A study of the reproductive performance of different breeds of sheep under the system of repeat births

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Abstract

The study was conducted in one of the fields of Barakat Abi Al-Fadl Al-Abbas station, affiliated to the Al-Kafeel Company for Private Investments of the Abbasid shrine in the holy province of Karbala for the period from April 1, 2021 to June 1, 2022. To study the possibility of repeat births for three groups of sheep and the effect of some genetic factors represented by the genetic group and non-genetic factors represented by the age of the ewe, the weight of the ewe at mating and the season of birth, on the fertility rate, fertile birth rate, fertility rate, barrenness ewes, abortion rate, birth rate and twins rate.The study included 60 ewes of three genetic groups, 20 local Awassi ewes, an Iranian Karakul, and an Iranian Karakul cross a local Awassi. The ages of the ewes ranged from 2-5 years, and their weights were less than 45 and 45-50- and more than 50 kg. The results showed the following:

DOI Number: 10.14704/nq.2022.20.12.NQ77095 **NeuroQuantology 2022; 20(12): 1150-1157**

Iranian and raccoon ewes, respectively .The age of the ewe had a significant effect (P≤0.05) on the fertility rate, and the ewes at the age of 5 years recorded the highest fertility rate as it reached 111.1%.The weight of the ewe at fertilization had a significant effect (P≤0.05) on the fertility rate, and the highest percentage was 114% for ewes with weights less than 45 kg. The genetic group had a significant effect (P≤0.05) on the fertility rate, where the Iranian Karakul sheep group, excelled on the Awassi and cross groups, and the percentages reached 72.5, 62.5 and 67.5%, respectively. The genetic group had a significant effect (P≤0.05) on the percentage of Hail ewes, as the percentages were 37.5, 27.5 and 32.5% for local Awassi, Iranian Karakul and cross ewes, respectively. The age of the ewe had a significant effect (P≤0.01) on the percentage of barrenness ewes, as the percentages reached 43.3, 41.6, 11.1 and 38.8% for ewes aged 2, 3, 4 and 5 years, respectively. The weight of the ewe at fertilization had a significant effect (P≤0.01) on the percentage of barrenness ewes, as the percentages reached 46.8, 27.5 and 26.6% for ewes with a weight less than 45, 45-50 and more than 50 kg, respectively.It became clear from the results of the study that the genetic group and the season of birth did not significantly affect the abortion rate.The age of the ewe had a significant effect on the abortion rate (P≤0.05), as the percentages reached 10, 5.5, 0 and 11.1% for ewes of age 2, 3, 4 and 5, respectively. The weight of the sheep at fertilization had a

1-The Iranian Karakul ewes group arithmetically excelled in Al-Awassi and Al-Mutarib ewes groups in the first and second seasons, as the number of ewes born in the first and second seasons was 26, 23 and 25%, respectively. 4 year-old ewes mathematically excelled in a repeat of births for the two seasons over ewes of 2, 3 and 5 years of age, with percentages of 32, 14, 19 and 9%, respectively. The weight of ewes from 45-50 kg is arithmetic in the repeat of births over ewes with weights less than 45 and more than 50 kg, as the percentages reached 40, 14 and 20%, respectively.The genetic group had a significant effect (P≤0.05) on the fertility rate, where the Karakul and the battered sheep outperformed by 65 and 62.5%, respectively, compared with 57.5% for Awassi ewes.The age of the ewe had a significant effect (P≤0.01) on the fertility and fertilization rates, as the 4-year-age ewes recorded the highest rate of 88.8% .It was found that the weight of the sheep at fertilization had a significant effect (P≤0.01) on the fertility rate, where it reached the highest percentage of 68.9% for ewes whose weights reached 45-50 kg, and the percentages reached 43.7 and 66.6 for ewes with weights less than 45 and more than 50 kg, respectively.The birth season had a significant effect (P≤0.01) on the fertility rate, as the first (autumn) season was superior to the second (spring) season, which amounted to 88 and 35%, respectively.The genetic group had a significant effect (P≤0.05) on the fertility rate at birth, as it reached 108, 100 and 104% for local Awassi,

