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PHYSICAL CHARACTERISTICS OF THE FLEECE OF MERINO AND ITS CROSSES WITH OSSIMI SHEEP IN THE U.A.R.

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Eighty fleece samples from the 1965 clip representing four breed groups ; Fleisch Merino, Ossimi, ½ Merino-Ossimi and ¾ Merino ¼ Ossimi were tested for physical characters in 1966 at Sakha Animal Production Station, Ministry of Agriculture.

Merino had the highest mean grease fleece weight (M.G.F.W.) while it was surpassed by Ossimi in the mean clean fleece weight (M.C.F.W.). The first cross between Merino and Ossimi possessed intermediate values in M.G.F.W., while it exceeded both parents in the M.C.F.W., which was explained on basis of a heterosis process being expressed in some physical characters like density, fibre length and fibre cross-sectional area. Grading-up the ¾ M.O. caused a decrease in both grease and clean fleece weights, thus the ¾ M.O. showed the least M.G.F.W. and M.C.F.W. However, crossing increased the percentage yield in the crosses than in the Merino parents.

In general, crossing between Merino and Ossimi resulted in an offspring intermediate in its physical characters between its parental breeds, while grading up to the ¾ M.O. resulted in a decrease in the staple length and fibre length although the fibres were finer than both Ossimi and ½ M.O.

With respect to the fibre-type proportions, grading-up resulted in a more uniform fleece with less amounts of kemp fibres.

The local breeds of sheep in Egypt which are carpet wool breeds, exist mainly in the vicinity of the Nile valley and the rainy areas of the North Western desert.

Mutton production in the U.A.R. has long been of primary intetres while wool remained of a secondary value. The defficiency in fine wools and the shortage in production lead to a systemic up-grading program of the local sheep with Fleisch Merino, aiming at evolving a new strain of sheep adaptable to the local conditions and capable of producing medium or semi fine wool.

The object of this work was to study the physical characteristics of the fleece of Fleisch Merino, Ossimi the local carpet type sheep, ½ Merino-Ossimi (½ M.O.) and ¾ Merino - ¼ Ossimi (¾ M.O.).

Materials and Methods

This study was carried out at the Animal Production Research Station at Sakha, Ministry of Agriculture in 1966 and included four breed groups of sheep ; Fleisch Merino, originally imported from the G.D.R., Ossimi the local carpet wool type, Merino-Ossimi and Merino- ¼ Ossimi.

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Twenty mid-right side wool samples were collected from two year old ewes from the four breed groups, thus making a total of 80 samples. All the samples were collected at shearing time from the 1965 clip.

The samples were taken to the wool laboratory on campus where to be weighed, scoured and tested for physical characters.

Scouring of the samples was done according to Chapman (1960), while for estimating the yield and shrinkage, the specifications of the A.S.T.M. (1956 – a) were followed. Measurements of staple length in the grease state were according to the A.S.T.M. (1956 – b). Fibre length measurements were done according to the I.W.T.O. method (1966) while fibre diameter and fibre type proportions were measured as specified by the I.W.T.O. (1964). The study comprised the following sections:

1. Grease and clean fleece weights.
2. Shrinkage and yield percentages.
3. Staple length in the grease.
4. Fibre length.
5. Fibre diameter.
6. Fibre type proportions.

Statistical analysis of data was done according to Huntsberger (1961).

Symbols used for abbreviation were:

M = Merino, O = Ossimi.

Results

Fleece weights and shrinkage:

The highest mean grease fleece weight (M.G.F.W.) was that of Merino (3300.0 ± 123.6 g.) followed by the ½ M.O., Ossimi and the ¾ M.O. respectively (Table 1). Considering the two pure breeds, Merino and Ossimi, greater variability in this character was exhibited by the Ossimi (c.v. 36.27% vs. 16.79%). The clean fleece weight of the Ossimi slightly exceeded that of the Merino, however, Ossimi showed greater variation in this character (c.v. 32.29 vs. 16.43%). The greater variation in the G.F.W. indicates a corresponding variation in the amount of grease and other contaminants adherent to the fleece of Ossimi, while the greater variation in the clean fleece weight (C.F.W.) reflects a corresponding variation in the related characters such as fibre cross-sectional area and fibre length.

