

The Estimate of Heterosis Effects of Sheep Body Weights in Different Ages

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Abstract

The current study was carried out at the Radwaniyah station / Ministry of Agriculture, which included analysis of data of local awassi sheep, Assaf and crossing Assaf (local Awassi × Assaf). Records included weights at birth and weaning and in ages of 6, 9 and 12 months for the three genetic groups above. We aimed to study the effect of the genetic group on the lamb's weights at different ages and the effects of the hybrid vigor resulting from the crossing of local awassi sheep with Assaf sheep to the traits of the weights in ages from birth to one year old. The results showed that the genetic group had a significant effect ($p < 0.01$) in all the studied traits while the effect of hybrid vigor was not significant for all studied traits, but it was similar to some previous studies, with 10.36, 12.20, 5.80, 6.49 and 4.92 % for weights at birth, weaning, 6 months, 9 month and 12 month respectively.

Introduction

Many sources and scientific research have pointed to the usefulness of cross-breeding between different breeds and the effects of hybrid vigor on growth traits. The cumulative effects of hybrid vigor (on individual or maternal traits) resulting from genetically divergent breeds are of great economic importance [1, 2].

The hybrid vigor or heterosis can be defined as an improvement in the animal's performance and production as a result of the mating of two genetically separated parents (the genetic variability is that each father follows a population that does not mate nearly with the other father's family) [3].

Although sheep in Iraq are considered one of the main sources of red meat production desired and preferred by the Iraqi consumer, it is still characterized by low production efficiency of meat and milk compared to the original breeds specialized. Therefore, programs should be designed to improve this low efficiency by relying on the selection within a single line or by mixing with imported breeds such as the Turkish Awassi, Assaf and Addman in order to obtain genetic structures suitable for semi-intensive production systems and spread them in various regions of Iraq.

Consequently, the effects resulting from the out breeding of Iraqi sheep in general and local Awassi in particular are the opposite of the effects of inbreeding. The out breeding increase the percentage of mixed individuals and decrease the percentage of indigenous individuals in the herd.

Therefore, mating with foreign breeds gives the undesirable genes the chance to hide under their desired alleles. So, The objective of this study was to estimate the effect of the hybrid vigor on body weight parameters with ages ranging from birth, weaning, 6, 9, and 12 months of first-generation resulting from local Awassi with Assaf sheep.

Material and Methods

This study was conducted at the Sheep Improvement Station in Radwaniya/ Ministry of Agriculture, located 22 km west of Baghdad. The study included the data of sheep herds (Local Awassi and Assaf and the first generation of the Assaf × Awassi crossing) of 1370 animals, which included weights at birth, weaning, and ages 6, 9 and 12 months to study the possibility of the emergence of hybrid vigor to the weights mentioned in the first generation of the Assaf crossing.

Animals feed on green feed crops (barley, barley and alfalfa mixtures) during winter and spring, and on yellow and white maize during the summer and autumn, as well as that these animals go out to graze daily (average of six hours) and fed once a day (150 - 500 g / animal) by the age of the animal. As for ewes, they are included in the system of food flashing before the season of mating about 14 days and before the birth of about one month and also during the period of suckling.

All animals are subject to a regular health and safety program that includes procedures to maintain their health from dipping them with Cypervet solution (1: 450) twice / year and during April and September to vaccinate

them against epidemic and infectious diseases (Smallpox, Anthroxemias, Mastectomy, lung and Liver worms, etc.). The general linear model-GLM method was used in the statistical analysis of the data of sheep, which included weights of birth, weaning, 6 months, 9 months and 12 months ages.

The adjustment For some fixed factors was made (without reference to theme in this study because they were published in previous research), which include year of birth, age of the mother, weight of the mother at lambing, type of birth and sex of the lam using the statistical program SAS,2012(4). For the purpose of analysis and study the Heterosis, the following equation was used:

$$\% \text{ Heterosis} = (\text{Ha}-\text{Ea}) / \text{Ea} \times 100\%$$

Whereas:

Ha: Average actual hybrid

Ea: expected Average parents.