eISSN 1303-515

different times of the year (Gomez et al., 2012). Awassi sheep are considered one of the most important sheep breeds in the countries of the Middle East and Iraq, and they constitute 58.2% of Iraq's sheep. They are three-purpose breeds that produce meat, milk and wool (Al-Zubaidi, 2013). It has a high ability to withstand harsh environmental conditions, and this strain differs in its reproductive and productive traits depending on the region and environment in which it lives (Haile et al., 2019). Reproductive efficiency is one of the mainstays in sheep breeding because of its direct impact on biological efficiency and its role in genetic improvement. As its increase leads to an increase in the number of lambs produced annually, which is one of the main and important factors in determining the income derived from the breeding herd (Al-Tai, 2002). Studies conducted on local sheep reported a decrease in reproductive efficiency (Al-Anbari et al., 2000). Therefore, improving reproductive efficiency is an entry point to increasing productive efficiency in sheep. The local sheep are characterized by their ability to reproduce throughout the year and their tolerance of harsh environmental conditions (Al-Rawi et al., 1997) Therefore, some researchers have mentioned the possibility of giving birth more than once a year or having three births within two years (Al-Rawi and Shuja'a, 2002). The Karakul sheep is one of the breeds that spread in Asian and African countries, which is characterized by having a fat tail. It is a medium-sized sheep resistant to harsh environmental conditions and bred to produce meat, milk and fibre. The Karakul has a long reproductive season with the possibility of giving three births in two years (Mirhoseini et al., 2015). The development of intensive production of sheep tends to vertical product with the aim of increasing the production of one head of sheep per unit time (Amin, 2003). Thomson et al., (2003) explained that the results of the fertility survey in the Al-Jazirah region in the northwest of Qatar, where the most significant number of Awassi sheep are found, are characterized by a low fertility rate of 60-70% and twins (2-9%.(The current study aims to determine the breed or significant effect (P≤0.05) on the abortion rate, where the percentages reached 9.3, 3.4 and 6.6% for ewes with weights less than 45, 45-50 and more than 50 kg, respectively.The genetic group did not significantly affect the birth rate.The age of the ewe had a significant effect (P≤0.01) on the birth rate, as the percentages were 46.6, 55.5, 91.6 and 55.5% for ewes aged 2, 3, 4 and 5 years, respectively.The weight of the ewe had a significant effect (P≤0.01) on the birth rate, as the percentages reached 50, 68.9 and 70% for ewes with weights less than 45, 45-50 and more than 50 kg, respectively.The genetic group had a significant effect (P≤0.01) on the percentage of twins, as the percentages were 8.6, 0 and 4% for local Awassi, Iranian and batting ewes, respectively.The age of the ewe had a significant effect (P≤0.01) on the percentage of twins, as the percentages were 0, 5.26, 3.1 and 11% for ewes aged 2, 3, 4 and 5 years, respectively.The weight of the ewe had a significant effect (P≤0.01) on the percentage of twins, as the percentages were 14.2, 0 and 5% for ewes with weights less than 45, 45-50 and more than 50 kg, respectively. the birth season had a significant effect (P≤0.01) on the proportion of twins, as the percentages reached 1.8 and 9.5 for the first and second seasons, respectively.

Keywords: reproductive performance, breeds, repeat births

Introduction :

The livestock sector is considered one of the most important agricultural sectors in Iraq, especially sheep production. This importance comes from the urgent need for its products for human consumption because it is one of the important and preferred sources of red meat in Iraq (Al-Rawi, 2011). Sheep are seasonal polyestrous animals. It shows a seasonal pattern in breeding to ensure the birth of lambs at the appropriate time for the environmental conditions of the year, represented in the appropriate temperature and the provision of food. The reproductive season of European sheep breeds usually begins at the end of summer or the beginning of autumn as a result of the response to the short day length. It ends at the end of winter or the beginning of spring. The breeding season is the most important challenge facing the sheep industry in the world, which makes the availability of animal products (meat and milk) take a noticeable seasonal pattern at

eISSN 1303-515

afternoon until seven in the evening. It grazes on the available weeds and the remnants of the grain harvest. Green and concentrated feed were provided to the animals and the concentrated feed whose chemical composition contains: crude protein (10%) and consists of (52%) of:

1- Wheat and barley bran (40%)

2- Soybean meal (5%)

3- Limestone (2%)

4- Table salt (1%) at a rate of 250 g / day / animal

The feeding of the females was conducted about two weeks before the breeding season, about four weeks before birth and during the lactation period, as the amount of concentrated feed reaches 1000 g / day/animal, divided into two morning and evening meals.