The ½ M.O. showed a mean G.F.W. intermediate between both values of the parents. However, the C.F.W. slightly exceeded the corresponding parental values, thus demonstrating a heterosis process being expressed in some related physical, characters. This result conforms with those reported by Hunt *et al.* (1952), Ragab *et al.* (1965) and Cumlivski (1962) who reported that crossbreds exceeded both parents in their clean fleece weights. Although crossing usually increases variation in any measurable character, yet, crossing

TABLE 1.—MEANS, STANDARD DEVIATIONS (S.D.) AND COEFFICIENTS OF VARIATIONS (C.V.) FOR G.F.W., C.F.W AND SHRINKAGE

Breed	G.F.W.			C.F.W.		C.V.
	Mean	S.D.	C.V.	Mean	S.D.	
Merino 12-months growth	3300±123.6	554	16.79	1528.5+56.1	251.1	16.43
Ossimi 6-months growth	1415.0±114.5	513	36.27	790.4+56.9	255.2	32.29
½ M.O. 12-months growth	3010.0±199.1	892	29.63	166.M6+123.1	551 3	33.02
¾ M.O. 12-months growth	1865 0±218.7	979	52.54	975.45+92.7	415.3	42.57

TABLE 1. (*contd.*).

Breed	Yield Percent			Shrinkage Percent		
	Mean	S.D.	C.V.	Mean	S.D.	C.V.
Merino 12-months growth	46.75±1.39	6.23	13.33	53 35±1.39	6.23	11.7
Ossimi 6-months growth	56.50±0.98	4.37	7.73	43.64±1.02	4.59	10.52
½ M.O. 12-months growth	55.94±2.30	1.32	18.45	44.06±[illegible]	10.32	23.42
¾ M.O. 12-months growth	49.12±3.88	17.40	35.42	50.88±3.68	16.50	32.43

between Merino and Ossimi resulted in an offspring exhibiting less variation in both grease and clean fleece weights than that exhibited by the Ossimi parents. This may be explained on basis of the effect of the Merino sire on some related physical cahracters, mainly fibre diameter.

The ¾ M.O. showed the least grease and clean fleece weights among the four breed groups. These low values may be explained on the basis of a decrease in some productive characters, like density, fibre cross-sectional area, length and the great individual variation which ranged from 1200 g. to 4200 g. for the grease fleece weights.

Arranging the four breeds in a descending order for their yield percentages; Ossimi 56.50, ½ M.O. 55.94, ¾ M.O. 49.12 and Merino 46.75. This result which is normally expected depends on the mere fact that finer wools shrink more than coarser wools (Spaulding, 1948 and Von Bergen, 1963). However, the relatively high shrinkage value of Ossimi (43.50%), does not necessarily indicate a high content of grease, it may be referred mainly to excessive acquired impurities.

Staple length in grease and fibre length :

From the results listed in Table (2) it is shown that although Ossimi represented a 6-months growth, yet it possessed a longer staple than the other breeds which emphasizes the fact that it belongs to the long wool breeds. Merino, however, being of the fine wool goup possessed a mean staple length of 55.3 ± 3.0 mm and consequently the least variation (v.c. 14.1%), in this character. Crossing between Merino and Ossimi resulted in staples longer than that of Merino but almost half of the Ossimi, while grading up to the ¾ M.O. resulted in a mean staple length lower than both Merino and the ½ M.O. parents and exhibiting great variation (25.60%).

The same order of the staple length was also apparent in fibre lentgh with Ossimi having the longest fibres 116.8 ± 8.7 mm in a 6-months growth. The ½ M.O. possessed a mean fibre length (135.1 ± 19.5 mm.) intermediate between Merino (88.7 ± 10.5 mm.) and Ossimi. The ¾ M.O. still possessed the least fibre length (78.8 ± 12.1 mm.) with the highest variation.

Relating the fibre length to its corresponding staple length, a factor of 1.60 could be derived for Merino wool to transform the staple length to its corresponding fibre length. This factor also indicates the degree of crimpiness as it represents the difference between the unstretched staple length and the slightly stretched fibre length. The derived factor is not far from that obtained by Chaudhri (1965) who reported a factor of 1.37 for Merino wool in India. It may be stated however, that the factor derived to transform staple length to fibre length is only applicable to those types of wools which are not felted or matted, since felts would contribute a source of error where felted staple does not represent the real length. Therefore, the application of such a transformation factor for Ossimi wool as well as some of the crossbred wools, which are usually matted while on the sheep's back, is incorrect. For the ¾ M.O. wool the transformation factor was calculated to be 1.65 which is almost similar to that of the Merino, thus indicating that the ¾ M.O. has acquired the character of crimpiness from its Merino parent.

