

EFFECT OF CROSSING MERINO WITH OSSIMI SHEEP ON GROWTH AND BODY WEIGHT

by

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Summary

Four breeding-groups including Merino, Ossimi, $1/2$ Merino and $3/4$ Merino were used in this work. 170 single lambs were born during the 1963 lambing season were obtained from those crossing. The traits dealt with were body weight at birth, weaning, 6 months old, 8 months old yearling age and at 18 months old. Growth rate and relation between body weights at different ages were studied.

At all ages studied the crossbred lambs were the heaviest in their body weight and grew faster than the two purebred groups. The percent of increase for the crossbreds over mid-purebred parents had its peak at 9 months of age where it reached 134.9, 124.4, 145.8 and 144.5% for $1/2$ Merino and $3/4$ Merino females and males, respectively, while it declined slightly thereafter. Generally, the $1/2$ Merino lambs were the heaviest and Ossimi lambs were the lightest in body weight among all groups studied. The Merino lambs were lighter than the Ossimi in body weight only at birth.

The effect of sex on body weight became more pronounced with the advance in age. The males were heavier in body weight and grew faster than the females.

Introduction

The importation of some standard breeds of sheep from abroad is considered one of the solutions for the present problem of meat shortage in U.A.R. It is well known that crossbreeding is used on a large scale for mutton production in sheep. In 1960, the Egyptian Ministry of Agriculture imported a flock of Merino sheep from East Germany. Crossing Merino rams with Ossimi and Barki ewes was practised with the aim of improving both wool and mutton production of local breeds of sheep.

The object of the present investigation is to study the effect of crossing Fleisch-Merino rams with the local Ossimi breed on growth and body-weight of their offspring.

Materials and Methods

One hundred and seventy lambs from 4 breeding groups born from 10th - 30th of October 1963, were used in this study. The four breeding groups were pure Ossimi, pure Merino, $1/2$ Merino (Merino \times Ossimi) and $3/4$ Merino (Backcrosses with Merino). Only single males and females from each group were used.

The lambs were raised at Sakha and Mehalet Mousa Experimental Stations. During winter months, animals were allowed to graze on Egyptian clover from November till May. In summer (from June to September) they grazed on corn-residues and Sorghum. Additional feeding of pelleted concentrate mixture was given, and Egyptian clover hay was also supplied. Lambs were marked with metal ear tags soon after birth. At the age of 2-3 weeks Merino and crossbred lambs were docked.

The lambs were weighed at weekly intervals from birth till weaning age (16 weeks). From weaning up to yearling age the lambs were weighed every month and also at the 15th and 18th months of age. Weight was recorded to the nearest 0.1 kg. The methods suggested by Snedecor (1962) were used for statistical analysis. Relative growth rate was computed by formula reported by Brody (1945).

Results and Discussion

Birth Weight

Table I includes the average birth weights, coefficients of variability for both sexes and the total means of the four breeding groups studied. Merinos were born the lightest in body weight of all groups, while the $1/2$ Merino lambs were the heaviest. The $3/4$ Merino lambs exceeded the pure Ossimi ones in birth weight. However, the differences between average birth weights of the groups studied were statistically insignificant, Asker *et al.* (1954 B) crossing Ossimi and Rahmany breeds, and Fahmy (1964) studying Merino, Barki sheep and their crosses showed that the crossbred lambs were born heavier than lambs from both pure parents. While Sidky (1948) reported that Suffolk \times Ossimi crossbred lambs were heavier at birth than the local breed only. Labban and Radwan (1963) found that Merino \times Ossimi and Merino \times Barki crossbred lambs were intermediate in their birth weight between the two parental breeds.

