



# THE ROLE OF THE BREED AND SOME NON-GENETIC FACTORS IN THE TRAITS OF MILK PRODUCTION FOR LOCAL AWASSI EWES AND IRANIAN KARAKUL AND THEIR CROSSES

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## Abstract

This study was conducted on 90 ewes in the animal field of Al-Kafil station for Abbasia threshold office. in the holy Karbala province, Karbala - Najaf road / Iraq for the period from 15 April 2019 until 15 May 2020. The overall average daily and total milk production and length of lactation was 0.677 kg / day, 85.197 kg and 124.81 days, respectively and the genetic group had a highly significant effect ( $P < 0.01$ ) on daily and total milk production and the milk production curve during all study weeks. The group of Al-Awassi crossbred with karakul on both breeds, while there was no difference between the two breeds and their crossings in the length of the milking season. No significant effect of the month of birth was observed on the studied traits, despite the excelled for the ewes born in the month of November compared to the ewes during the month of December. The weight of the mother at birth had a significant effect ( $P < 0.01$ ) on the total milk production and the length of the milking season and ( $P < 0.05$ ) in the daily milk production and the milk production curve except for week 16 did not show significant differences due to the mother's weight, the mother's age showed a significant effect ( $p < 0.05$ ) in all studied characteristics except for the sixth and sixteenth week, The lamb sex had a highly significant effect ( $p < 0.01$ ) on daily and total milk production during the weeks (12 and 16), while ( $P < 0.05$ ) at the rest of the measurement weeks, as the ewes with male births, achieved excelled to the ewes with female births and lack of significant effect in length milk season, No significant sign of lambing type was observed in the studied traits except for the second week. And conclude from the study that the majority of the factors studied have an important impact on the traits of milk production, which requires studying it and determining its impact and attention to the administrative aspects of the herd to raise the level of performance and increase the economic return.

**Key words:** Awassi, karakul, milk production, milk production curve.

## Introduction

Local sheep are characterized by low production of meat and milk, which is due to genetic and environmental factors, due to the likelihood of their ability to live in harsh environmental conditions at the expense of productive traits. For the purpose of improving lamb breeding projects, important economic traits such as growth and milk production should be highlighted (Juma and AlKass, 2004), Awassi sheep are among the most common breeds in Iraq and play an important role in the lives of their citizens and their food security, where it is one of the most important sources of animal protein in meeting consumers' need for food through providing meat (40%) and milk (5%) as well as wool (50%) and leather (40%) (Al-Jailawi *et al.*, 2011) Despite this importance, it is still grown in Iraq that takes the traditional style, which made

its productivity of milk, which is an important source of nutrition and growth of new lambs (Al-Rawi, 2000), While studies indicated that local Awassi sheep could respond to genetic improvement to increase milk production (Al-Samarai and Al-Anbari, 2009), One of the sheep improvement programs in general and Awassi, in particular, was dependent on crossbreeding with imported breeds such as the Iranian Karakul, which were imported by Abbasia threshold office. in the holy Karbala province. The current study represents one of the crossing tests where it aims to improve the studied traits in the Awassi sheep breed, through studying the effect of the breed and some non-genetic factors (the mother's age, mother's weight, lamb sex, lambing type and the month of birth) on the traits of daily and total milk production, the milk production curve and the length of the milking period.

## Materials and Methods

The research was conducted in the animal field of Al-Kafil station for Abbasia threshold office. in the holy Karbala province - Najaf road for the period from 15/ April / 2019 until 15/May/2020 in which 90 ewes of different ages and weights were used. Births were concentrated during the months of November and December, The animals were raised in semi-open sheds designated to house the sheep and the herd was managed according to a program designed for the mating season and preparing for the stages of pregnancy and birth, Where the males were isolated from the herd with special sheds, they were given to the females in the mating season, which usually begins in the month of 6-5 after the females were isolated according to the breed and the introduction of the males to mating from Then, pregnant women were isolated before birth in special sheds and returned to the herd a week after birth. The herd is fed on the basis of a food program calculated according to the station system, As the feed varied between the concentrate and the green according to what is available in the field throughout the period of research, with the provision of mild's of mineral salts, it also provides crushed hay in sufficient quantities to meet the animal's need and its feeling of satiety. Clean water was provided to the animals in ponds inside the sheds and it was constantly renewed. Note that there is no continuous grazing of animals, but there is an annual grazing of animals that is at 4 days per week and for a period of only two months (February and March). As for feeding the new borns, they were left with her mother's until weaning, while eating small quantities of green feed and concentrated feed after two weeks of birth, which gradually increases with age.

