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Comparison of Productive Performance for Body Weight and Wool Traits between Iraqi Sheep Breeds

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Abstract

This study was conducted at Khairat Al-Ittihad station in Al-Shumali district/Babil Governorate from 20/7/2023 until 1/4/2024, to study born weight and wool qualities of ewes in local sheep by (20) Awassi and (20) Al Nuaimi, and (20) Awassi crossing Naimi. The study aimed to compare three breeds of local sheep for the traits of ewe weight at birth, born weight, body weight, body dimensions, body length, body height, chest circumference, front height, abdominal circumference, body mass index, in addition to study trait of wool, the weight of the raw and clean wool, length of the tuft, length of the fiber, number of folds, softness of the fiber, tensile strength, elongation, the diameter of the fiber, fat ratio, and blood traits with regard to total protein, cholesterol, cholesterol, triglycerides and creatine. The results of the statistical analysis showed that there was a significant effect regarding the body length c traits of the Al-Awassi breed 69.25, 66.73, respectively, and their superiority over the Al-Naimi breed, and that the chest circumference was superior to the Al-Awassi, 105.100, over Al-Naimi 99.31, 100.26, respectively, and for the body mass index traits. There was a significant superiority in tensile strength, as Al-Naimi outperformed 1.28 over Al-Awassi 1.22 and 1.09, respectively. There was no significant effect of the breed on blood traits.

Keywords: Awassi sheep, birth weight, wool.

Introduction

Sheep are among the living organisms that have been known since ancient times across various regions of the world, as they represent an important source for the production of a large and diverse group of agricultural and food resources, not to mention their economic benefit, which includes meat, wool, and milk, in addition to leather, [1]. With regard to Iraq, it is noted that there is a large diversity of local sheep breeds, and among these breeds are the Awassi, Al-Hamdani and Al-Kradi, in addition to the Al-Naimi, as the Awassi breed is greatly distinguished by its ability to produce meat and wool with high efficiency [2]. There is a difference in born weights for local sheep, and this difference includes within the breed itself, and there are also individual differences that distinguish individuals within each breed [3]. These weights range from 1.5 to 6 kg [4]. Breeding and improvement programs are among the most important requirements for breeders, developing plans to obtain good results through studying and evaluating the production of lambs with distinctive specifications, helps save time and effort through valuable actual study according to fixed standards in order to obtain

sheep with economic traits and great endurance capacity to face Difficult environmental conditions [5]. As for the economic aspect, it is no less important, as achieving goals by companies has become more complex in light of the high economic value of meat when compared to wool [6]. And since the main goal of companies is to achieve profits from raising sheep, it is necessary to find ways to obtain economically profitable results through the reproduction of strong breeds that produce wool and meat [7]. In a study he conducted [8] expressed heritability estimates for annual and adult expression are of economically relevant traits in Uruguayan Merino sheep. Adult expression of the major wool traits, fiber diameter, wool fat weight and live weight were highly heritable, which is consistent with other Merino studies. [9] stated in his study at the College of Agriculture in Erbil on the effect of the breed on the economic traits of local ewes that there is a highly significant effect of the breed on some economic traits, including wool, as his mother excelled in milk production over the Kuradi and Awassi, and with regard to wool, the wool weights reached The raw material for the Awassi, Al-Karadi, and Al-Mama Sh. ewes were

1.829, 2.220, and 2.585 kg, respectively, where the Al-Mama Sh. ewes outperformed. He pointed out ^[10] in his study of estimates of the components of common variance, phenotypic and genetic traits of growth traits and wool traits in Alpine Merino sheep, showed that there is a significant effect of breed on wool traits: pre-weaning growth rate, post-weaning growth rate, annual body weight, average fiber diameter, Fat wool weight, clean wool weight, production, annual wool staple length, coefficient of variation of average fiber diameter and number of wool visual accuracy were 0.30, 0.18, 0.18, 0.20, 0.29, 0.20, 0.19, 0.20, 0.35, 0.19, 0.16 and 0.13, respectively.

The aim of the study is to compare three breeds of local sheep (Al-Awassi, Al-Naimi and their counterparts) in terms of born weight, body weight and dimensions of the ewes, and measure the productive and physical wool traits and blood traits of the ewes.

Materials and Methods

The study was carried out at Khairat Al-Ittihad station in Al-Shumali district in Babil Governorate for the period from 7/20/2023 until 4/1/2024, to study born weights and wool traits of ewes in local sheep by (20) Awassi, (20) Al-Nuaimi, (20) Awassi crossing Naimi. born weight was measured approximately 12 hours after birth using a special scale to measure born weights. Ewe weight were also weighed and cleaned after birth with a scale with a capacity of 120 kg.

