

**THE INTERACTION BETWEEN BREEDS OF
SHEEP AND PATTERN ON PRODUCTION
AND MANAGEMENT**

By

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Field data on 2045 weaning and 1166 yearling range sheep and feed-lot and carcass data on 83 fattened sheep were analysed. These data represent observations on the native Barki and imported Hungarian Merino and Awassi breeds and different crosses between each of the Merino and Awassi with the Barki. Field data included weaning weight, yearling weight and daily growth from weaning to yearling. The feed-lot and carcass data included final weight, daily gain during the fattening period, carcass weight, dressing % and eye-muscle thickness. Appropriate least-squares models were assumed for analysing the data.

The Barki performed better than the two imported breeds in all traits under range conditions. However, under feed-lot conditions the Merino performed the best in all traits except the dressing % and the Awassi ranked better than the Barki in all traits. This was taken as an indication of interaction between breeds of sheep and type of management and production.

Heterosis was detected in all traits studied, which agrees with finding in the literature.

The significance of these results and their bearing on the process of importing foreign breeds were discussed.

In their effort to enhance their animal industry most of the sub-tropical countries have been importing improved breeds from other regions to use them either as purebred or cross them with their native breeds.

In U.A.R., a project was started in 1955 at Ras El Hekma Desert Research Station to improve the production of the Barki breed of sheep, native of the Northwestern coastal desert. In 1958, Hungarian Merinoes were introduced to study the prospects of their acclimatization and the outcome of crossing them with the Barki, and comparing such results with those of improvement obtained by the selection within the Barki breed (Fahmy 1967). Also, Syrian Awassi sheep (fat-tailed carpet woolled) were introduced in 1961 for improving milk production.

This study deals with comparative evaluation of the local Barki and the imported Merino and Awassi sheep and their different crosses under range and feed-lot conditions, with regard to body growth and some aspects of meat production.

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Materials and Methods

Animals included in this study were 2045 and 1166 sheep at weaning and yearling respectively. These animals were raised under range conditions at Ras El-Hekma from 1961 to 1965. There were another group of 83 animals born in 1965 that were raised until the age of 14 months under range conditions and then shipped to Cairo for fattening for a period of about 12 weeks. The lambing season usually last during the 2nd half of December and the 1st half of January. Lambs were kept with their mothers until they were weaned at the age of about 120 days. In the preweaning period, natural grazing was usually available but in the case of low rain-fall, supplements of pelleted concentrate mixture (about 0.75 kg per head) daily and barely or wheat straw were provided. After weaning, lambs were provided with about $\frac{1}{4}$ - $\frac{1}{2}$ kg daily of pelleted concentrate mixture together with barely or wheat straw. The eighty-three animals that were at the feed-lot had a fattening ration that consisted of pelleted concentrate mixture, Egyptian clover hay and wheat straw, and were fed according to Morrison's fattening standard. The pelleted concentrate mixture consisted of 65% cotton seed meal, 9% wheat bran, 20% rice polish, 2% calcium carbonate, 1% salt and 3% molasses.

Among the many measurements that were taken on the carcass three relevant ones are reported here. These are: carcass weight, dressing percentage and the average thickness (average of horizontal and vertical diameters) of the rib-eye muscle (*longissimus dorsi*) between the 12th and 13th ribs. All measurements were taken on the hot carcass, except those of the rib-eye, which were taken after chilling.

For analysing the data of the grazing animals, a least squares model was assumed that included the effects of breeds, years, sex and type of birth. However, for the 83 animals a model that included the breeds was assumed. The 83 animals were all single males born during the same season.

Results and Discussion

Table 1 shows the performance of animals under range and feed-lot conditions. Mean separation procedures were performed according to Duncan (1955) using the least squares error term from the model assumed. In weaning weight Merino and Awassi lambs were significantly lower than the Barki and the other crosses while at yearling both imported breeds were still significantly lower than all other breed groups except the 3/4 Merino-1/4 Barki. The performance of both Merino and Awassi were also comparatively lower in average daily gain from weaning to yearling age on the range.

The relative performance of the three breeds in the feed-lot, on the other hand, showed quite a different picture. With regards to the ranking of each of the introduced breeds relative to the local Barki, the latter breed ranked the lowest in all the traits considered except in dressing % where the Merino ranked the lowest. However, the superiority of the Merino and

Awassi to the Barki reached the significance level in final weight and carcass weight. Carcass figures shown in the table were calculated including the tail in the carcass. However, when the tail weight was discounted from the carcass weight, this further increased the superiority of the Merino in the tailless carcass weight. It also made the Merino more superior to both other breeds in dressing % and the Barki superior to the Awassi.