3-4 : health and veterinary care

The experimental animals were exposed to a health and prevention program that includes the necessary measures that preserve the safety and health of the experimental animals from infectious diseases and epidemics, as follows:

1- Monitoring rams prepared for fertilization and supervising them in terms of their safety and ability to fertilize, through:

A - Rams' hoofs tests

B - The presence or absence of joint diseases that may affect the process of benefiting.

C - Presence or absence of communicable diseases such as brucellosis, urinary tract infections or other diseases

2- Dipping the animals using a solution of bithroid-cypromethrin at a concentration of 10% twice a year (May and October) to eliminate diseases and external parasites

3- Preparing the barns for the purpose of receiving births for the new season by spraying them with pesticides or disinfectants to combat diseases and limit their spread.

4- Organizing a preventive program to vaccinate pregnant ewes in their last month, especially three weeks before birth, where they are vaccinated with Cephapix against Enterotoxaemia to transmit immune bodies to the fetus. As well as vaccinating the rest of the previously vaccinated and adult animals annually.

5- All animals are vaccinated with sheep pox vaccine during the month of March.

genetic group that responded to repeat births, in addition to determining the appropriate ages and weights that showed the most response to repeat births, and whether the local and imported breeds located in the al-Abbas (Iraq) threshold (Iraq) tend to reproductive seasonality or not.

Materials and Methods

3-1: Experimental animals

The study was conducted in one of the fields affiliated to the Barakat Abi Al-Fadl Al-Abbas Station Company, which is affiliated with the Al-Kafeel Company for Private Investments of the Abbasid shrine in the Holy Karbala province for the period from April 1, 2021 to June 1, 2022. The study included 60 sheep of different types, weights and ages divided into three genetic groups, the first group included 20 local Awassi sheep, the second group 20 Iranian Karakul sheep, and the third group 20 cross sheep (Krakoul × Awassi), their ages ranged from 2-5 years and their weights ranged from 30 kg to more than 55 kg.

3-2: Herd Management

The animals were distributed in semi-open pens (40% roofed and 60% open) designated to house sheep. The barn is 50m x 20m. These barns contain 15 and 30m long manholes and troughs, respectively.

Where the management of the herd was applied according to a program that includes feeding, preparation for the feeding season, preparation for the stages of pregnancy and childbirth, as well as the use of veterinary medicines and health care.

3-3 : Nutrition feeding

The animal feeding system depends on the program followed in the station. As the feeding varied on the available green feed (such as Medicago sativa and alfalfa) according to the season and the concentrated feed, mineral salt briquettes were also available with the presence of free water, and hay was provided to the animals in sufficient quantities. In winter, animals were allowed to graze from eight in the morning until two in the afternoon, while in the summer, the animals were released for grazing from eight in the morning until twelve in the afternoon, and then returned to the pasture at four in the

eISSN 1303-515

The second season includes the month of May

3-8: Statistical analysis

The statistical program Statistical Analysis System -SAS (2012) was used in data analysis to study the effect of different factors (genetic group, season, maternal age at birth and mother's weight at birth) on reproductive efficiency indicators studied according to a completely randomized design (CRD). The significant differences between the means were compared with the Duncan (1955) polynomial test (the rate of twins or fertility), while the significant differences between the percentages of all other reproductive efficiency indicators were compared with the Chi-Square test.

Mathematical model:

Yijklm = μ + Gi + Sj + Ak + Wl + eijklm

Since:

Yijklm: Viewing value l.

μ: the general average of the trait studied.

Gi: the effect of genetic group i (1= Awassi, 2= Karakul , 3= Mudarab).

Sj: the effect of j birth season (first-second).

Ak: the effect of maternal age at birth k (2, 3, 4, 5 years).