Results and Discussions

Birth Weight

The average weight at birth in Assaf crossing sheep was 3.619 kg, surpassing both local

Awassi and Assaf sheep (P<0.01), who had a mean birth weight of 3.545 and 3.015 kg respectively (Table 1 and Figure 1), an approach to [5].

Table 1: least square means ± S.E. of body weights in different ages

Trait	Genetic group					
	Anim.	Awassi(A)	Anim.	Assaf(AS)	Anim.	A×AS
Birth weight	1100	3.545±0.060 a	110	3.015±0.890 b	160	3.619±0.060 a
Weaning weight	995	23.180±0.400 a	87	19.600±0.811 b	135	24.001±0.610 a
6 Mo. weight	833	31.501±0.399 a	55	27.099±0.798 b	120	31.001±0.770 a
9 Mo. Weight	741	36.599±0.610 a	42	31.609±1.008 b	90	36.319±0.771 a
12 Mo. weight	561	39.915±0.598 a	27	34.072±1.410 b	67	38.811±1.119 a

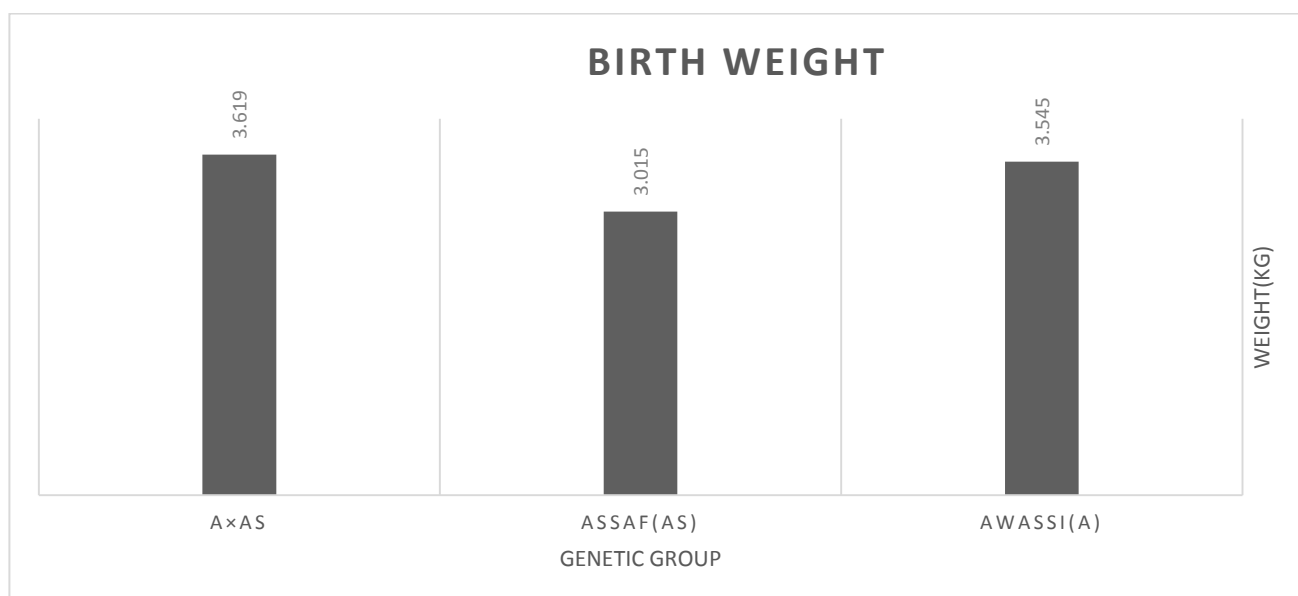


Figure 1: Graphical representation of birth weight by genetic groups

Weaning Weight

The results of the current study (Table 1 and Fig. 2) showed that the sheep of Al-Assaf crossing were superior in weaning weight at

24.001 kg compared to the local sheep (23.180 kg) and the Assaf (19.60 kg), with a significant superiority ($p < 0.01$) with Assaf and non-significant with Local Awassi.

