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THE EFFECT OF LOCAL ENVIRONMENTAL
CONDITIONS ON THE WOOL CHARACTERISTICS
OF SOME IMPORTED BREEDS OF SHEEP

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SUMMARY

In January 1956, the Tahreer Province project imported 27 Suffolk sheep and 27 Leicesters from England as well as 41 Preocé Merino sheep from France. The wool characteristics of these foreign breeds were studied. The traits dealt with were grease fleece weight, clean wool percentage, fiber diameter, crimps, staple length, fiber length, kemp percentage and density of fiber population. Observations were taken at the first year of age in which wool grew almost entirely abroad, and at the second and third years of age in which wool grew at Tahreer Province.

Some of the wool characteristics were affected after the transfer of these breeds of sheep from their countries to Tahreer Province in Egypt, while the other characters were not subject to change. Those were the fiber diameter, crimps and kemp percentage.

The results obtained are discouraging for the Suffolk and Leicester sheep as they failed to survive successfully under the hot climatic conditions of Tahreer Province, while the only breed which showed fine adaptability to such conditions was the Merino sheep.

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INTRODUCTION

Few numbers of Merino, Suffolk and Leicester sheep were introduced into Tahreer Province in January 1956. This importation had two main objectives : first, the test of breeding these new breeds of sheep under the local conditions of this region and studying to what extent do their high potentiality of both mutton and wool could stand the peculiarities of their new environment ; second, the use of their inherent characteristics, represented in high fertility, great wool production and rapid rate of growth in improving the indigenous breeds of sheep and probably in developing new breeds of better potentialities.

MATERIAL AND METHODS

In January 1956, the Tahreer Province imported 25 ewes and 2 rams of Suffolk sheep, 25 ewes and 2 rams of English Leicester sheep from England, as well as 27 ewes and 14 rams of Merino Precoce sheep from France. These sheep were born in their home-lands during the last three weeks of March and the first few days of April 1955.

Samples used in the analysis were taken from the imported breeds of sheep at the following ages :

- (a) 12 months old, in which wool grew almost entirely abroad.
- (b) 24 months old, in which wool grew at Tahreer Province.
- (c) 36 months old, in which wool grew at Tahreer Province.

The traits dealt with were grease fleece weight, clean wool percentage, density of wool fibers, fiber diameter, number of crimps per 2 centimeters, staple length, fiber length and kemp percentage. For studying these traits

except the density of wool fibers, the samples were taken at shearing time in April 1956, April 1957 and April 1958. Four mature ewes from Suffolk, Merino and Leicester sheep chosen at random and prevented from being mated during the mating season of October 1957. These ewes were used for estimating density of wool fibers.

Prior to shearing a small sample of grease wool was clipped from the right shoulder of each animal. This sample was used to determine fiber diameter, number of crimps per 2 centimeters, staple length, fiber length and kemp percentage by weight. At shearing time, each fleece was weighed to the nearest 0.1 Kg. Also a small sample of wool weighing approximately 10 to 20 grams was taken before shearing from the right side of each sheep to estimate clean wool percentage. The methods used for measuring these traits were previously reported by Ragab and Ghoneim (1961). The methods suggested by Snedecor (1950) were used for statistical analysis.

RESULTS AND DISCUSSION

1.—*Fiber Diameter*

Fiber diameter increased from one year to the third year of age in all breeds. This was probably due to the effect of age. Jones et al (1944) found that the fiber diameter of Rambouillet ewes increased from 11.8 microns at one year old to 13.2 microns at the third year of age, while Terrill et al (1950) stated that the fiber diameter increased from 21.3 microns at one year to 23.9 microns at the third year of age in Rambouillet rams. The same trend was found by Badreldin et al (1952) and Ragab et al (1956) in Egyptian Ossimi and Rahmani sheep. The Merino and Leicester sheep showed in this study the smallest range in fiber diameters among all groups of sheep (Table 1).

2.—*Crimps*

As shown in table (1) no significant difference was observed between ages in the number of crimps of Leicester sheep. In Merino and Suffolk sheep, age proved to have a significant effect upon crimps. However, it was suggested that the decrease in the number of crimps from one year to the third year of age, in Merino and Suffolk sheep, was due to the increase of fiber thickness with the advance in age rather than to changes in the environmental conditions. Hultz (1927), Darlow (1930), Darlow and Craft (1935) and Lang (1947) found that the increase in fiber diameter caused a decrease in the number of crimps per inch in different breeds of sheep.

3.—*Kemp*

Kemp percentage was too small to be of any serious value in all breeds. It ranged between 0.016% and 0.283% in all groups of sheep at ages studied (Table 1). Moreover, the kemp fibers were very short compared to the wool fibers and would not affect the value of the wool in manufacture.

4.—*Staple and Fiber Lengths*

As far as staple and fiber lengths are concerned, it seems that the Merino and Leicester sheep were less affected by the hot conditions at Tahreer Province than the Suffolk sheep in these two characters (Table 1). The longest staple length was produced during the first 12 months of age for all imported breeds of sheep. The wool of the first year was almost grown abroad. The staple and fiber lengths of Suffolks decreased from the first to the third year of age, while the Merino and Leicester sheep showed that their staple and fiber lengths at the third years were greater than those of two years of age.