Wl: the effect of the mother's birth weight l (1 = less than 45 years, 2 = 45 to 50 kg, 3 = more than 50 years).

eijklm: the normally distributed random error with a mean of zero and a variance of σ2e.

Results and Discussion

4.1 Factors affecting the repeat of births

4-1-1: Genetic group

Table (4) showed that the number of births that were achieved during the trial period, which included two reproductive seasons, was 74 from 120 ewes, 23 for Awassi ewes, 26 for Karakul ewes, and 25 for bats. Divided 18 and 5 for the first and second seasons, respectively, for Awassi ewes, 18 and 8 for the first and second seasons, respectively, for Karakul ewes, and 17 and 8 births for the first and second seasons, respectively, for cross ewes. As for the barrenness ewes for the first season, there were 3 ewes of 2, 0 and 1 for Awassi, Karakul and cross ewes, respectively. In the second season, the number of barrenness ewes was 36, divided into

6- Dosing animals with fendex for the prevention of liver and intestine worms in March and April, and it is repeated 21 days after the first dose.

7- Vaccinating the herd with the Fever Mouth Disease-FMD vaccine during the month of May

8- Treating mastitis cases when it occurs.

3-5 : mating season

The mating season of ewes for the first season started on 1/5/2021. The rams that were selected and tested in advance were released with one ram per group (Awassi x Karakul and Karakul x Awassi) for a period of 51 days (three estrus cycles) after which the rams were isolated from the ewes and Monitoring the herd until birth After two months have passed, the same rams (second season) were re-launched to the sheep groups with the aim of mating the stranded ewes from the first mating season and the aborted ewes or those whose offspring died during childbirth or days after birth, as well as the possibility of reproduction for the parent ewes. Where the main objective of raising sheep herds is to obtain the birth of each sheep in the herd at least and then isolate the rams after 34 days and then monitor the herd until the birth.

3-6: The traits studied:

1- Fertility ratio = number of ewes born / number of ewes exposed to rams x 100

2- Fertility rate at birth = number of live births / number of ewes born x 100

3- Fertilization rate = number of birth and aborted ewes / total number of ewes exposed to rams x 100

4- Missing percentage = the number of barrier ewes / the number of ewes subjected to mating x 100

5- Abortion rate = number of aborted ewes / total number of ewes x 100

6- Birth rate = number of animals born / number of ewes exposed to rams x 100

7- The proportion of twins = the number of twin births / the number of females born x 100

3-7: The studied factors:

1- Breed: (local Awassi, Iranian Karakul, racket)

2- Age of the sheep: (2 to 5 years)

3- Ewe weight: (from 30 to more than 55 kg)

4- Season: The winter season includes the months of October and November

eISSN 1303-515

of 35%, representing the additional return from births, as two harvesting seasons were created per year instead of applying only the main season. This result was lower than what was mentioned by Al-Tai (2002) and higher than those who reached the mechanism of Al-Rawi and Shuja (2002) by introducing two breeding seasons per year, and the reason may be due to the difference in the variance between the three genetic groups and the environmental and administrative conditions between the two studies. In addition, it is clear that Awassi sheep show a kind of seasonality in breeding, while Karakul sheep and Awassi sheep in Karakul are less inclined to seasonality.

13, 11 and 12 for Awassi, Karakul and cross ewes, respectively.This means that the first season (autumn) is the best season for harvesting, unlike the second season (spring), and this study agrees with what Abd-Allah et al., (2011) and Sharifi, (2020), while it did not appear in agreement with Duricic et al., (2018).The number of aborted ewes in the first season was 4, 0, 2 and 2 for Awassi, Karakul and cross ewes, respectively. This study agrees with Gebretensay et al., (2019) and Sharifi, (2020). That there was no significant effect of the genetic group on the abortion rate.It is noted from the table that the number of births in the first season is 53, or 88.3%. As for the births of the second season, 21 births at average of 35%, and this means that there are 21 births at a rate

Table (4) The number of ewes exposed to fertilization and their reproductive performance under the system of repeat birth according to the genetic group