TABLE 1.—LEAST SQUARES MEANS OF DIFFERENT CHARACTERS UNDER RANGE AND FEED-LOT CONDITIONS

| Breed group | Range | | | Feed-lot | | | | |
|-------------|----------------|----------------|---------------|--------------|---------------|--------------|-------------|-------------------------|
| | Wean. c wt. | Year d: wt. | Daily gain | Final wt. | Daily gain | Carc. wt. | Dress: % | Eye muscle thick. |
| | kg. | kg. | gm. | kg. | gm. | kg. | % | cm. |
| Merino (M) | 16.0a | 27.8a | 42a | 50.1a | 149a | 22.71 | 45.3a | 4.4a ^a b |
| 3/4M1/4B | 16.7b | 29.3a | 49ab | 49.3a | 142a | 21.5a | 45.6a | 4.47ab |
| 5/8M3/8B | 18.1cde | 34.3bc | 64d | 52.9a | 135a | 25.2bed | 47.7a | 4.56b |
| 1/2M1/2B | 20.1f | 35.9f | 60de | 53.4 | 138a | 25.5cd | 47.8a | 4.53b |
| 3/8M5/8B | 19.1g | 34.6bc | 61.cd | 48.5b | 133a | 23.2ab | 47.8a | 4.56b |
| 1/4M3/4B | 18.3de | 33.7bc | 57cef | 53.1a | 141a | 26.3c | 49.6a | 4.58b |
| Barki (B) | 18.2cd | 33.4cd | 57bce | 46.2c | 127a | 21.2e | 46.1a | 4.14a |
| 1/2A1/2B | 17.2cd | 32.0be | 53be | 53.6a | 160a | 25.4cd | 48.5a | 4.63b |
| Awassi (A) | 16.1ab | 31.6e | 51bce | 49.8a | 143a | 23.2d | 47.3a | 4.39b |

(a) Numbers of animals in each group are : 278, 94, 102, 340, 89, 153, 796, 185 and 8 for weaning wt., 177, 47, 51, 157, 48, 127, 489, 76 and 44 for yearling traits on range and 8, 7, 10, 12, 8, 7, 11, 11 and 9 for feedlot, respectively from M to A.

(b) Within each column, any two or more means having the same letter are significantly different from each other, otherwise they are.

(c) Adjusted to 120 days.

(d) Adjusted to 365 days.

Under both range and feed-lot conditions, the crossbred groups exceeded their respective means, calculated from the purebred means with the same blood ratios, in all characters considered. This may be attributed to heterosis. Similar results were obtained by Mackinzie (1958), Torres Da Costa (1963), Carpenter *et al* (1964), Seljkin (1965) and Osipov (1965) in sheep and Kincaid (1962) and Gaines *et al* (1967) in beef.

The contrast between the relative performances of breeds on the range and at the feed-lot is readily seen (table 1). While the numbers involved in the feed-lot were relatively too small to draw firm conclusions, the consistency of the mediocrity of the Merino and Awassi as compared to the Bakri under range conditions and the superiority of the Merino and Awassi under feed-lot conditions indicates that a reasonable explanation is warranted. Reasons for the observed superiority of Barki to the introduced breeds under range conditions at Ras El-Hekma could be many. The Northwestern coastal is the natural habitat of the Barki breed, while the introduced Merino and Awassi are probably faced with adaptational problems to such environment. The coastal desert environment is characterized by frequent severe droughts, poor grazing and adverse climatic conditions during late winter and early spring months, with frequent sand storms. When animals were shipped to Cairo, however, a better environment was afforded by the higher quality feed, plenty of water and shade. Under these conditions, the adaptability of the Barki to the coastal desert environment was no longer an advantage over the other two breeds. Thus, it is presumed that under more favorable environmental conditions, both Merino and Awassi sheep surpassed the Barki. This means, from statistical point of view, that there is an interaction between heredity (represented by breeds) and environment (represented by the two types of management described).

The implications of these results on the problem of introducing foreign breeds of livestock for improving production seem obvious. In other words, when making decisions about which foreign breeds of livestock are to be introduced, the pattern of production and management should be considered. It may also be suggested that the introduced breeds be tried under different practicable types of management available, in order to evaluate their potentialities for production in the new environment.

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التداخل بين النوع ونمط الإنتاج في الأغنام

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الملخص

تم تحليل أوزان ٢٠٤٥ حوليا من أنواع مختلفة عند الفطام وأوزان ١١٦٦ عند عمر سنة كما تم تحليل الأوزان عند عمر سنة ومعدل النمو اليومي من الفطام حتى عمر سنة هذا بالإضافة الى تحليل أثر هذه العوامل المتداخلة على وزن الذبيحة ونسبة التصافي وسمك العضلة العينية على ٨٣ حيوانا مسمنة كما من أنواع البرقى والمرينو المجرى والعواس السورى والهجن المختلفة بين كل من المرينو والعواس مع البرقى . وقد استخدمت طريقة المربعات الصفرى فى التحليل الاحصائى .

وقد تبين من هذه الدراسة أن البرقى كان أحسن أداء فى هذه الصفات المدروسة من كل من المرينو والعواس تحت ظروف المرعى الطبيعى الخاص بالصحراء الغربية بينما كان المرينو الأحسن أداء فى كل الصفات المدروسة ما عدا نسبة التصافي ولبه العواس بالبرقى وقد اعتبرت هذه النتيجة دلالة على وجود تداخل بين النوع ونمط الإنتاج هذا وقد لوحظ وجود قوة الهجن فى جميع الصفات المدروسة .

كما نوقشت نتائج هذا البحث من حيث أهميتها بالنسبة لاستيراد الأغنام الأجنبية بقصد توطينها فى بيئات جديدة وأثر خلطها فى تحسين الأنواع المحلية الخاصة لهذه البيئة .