Sex showed insignificant effect upon birth weight. Although males were slightly heavier than females in their birth weights for Ossimi, $1/2$ Merino and $3/4$ Merino groups; yet the Merino lambs showed the reverse (Table 1). Asker *et al.* (1954 A), Borgart *et al.* (1957) and Fahmy (1964)

TABLE 1

Average birth weights for different breeding groups in kgs.

| | Females | | | Males | | | Total | | |
|--------------------|---------|---------|------|-------|---------|------|-------|---------|------|
| | No | Mean | CV % | No | Mean | CV % | No | Mean | CV % |
| Ossimi | 21 | 3.5±0.2 | 19 | 26 | 3.6±0.1 | 19 | 47 | 3.6±0.1 | 19 |
| Merino | 21 | 3.1±0.1 | 18 | 21 | 3.0±0.1 | 23 | 42 | 3.1±0.1 | 21 |
| 1/2 Merino | 16 | 3.9±0.2 | 17 | 28 | 4.1±0.2 | 20 | 44 | 4.0±0.1 | 20 |
| 3/4 Merino | 20 | 3.6±0.1 | 15 | 17 | 4.0±0.1 | 16 | 37 | 3.8±0.1 | 15 |

using different breeds of sheep, reported that sex had no effect on birth weight. Hammond (1932) ascribed the reason for the non significant effect of sex on birth weight to the fact that the influence of male sex hormones is not marked at this early age.

Weaning Weight

The two crossbred groups were heavier than both the parental breeds in their weaning weights (Table 2) and the differences were significant. This may be attributed to the effect of hybrid vigour. However, Labban and Radwan (1963) showed that Merino × Ossimi lambs were intermediate in their weaning weights between the two parental breeds.

The two crossbred groups in the present study were insignificantly different, while Ossimi group was highly significant ($P < 0.01$) and lighter

TABLE 2

Average weaning weights for different breeding groups in kgs.

| | Females | | | Males | | | Total | | |
|--------------------|---------|----------|------|-------|----------|------|-------|----------|------|
| | No | Mean | CV % | No | Mean | CV % | No | Mean | CV % |
| Ossimi | 21 | 16.4±0.6 | 15 | 26 | 18.3±0.5 | 18 | 47 | 17.4±0.5 | 18 |
| Merino | 17 | 19.5±0.9 | 20 | 18 | 20.2±1.1 | 22 | 35 | 19.8±0.7 | 21 |
| 1/2 Merino | 15 | 25.2±0.6 | 10 | 26 | 26.0±1.1 | 22 | 41 | 25.7±0.7 | 18 |
| 3/4 Merino | 18 | 23.5±0.5 | 9 | 16 | 25.9±1.2 | 18 | 34 | 24.6±0.7 | 17 |

than the Merinoes. The variation within the Merino group in weaning weight was the highest in this respect (Table 2).

Sex became an important factor affecting weaning weight significantly. Males were heavier than females by 1.9, 0.7, 0.9 and 2.5 kgs. for Ossimi, Merino, $1/2$ Merino and $3/4$ Merino groups respectively (Table 2).

Weight at 6 Months of Age

Differences between the four breeding groups were highly significant in body weight at 6 months of age. Large differences were found between each of the two crossbred groups on one hand and each of the two purebreds on the other (Table 3). Merinoes were significantly heavier ($P < 0.01$) than the Ossimi group, while $1/2$ Merino and $3/4$ Merino crossbred groups did not differ significantly.

Both sex and the interaction between sex and breeding groups caused a significant variation in body weight at this age. The difference between males and females was pronounced in the crossbred groups where it was 4.7 and 4.9 kgs. for Merino and $3/4$ Merino respectively. In case of purebreds it was only 2.1 and 2.0 for Ossimi and Merino groups respectively.

