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Fleece Properties of Indigenous, Exotic and Crossbred Sheep in a Southern Zone of the Mediterranean Area

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THE ANNUAL productivity, Physical and chemical characters of wools of 105 ewes(33Fleisch Merino, 34Ossimi and 38crossbred (Merino × Ossimi) were studied. Merino ewes surpassed the other two breeds in greasy fleece weight, shrinkage %, number of crimps per two cm, elongation %, and fat content. Ossimi sheep produced the heaviest claan fleece weight, the thickest fibres with the best uniformity, the longest and the strongest fibres. Crossbreds produced wool intermediate between the two pure breeds in all characters studied except the fibre sulphur content which was the highest.

The wool of the Egyptian sheep is coarse. The total annual wool crop produ ced by the Egyptian sheep was estimated to be about 2·5 million Kilogrames with an average fleece weight of about 1-1·5 kg / head (Ashmawi, 1981). The local factories began to mix it with fine imported wool so as to produce blankets and some woollen fabrics necessary for the local consumption. Owing to the increase of the population in Egypt, the growing demands for wool textiles during the recent years have led to the expansion of Egyptian wool industry. Thus the need to raw wool has become more. This has created a great necessity to make studies for impoving the wool produced locally, either from the foreign (Merino) or the local (Ossimi), sheep and their crossbreds to standardise the manufacturing needs to produce woollen textiles satisfying the consumer's taste, thus decreasing the imported wool.

Material and Methods

The experiments were carried out at Abis and Moatamadia Sheep Breeding Stations, which belong to the Egyptian Organization for Meat and Milk production. The field experiment started from 1st. October, 1976 and extended for twelve months. A number of 105 ewes 2-5 years old, was randomly chosen (33 Fleisch Merino, 34 Ossimi and 38 first

generation of Fleisch Merino ewes X Ossimi rams) from the flocks. The feedstuffs commonly used in the stations as the daily ration, were 750 g of a concentrate mixture 300 gm. clover hay and 300 g. rice straw. The dry matter, starch value and digestible protein intake were 1224,595 and 119 gm respectively. Rations were given twice daily at 8.00 a.m. and 3.00 p.m. The animals were shorn at the end of the experiment. Just before shearing, a representative mid-side sample was collected from each ewe. Individual fleece weight was recorded. The scouring of samples to estimate the clean wool yield was carried out according to Champan (1960). A lanameter was used for measuring 300 fibres / sample to determine the average fibre thickness and its variability. Semi-automatic Fiber Length Tester was used to estimate the length of 200 fibres.

The fibre strength and elongation were estimated using the single wool fibre tester apparatus (A.V. E. Budapest Extensometer , on 20 fibres from each dried sample (A.S.T.M. Desig. 1294,196). As described by Ryder and Stephonson (1968), the number of crimps per 2 cm. lonegth was accounted. For estimating the fleece-fat content the method described by the Technical Committee of the International Wool Textile Organization (I.W.T.O., 1955) using petroleum ether as a solvent was adopted. Fibersulphur content was determined according to Carius method as described by Bell (1955). For statistical analysis, Snedecor (1961) and Steel and Torrie (1967) were consulted.

Results and Discussion

Productive characters

Table 1 shows the mean greasy -fleece weight. clean fleece weight and shrinkage %. The heaviest greasy - fleece weight was that of Merino followed respectively by those of Ossimi and crossbred.

Differences among the three breed - groups were found to be highly significant (Table 2). Significant differences ($P < 0.01$) were found between greasy fleece weight of Merino and that of either Ossimi or crossbred ones. The recorded greasy fleece weight for Merino ewes is within the range which would be inferred from previous studies on the same breed in Egypt (Ashmawy, 1972, Marai, 1972 and Shehata, 1976). Greasy fleece weight of Ossimi ewes is heavier than that found by Labban *et al.* (1971), Galal *et al.* (1972) and Aboul -Naga and Afifi (1977). The recorded fleece weights for the crossbred ewes is far greater than that reported for first generation of Merino × Ossimi by Makled (1965) and El-Sherbiny (1968). In the present study, Mereino ewes were used as dams while in the previous studies the dams were Ossimi. It seems that the better materinal media of the Merino along the embryonic stage had increased body size and consequently fleece weight of the off-spring.