TABLE 2.—STAPLE LENGTH, FIBRE LENGTH, FIBRE DIAMETER AND FIBRE TYPE PROPORTIONS

Breed	Staple length mm.		Fibre length mm.		Fibre diameter U.		Fibre type proportions				
	Mean	C.V.	Mean	C.V.	Mean	C.V.	True	Hair	Hetero-type	Colored	Kemp
Merino 12-months growth . .	55.3±3.0	14.01	88.6±10.5	30.67	21.7±1.7	20.27	98.68	0.0	1.10	0.07	0.15
Ossimi 6-months growth . . .	77.2±6.0	20.21	116.8±8.7	19.35	31.6±4.4	36.12	90.04	2.83	4.25	0.00	2.83
½ M.O. 12-months growth . .	76.6±5.3	17.75	135.1±19.5	37.23	25.9±3.0	30.41	99.11	0.13	0.30	0.43	0.03
¾ M.O. 12-months growth . .	47.7 5.2	25.60	78.8±12.1	37.56	24.5±2.6	25.94	99.30	0.05	0.5z	0.09	0.03

Fibre diameter:

Merino wool had the least diameter ($21.7 \pm 1.7\mu$) with the least variation (c.v. 20.27%), (Table 2). Therefore, and according to the A.S.T.M. (1963), Fleisch Merino could be classified as fine wool of the 64's grade and within the permissible limits (c.v. 20.0 – 23.0%) of variation which is of an average uniform.

Ossimi wool had the coarsest fibre diameter ($31.6 \pm 4.4\ \mu$) with the highest variation (c.v. 36.12%). If assigning Ossimi wool to a count grade, it would be classified as 48's but with extreme variability (30.2% and over).

The $\frac{1}{2}$ M.O. wool possessed a fibre diameter of $25.9 \pm 3.0\ \mu$ with a coefficient of variation of 30.41%. Thus, it is obvious that the $\frac{1}{2}$ M.O. came intermediate between its parental breeds in its fibre diameter and confirmed the results reported by Miller (1933), Nichols (1935) and Belic *et al.* (1963). Crossing, however, resulted in a better uniform wool fineness than that of Ossimi which may be attributed mainly to the effect of the Merino ram on decreasing the fibre diameter in its offspring and consequently decreasing the limits of variation. Assignment of the mean diameter to its corresponding count grade, showed that the $\frac{1}{2}$ M.O. wool may be classified as 58's grade but far from being uniform.

Grading Ossimi up to $\frac{3}{4}$ M.O. resulted in a decrease in fibre diameter to $24.5 \pm 2.6\ \mu$ and a decrease in its variability (c.v. 25.94%) relative to its $\frac{1}{2}$ M.O. female parent. Assignement of the $\frac{3}{4}$ M.O. wool to its corresponding count grade, showed that it would come under the 60's wool class but rather variable.

Fibre-type proportions:

It is shown from the results in table (2) that with the exception of Ossimi, all the other three breed groups showed small percentages of the undesirable fibres, *i.e.* kemp, coloured, hair and heterotypes. True wool contributed to the majority of the prevailent fibres, consequently, these types of wools may be considered uniform with regard to their fibre types.

Ossimi, however, showed less uniformity in this respect as it contained only 90.04% true wool fibres. Kemp comprised a relatively high percentage (2.88) while hair and heterotype fibres contributed only 2.83% and 4.25% respectively . It is noteworthy that up-grading Ossimi resulted in a more uniform fleece with less amounts of kemp fibres.

Discussion

Grease and clean fleece weights varied between breeds and within one breed, however, Merino showed less variation between its grease and clean fleece weights, raising the possibility of estimating yields from few numbers of fleece samples. Moreover, the shrinkage varied between breeds, while crossing resulted in individuals intermediate in their shrinkage values between their parental breeds. As the Merino blood increased in the offspring, the shrinkage also increased, thus emphasizing the concept that shrinkage is correlated to the fineness of the fleece of which the most important component is the natural grease.

Staple length varied between breeds and within the same breed and even within different staples in one fleece. The longer staples and fibres were those present in Ossimi wools, thus it is suggested that its useful length is attained in 6-months growth period, and accordingly the twice per year shearing should be better established, while fine wools should be shorn yearly when they attain their useful industrial length.

Merino possessed the finest fibre diameter, while Ossimi possessed the coarsest. Crossing of the two breeds resulted in an intermediate fibre diameter with less variation in the offspring compared to its dam, while grading up to the ¾ M.O. did not increase the wool fineness greatly in the offspring than in its ½ M.O. dams. The fineness was increased by only 2.78% than the ½ M.O. wools, although better diameter uniformity was attained through up-grading.

The analysis of fibre-type proportions revealed that heterogeneity of fibre types is associated with the coarseness of the fibres, thus Ossimi and its first cross with Merino possessed the most heterogenous fleeces. Uniformity is attained through up-grading together with rugged selection.

It may thus be concluded that crossing the local Ossimi sheep with Fleisch Merino will lead to the expected improvement in wool production quantitatively, while grading up will improve the quality of production through attaining the desired fineness and uniformity of the fleece. With regard to fineness, ¾ M.O. attained the 60's grade or ½ blood wool, however, the uniformity of fineness may be attained through rugged selective breeding. Considering the staple length and fibre length, selection should also be practiced to attain longer wools, which in turn will cause the increase in the clean fleece weight and relatively reduces the shrinkage. However, it should be borne in mind that increasing the wool production will increase the fibre diameter,therefore, limits of fineness should be set up to avoid inferior quality wools.