The body dimensions of the ewe were measured after giving birth using a ruler and measuring tape, and the measurement includes chest circumference, body length, front height, abdominal circumference, butt height and according to the method ^[11]. Wool samples were taken. From the experimental animals from the right side of the ewes, from the end of the ribs. They were considered homogeneous gave similar readings, and were placed on the surface of the animal. A 20-30 g sample of wool was taken and placed in a special bag on which the animal's number and sex were recorded. After that, naphthalene was added, which preserves the wool sample until analysis begins according to ^[12].

The sheep were sheared at the beginning of April using special electric machines. They were weighed on a sensitive scale, and the animal's number and even the weight of the wool were recorded. A wool sample was taken, weighed on a sensitive scale, and then washed with warm water. 55ml containing a non-ionic detergent for 5 minutes to remove dust and dirt, in addition to stirring and squeezing, then washing it with water to remove traces of the detergent and leaving it for 24 hours to dry, then washing it with regular gasoline for 5 minutes to dissolve the fatty materials and leaving it to dry for 24 hours again. The sample is then weighed to calculate the clean weight of the sample. After that, the ratio of clean wool and the clean weight of the wool is estimated according to the following equations:

$$\text{Ratio of clean wool \%} = \frac{\text{Clean sample weight}}{\text{Raw sample weight}} \times 100$$

Clean wool weight = ratio of clean wool x raw wool weight ^[13,14] The length of the fiber in the wool was measured. It was measured for each fiber separately using the velvet plate to fix it and by (25 fibers/skein) and using the included ruler to measure in centimeters after stretching the fibers to obtain the actual fiber length. This method was used to calculate the general average based on previous research as stated in ^[15].

The diameter of the wool fiber was measured based on a measure of the softness of the wool fibres Fineness Meter ^[16]. The working mechanism of this device depends on the principle of constant air pressure through the resistance of the fiber to the air current depending on the surface area of the wool fibers of the wool sample.

The length of the strand was measured using a regular ruler, provided that it was not pulled or pulled from the base of the strand to the average of the pyramid forming the top ^[17] The measurement was taken manually, also using a ruler, for 5 random fibers belonging to several strands of the sample after securing them from both ends with special clamps to be tight and straight to adjust their true length.

To measure the number of folds or wrinkles in the fiber, the number of folds for each wool fiber was collected (25 fibres/skein) using the velvet board and a special graduated ruler to count the number of folds per centimeter. This method was used to extract the general average and was based on previous research as stated in ^[18].

The process of extracting the ratio of fat in unwashed wool is not carried out. A sample was taken from the wool of the shoulder, back and buttocks, with an amount of 1gm for each sample, then put in the fat estimation device by adding ethyl alcohol and running the device for 5 hours to extract the fat ratio, as alcohol is considered a good solvent for wax wool fat, and then extracting the fat ratio according to the following equation:

$$\text{Fat ratio} = \frac{\text{Weight of lost fat}}{\text{Weigh the sample before extraction}} \times 100$$

The data was statistically analyzed using statistical software SAS (Statistical Analysis System) ^[19] to study the comparison between sheep breeds and their effect on weights, body dimensions, and wool and blood traits of ewes. The test for significant differences between means was conducted using Duncan's multinomial test ^[20].

$$Y_{ijm} = \mu + B_i + e_{ij}$$

Y_j = observed value for genotype i.

μ = the overall average of the studied trait.

B_i = effect of strain (Awassi, Al-Naimi, Awassi crossing Naimi) on the studied traits.

e_{ijm} = the random error that is assumed to be randomly and normally distributed with a mean of zero and a variance of σ^2_{2e} .

Results and Discussion

Shown in there table (1) There is no significant effect of the breed on the traits ewe weight at birth, born weight, body weight, body length and height for all breeds (Awassi, Al-Nuaimi, Awassi x Al-Naimi), and these results were close to the study of ^[2] with no effect of the breed.

The study showed that there was no significant effect of breed on body weight, and this result agreed with ^[22-23] and disagreed with the study of ^[24], in which a significant effect was found on the body weight of Rashidiya lambs, with a difference of 6.08 kg from College lambs. This result was due to genetic differences as well as nutrition from one flock to another.

The study indicated that there was a significant effect on body length, as the two breeds (Al-Awassi, Al-Awassi and Al-Naimi) excelled. 69.25, 66.73 over the Al-Naimi breed 63.94.

This result was consistent with what was found by ^[21,23,24], where superiority was recorded in all traits for Al-Awassi, except for the chest circumference characteristic, while the result differed with what was found by ^[25], which indicated that there were no significant effects for this trait.