Traits	Awassi	Karakul	cross	total or average
Number of ewes exposed per season	20	20	20	60
number of ewes born from the first season	18	18	17	53
number of ewes born from the second season	5	8	8	21
number of barrenness ewes from the first season	2	0	1	3
number of barrenness Ewes from the second season	13	11	12	36
Number of aborted ewes for the first season	0	2	2	4
Number of aborted ewes for the second season	2	1	0	3
Number of births for the two seasons	23	26	25	74

age of the ewe for the first season was 53 births, 13, 17, 17 and 6 for ewes aged 2, 3, 4 and 5 years, respectively. As for the second season, there were 21 births divided into 1, 2, 15 and 3 for ewes aged 2, 3, 4 and 5 years, respectively. The number of Hail ewes for the first season was 5

sheep age

It is evident from Table (5) that the number of ewes exposed to fertilization for one season was 15, 18, 18 and 9 for ewes of 2, 3, 4 and 5 years of age, respectively. The number of births that were achieved during the experiment period for the

eISSN 1303-515

is clear from the table that the age of the mother has an effect on the number of births.As the young ewes (2 years) had the lowest births for the first and second seasons, and the reason may be due to irregular estrus cycles, short estrus period, low ovulation rate, and increased embryo death due to the fact that these ages are still in the process of development (Al-Sayegh and Al-Qass, 1992).This result was in agreement with the results of (Notter and Copenhaver, 1998 and Al-Tai, 2002).

ewes for ages 2, 3, 4 and 5 years, 2, 1, 1 and 1, respectively.As for the second season, there were 34 barrenness sheep, 11, 14, 3 and 6, for ages 2, 3, 4 and 5 years, respectively. It was noted from the table that the number of aborted ewes for the first season is 2 ewes for ewes that are only 5 years age. In the second season, 5 abortions, 3 and 2 were recorded in favor of ewes, aged 2 and 3 years, respectively.The total number of births divided by ages was recorded as 14, 19, 32 and 9 for ewes aged 2, 3, 4 and 5 years, respectively. It

Table (5) The number of ewes exposed to mating and their reproductive performance under the system of repeat birth according to the age of the ewe

Traits	2years	3 years	4 years	5years	total or average
Number of ewes exposed per season	15	18	18	9	60
number of ewes born from the first season	13	17	17	6	53
number of ewes born from the second season	1	2	15	3	21
number of barrenness ewes from the first season	2	1	1	1	5
number of barrenness Ewes from the second season	11	14	3	6	34
Number of aborted ewes for the first season	0	0	0	2	2
Number of aborted ewes for the second season	3	2	0	0	5
Number of births for the two seasons	14	19	32	9	74

and 13 for the three weights, respectively. In the second season, the mother ewes scored 2, 12 and 7 for the three weights, respectively. The number of barrier ewes in the first season was 2, 1, and 0 for ewes whose weights were less than 45 kg, 45-50 kg and more than 50 kg.The number of

ewe weight

It is clear from Table (6) that the number of ewes exposed to fertilization in one season is 16, 29 and 15 for ewes whose weights are less than 45 kg, 45-kg 50 and more than 50 kg, respectively. The first season recorded the birth rate of 12, 28

eISSN 1303-515

the lowest. barrenness and abortion, and this indicate that the good condition of her bodies led to a high rate of ovulation and then births, as well as her response to repeat births (Doney, 1981).

barrenness ewes in the second season was 13, 15 and 8 for ewes of three weights, respectively. It is clear from the table that ewes with weights of 45-50 kg were given the highest birth rate and

Table (6) The number of ewes exposed to fertilization and their reproductive performance under the system of repeat birth according to the weight of the ewes

Traits	less than 45	from 45-50	More than 50 kg	total or average
Number of ewes exposed per season	16	29	15	60
number of ewes born from the first season	12	28	13	53
number of ewes born from the second season	2	12	7	21
number of barrenness ewes from the first season	2	1	0	3
number of barrenness Ewes from the second season	13	15	8	36
Number of aborted ewes for the first season	2	0	2	4
Number of aborted ewes for the second season	1	2	0	3
Number of births for the two seasons	14	40	20	74

Amin, Hani Mohamed. 2003. Sheep production and care. Ministry of Agriculture and Land Reclamation - Agricultural Research Center. Central Administration of Agricultural Extension. Bulletin No. 806.

