Comparison of AWASSI sheep lambs livability at effects of genetic and environmental factors

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Abstract

Viability of Local and Turkish AWASSI sheep lambs where compared at weaning, 6, 9, and 12 months of age in order to study the effects of the parents breed, sex, birth type, age and interaction among them for the years 2009, 2010, 2011, sheep records of Agriculture research state board – sheep station in Baghdad, were analyzed, which its account were 1218, 1199, 1190, 1163 at weaning, 6, 9, 12 months of age respectively. Study result appeared that the parents breed was significant (p˂0.01), to the Turkish lambs from the weaning to one year of age. while the parents age were significant (p˂0.05) at 6, 9 months and high significant (p˂0.01) for lambs livability at 12 months of age, while parents sex and birth type effects were not significant at lambs livability at any period from weaning to one year of age. Highest livability of lambs were for parents of 4 years old that reached 90.738%, 89.976%, 89.685%, and 88.887% while the lowest lambs livability were for parents of 8 years old that reached 77.777%, 76.736%, 76.736%, 61.111% at weaning, 6, 9, and 12 months of lambs age respectively. Interaction between parents breed and age was significant (p˂0.05), for lambs livability, only at the age of 12 months, while all the other interactions were not significant.

Key words: Livability, AWASSI lambs, Parents, Breed, Environmental factors.

1.Introduction

AWASSI sheep possess high potentials for improvement, their weights and almost all of their economic traits display overwhelming ranges, but their adaptation to the conditions of the country is at the expense of important economic traits [1]. Livability affected with several genetic and environmental factors and considered one of the important economic factors affecting sheep production efficiency [2, 3, 4, 5, 6]. Genetic factor represented by the breed of the sheep has a clear influence on lambs livability, therefore utilization of genetic variation is necessary to increase profits, of marketed lambs, requires information concerning differences in performance components among breeds. [7] studied the Effects of service sire on prenatal mortality and prolificacy in ewes and found that The main effects of breed type on lambs born were not significant, but breed types of both service sires (P < 0.0002) and ewes (P < 0.001). Effects of ewe breed were studied by many researchers whom found it high significant on lambs livability, [8, 9, 10, 11, 12, 13, 14, 15]. Ewe age is also an important environmental factor with a high effect on lambs livability, which also studied by considerable researches and found it with a high significant effect on lambs livability [16, 17]. However, the efforts to increase lambs livability are still exist. The present study was conducted to estimate the influence of parents sheep breed (Local and Turkish AWASSI), age, sex, birth type and interactions among studied factors on lambs livability from birth to one year of age, and to determine the optimal management procedures that should be provided in order to increase lambs livability in difficult cases that require the farmer assistance.

2.Materials and Methods

Research was achieved at the Agriculture research state board – sheep station in Baghdad, SHE’LAA (30 km west of Baghdad), data of the production records were analyzed, which its account were 1218, 1199, 1190, 1163 at weaning, 6, 9, 12 months of age respectively, for the years 2009, 2010, 2011. Statistical analysis system SPSS-20 was used, with the current mathematical model:

$$Y_{dijkl} = \mu + Bd + Si + Tj + Pk + (B \times S)_{di} + (B \times T)_{dj} + (S \times P)_{ik} + (T \times P)_{jk} + (B \times S \times T \times P)_{dijk} + e_{dijkl}$$

Were:

$$Y_{dijkl}$$ : observation value for lambs livability at weaning, 6, 9, 12 months of age.
Bd : Breed of parents (local AWASSI - Turkish AWASSI)

Si : parent’s sex ( RAMS – EWES)

Tj : parent’s birth type( single – twine)

Pk : parent’s age ( rams and ewes ) from 2 to 8 years.

(B×S) : interaction between parent’s breed and sex

(B×T) : interaction between parent’s breed and birth type.

(B×P) : interaction between parent’s breed and age.

(S×T) : interaction between parent’s sex and birth type

(S×P) : interaction between parent’s sex and age.

(T×P) : interaction between parent’s birth type and age.

(B×S×T×P) interaction among parent’s breed , sex, birth type and age.

edijkl : Standard error value which distribute normally with mean equal zero and variation equal $\sigma^2$.

3. Herd Management

Rams and ewes were prepared for mating season by feeding breeding stock with concentrate feed ( 500 gr/ head) until the last six weeks of gestation, which consists of 10% Barley, 40% barn, 37% Maize, 10% Soybean, 3% minerals mixture. Green forage ( Alfa alfa and other green forage), were served due to the season of the year. Pigments were fixed on teasers chest, in the beginning of mating season to determine the ewes with estrus in order to isolate then in breeding chambers for natural mating by breeding rams. Lambs were weighted at birth, numbered and join their dams to ensure their obtaining on colostrum. Health procedures were done at station by vaccination schedule and treatments against parasites.