TABLE 3

Average body weights at 6 months of age for different breeding groups in kgs.

| | Females | | | Males | | | Total | | |
|------------------------|---------|----------|------|-------|----------|------|-------|----------|------|
| | No | Mean | CV % | No | Mean | CV % | No | Mean | CV % |
| Ossimi | 21 | 23.0±0.7 | 13 | 22 | 24.9±0.9 | 17 | 43 | 24.0±0.6 | 16 |
| Merino | 17 | 27.2±1.2 | 19 | 17 | 30.1±1.6 | 22 | 34 | 28.6±1.0 | 20 |
| $1/2$ Merino | 15 | 33.7±1.0 | 12 | 24 | 38.4±1.4 | 17 | 39 | 36.6±1.0 | 16 |
| $3/4$ Merino | 18 | 33.1±0.9 | 12 | 15 | 38.0±1.4 | 15 | 33 | 35.4±0.9 | 14 |

Weight at 8 Months of Age

It is evident from the results presented in (Table 4) that the superiority of crossbreds over purebreds were more pronounced at 8 months of age. Asker *et al.* (1954 B) found similar superiority in body weight at 8 months old for the crossbreds between Rahmani and Ossimi sheep over the purebreds. In the present study highly significant difference was found between

TABLE 4

Average body weights at 8 months of age for different breeding groups in kgs.

| | Females | | | Males | | | Total | | |
|--------------------|---------|----------|------|-------|----------|------|-------|----------|------|
| | No | Mean | CV % | No | Mean | CV % | No | Mean | CV % |
| Ossimi | 21 | 28.0±0.6 | 9 | 22 | 31.1±1.2 | 17 | 43 | 29.3±0.7 | 15 |
| Merino | 17 | 32.0±1.4 | 17 | 17 | 35.6±1.2 | 14 | 34 | 33.9±1.0 | 17 |
| 1/2 Merino | 15 | 39.8±1.0 | 10 | 24 | 47.8±1.6 | 17 | 39 | 44.7±1.3 | 17 |
| 3/4 Merino | 18 | 37.3±1.0 | 11 | 15 | 47.4±2.0 | 16 | 33 | 41.9±1.4 | 13 |

Merino lambs and Ossimi ones. The latter was the lowest in its body weight among all groups studied. No significant difference between the two crossbred groups was observed.

Males were significantly heavier in their body weights than females and the differences due to sex were 8.0, 10.1, 3.1 and 3.9 kgs for 1/2 Merino, 3/4 Merino, Ossimi and Merino groups respectively. Asker *et al.* (1954 A) found a difference of 3.0 kgs between Ossimi males and females at 8 months of age Data *et al.* (1963) noticed a significant difference between Bikaneri males and females at 8 months of age.

Yearling Body Weight

The differences in yearling body weights between Merino and Ossimi groups on one hand and the two crosses on the other, were highly signifi-

TABLE 5

Average yearling weights for different breeding groups in kgs.

| | Females | | | Males | | | Total | | |
|--------------------|---------|----------|------|-------|----------|------|-------|----------|------|
| | No | Mean | CV % | No | Mean | CV % | No | Mean | CV % |
| Ossimi | 21 | 34.9±0.9 | 12 | 12 | 39.7±1.6 | 14 | 33 | 36.7±0.9 | 14 |
| Merino | 16 | 35.4±1.4 | 16 | 15 | 39.7±1.6 | 15 | 31 | 37.5±1.1 | 16 |
| 1/2 Merino | 15 | 44.9±1.0 | 19 | 22 | 52.2±1.3 | 14 | 37 | 49.2±1.2 | 14 |
| 3/4 Merino | 17 | 42.0±1.1 | 11 | 14 | 50.5±1.6 | 12 | 31 | 45.8±1.2 | 15 |

cant. Half-Merino lambs were the heaviest in body weight among all groups studied followed by the 3/4 Merino, while the Ossimi lambs were the lowest (Table 5). This result is in accordance with those reported by Fahmy (1964) studying Merino, Barki and their crosses and Sidky (1948) on Suffolk × Ossimi crossbred lambs. Labban and Radwan (1963) working on the crosses of Merino with Ossimi and Barki sheep reported that yearling weights of crossbreds was greater than the indigenous sheep only. However, non-significant differences were found between the two purebred groups, or the two crossbred groups in the present study when compared with each other.

Males maintained their superiority over females in their weights as shown in Table 5. Karam (1959) pointed out that sex differences increased with age, being more pronounced at 12 months than before in Rahmani sheep. Ghoneim *et al.* (1961), Fahmy (1964) reported that sex is an important source of variation in yearling weight of different breeds of sheep.