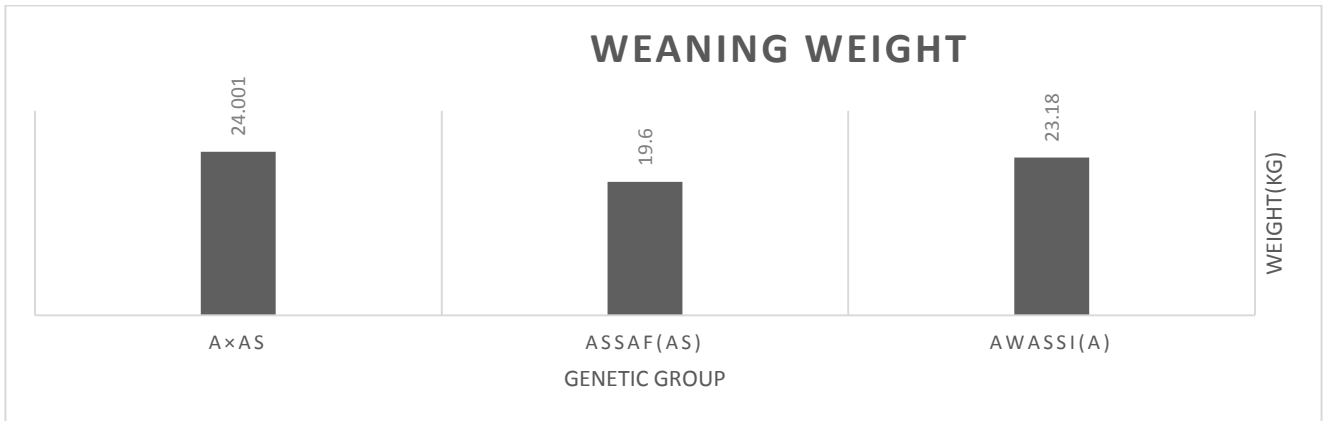


Figure 2: Graphical representation of weaning weight by genetic groups

6 Months Weight

By following Table 1 and Figure 3, the partial mental superiority ($p < 0.01$) for the

Assaf crossing was shown with an average weight of 31.001 kg on one of the parents (Assaf) with 27.009 kg, and very close to the local Awassi average of 31.501 kg.

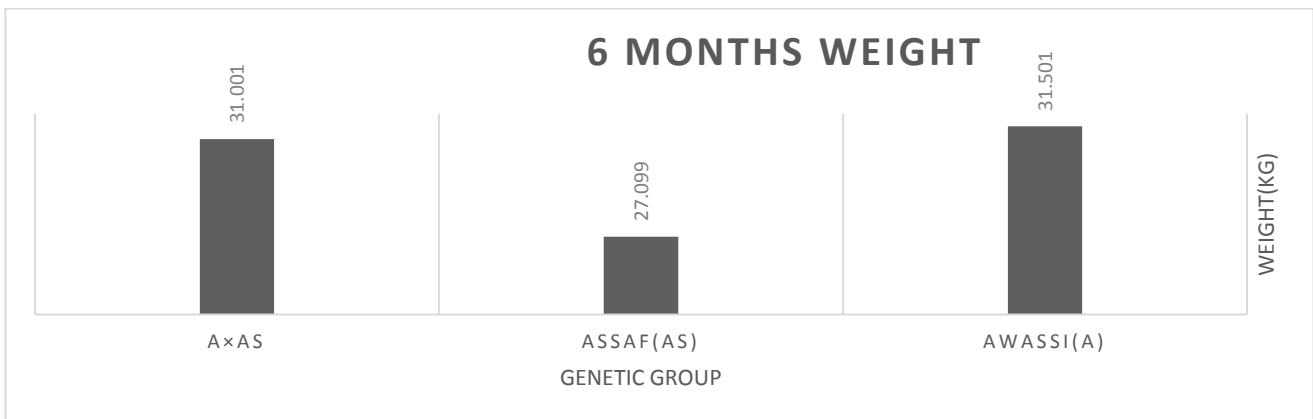


Figure 3: Graphical representation of 6 months weight by genetic groups

9 Months Weight

In the same context above (6 months weight), the partial and significant superiority ($p < 0.01$)