As for health and veterinary care, all animals were subject to a health and preventive program in terms of periodic vaccines against germs that cause various diseases, as well as animals doses against internal and external parasites and spraying barns with special pesticides. The amount of milk produced from birth has been calculated until the ewe dries, after two weeks have passed, depending on the morning ring, As the lamb are isolated from their mothers at eight in the evening, Then the measurement is taken on the following morning 12 hours after the isolation process, after which they weighed the lambs and left with her mother's to breastfeed for a period of (15 minutes), then weighed the lambs again and the difference in weight is the amount of milk consumed by the pregnancy, after which the ewes were completely emptied to ensure that the udder was completely emptied of milk and weigh the amount of milk,

then add to the difference between the two weights. by multiplying the amount of milk produced  $\times 2$ , daily milk production is obtained (Boujenane and Lairini, 1992). These measurements were taken every two weeks periodically until the ewe dried up and total milk production was calculated by multiplying the average daily milk production by the length of the milking season (ICAR, 1992). The data were statistically analyzed using the Statistical Analysis System -AS (2012). To study the effect of the genetic group and some fixed factors on the length of the milking season, total daily milk production and the milk production curve and the significant differences between the averages were compared to the Duncan, (1995) multi-range test by applying the Least square means test according to the General Linear method. Model-GLM) according to the mathematical model below:

$$Yijklmno = \mu + G_i + A_j + W_k + O_l + T_m + S_n + eijklmno$$

Yijklmno: the value of viewing 0.

$\mu$ : general average for the trait.

$G_i$ : Effect of the genetic group (Awassi, Karakul and crossing).

$A_j$ : the effect of the mother's age at birth (2, 3, 4 and 5 years).

$W_k$ : effect of mother's weight at birth (less than 45 kg, 50-45 kg and more than 50 kg).

$O_l$ : Effect of the month of birth (November and December).

$T_m$ : effect of type of birth (single and twin).

$S_n$ : effect of the lamb sex (male, female).

eijklmno: a randomly distributed random error with an mean of zero and a variance of  $e^2$ .

## Results and discussion

### Factors affecting on daily milk production

#### • Genetic group:

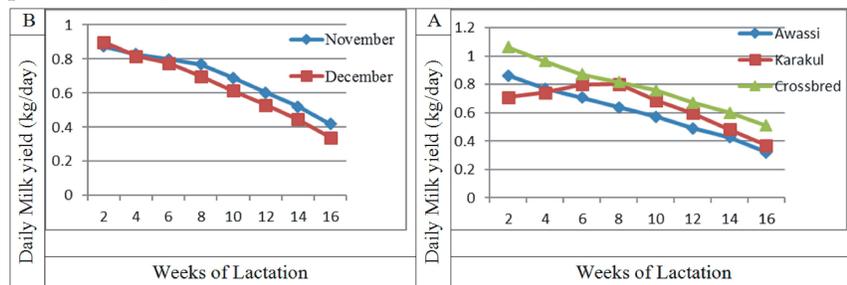
The overall average daily milk production for non-genetic groups in our study was 0.677 kg / day and it is clear from table 1 that the Genetic group had a significant effect ( $P < 0.05$ ) in daily milk production where the crossbred ewes group excelled the Awassi and Karakul breeds, while the Awassi group recorded the lowest average in daily milk production it reached 0.599. It is higher than what Al-Dabbagh, (2019) 0.414 kg / day and agreed with Al-Jawari, (2005) found 0.569 kg / day and less than what the narrator, (2011) got 0.724 kg / day. While the average production of Karakul ewes in the study was 0.650, which is lower than that of Turganbaev and Bekbaev, (2019) 1.00 kg / day, The results of the