4. Results and Discussion

Parents Breed . Genetic factor represented by the breed of the sheep had a clear influence on lambs livability in each period of lambs life from weaning to12 months of age, the effects of breed were high significant (p>0.01) for lambs livability at weaning age, 6, 9, and 12 months of age for the Turkish AWASSI sheep lambs that reached 91.708%, 90.722%, 90.439%, and 88.664% respectively in opposite of 79.324%, 78.045%, 77.163%, and 71.073% for Local AWASSI sheep lambs livability at weaning, 6, 9, and 12 months of age respectively table 1. That noticeable differences between Local and Turkish AWASSI sheep in the livability of their lambs comes from that the Turkish AWASSI sheep breed is heavier in weight than the Local AWASSI sheep breed in all the stages of the growth from birth to the mature body weight, that’s mean accumulated effects on lambs livability hence the lambs with higher birth weight tend to be more healthy in comparison with lambs of low birth weight, in addition to the differences between the two breeds in milk production, which is higher in Turkish AWASSI sheep breed , Figure 1.
Figure 1. Effects of parents breed on lambs livability from weaning to 12 months of age.

These differences between the Turkish and Local AWASSI sheep, in body weight and milk production, come from that the Turkish AWASSI sheep breed were improved very earlier than the improvement of the Local AWASSI sheep, these results are in general agreement with [18].

Parents age had a very important effect on lambs livability, which was significant (p<0.05) at 6 months and 9 months of age, and high significant (p< 0.01) for lambs livability at 12 months of age, while that effect was not significant for lambs livability at weaning age. Ewe age and ram age both had an effect on lambs livability, parents with 4 years had the highest lambs livability, that reached 90.738%, 89.976%, 89.654%, and 88.887% for lambs livability at weaning, 6, 9 and 12 months of age respectively, while parents of 8 years of age had the lowest lambs livability that reached 77.777%, 76.736%, 76.736% and 61.111% for lambs livability at weaning, 6, 9 and 12 months of age respectively, (table 1, 2), figure 2.

Figure 2. Effects of parents age on lambs livability from weaning to 12 months of age.

The effect of ewe age comes from that young ewes as in case of 2 years ewes, especially those of first lambing, are with weak experience in raring newborn lambs in addition to their low milk production in comparison with older ewes, while aged ewes (more than 7 years) tend to be more infected with diseases especially mastitis, in addition to their low production of milk as a result of the decrease in general health and difficulties in consuming forage due to their broken teeth. While the ewes of 3, 4, 5 years are with high lambs livability according to their experience in raring lambs and their high milk production due to their suitable general health. Similar results were reported by [19]. Number of lambs per ewe is not
necessary an indication on high lambs marketing. While the use of hormones to increase lambing were not significant on lambs livability in addition to its un favorable side effects, then depending on breed and management system will be a suitable option to increase lambs livability. [20]. Effects of parents sex and birth type were not significant as shown in table 1, 2 and figures 3, 4 respectively.

Table 1. Effects of parents breed, sex, birth type and age on lambs livability.

| STUDIED FACTORS | LAMBS LIVABILITY AT WEANING ±S.E. | LAMBS LIVABILITY AT 6 MONTHS ±S.E. | LAMBS LIVABILITY AT 9 MONTHS ±S.E. | LAMBS LIVABILITY AT 12 MONTHS ±S.E. |
|-----------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| BREED           | local               | 79.324 ± 2.163                   | 78.045 ± 2.168                   | 77.163 ± 2.161                   | 71.073 ± 2.134                   |
|                 | Turkish             | 91.708 ± 2.163                   | 90.722 ± 2.168                   | 89.439 ± 2.161                   | 88.664 ± 2.134                   |
| SEX             | ram                 | 85.410 ± 2.163                   | 84.161 ± 2.168                   | 83.473 ± 2.161                   | 79.318 ± 2.134                   |
|                 | ewe                 | 85.621 ± 2.163                   | 84.606 ± 2.168                   | 84.130 ± 2.161                   | 80.419 ± 2.134                   |
| BIRTH TYPE      | single              | 86.498 ± 2.163                   | 85.172 ± 2.168                   | 84.819 ± 2.161                   | 82.619 ± 2.134                   |
|                 | twin                | 84.533 ± 2.163                   | 83.595 ± 2.168                   | 82.784 ± 2.161                   | 77.118 ± 2.134                   |
|                 | 2 years             | 78.111 ± 4.047                   | 74.288 ± 4.055                   | 72.052 ± 4.042                   | 67.633 ± 3.992                   |
|                 | 3 years             | 90.399 ± 4.047                   | 89.612 ± 4.055                   | 89.400 ± 4.042                   | 87.182 ± 3.992                   |
|                 | 4 years             | 90.738 ± 4.047                   | 89.976 ± 4.055                   | 89.685 ± 4.042                   | 88.878 ± 3.992                   |
|                 | 5 years             | 90.255 ± 4.047                   | 89.206 ± 4.055                   | 87.870 ± 4.042                   | 86.624 ± 3.992                   |
|                 | 6 years             | 87.689 ± 4.047                   | 87.226 ± 4.055                   | 87.226 ± 4.042                   | 87.127 ± 3.992                   |
|                 | 7 years             | 83.640 ± 4.047                   | 83.640 ± 4.055                   | 83.640 ± 4.042                   | 80.515 ± 3.992                   |
|                 | 8 years             | 77.777 ± 4.047                   | 76.736 ± 4.055                   | 76.736 ± 4.042                   | 61.111 ± 3.992                   |