for the Assafcrossig (36.319 kg) was observed on the Assaf sheep (31,609 kg) and the non-superiority compared to the local Awassi (36.599 kg) (Table 1 and Figure 4).

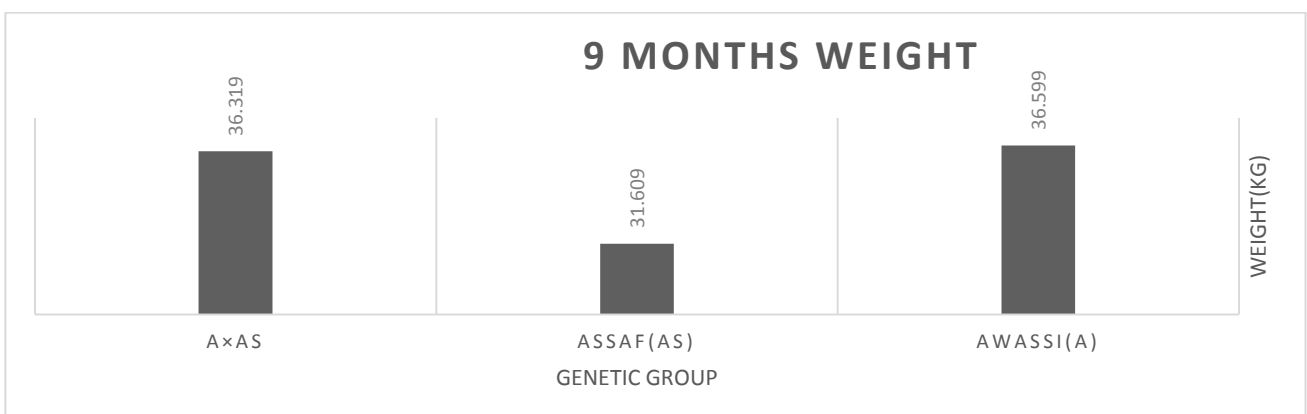


Figure 4: Graphical representation of 9 months weight by genetic groups

12 Months Weight

Our results indicated that the Assaf crossing surpassed (39.811 kg) significantly ($p < .01$) on one of its parents (Assaf, which was an

average of 34.072 kg) in the mean weight at the age of 12 months compared to the average for the same character with local Awassi (39.915 Kg) (Table 1. and Figure 5).