current study agreed with Abdel Nour (2011) and the reason for this may be that the hybridization between breeds process shows the state of the hybrid vigor, Hashem and EL-Zarkouny, (2016) have indicated the significant effect of the breeds on daily milk production and otherwise no significant effect of the breeds on daily milk production (Alkass and Akrei, 2015) was observed. lamb sex and the type of birth: The results of the research showed a significant effect ( $p < 0.01$ ) of the lamb sex in daily milk production, table 7. Its gave ewes with male and female births (0.718 and 0.625 kg / day), respectively. The reason for this may be that the udder stimulates more milk production due to the greater size of males compared to females. This is consistent with Raouf *et al.*, (2017), who noted a significant excelled of ewes with male births on ewes with female births. The results of the statistical analysis did not show any significant effect of the type of childbirth on daily milk production and this is consistent with what Abdel-Nour, (2011); Al-Barzanji and Abd Al-Rahman, (2012) did not notice in their study on Hamdian ewes a significant effect of the type of childbirth on daily milk production.

The lack of the effect of the type of birth on daily milk production may be due to the low number of observations for twin births compared to single births, as well as the cases of Mortality that accompanied twin births, thus reducing the difference between the two types of birth. This result was in contradiction to what Samurai *et al.*, (2015).

• **Age and weight of the mother at birth:**

It is clear from table 7 that the age and weight of the mother have a significant effect ( $P < 0.05$ ) in daily milk production, where the ewes at the age of 4 years were significant in the daily milk production by 0.57 kg on the ewes at the age of 2 years and computationally on the ewes at the age of 3 and 5 years old. The ewes excelled in the weight of more than 50 kg by 0.112 and 0.070 kg on the ewes with a weight of less than 45 and 50-45 kg due to the increase in daily milk production with the increase in the age of the ewes to a certain extent due to the development of the milk system responsible for milk production (Abdullah and Hassan, 2008). It also



**Fig. 1:** Shape of Lactation curve according to A: Genetic group; B: Month of birth.

**Table 1:** Least Squares (mean±SE) For Effect Of Genetic Group and Non-Genetic Factors on Daily Milk Yield (kg/Day).

Factors	No.	Mean ± S.E
Overall mean	90	0.01 ± 0.677
Breed		**
Awassi	30	0.02 ± 0.599 b
Karakul	30	0.02 ± 0.650 b
Crossbred	30	0.02 ± 0.782 a
Weight of dam at lambing (kg)		**
Less than 45	24	0.02 ± 0.625 c
45-50	39	0.02 ± 0.667 b
More than 50	27	0.03 ± 0.737 a
Age of dam (year)		*
2	18	0.03 ± 0.587 b
3	16	0.03 ± 0.690 a
4	28	0.02 ± 0.702 a
5	28	0.02 ± 0.702 a
Sex of birth		**
Male	50	0.02 ± 0.718 a
Female	40	0.02 ± 0.625 b
Taype of birth		NS
Single	80	0.01 ± 0.678 a
Twine	10	0.06 ± 0.670 a
Month of birth		NS
November	70	0.01 ± 0.688 a
Decembar	20	0.04 ± 0.640 a

\*( $p < 0.05$ ), \*\*( $p < 0.01$ ), NS( $P > 0.05$ ) Least Squares mean with same superscript in the same column indicate non significance.

accompanies an increase in the size of the gut and the utilization of feed, which has a positive effect on daily milk production (Al-Khalisi, 1996). This result is consistent with Turganbaev and Bekbaev, 2019. Otherwise, Merkhan, (2014) found that in his study no significant effect of maternal age on daily milk production. The results of the study agree on the significance of the mother’s weight in daily milk production with Al-Qudsi and Ibrahim, (2014) in his study on improved Awassi sheep, where it found a positive and highly significant direct correlation between the mother’s weight and milk production reached 0.41.

• **The birth month:**

The study results did not show any significant effect of the birth month on daily milk production (Table 1). The reason that the differences did not reach the level of significance between the two months may be due to that the months of testes in which the study was conducted (November and December) within the autumn months, in this period, the animals are distinguished by their high

ability to produce milk, as well as to the administrative conditions followed, the results of this study agreed with the findings of Alhamd, (2009), which did not notice any significant effect of the month of tests on daily milk production, while the results of the current study differed with the results of Al-Samarai *et al.*, (2015).