TABLE 1.—Average Wool Characteristics of Merino, Suffolk and Leicester Sheep at Different Ages

Group	No. of animals	Grease fleece weight in Kgs.	Clean wool percentage	Fiber diameter in microns	No. of crimps per 2 cms.	Staple length in mm.	Fiber length in mm.	Kemp percentage
<i>Merino</i>								
At one year old	41	5.4±0.2	43.9±3.7	19.3±0.5	16.8±0.7	72.0±3.2	107.0±2.2	0.016
At two years old	24	3.7±0.2	48.9±2.2	21.2±0.2	13.8±0.4	39.9±2.1	82.2±2.9	0.038
At three years old	19	4.2±0.1	40.8±1.6	21.8±0.2	13.6±0.3	53.5±2.1	104.5±3.3	0.035
<i>Suffolk</i>								
At one year old	27	3.5±0.1	60.7±2.8	29.7±0.4	9.1±0.2	87.0±4.3	134.1±6.3	0.150
At two years old	22	2.9±0.2	68.8±3.5	31.9±0.5	8.2±0.3	66.3±2.6	111.5±3.4	0.225
At three years old	18	2.3±0.2	54.8±2.6	33.1±0.5	7.4±0.2	55.6±1.6	101.5±5.6	0.283
<i>Leicester</i>								
At one year old	27	5.8±0.2	70.3±1.3	33.4±0.5	2.9±0.1	259.8±7.8	353.9±7.9	0.030
At two years old	21	3.2±0.1	79.8±2.3	34.5±0.5	2.5±0.1	113.0±3.3	163.2±3.3	0.060
At three years old	15	4.8±0.2	57.5±2.2	35.1±0.4	2.6±0.1	159. ±7.1	221.1±7.3	0.082

Spencer et al (1928) found that staple length in Rambouillet ewes decreased with age, while Jones et al (1944) and Terrill et al (1950) stated that staple length increased as age advanced till the third or fourth year of age in Rambouillet ewes and rams respectively. Ragab et al (1956) came to the same conclusion in both sexes in Egyptian Ossimi and Rahmani sheep.

5.—*Clean Wool Percentage*

In this character, the reaction following the change in environmental conditions differed from breed to breed. The Merino sheep showed the least change in clean wool percentage, during the three ages studied, ranging between 40.8% and 48.9%, while the Leicester sheep showed the greatest ones ranging from 57.5% to 79.8%. The Suffolk sheep ranged from 68.8% to 54.8% in this respect (Table I).

Moreover, it was observed that the Suffolk and Leicester wool contained more dirts and vegetable materials than that of the Merino sheep. It seems that a certain amount of grease in the wool of sheep grazing under hot climatic conditions is necessary to exclude dirts. Light grease especially at the tips of the fleece, such as the Leicester and Suffolk, have been observed to catch or hold more dirts than an average amount of grease which goes compactly to the tip of the wool fibers as that of the Merino sheep. The more open and less dense fleeces of Leicester and Suffolk compared to the Merino could add to the explanation of such breed differences.

6.—*Grease Fleece Weight*

The highest grease fleece weight was that obtained during the first twelve months of age in all breeds studied. This wool of the first year mostly grew abroad, while the reaction in the character following the change in environmental conditions differed from breed to breed. The Merino

showed the least decreases in grease fleece weight, while the Suffolk sheep showed the greatest ones. In Merino and Leicester sheep, the wool crop of the third year was higher than that of the second year of age. The suffolks showed that their wool output decreased from the first to the third year of age.

The decrease of grease fleece weight from yearling age to the third year of age, is not in agreement with the results stated by Spencer et al (1928), Mercuri and Chiavarelli (1934), Gorman et al (1942), Jones et al (1944), Terrill et al (1950), Ragab et al (1956) and Mason and Dassat (1958) who agreed that fleece weight increased as age advanced till the fourth year of age in different breeds of sheep. Doubtless, this decrease is attributed to the change of the sheep's environment from their homelands in France and England to the Tahreer Province in Egypt. Davenport and Ritzman (1926) stated that changing weather conditions may vary the weight of fleece from the same individuals by fifty percent in extreme cases.

However, it was found that the Merino and Leicester sheep gave the highest wool production during their three years of age: the average grease fleece weight for the three ages studied was 4.5, 4.6 and 2.9 Kgs. for Merino, Leicester and Suffolk sheep respectively. It is interesting to note here that the wool production of the imported breeds of sheep under those new conditions is far greater than that of the indigenous breeds of sheep. Sidky (1948) and Ragab et al (1956) stated that the average weight of grease wool obtained from Egyptian Ossimi and Rahmani sheep ranged between 1.0 and 1.5 Kgs. annually. This means that foreign breeds of sheep under their new environmental conditions and in their first stage of acclimatization were capable of giving about threefold the wool crop of the indigenous sheep irrespective of the quality.