Weight at 18 Months of Age

The half-Merino group showed heaviest bodyweight among all breeding groups studied, followed by the 3/4 Merino group (Table 6) and the differences were significant. Merinos were significantly heavier than Ossimi sheep in their live weight at this age. Kovar (1957) crossing Valachian native ewes with Hampshire rams, and Donald (1963) studying the heterosis in crossbred hill sheep reported that the crossbreds exceeded the better parent in their live weights. However, it was found in the present work that the percent of increase for the crossbreds over mid-purebreds reached its higher values at 9 months of age where it became 139.4, 124.4, 145.8

TABLE 6

Average body weights at 18 months of age for different breeding groups in kgs.

| | Females | | | Males | | | Total | | |
|--------------------|---------|----------|------|-------|----------|------|-------|----------|------|
| | No | Mean | CV % | No | Mean | CV % | No | Mean | CV % |
| Ossimi | 21 | 39.2±0.9 | 8 | 5 | 44.8±2.1 | 15 | 26 | 40.2±1.0 | 13 |
| Merino | 15 | 41.0±0.9 | 9 | 14 | 45.9±1.9 | 16 | 29 | 43.3±0.7 | 16 |
| 1/2 Merino | 15 | 50.0±1.3 | 10 | 21 | 64.6±1.3 | 10 | 36 | 58.5±1.0 | 16 |
| 3/4 Merino | 16 | 47.3±1.3 | 11 | 12 | 60.9±1.6 | 9 | 28 | 53.1±1.6 | 16 |

TABLE 7

Percentage of increase for crossbreds over mid-pure-breds.

| Age | Females | | Males | |
|--------------------|--------------|--------------|--------------|--------------|
| | 1/2 Merino % | 3/4 Merino % | 1/2 Merino % | 3/4 Merino % |
| At birth | 119.5 | 109.0 | 122.2 | 121.0 |
| 4 weeks | 115.0 | 116.2 | 124.0 | 128.5 |
| 8 " | 127.0 | 125.3 | 123.9 | 130.1 |
| 12 " | 128.5 | 124.7 | 129.0 | 131.2 |
| 16 " | 140.5 | 128.3 | 135.4 | 134.7 |
| 6 months | 133.7 | 131.3 | 139.8 | 138.4 |
| 8 " | 132.8 | 124.5 | 142.6 | 138.6 |
| 12 " | 127.0 | 119.4 | 133.1 | 128.8 |
| 18 " | 124.6 | 117.9 | 138.6 | 130.8 |

and 144.5% for Merino and 3/4 Merino females and males respectively, while it declined slightly thereafter (Table 7).

The differences between the two sexes became larger as the animals became older. The variations due to sex were highly significance ($P < 0.01$). The same results were found by many investigators on different breeds of sheep (Ragab *et al.*, 1953; Asker *et al.*, 1954 A and Ghoneim *et al.*, 1961).

Relation between body weights

The results presented in Table 8 show significant correlation coefficients between body weight at weaning and that at yearling and 18 months old for all groups studied. Body weights at 18 months old were strongly correlated with yearling weights for all the breeding groups studied. It

TABLE 8

Phenotypic correlation coefficients between body weights at different ages.

| Ages | Ossimi | Merino | 1/2 Merino | 3/4 Merino |
|--------------------------------|--------|--------|------------|------------|
| Weaning — yearling | 0.38** | 0.73** | 0.62** | 0.75** |
| Weaning — 18 months | 0.50** | 0.65** | 0.49** | 0.82** |
| Yearling — 18 months | 0.95** | 0.88** | 0.88** | 0.90** |

** $P < 0.01$

seems possible to predict body weight at yearling and at 18 months old from that at weaning age for the different breeding groups with a reasonable degree of accuracy. On the other hand, probably less accurate prediction could be realized when body weights of Ossimi lambs at weaning are used as indices for their weights at yearling.