**Milk production curve**

**• Genetic group:**

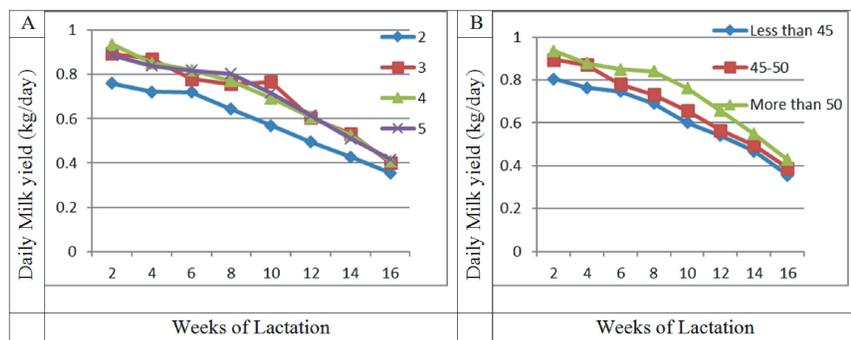
The breed showed a significant effect ( $p < 0.05$ ) and for all study weeks (Table 13). Where the ewes of the Awassi crossbred with Karakul surpassed all weeks of study on the Awassi and Karakul breeds, while the Karakul breed drew a production curve higher than the Awassi breeds in all weeks except for the second week in which the production curve of the Awassi breeds was higher and this is similar to the result of Al-Jawari, (2005) in his study of Awassi sheep, as he emphasized that milk production in the Awassi breed begins to rise during the first and second week and then begins to decrease gradually until the end of the production period. The significant differences in the production curve can be explained to The emergence of a state of hybrid strength, unlike Awassi ewes, who live in conditions of natural selection and not having access to processes and genetic improvement for a long time.

**• Month of birth:**

The results of the study showed the significant effect of the month of birth ( $p < 0.05$ ) during the weeks (16, 14, 12), while milk production during the weeks (10-2) was not significantly affected by the month of birth and these results are similar to those reached by Abdel Latif, (2017), which indicated that Milk production was affected by the mother’s age during all measurement periods except for the 75-day period. The results of the study were consistent with the results of Al-Qudsi and Ibrahim, (2014).

**• Age and weight of the mother:**

The results of the study showed the significant effect



**Fig. 2:** Shape of Lactation curve according to A: Age of dam (year); B: Weight of dam (kg).

**Table 2:** Least Squares (mean±SE) For Effect Of Genetic Group and Non-Genetic Factors on Total Milk Yield (kg).

Factors	No.	Mean ± S.E
Overall mean	90	2.57 ± 85.197
Breed		**
Awassi	30	4.01 ± 76.335 b
Karakul	30	4.21 ± 80.840 b
Crossbred	30	4.20 ± 98.415 a
Weight of dam at lambing (kg)		**
Less than 45	24	3.75 ± 72.460 b
45-50	39	3.38 ± 82.689 b
More than 50	27	5.09 ± 100.141 a
Age of dam (year)		*
2	18	5.06 ± 70.173 b
3	16	6.21 ± 88.541 a
4	28	3.93 ± 87.705 a
5	28	5.02 ± 90.435 a
Sex of birth		**
Male	50	3.60 ± 91.611 a
Female	40	3.25 ± 77.179 b
Taype of birth		NS
Single	80	2.66 ± 85.236 a
Twine	10	9.54 ± 84.880 a
Month of birth		NS
November	70	2.84 ± 86.618 a
Decembar	20	5.91 ± 80.223 a

\*( $p < 0.05$ ), \*\*( $p < 0.01$ ), NS( $P > 0.05$ ) Least Squares mean with same superscript in the same column indicate non significance.

of the mother’s age ( $p < 0.05$ ) during all study weeks except for the sixth and sixteenth weeks, which did not significantly affect the mother’s age. These results are similar to those reached by Abdel Latif, (2017). It was found from the research results that there was a significant effect of the mother’s weight on the curve of milk production by the excelled of the ewes with a weight of more than 50 kg significantly ( $P < 0.05$ ) in all weeks on the ewes with other weights except for the sixteenth week did not show the mother’s weight a significant effect in milk production during it. This is consistent with Sultan and Muhammad, (2019) found, which indicated a

significant effect ( $p < 0.05$ ) of the mother’s weight at birth on the milk production curve during all study weeks.