7.—*Density of Wool Fibers*

There was a common trend in all breeds studied for the effect of season on wool density. The highest density was noticed during both winter and spring, while summer and autumn showed the least values (Table 2). The difference between summer and winter densities in the Merinos was more pronounced than in the case of Suffolk and Leicester sheep.

These results indicated that inspite of the hot and dry desert conditions of the Tahreer Province especially at summer, the Merino survived successfully under these conditions giving the same wool production known to the breed in its homeland. The Suffolk and Leicester sheep were remarkably affected by those conditions that their wool production was more seriously affected.

It was found that there was a highly significant difference between regions as well as between individuals in the number of fibers per square centimeter for Merino, Suffolk and Leicester sheep. This is in accordance with the findings of Wolf et al (1943), Hardy and Wolf (1947), Galpin (1948 and Badreldin et al (1952).

The Suffolk and Leicester sheep had a considerable trouble in adapting themselves in the new conditions at Tahreer Province. Also, they showed in general very rapid signs of fatigue when they were grazing outdoor especially if they walk for long distances or it happened that the weather was rather hot. It was necessary to keep the imported Suffolk and Leicester sheep in door, except during the winter, and to feed them on a special diet, but nevertheless some of them died. The others suffered greatly from heat and climatic conditions and were very susceptible to many troubles especially respiratory and urinal disorders.

TABLE 2.—Average Number of Fibers Per Square Centimeter From Shoulder and Hip Regions At Different Seasons In Merino, Suffolk And Leicester Sheep.

Group	No. of animals	Merino	Suffolk	Leicester
<i>Winter</i>				
Shoulder ...	4	10424.7 ± 513	4012.5 ± 320	2778.5 ± 110
Hip	4	9194.0 ± 676	3524.8 ± 177	2264.8 ± 39
Total Average	4	9809.4 ± 456	3768.6 ± 160	2521.6 ± 110
<i>Spring</i>				
Shoulder ...	4	10536.5 ± 454	3933.0 ± 334	2686.8 ± 93
Hip	4	9225.5 ± 608	3355.8 ± 139	2243.8 ± 71
Total Average	4	9881.0 ± 429	3644.4 ± 200	2465.3 ± 99
<i>Summer</i>				
Shoulder ...	4	9867.3 ± 445	3505.5 ± 254	2476.5 ± 98
Hip	4	8594.5 ± 580	3250.8 ± 44	1959.4 ± 62
Total Average	4	9230.9 ± 415	3375.4 ± 128	2217.9 ± 112
<i>Autumn</i>				
Shoulder ...	4	9765.3 ± 450	3672.0 ± 254	2578.5 ± 140
Hip	4	8819.3 ± 536	3294.3 ± 88	2147.3 ± 101
Total Average	4	9292.3 ± 370	3483.1 ± 143	2362.9 ± 114

The results arrived at in this work are discouraging for Suffolk and Leicester sheep to survive successfully under the local conditions of Tahreer Province which are subtropical to some extent, especially if we take into consideration that there is a great difficulty in getting the ewes in œstrus, as well as the rams to mate the ewes. By contrary, the Merino sheep showed their adaptability to those conditions from the standpoint of both lamb and wool production. However, if better results are sought for Suffolk and Leicester sheep, greater numbers and wider distribution should be followed, thus giving a chance to the more adaptable sheep under the best optimum conditions to survive.

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ملخص

أثر ظروف البيئة المحلية على صفات الصوف في بعض أنواع أغننام الصوف المستوردة

درست صفات الصوف في بعض أنواع الأغننام المستوردة إلى مديرية التحرير في عام ١٩٥٦ . وقد شملت الدراسة ٢٧ رأساً من السافولك و٢٧ رأساً من الليستر استوردت من إنجلترا وواحد وأربعون رأساً من أغننام المرينو البريكوسية والمستوردة من فرنسا . وقد قدر في صوف هذه الأغننام الذي نما عليها وهي في بلادها الأصلية وزن الجزء وكذلك النسبة المئوية للصوف النظيف وسمك الليفة والتموج وطول الخصلة وطول الليفة ونسبه الشعر البري وكذلك غزارة الصوف كما قدرت هذه الصفات في صوف نفس هذه الأغننام بعد أن مكثت عاماً تحت الظروف المحلية للبلاد .

وقد تبين من الدراسة أن كل الصفات قد تأثرت بتغيير ظروف البيئة فيما عدا سمك الليفة والتموج والنسبة المئوية للشعر البري التي ظلت على حالها دون تغيير .

كما اتضح أن أغننام الليستر والسافولك لم يمكنها المعيشة تحت ظروفنا إذا أنها كانت ذات خصب منخفض جداً بالإضافة إلى نفوق أفراد كثيرة منها وإصابتها بالأمراض المختلفة مما أدى إلى التخلص منها أما النوع الوحيد الذي لم يجد صعوبة في المعيشة بنجاح تحت ظروف البلاد فقد كان المرينو .