Growth Rate

Relative growth rate differed widely between different ages of the four groups studied (Table 9). However, three growth cycles were observed. The first month of life showed a high growth rate. The second growth cycle showed a slight but gradual decrease in relative growth rate. It started from the 5th week for all the breeding groups but did not end at one age in all the groups. The end of this stage was at 5 months for the 3/4 Merino group and 1/2 Merino females, while it extended to the 6th month for Merinos and 1/2 Merino males, and to the 7th month and 8th month for

TABLE 9

Relative growth rate per day for body weight.

| Age | Female | | | | Male | | | |
|---------------------|--------|------|-------|------|------|------|-------|-------|
| | O. | M. | 1/2M. | 3/4M | O. | M. | 1/2M. | 3/4 M |
| From Birth — 1 week | 5.10 | 6.23 | 5.94 | 6.36 | 5.56 | 6.32 | 7.73 | 6.22 |
| 1 week — 2 weeks | 3.46 | 4.05 | 3.67 | 4.02 | 3.53 | 4.16 | 4.15 | 3.43 |
| 2 weeks — 3 " | 2.08 | 2.92 | 2.33 | 2.61 | 2.23 | 2.73 | 2.47 | 2.90 |
| 3 " — 4 " | 1.69 | 2.05 | 2.03 | 1.76 | 1.77 | 1.89 | 2.00 | 2.33 |
| 4 " — 5 " | 1.40 | 1.39 | 1.39 | 1.04 | 1.52 | 1.59 | 1.42 | 1.33 |
| 5 " — 6 " | 1.18 | 0.89 | 1.19 | 1.06 | 1.14 | 1.94 | 1.87 | 1.87 |
| 6 " — 7 " | 0.95 | 1.09 | 0.97 | 1.28 | 1.09 | 1.45 | 1.05 | 1.29 |
| 7 " — 8 " | 1.04 | 1.60 | 1.00 | 1.21 | 1.04 | 1.24 | 1.24 | 1.28 |
| 8 " — 9 " | 1.08 | 1.07 | 1.22 | 0.94 | 1.01 | 0.84 | 1.16 | 0.93 |
| 9 " — 10 " | 0.75 | 1.01 | 0.92 | 0.95 | 0.66 | 1.04 | 0.68 | 0.94 |
| 10 " — 11 " | 0.62 | 0.72 | 0.83 | 0.77 | 0.64 | 0.68 | 1.07 | 0.66 |
| 11 " — 12 " | 0.51 | 0.60 | 0.49 | 0.59 | 0.62 | 0.65 | 0.74 | 0.67 |
| 12 " — 13 " | 0.44 | 0.56 | 1.05 | 0.72 | 0.52 | 0.73 | 0.85 | 0.85 |
| 13 " — 14 " | 0.40 | 0.79 | 0.89 | 0.72 | 0.52 | 0.59 | 0.79 | 0.61 |
| 14 " — 15 " | 0.36 | 0.55 | 0.64 | 0.61 | 0.51 | 0.67 | 0.69 | 0.51 |
| 15 " — 16 " | 0.39 | 0.52 | 0.57 | 0.39 | 0.60 | 0.61 | 0.69 | 0.72 |
| 4 months — 5 months | 0.55 | 0.63 | 0.48 | 0.63 | 0.47 | 0.63 | 0.61 | 0.66 |
| 5 " — 6 " | 0.39 | 0.38 | 0.33 | 0.37 | 0.40 | 0.48 | 0.48 | 0.39 |
| 6 " — 7 " | 0.32 | 0.29 | 0.27 | 0.17 | 0.39 | 0.24 | 0.32 | 0.30 |
| 7 " — 8 " | 0.34 | 0.29 | 0.28 | 0.24 | 0.23 | 0.34 | 0.41 | 0.43 |
| 8 " — 9 " | 0.17 | 0.11 | 0.19 | 0.14 | 0.12 | 0.12 | 0.14 | 0.14 |
| 9 " — 10 " | 0.18 | 0.11 | 0.06 | 0.09 | 0.10 | 0.16 | 0.07 | 0.04 |
| 10 " — 11 " | 0.13 | 0.05 | 0.03 | 0.03 | 0.12 | 0.07 | 0.07 | 0.01 |
| 11 " — 12 " | 0.27 | 0.08 | 0.14 | 0.13 | 0.39 | 0.09 | 0.08 | 0.07 |
| 12 " — 13 " | 0.07 | 0.08 | 0.04 | 0.04 | 0.10 | 0.06 | 0.09 | 0.07 |
| 15 " — 18 " | 0.05 | 0.08 | 0.08 | 0.09 | 0.12 | 0.10 | 0.15 | 0.14 |

