N.K. (2013). The effect of maternal age and some biochemical traits on productive and reproductive performance in Awassi sheep. University of Karbala Scientific Journal, 11(2): 251-256.

Al-Taei, H.M.A. (2002). Two genetic groups of sheep respond to birth. PhD thesis - College of Agriculture - University of Baghdad - Iraq.

Al-Wahab, R.M.H.; Al-Murani, W.K. and Alkass, J.E. (1982). Some observation on the breeding season of the Awassi breed in Iraq. Wld. Rev. Anim. Prod, 18: 54-63.

Atti, N.; Theriez, M. and Abdennebi, L. (2001). Relationship between ewe body condition at mating and reproductive performance in the fat-tailed Barbarine breed. Anim. Res., 50: 135–144.

Baneh, H.; Ahmadpanah, J. and Mohammadi, Y. (2020). Genetic analysis of reproductive characteristics in Iran-Black sheep. Acta Scientiarum. Anim. Sci., 42(1):1-8.

Duncan, D.B. (1955). Multiple Rang and Multiple F-test. Biometrics, 11: 4-42.

El-Fadili, M.; Michaux, C.; Detilleux, J. and Leroy, P.L. (2000). Comparison of five crossbreeding types

involving Timahdit, D'man and improved terminal sire breeds of sheep: ewe reproduction, lamb survival and growth performance. Anim. Sci., 71(3): 435-441.

Epstein, H. (1985). The Awassi sheep with special reference to the improved dairy type. FAO. Animal production and health paper No. 57, Rome.

Erol, H.; Ozbeyaz, C. and Unal, N. (2020). Investigating various performance traits of Karakul sheep. Ankara Univ. Vet. Fak. Derg., 67: 113-120.

Florea, A.M.; Gh, H.; Nechifor, I.; Pascal, C. and Nechifor, C. (2015). Reproduction indices in the Botosani Karakul females and their evolution in the reproduction period. *Lucrari stiintifice, Seria Zootehnie*, 63: 44-51.

Florea, M.A.; Nechifor, I. and Pascal, C. (2017). Estimation of breeding activity for the Karakul of Botosani breed. Lucrari Ştiinţifice-Seria Zootehnie, 67: 67-72.

Fukui, Y.; Kohno, H.; Okabe, K.; Katsuki, S.; Yoshizawa, M.; Togari, T. and Watanabe, H. (2010). Factors affecting the fertility of ewes after intrauterine insemination with frozen-thawed semen during the non-breeding season. J. of Reprod. & Devel., (56)4: 460-466.

Gursoy, O. (2011). Awassi and its possible rural development role in Africa and Asia. Macedonian J. of Anim. Sci., 1(2): 305–316.

Kiyanzad, M.R.; Panandam, J.M.; Emamjomeh, K.N.; Jelan, Z.A. and Dahlan, I. (2003). Reproductive performance of three Iranian sheep breeds. Asian-Australasian J. of Anim. Sci., 16(1): 11-14.

Kridli, R.T.; Abdullah, A.Y. and Husein, M.Q. (2009). The effect of breed type and lactation status on reproductive performance in Awassi ewes. South African J. of Anim. Sci., 39(1): 54-60.

Kul, S. and Şeker, I. (2007). Fertility and wool properties in East Friesian× Awassi crossbred (F1) ewes. J. of Applied Anim. Res., 32(1): 73-75.

Moura, A.C.B.; Teixeira, P.P.M.; Coutinho, L.N.; Paz, C.C.; Santos, V.J.C.; Soares, F.N.; Oliveira, M.E.F.; Vicente, W.R.R.; Araujo, A.A. and Rodrigues, L.F.S. (2014). Reproductive performance of Santa Inês ewes during dry and rainy seasons in eastern Amazon. Anim. Reprod., 11(1): 44-48.

Pascal, C.; Ivancia, M.; Gilca, I.; Nacu, G.; Stancescu, L.; Hrinca, G. and Iftimie, N. (2009). Study about some factors which have influence about reproduction function in sheep. Sci. Pap. of Univ. of Agr. Sci. and Vet. Med. Iaşi–Fac. of Anim. Sci. Series Husbandry, 52: 467-474.

Ploumi, K. and Emmanouilidis, P. (1999). Lamb and milk production traits of Serrai sheep in Greece. Small Rumin. Res., 33(3): 289-292.

Ptacek, M.; Duchacek, J.; Stadnik, L.; Beran, J. and Stoloc, L. (2014). Effects of ewes' live weight and backfat thickness at mating on fertility and production performance in Suffolk shee p and their crosses. Bulg. J. of Agri. Sci., 20(5): 1261-1267.

Salman, M. and Abdallah, J. (2014). Evaluation of performance and estimation of genetic parameters for milk yield and some reproductive traits in sheep breeds and crosses in the West Bank. Tropentag, Prague, Czech. Republic: 17-19.

Trabzon, U. and Ozturk, A.B. (2019). Some Reproductive Characteristics of Hasak and Hasmer Sheep: 1. Some Fertil-ity Criteria. Selcuk J. Agr. Food Sci., 33(2): 94-98.

Yavuzer, U. (2005). The Possibilities of Twice-Yearly Lambing of Awassi Sheep Ewes without Using Hormones in an Organic Animal Production System. Turk. J. Vet. Anim. Sci., 29: 27-30.

.