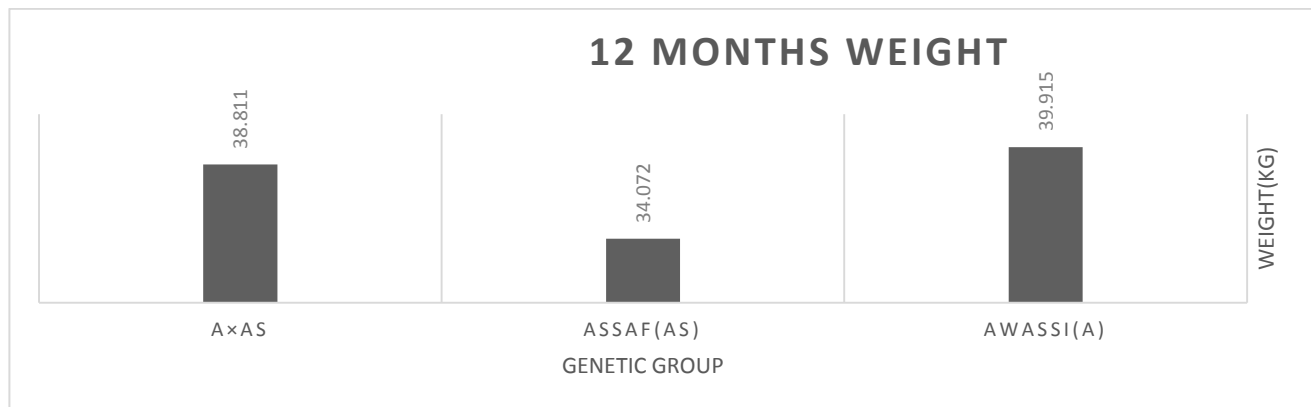


Figure 5: Graphical representation of 12 months weight by genetic groups

Effects of Hybrid Vigor

Although the results of the current study of the hybrid vigor in growth characteristics (from birth to age of one year) were not significant, they did give an advantage to the result of mixing between the Awassi and Assaf on both parents, or one of them indicating the importance of the heterosis of different weight traits in sheep.

The hybrid vigor of the weight at birth was 10.36% which was the second highest proportion obtained in this study (Table 2), which is much higher than 3.2% that indicated by [6] which was 3.2% individual hybrid vigor in some US sheep, and Higher than that of [7] and his colleagues for the same degree in the first generation of Herford with African cattle (South Africa) and Herford with Simmental cattle and Simmental with African cattle, which were 1.35%, 1.16% and 3.62%, respectively. For weaning weight, the hybrid vigor was 12.20% (Table 2), the highest proportion among the studied traits, and higher than [6] for

weaning weight, which was 5% and close to [2] (12.07 %) and higher than that of the same researcher of Herford with Simmental (5.55%) and Herford × African (17.82 %). This result can be explained by either the fact that the different genes of the parents interfere with each other in the offspring or from the structures of the original epistatic genes in the parents, which in turn pass through the crossing offspring [8].

The 6-month-old hybrid vigor was 5.8% (Table 2), lower than [6], which was 6.6% for the same age. It was also found that the hybrid vigor of the 9 months weight is slightly higher than the previous weight (6 months weight), reaching to 6.49%. The heritability of growth traits tends to increase with age from birth to weaning and subsequent ages [9], which in some way confirms the hypothesis that the hybrid vigor is inversely proportional to the estimation of the heritability of the same characteristic [6]. The hybrid vigor proportion was down from its previous 9 months weight to 4.92% for 12-month weight, slightly lower than [6] (5.2%).

Table 2: Estimations of Heterosis (hybrid vigor) of sheep weights in different ages

Trait	Heterosis (%)
Birth weight	10.36
Weaning weight	12.20
6 months weight	5.80
9 months weight	6.49
12 months weight	4.92

In general, the hybrid vigor level is higher under poor environmental conditions compared to good environmental conditions, making cross-fertilization the best and most obvious practice in genetic improvement processes under unfavorable environmental

conditions [7]. Therefore, the relative importance of the effects of hybrid vigor should be studied in a variety of environmental conditions. In previous studies, the effects of heterosis were significant for growth traits and live weights

from birth to the age of slaughter in sheep [10]. Similar results (for the heterosis) were obtained in a previous study of the crossing of the Cypriot and local Awassi with a foreign sheep breeds [11]. In another study, In the United Kingdom, the combination of three strains (Scottish Blackface, Cheviot, and Welsh Mountain) demonstrated clear hybrid vigor in various productive traits, A In general, most of the confounding results suggest that external crossbred with pure

strains improves the live body dimensions and carcass measurements [13]. The important conclusion of this study is that the Assaf crossing showed positive hybrid vigor effects for all studied traits. Thus, the results may be of benefit and help to breeders in the breeding of Assaf crossbred sheep, which is similar to the current studied characteristics of the local Iraqi Awassi (sheep preferred to the Iraqi consumer).

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