Ossimi females and males respectively. The third growth cycle began after the second growth period till the end of the study and is characterized by a marked decline in growth rate. Hammond (1952), Ragab *et al.* (1953) Jakupc (1959), Karam (1959), and Data *et al.* (1963) working with different breeds of sheep reported a gradually and marked decrease in growth rate after the first period of life (from 1-2 months) which is the most intensive period of growth.

Fig. 1 shows clearly that in general males and females for the two crossbred grew in a faster rate than the two purebreds. Similar findings

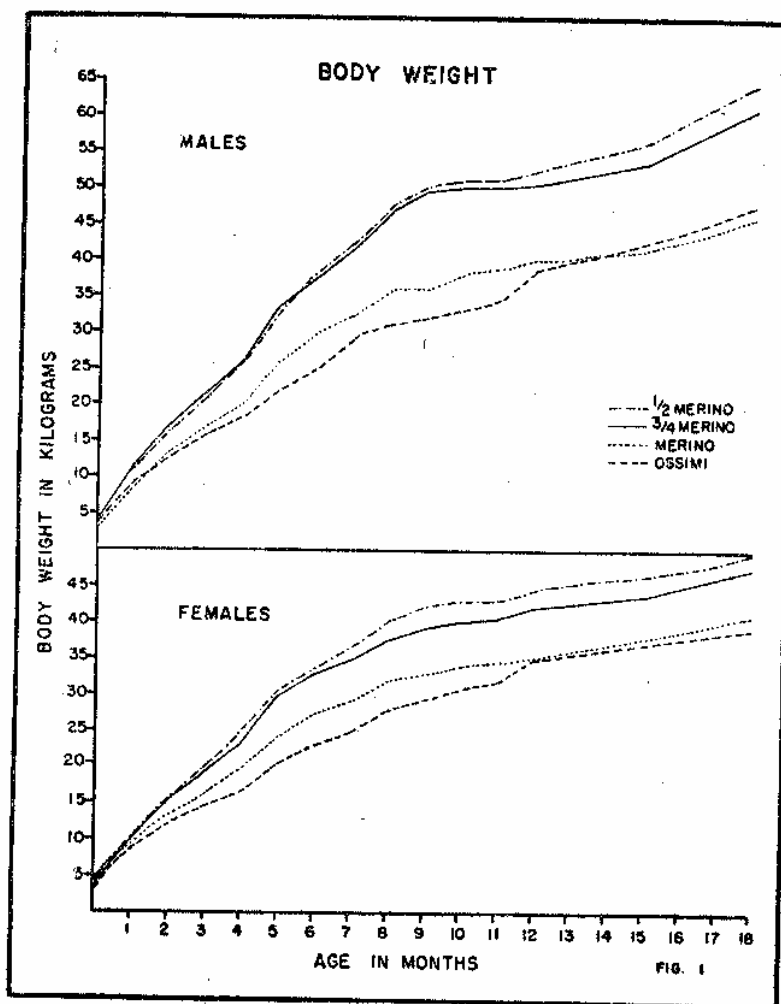


Fig. 1

were reported by Asker *et al.* (1954 B) and Fahmy (1964). Ossimi group was the lowest in its growth rate among all breeding groups studied. Comparing the two crossbred groups with each other, 3/4 Merino lambs grew more rapidly at the first growth cycle. From the 4th week of age and thereafter, the 1/2 Merino males and females were faster in their growth than the 3/4 Merino group. Males grew faster than females, the differences were more pronounced in the crossbred than in the purebred groups.