Abd-Allah, M., S. F. Abass and F. M. Allam (2011). Reproductive performance of Rahmani and Chiose sheep and their lambs under upper Egypt conditions. Journal Animal Feed Research, 1, 121-129.

Duricic, D., M. Benic, I. Z. Zaja, H. Valpotic, and M. Samardzija (2018). The effects of monthly air temperature and rainfall variations on the reproductive performance and lambing distribution of the Jezersko-Solcava sheep. International journal of biometeorology, 63 (2): 153-158.

References

Sharifi, Mortada Abbas Hamad (2020). The relationship of the genetic group and some fixed factors in reproductive performance in the local Awassi sheep and the Iranian Karakul and their racket. Master Thesis / College of Agriculture / Al-Qasim Green University.

Al-Tai, Hafez Musa Ali (2002). Response of two genetic groups of sheep to repeat parturition. PhD thesis - College of Agriculture - University of Baghdad - Iraq.

Alrawi, Abdul Razzaq Abdul Hamid and Taher Abdul Latif Shuja (2002). Reproductive efficiency of Awassi ewes and their mixtures under repeat parturition system. Iraqi Agriculture Journal. 7 (6): 73-84.

Al-Sayegh, Muzaffar Nafeh and Jalal Elia Al-Qass (1992). Sheep and goats production in Iraq. House of Wisdom Press. Albasrah university.

eISSN 1303-515

sheep and goats. Tropical and subtropical Agroecosystems, 15(S1).

Al-Zubaidi, K. A. F. (2013). Effect of addition of bread residues on the fattening of lambs Awassi diet on weight gains and body measurements for different periods. *Journal of the Babylon University for pure and applied sciences*, *21*(3), 1102-1108.

Haile, A., Hilali, M., Hassen, H., Lobo, R. N. B., & Rischkowsky, B. (2019). Estimates of genetic parameters and genetic trends for growth, reproduction, milk production and milk composition traits of Awassi sheep. *animal*, *13*(2), 240-247.

Al-Anbari, N. N., Al-Salman, M. H., Al-Kass, J. E., & Juma, K. H. (2000). Genetic analysis of body weights and dimensions of sheep. 2-6, 9 and 12 months of age. *IPA J. of Agric. Res*, *10*(1), 166-173.

Mirhoseini, S. Z., Zare, J., Hossein-Zadeh, N. G., Khanzadeh, H., Seidavi, A., Laudadio, V., ... & Selvaggi, M. (2015). Estimation of genetic parameters for body weight traits and pelt quality score in Iranian Karakul sheep. *Small Ruminant Research*, *132*, 67-71.

Thomson, E. F., Martini, M. A., & Tutwiler, R. N. (2003). Sheep management practices in Iraq, Jordan and Syria: the case of reproduction and fertility. *Technical Research Report Series*.

Gebretensay, A., G. Alemayehu, M. Rekik, B. Alemu, A. Haile, B. Rischkowsky, F. Aklilu, and B. Wieland (2019). Risk factors for reproductive disorders and major infectious causes of abortion in sheep in the highlands of Ethiopia. Small Rumin. Res. 177:1–9.

Notter , D.R. and J.S. Copenhaver. 1998. Performance of Finnish Landrace crossbred ewes under accelerated lambing. I- Fertility , prolificacy and ewe productivity. J. Anim. Sci., 76 : 1033-1042.

Doney, I.M. (1982). Nutrition and reproductive function in female sheep. In: Management and disease of sheep. The British Council Commonwealth Agriculture Bureau, UK, pp. 152-160.

SAS. 2012. Statistical Analysis System, User's Guide. Statistical. Version 9.1th ed. SAS. Inst. Inc. Cary. N.C. USA.

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

Al-Rawi, A. (2011). The relationship between the formal measurements of udder Turkish Awassi ewes produce milk and some of its components and their impact on the growth of lambs to weaning, MSC. Thesis, agriculture collage, Al-Anbar University.

Gomez-Brunet, A. G., Santiago-Moreno, J., Toledano-Diaz, A., & LApez-SebastiA, A. (2012). Reproductive seasonality and its control in Spanish