The study showed that there was a significant effect regarding chest circumference, as it witnessed the superiority of the Awassi breed over the Al-Naimi on the Awassi x Al-Naimi (105,100,99) cm. This result agreed with the study of ^[24,26]

which showed a significant superiority for this trait, while it differed with what was found by ^[21,27].

The results for abdominal circumference were non-significant for each of the studied breeds, with a mathematical difference found between them, but without any significant effect, and this was in agreement with ^[21]. While Al-Awassi BMI was significantly higher at 59.10 than Al-Naimi at 53.45, and Awassi crossing Naimi. 57.10.

Table 1: The effect of breed in body weight and dimensions (mean \pm standard error)

Breed	Awassi crossing Naimi	Awassi	Al Nuaimi
Ewe weight at birth/kg	49.29 \pm 1.93	52.31 \pm 1.79	49.72 \pm 2.91
Born weight/kg	4.28 \pm 0.14	4.43 \pm 0.13	7.49 \pm 3.11
body weight/ kg	57.21 \pm 1.70	59.1 \pm 1.98	54.26 \pm 1.76
Body length/cm	66.73 \pm 0.84 a	69.25 \pm 0.98 a	63.94 \pm 0.82 b
Body height/cm	76.05 \pm 0.78	79.20 \pm 1.00	77.47 \pm 1.64
Chest circumference/cm	100.26 \pm 1.36 ab	105.10 \pm 1.83 a	99.31 \pm 2.26b
Front height/cm	77.21 \pm 0.75	80.30 \pm 0.70	78.36 \pm 1.79
Abdominal circumference/cm	101.84 \pm 1.73	1.4.45 \pm 1.87	98.31 \pm 5.44
Body mass index	57.10 \pm 1.62 ab	59.10 \pm 1.98 a	53.45 \pm 1.62 b

The results are shown in there table (2) There were no significant differences in the weight of the raw wool and the weight of the clean wool for each of (Al-Awassi, Al-Nuaimi, Awassi crossing Naimi.) and this was different from a study conducted by ^[28,29] on a number of Awassi and Al-Hamdani sheep, where there was a high effect. The significance of the breed on wool weight, as Al-Hamdani performed Al-Awassi in raw wool weight by 0.363, which he attributed to genetic differences between the two breeds for wool production, not to mention the increase in body surface area ^[30]. The results were in agreement with ^[31] after their study on ewes. Al-Awasi and Al-Hamdani showed no significant differences in this trait.

Regarding the weight of the clean wool, the study showed that there were no significant differences between the breeds, as it was different from the study of ^[32] showed that there was a significant effect of the Awassi on the average wool wool weight, which amounted to 10.55 kg, and the superiority amounted to 0.494 kg regarding the weight of the four-Assaf wool wool. The reason was attributed to the production of more milk by the Assaf ewes than the local Awassi, which affected productivity. Wool, separated from the small size of the Assaf sheep ^[33], while this result was consistent with what ^[35] found that the local Awassi achieved a “significant superiority” ($P>0.01$) in wool weight of 85.1 kg over the Assaf quartet, 65.1. kg.

The study showed that there were no significant differences in the attribute of strand length for each of (Al-Awassi, Al-Nuaimi, Al-Awassi x Al-Nuaimi), as here there was a significant superiority of Al-Awassi over the Al-Assaf quartet ^[28] which found that there were significant differences in favor of Awassi sheep at the expense of Al-Hamdani, in addition to a study conducted by ^[35], as a result of the difference in genetic traits and also the size of the Awassi when compared to the quadrupedal Assaf. This matter was different from what ^[32] demonstrated in their study on sheep. Al-Awassi and Al-Assaf for the trait of fiber length. ^[31] After their study on Al-Awassi and Al-Hamdani ewes showed that there were no significant differences for this trait.

As for the fiber diameter in our study, it showed that there was no significant effect between the strains, and the results

were in agreement with ^[31] after their study on Al-Awassi and Al-Hamdani ewes, where it appeared that there were no significant differences for this trait. This differs from what ^[28] found in his study on local sheep (Al-Hamdani, Al-Awassi), where he found significant differences, and Al-Hamdani performed the Al-Awassi by a difference of 1.155 microns. The reason is due to the differences. The two genetics between them ^[36] found significant effects with regard to fiber diameter in their study on the effect of age and body region on wool traits in hybrid Merino sheep in Turkey, where the Turkish KM breed was superior because the shearing period is short for this breed. There were no significant effects on the character of fiber length for the breeds in this study, and this was consistent with what was found by ^[37] and different from what was found by ^[38] in their study on Awassi and Turkish sheep in addition to Al-Hamdani and Al-Assaf. They confirmed the presence of a significant effect regarding age on length. The fiber reached a height of 13.18 cm at the age of 4 years, ^[36].