TABLE 1. **Quantitative physical and chemic, characteristics of Merino Ossimi, and crossbred fleeces.**

Trait	Merino	Ossimi	Crossbred
Greasy-fleece weight.	2.385±0.06	2.118∓0.01	2.0 ±0.05
Clean fleece weight.	1.505±0.02	1.595±0.04	1.519±0.04
Shrinkage %.	36.39±0.56	24.13±0.81	25.62±0.60
Fibre diameter (micron)	19.56±0.25	34.71±0.42	22.53±0.21
Variabilty in fibre diameter.	23.30±0.41	20.26±0.58	23.82±0.35
Fibre length (cm).	8.02±0.15	14.81±0.38	13.25±0.25
No. of crimps/2 cm.	11.27± 0.7	2.06±0.09	4.16±0.77
Fibre strength (g)	6.60±0.05	26.98±0.26	17.13±0.16
Fibre elongation %	33.25±0.35	30.70±0.36	31.70±0.24
Fat %	13.16±0.19	10.73±0.16	12.88±0.14
Sulphur %	3.76±0.03	3.55±0.06	3.80±0.04

TABLE 2. **Analysis of variance for the effect of breed on the different fleece characteristics.**

Character	d.f.	M.S.
Greasy-fleece weight	2	1.21**
Clean fleece weight	2	0.08
Shrinkage %	2	1507.77**
Fibre diameter	2	2188.0**
Variability in fibre diameter	2	128.7*
Fibre length	2	424.4**
No of crimpis/2 cm	2	783.0**
Fibre strength	2	3478.0**
Fibre elongation	2	55.2**

From data in Table 1 it is obvious that Merino fleeces shrank more than the crossbred and Ossimi fleeces. The differences between breed groups were highly significant (Table 2). Differences in shrinkage % were higly significant ($P < 0.01$) between Merino and each of Ossimi and crossbared ewes. But differences in skrinkage % between Ossimi and crossbred were non-significant. Under Egyptain conditons, Merino fleeces were found to shrink 38.0-61.26% (Latif *et al.* 1972) Shehata, 1976 and Guirgis, 1980). The low shrinkage % obtained for Merino ewes in the present work may be attributed to the relatively better management conditions. From previous results (Latif *et al* ; 1972, Shehata, 1976 and Aboul-Naga and Afifi, 1977) itcan be inferred that the fleeces of the indigenous Ossimi sheep shrink 20.0 to 43.8% Thus the obtained results for shrinkage % in Ossimi fleeces is in harmony with the previously reveiwed results.

Comparisons among the three breed groups show that the Ossimi sheep gave the highest clean fleece weight (Table 1). Similar estimates for clean fleece weight of the Ossimi were given by Shehata (1976) and Aboul-Naga and Afifi (1977). The obtained clean fleece weight for the Merino is similar to those previously recorded on the same breed under Egyptian conditions (Shehata, 1976 and Gurigis, 1980). The between breeds difference was found to be non-significant (Table 2).

Physical characters

As expected, the thickest fibres were produced by the Ossimi breed followed by those of the crossbred while the Merino breed gave the finest fibres (Table 1.). The average fibre diameter of the Ossimi ewes is less than the 43.19 microns recorded on the same breed by Mohamed (1976). However, it is similar to the value (32.4 microns) reported by Shehata (1976) as fibre diameter of the Ossimi breed. The obtained fibre diameter of the Merino ewes is similar to those reported for the same breed under Egyptian conditions (Ashmawy, 1972). But it is less than the value (27.31 microns) recorded on the same breed by Mohamed (1976). The average fibre diameter of the crossbred resembled more that of the maternal side (the Merino). A similar result was arrived at by Antronova (1973). On the other hand, using Merino on either Ossimi ewes (Shehata, 1976 and Mohamed, 1976) or Indian coarse wool ewes (Dhanarajain *et al.* 1972, Krishnaminthly *et al.* 1975 and Arora *et al.* 1978) resulted in a crossbred with an obviously thicker fibre diameter than that of Merino. Differences among the breed groups in their fibre diameter were highly significant (Table 1). Differences in fibre diameter between wools produced by crossbred and Merino ewes were non-significant.

As far as the effect of breed of sheep on coefficient of variation of fibre diameter (CV), it can be observed that crossbred ewes exhibted the highest CV% (Table 1). This situation might arise form the less uniformity in fibre diameter caused by crossing to genetically different breeds. The contribution of breed to CV was found to be highly significant (Table 2). This wide difference reached a significant level ($P < 0.01$ between Ossimi and each of Merino and crossbred wools.

The longest and shortest fibres were yielded by the Ossimi and the Merino ewes respectively. Fibres produced by the crossbred ewes were slightly shorter than those of the Ossimi (Table 1). The obtained ranking for fibre or length of the three breed groups resembled that previously recorded on similar breeds and their crosses (Galal *et al*; 1972 ; Marai, 1973 and 1975, Antronova, 1973, Sadek, 1974 Shehata, 1976 and Guirgis, 1980). Unlike the case previously found for the fibre diameter of the sheep, studied, fibre length of the crossbred tended to be similar to that of the Ossimi. Differences in fibre length among the three breed groups were statistically highly significant (Table 2). But non-significant differences existed between fibre length of the Ossimi and the crossobred sheep.