**• The lamb sex and the lambing type:**

From the table of analysis of variance, no significant effect was observed on the lambing type in the milk production curve except for the second week. The ewes with twin births excelled on the ewes with single births

significantly ( $p < 0.01$ ) by 0.16 kg/day. In a study conducted by Abdel Latif, (2017), the milk production curve was affected by the lambing type and this effect was significant ( $p < 0.05$ ) on days 30 and 75 and high significance ( $p < 0.01$ ) on day 45 of production, while there were no significant differences due to the lambing type during the days 15, 60 and 90. The results showed that there was a significant effect ( $p < 0.05$ ) of the lamb sex in the production curve during the weeks (10-2 and 14) and a highly significant effect ( $p < 0.01$ ) during the two weeks (12 and 16) and this is consistent with Al-Barzanji and Abdel Rahman, (2012), where lamb sex had a significant effect on the milk production curve, where the lactating ewes of males excelled in their milk production, while the lamb sex did not constitute a significant effect on the milk production curve during all measurement periods (Abdel Latif, 2017).

**The factors affecting total milk production**

**• Genetic group:**

The overall mean production of total milk for study ewes during the lactation period was 124.81 days, reaching 85.120 kg. The genetic group had a highly significant effect ( $p < 0.01$ ) on total milk production, where production averages were 76.336 80.841 and 98.415 kg for the Awassi and Karakul breeds and the Genetic group, respectively, where the Genetic group excelled the Awassi and Karakul breeds, this variation in total milk production, due to the different genotypes, may be due to the emergence of a state of hybrid strength. This finding is consistent with what Al-Samarai *et al.*, (2014). Haile *et al.*, (2017), in his study of five Genetic groups, did not find any significant effect of the breed on total milk production.

**• The lamb sex and the lambing type:**

The effect of the lamb sex significantly in the production of total milk ( $P < 0.01$ ), where the group of ewes born to male excelled on the group of ewes born to the female by 14.432 kg and the reason for this excelled in total milk production due to the difference in sex may be due to the amount of milk Consumed by males

compared to females during the period from birth to weaning and the ability of males to stimulate their mothers to produce milk (Al-Taie, 2002) and this result is consistent with Raouf and Balisany, (2016).

It is clear from table 2 that there was no significant effect of the lambing type on total milk production, where the mean of total milk production from ewes with single and twin births reached 85,236 and 84,880 kg, respectively. The reason for the absence of a significant effect of the lambing type on total milk production may be due to the low number of observations for twin births, in addition to the death of one of the twins. This finding is consistent with Abdel Nour, (2011) found.

**• The birth month:**

It was found from table 2 that the month of birth of lambs did not significantly affect total milk production despite the excelled in favour of November births by 6.395 kg. This result agrees with Abdel-Nour, (2011) and Al-Samarai *et al.*, (2014) found that the month of birth had a significant effect on total milk production. The reason is due to that the most months studies fall within the autumn season and hence there is no significant variation in environmental conditions.

**• Age and weight of the mother at birth:**

It is clear from table 2 that there is a significant effect of the mother’s age and the mother’s weight on total milk production, where it gave the ewes at the age of 5 years the highest production of 90.436 kg compared to the production of ewes at the age of 2 years (70.174) kg.