As for the number of folds, there is no significant effect in the study regarding the breeds, but there is a slight arithmetic difference that does not reach the level of significance, and this was in agreement with what ^[39], while ^[37] found significant effects in the number of folds, which were observed in the shoulder area, the back area, in addition to the buttocks, reaching 1.640 folds/cm, 1.581 folds/cm, and 0.050 \pm 1.332 folds/cm, respectively, while it differed ^[40] confirmed in their study on local and Turkish Awassi sheep is that there were no significant effects of breed on the number of fold, as the average reached 4.48 cm for the local Awassi, while 4.02 cm for the Turkish Awassi.

Regarding the softness of the fiber, our study showed that there were no significant effects for the strains, but rather that there was a difference in simple calculations between them, but without a significant effect, and this was consistent with what was found. ^[41] in their study on Merino sheep in Uruguay, where it led to the appearance of heavier animals and softer wool at the age of one year and adulthood, differed from ^[42], as showed in his study that the production of large quantities of wool does not affect the softness of the fiber.

While the study showed with regard to the tensile strength of wool, the results showed significant effects, indicating that there is superiority for the Al-Naimi breed. 1.28 at the expense of the Awassi, respectively, 1.22 and 1.09, which is due to genetic differences, since the breeds included the same

nutrition, environmental and therapeutic care, and this is what agreed with the study of [43] on Australian Merino sheep, and disagreed with [44] on the effect of the shearing process. The growth of Turkish and local Awassi lambs up to one year of age.

Table 2: The effect of breed on wool weight and physical wool traits (mean \pm standard error)

Breed	Awassi crossing Naimi	Awassi	Al Nuaimi
Raw wool weight/kg	2.155 \pm 0.113	2.056 \pm 0.111	2.105 \pm 0.113
Weight of clean wool/kg	1.494 \pm 0.092	1.373 \pm 0.090	1.460 \pm 0.097
Strand length/cm	7.74 \pm 0.23	7.94 \pm 0.26	8.02 \pm 0.42
Fiber length/cm	8.60 \pm 0.54	10.05 \pm 0.69	9.21 \pm 0.83
Number of folds	1.65 \pm 0.19	1.73 \pm 0.12	1.61 \pm 0.13
softness of fiber	20.55 \pm 0.85	21.34 \pm 0.72	21.50 \pm 1.45
tensile strength	1.09 \pm 0.05 b	1.22 \pm 0.05 ab	1.28 \pm 0.05 a
Elongation	38.63 \pm 2.97	46.28 \pm 2.34	46.69 \pm 3.61
Fiber diameter	31.87 \pm 4.79	34.70 \pm 0.92	36.47 \pm 1.40
Fat ratio/%	3.27 \pm 0.25	3.16 \pm 0.18	3.37 \pm 0.13

Note from the table 3 the effect of breed on blood traits did not indicate any significant effect, but there are mathematical differences between the studied breeds.

[31] found the effect of the breed on protein concentration was highly significant, as they found that the Hamdaniya ewes were superior to their Awassi counterparts with a difference of 0.52 g/100 ml, which is the same thing that was found by [39] and was in contradiction with what [39].

Among [31] that the effect of the breed was highly significant on glucose, as it reached 4.25 mm/L in Hamdaniya ewes,

compared to Awassi ewes, which reached 2.26 mm/L. This discrepancy may be due to the benefit of food as well as the difference in weight, as Hamdaniya ewes are larger in size than Al-Awassi agreed with [39] and the results contradicted the findings of [46,47] in their study on the effect of adding arginine on the blood traits of Awassi sheep, there was no significant effect with regard to cholesterol, as it led to an increase in progesterone, since cholesterol is the basic substance for the manufacture of steroids.

Table 3: Effect of breed on blood traits (means \pm standard error)

Breed	Al-Awasi x Al-Naimi	Awassi	Al Nuaimi
Total protein Mg\dl	6.63 \pm 0.11	6.47 \pm 0.14	6.52 \pm 0.09
Glucose Mg\dl	31.25 \pm 1.54	33.10 \pm 1.85	29.38 \pm 1.40
Cholesterol Mg\dl	64.75 \pm 4.28	60.25 \pm 4.89	66.72 \pm 5.21
Triglycerides Mg\dl	42.95 \pm 4.28	39.95 \pm 2.58	40.55 \pm 2.18
Creatinine Mg\dl	0.92 \pm 0.01	0.89 \pm 0.01	0.89 \pm 0.01

Conclusion

Awassi sheep are significantly superior in body dimensions, body length, chest circumference, and body mass index, and Nuaimi sheep are superior in the tensile strength of wool.

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