As a fine wool breed,.fibres of Merino exhibited the highest number of crimps (Table 1). Ragab and Ghoneim (1963) and Seoudy *et al.* (1969) found that the number of crimps of Merino wool fibres ranged between12·1 and 16·9 per 2cm. of length, while it ranged between 2·5 and 6·6 for Ossimi breed. The number of crimps of the studied crossbred fibres was intermediate between the two pure breeds but more closer than that of Ossimi. Makled (1965) and Ragab *et al.* (1969) gave a similar estmate (3·16) as an average number of crimps of Ossimi × Merino cross. Differences in fibre crimpness among the breed groups were highly significant (Table 2). Difference between any two breeds was found to be highly significant ($P < 0.01$).

It can be easily seen (Table 1) that wool fibres of Ossimi sheep were stronger than those of the other two breeds. Meanwhile fibre strength of the crossbred was better than that of the Merino. Moreover, wool fibres of Merino breed had the highest elongation % successively followed by the crossbred and Ossimi breeds (Table 1). Similar estimates for fibre strength and elongation of Merino sheep kept in Egypt and of local breeds were recorded by Awad *et al.* (1969) and Latif *et al.* (1972). Meanwhile, the elongation % of the crossbred, being 31·70%, is similar to that of Barki x Merino cross (Awad *et al.*, 1969).

Statistical analysis showed that differences either in fibre strength or in fibre elongation among the breed groups in the present work wee highly significant (Table 2). Arora *et al.* (1978) found that fibre strength of the cross between Chokla (Coarse wool breed) and Merino sheep was intermediate betwen that of the parental ones. Similar results were arrived at by Awad *et al* (1969).

The differences in fibre strength between any two breed groups were found to be highly significant.

However, differences in fibre elongation were highly significant ($P < 0.01$ between Merino and Ossimi, significant ($P < 0.05$) between Merino and crossbred and non significant between crossbred and Ossimi.

Chemical characters

It can be noticed (Table 1) that the highest % of fat was obtained from Merino fleeces followed by those of crossbred and Ossimi fleeces respectively. The content of fat in the Merino is similar to those previously reported (Latif *et al.*, 1972), but is less than that obtained by Zaporozhtsev and Zinchenko (1973). The fat % recorded in the present work for Ossimi is almost the same as that given for the same breed by Latif *et al.*, (1972). However, the fat content in crossbred fleeces was always closer to those of Merino. Differences in the fibre-fat content were found to be highly significant (Table 2). The differences between the three breed groups in this respect can either be attributed to their unsimilar density of sebaceous glands which is determined to agreat extent by heredity and / or to differences in the secretory activity of these glands which are controlled by genetical and non-genetical factors. Comparing fat % in the studied sheep revealed that both Merino and crossbred fleeces contained significantly higher ($P<0.01$) fat % than those of Ossimi.

The sulphur content (Table 1) of crossbred wool fibres was relatively higher than those of Merino and Ossimi breeds. Ossimi wool contained the lowest sulphur%. Similar results for breed differences in sulphur content of wool fibres were reported by Latif *et al.* (1972). The differences in sulphur content among the three breed groups were highly significant (Table 2). Differences in sulphur content between each pair of the crossbred and the Merino and the Ossimi were statistically highly significant ($P < 0.01$).

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تأثر الخصائص التصنيعية لجزات المارينو المنتجة تحت الظروف نصف القاحلة ببعض التعديلات البيئية

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قسمت ١٣٢ نعجة فلايش مارينو عشوائيا الى أربع مجموعات متساوية ، أعطى جرام واحد كبريت للرأس من نعاج أول مجموعة ، استبدل جزء من العليقة المركزة لثانى مجموعة بـ ٣٪ يوريا + ٥٪ مولاس ، غطيت جزأت المجموعة الثالثة بأكياس من الجوت بينما استخدمت المجموعة الرابعة كمجموعة مقارنة • وبعد عام كامل قصت جزات جميع النعاج داخل كل مجموعة وأرسلت لمصنع نسيج حيث عرضت لعمليات التصنيع المعتادة للحصول على غزل • وقد أوضحت القياسات التى سجلت عند كل مرحلة تصنيعية أن تطبيق أيا من التعديلات المستخدمة قد أدى الى :

(أ) نقص نسبة الفاقد (الويست) خلال أى من العمليات التصنيعية •

(ب) زيادة فى طول ألياف الكرد •

(جـ) نقص فى سمك ألياف التوبس •

(د) ازدياد طول ومتانة الياف التوبس ، ومتانة فتلات الغزل وتمددها (فيما عدا مجموعة اليوريا + المولاس) •

(هـ) نقص عدد النتؤات (النبس) فى التوبس •