An interesting point in studying growth and body weight of sheep is to determine the best age for economic marketing. From the results obtained in this investigation it could be suggested that crossbreds can be marketed economically at weaning or at 5 months of age after a period of grazing for one month on Egyptian clover if available. At weaning age Merino and Ossimi lambs did not have the desirable weight for market. Merino lambs could be sent to market at 6 months of age while the Ossimi are not ready for marketing till the 7th months of age. Karam (1959) suggested 8 months old for Rahmani lambs as a suitable age for marketing.

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تأثير الخلط بين أغنام المرينو والاوزيمى على معدل النمو ووزن الجسم

الملخص

استخدمت أربعة مجاميع من الاغنام فى هذه التجربة وهى المرينو
الاصيل والاوزيمى وخليط نصف مرينو وخليط ثلاثة ارباع مرينو . وقد
اختير ١٧٠ حملا مولودة فرديا من موسم ولادة عام ١٩٦٣ بطريقة عشوائية
من قطيع محطة التجارب بسخا ومحلة موسى حيث درست الصفات الآتية :
وزن الجسم عند الميلاد وعند الفطام وعند أعمار ٦ ، ٨ ، ١٢ ، ١٥ ، ١٨
شهورا . وقيست سرعة النمو لكل من الذكور والاناث فى كل مجموعة
وكذلك قدر معامل التلازم بين أوزان الجسم فى الاعمار المختلفة .

وأظهرت نتائج هذا البحث أن الاغنام الخليطة كانت أثقل وزنا وأسرع
نموا من الاغنام الاصيلة فى جميع الاعمار السابقة وخصوصا عند عمر ٩
شهور حيث قدرت نسبة زيادة وزن الاغنام الخليطة عن متوسط الاغنام
الاصيلة بنحو ١٣٤٩ ٪ ، ١٢٤٩٤ ٪ ، ١٤٥٨ ٪ ، ١٤٤٥٥ ٪ فى المائة لكل
من الاناث والذكور فى خليط نصف مرينو وخليط ثلاثة ارباع مرينو على
التوالى . كما أن الاغنام الخليطة نصف مرينو كانت أثقل وزنا وأسرع
نموا من المجموعات الأخرى بينما كانت اغنام الاوزيمى أقلها فى هذه الناحية،
ولوحظ أن حملان المرينو تولد أقل وزنا من حملان الاوزيمى ولكنهما سرعان
ما تتفوق عليها عند عمر الفطام وعند الاعمار المختلفة حتى نهاية التجربة .
كما أن تأثير الجنس كان ضعيفا على الوزن عند الميلاد ولكنه أصبح واضحا
ومعنويا عند الفطام وفى الاعمار المختلفة حيث كانت الذكور أثقل وزنا وأسرع
نموا من الاناث .

وتراوح معامل التلازم بين وزن الجسم عند الفطام وعند عمر سنة
بين ٣٨ر٠ - ٧٥ر٠ وبين الوزن عند الفطام وعند عمر ١٨ شهرا
٤٩ر٠ - ٨٢ر٠ وبين عمر سنة وعمر ١٨ شهرا ٨٨ر٠ - ٩٥ر٠ فى
المجموعات المختلفة من الاغنام وبذلك يمكن انتخاب الاغنام للتربية على
أساس الوزن عند الفطام . وأمكن تمييز ثلاث دوائر للنمو حيث تميزت
الدائرة الأولى « من الميلاد حتى عمر ٤ أسابيع » بسرعة النمو الفائقة
ثم تلتها الدائرة الثانية « من ٤ أسابيع الى ٦ شهور » بينما كانت الدائرة
الثالثة « من ٦ الى ١٨ شهرا » أقلها فى سرعة النمو .