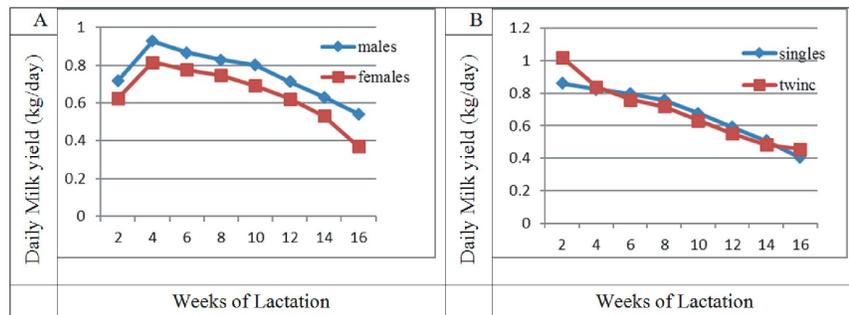
The ewes in the weight category excelled 50 kg, with a difference of 27.68 and 17.45 kg, on the weight groups (less than 40 and 50-40) kg, respectively. The reason for the increase in the productivity of adult and heavier ewes may be due to the complete development of the udder and the mammary glands where the animal is at its best productive conditions, in addition to the increase in the weight of the mother due to the increase in the size of the gut. This result agrees with Reiad *et al.*, 2010; Al-Samarai and Al-Anbari, 2009 and Samurai *et al.*, 2015).

On the other hand, Abdel latif, (2017) did not find any significant effect of the mother’s age on the production of total milk.

**Factors affecting the length of the milking season:**

**• Genetic group:**

From the data analysis table, no significant effect of the genetic group on the length of the milk season was



**Fig. 3:** Shape of Lactation curve according to A: Sex of lambs; B: Type of birth.

**Table 3:** Least Squares (mean ±SE) For Effect Of Genetic Group and Non-Genetic Factors on Lactation Period (Day).

Factors	No.	Mean ± S.E
Overall mean	90	1.31 ± 124.81
Breed		NS
Awassi	30	2.20 ± 126.5 a
Karakul	30	2.34 ± 123.20 a
Crossbred	30	2.30 ± 124.7 a
Weight of dam at lambing (kg)		**
Less than 45	24	2.25 ± 115.91 c
45-50	39	1.54 ± 123.38 b
More than 50	27	1.99 ± 134.77 a
Age of dam (year)		*
2	18	1.96 ± 119.16 b
3	16	2.72 ± 127.18 ab
4	28	2.62 ± 124.42 a
5	28	2.51 ± 127.46 a
Sex of birth		NS
Male	50	1.80 ± 126.46 a
Female	40	1.87 ± 122.75 a
Taype of birth		NS
Single	80	1.43 ± 124.75 a
Twine	10	3.11 ± 125.3 a
Month of birth		NS
November	70	1.54 ± 124.98 a
Decembar	20	2.48 ± 124.20 a
*(p< 0.05), **(p<0.01), NS(P>0.05) Least Squares mean with same superscript in the same column indicate non significance.		

observed, except for an increase in favor of Awassi ewes and this result agrees with kass Al-Akreiyi, (2015) and Haile *et al.*, (2017). While this result differed with that of Selvaggi *et al.*, (2016), it indicated the significant effect of the genetic group on the length of the milking season as the Leccese breed achieved the shortest feeding period of 156 days compared to the Comisana and Sarda breeds (182 and 178 days), respectively.

• **The lamb sex and the lambing type:**

No significant effect of the lamb sex on the length of the milking season was evident from table 3. The results of the current study were also consistent with Al-Samarai and Al-Anbari, (2009), AlKass and Akreyi, (2016) who did not notice a significant effect of the lamb sex on the length of the milking season. The study did not show any significant effect of the lambing type on the length of the milking season and the results of the study are consistent with the results of (Raof and Balisany, 2016; Abdel Latif, 2017).

• **The month of birth:**

The results did not show any significant effect of the month of birth on the length of the milking season, table 3 and this is consistent with the results of Abdel-Nour,

(2011) in his study on Awassi local and Turkish sheep. Otherwise, Al- Samurai *et al.*, (2015) indicated the significant effect of the month Birth in the length of the milking season.

• **The age and weight of the mother at birth:**

Table 3 that there is a significant effect of the mother’s age on the length of the milking season, where it gave the ewes at the age of 5 years the longest period of lactation amounted to 127.464 days compared to the ewes at the age of 2 years 119.16 days. It is noted from table 3 that the weight of the mother has a highly significant effect (P <0.01) on the length of the milking season and this may be due to the development of ovaries for ewes with a heavy body weight, which led to a good development of the mammary gland and most of the development of the mammary gland occurs significantly during sexual maturity, where during the sexual maturity, there is a proliferation of secretory cells (Norgaar *et al.*, 2008).

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