Table 2. ANOVA Table of the factors affecting lambs livability.

| Source of variance | D.F. | Lambs livability at 3months of age | Lambs livability at 6 months of age | Lambs livability at 9 months of age | Lambs livability at 12 months of age |
|--------------------|------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Breed              | 1    | 6440.819**                        | 6750.325**                        | 7402.273**                        | 12997.075**                       |
| Sex of parents     | 1    | 1.869                             | 8.317                             | 18.137                            | 50.853                            |
| Parents birth type | 1    | 162.093                           | 104.375                           | 173.931                           | 1270.995                          |
| Parents age        | 6    | 786.132                           | 1003.639*                         | 1129.002*                         | 2940.499**                        |
| Breed * Parents Sex| 1    | 3.056                             | 12.882                            | 15.738                            | 91.509                            |
| Interaction                          | Source DF | Sum of Squares | Mean Square | F-Value | p-value |
|-------------------------------------|-----------|----------------|-------------|---------|---------|
| Breed*Breed*Birth type              | 1         | 32.842         | 64.035      | 143.080 | 804.038 |
| Breed * Age                         | 6         | 174.286        | 196.944     | 275.972 | 830.618*|
| Sex * Birth Type                    | 6         | 110.322        | 117.970     | 112.504 | 762.157 |
| Sex * age                           | 6         | 211.009        | 343.743     | 408.096 | 657.118 |
| Birth type * Age                    | 6         | 66.276         | 61.806      | 41.214  | 347.041 |
| Breed*Sex*Breed*Birth type          | 1         | 125.356        | 190.124     | 195.221 | 425.835 |
| Sex*Birth type* Age                 | 6         | 47.812         | 25.983      | 42.326  | 429.876 |
| Breed*Sex*Birth type*Age            | 18        | 44.503         | 55.503      | 60.670  | 212.303 |
| Error                               | 112       | 3.93           | 3.94        | 3.92    | 3.82    |

* (p ≤ 0.05) ** (p ≤ 0.01)

**Figure 3.** Effects of parents sex on lambs livability from weaning to 12 months of age.

**Figure 4.** Effects of parents birth type on lambs livability from weaning to 12 months of age.
The interaction between parents breed and parents age was significant (p˂0.05) for lambs livability at 12 months of age, were the Turkish AWASSI sheep lambs livability reached 82.992%, 91.769%, 92.697%, 91.269%, 91.170% , 92.281% and 78.472% in comparison with 52.274%, 82.596%, 85.078%, 81.979%, 83.083%, and 68.750 % for AWASSI sheep lambs livability at 12 months of age , from the ewes of age 2, 3, 4, 5, 6, 7, and 8 years respectively. This interaction was not significant for lambs livability from weaning to 9 months of age as shown in figure (5) , while the other interactions were not significant as shown in table (1).

![Figure 5](image.png)

**Figure 5.** Effects of parents breed and age interaction on lambs livability from weaning to 12 months of age.

**Conclusion**

The results of this study give many conclusions about the effects of parents breed, sex, birth type and age on lambs livability. The breed and age of parents were significant while the other factors were not, therefore depending on genetic improvement by selection of breeds with high lambs livability and using the age grading program to the breeding herd, will secure obtaining lambs on milk and adequate raring since first hours of partum, and generally the management of the farm, especially in the partum period, has a great effect on increasing lambs livability.

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