Ossimi has proved always to be an outstanding carpet wool breed, however, a better carpet wool quality and quantity may be produced by back crossing the ½ M.O. with the Ossimi rams.

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REFERENCES

A.S.T.M. (1965–a.)—Committee D–13 on Textiles. Tentative method of test for wool content of raw wool, Lab. Scale, D584–54T : 535–542.

A.S.T.M. (1965–b.)—Committee D–13 on Textiles. Standard method of sampling and testing staple length of wool in the grease.—D1234–54 : 547–549, illus.

A.S.T.M. (1963).—Proposed wool grade standards.—Wool subcommittee A–3, D–13, Philadelphia, Pensylvania.

BELIC, J. MITIC, N. AND VINOGRADOVIC, M. (1963). The production and quality of wool of first generation crossbreds of Pirot ewes and Arles Merino rams.—*Arch. Poljopr, Nauk.*; **16** : 27 (*A.B.A.*, **32** : 177).

CHAPMAN, R.E. (1960). Measurement of wool samples.—*C.S.I.R.O., Techn. paper* No. **3** : 97–107.

CHAUDHRI, B.N. (1965). Performance and wool quality of the sheep of Bihar.—*Ind. Vet. J.*, **42** : 191–200.

CUMLIVSKI, B. (1962). Wool characters of F_1 crossbreds from Soviet Tsigai rams and Valachian ewes.—*Zivocisna Vyroba*, **7** : 605–614.—(*A.B.A.*, 31 : 12).

HUNT, H.R., GHANEM, Y.S., LAWSON, C.A. AND BROWN, G.A. (1952).—Wool characteristics, growth and skin folds in a cross between Ramboullet and Black-top Delaine sheep. *Michigan Agric. Expt. Sta.*, **35** : 52.

HUNTSBERGER, D.V (1961). *Elemnts of statistical inference.*—Allyn and Bacon, Inc. Boston, U.S.A.

I.W.T.O. (1964). Method of test for determining the percentage of modulated fibres by the projection microscope.—*I.W.T.O. Techn. Commitee Paris.*

I.W.T.O (1966). Method of test for wool fibre length using a W.I.R.A. fibre diagram machine. *I.W.T.O.*—16–67 (E).

MILLER, WC. (1933). A general review of the inheritance of wool charactors in sheep.—*Emp. J. Expt. Agric.*, **1** : 173.

NICHOLS, J.E. (1935). The inheritance of productivity in farm livestock wool. *Emp. J. Expt. Agric.*, **3** : 156.

Ragab, M.T., ASKER, A.A. AND GHONEIM, K. (1956). Kemp. clean wool and grease fleece weight in Ossimi, Rahmani sheep and their crosses.—*Annals Agric. Sci. Ein Shams University*, **1** : 177.

SPAULDING, G.J. (1948). Wool fibre, wool fat suint and dirt in range wool.—*M.Sc. Thesis, University of Wyoming, Laramie, Wyoming.*

VON BERGEN, W. (1963). "*Wool chemical nature and properties.—Matthew's Textile fibres*", 6th edit., John Wiley and Sons Inc., New York.

الصفات الطبيعية لصوف المرينو وخليطه مع الأوسيمى

الملخص

اخذت ٨٠ عينـــة من صوف أربع مجموعات من الأغنـــام هى المرينو والأوسيمى ونصف المرينو ، ٣/٤ المرينو وقد تبين من دراسة هذه العينات ان المرينو كان اثقلها وزنا من حيث وزن الجزة بينما كان الأوسيمى هو أعلاها بالنسبة للجزة المغسولة وكان النصف مرينو وسطا بين المرينو والأوسيمى بالنسبة للجزة الخام واعلا بالنسبة للجزة المغسولة بالنسبة للأبوين وذلك بسبب قوة الخليط التى ظهر اثرها جليا فى بعض الصفات الطبيعية للصوف مثل الفزارة وطول الليفة وسمكها .

وقد كان التدريج الى المرينو سببا فى قلة وزن الجزة سواء كانت خاما او بعد الغسيل هذا وان كان الخلط قد تسبب عنه زيادة فى وزن الصوف بالنسبة للأب المرينو .

وعليه فقد امكن الاستنتاج بأن الخلط بين المرينو والأوسيمى ينتج عنه افراد متوسطة فى صفات صوفها الطبيعية بين الأبوين بينما اتجه التدريج الى قصر طول الليفة وان كانت أرفع من الأوسيمى ونصف المرينو كما أن الصوف فى الأفراد المدرجة الى ٣/٤ مرينو كان اكثر تجانسا واقل احتواء على الشعر الوحشى منه فى النصف مرينو .