

## Study of the Wool Follicle Population in the $\frac{3}{4}$ Barki and $\frac{3}{4}$ Ossimi Crosses with Merino

A.A. Elsherbiny, A.S. Elshikh and E.I. Shehata

Animal Production Department, Faculty of Agriculture,  
Al-Azhar University, Nasr City, and Animal Production  
Research Institute, Sheep Department, Dokki, Cairo, Egypt.

A SKIN histological study was conducted in 1974-1975 at the Animal Production Research Station, Sakha, Ministry of Agriculture to evaluate the feasibility of introducing 25% of the Merino blood on the wool production and characters of the local Barki and Ossimi sheep. The study included skin samples of 1 cm<sup>2</sup> from the mid side area of 11 ewes of  $\frac{3}{4}$  Ossimi  $\frac{1}{4}$  Merino, 7 ewes of  $\frac{3}{4}$  Barki  $\frac{1}{4}$  Merino, 9 ewes of each Barki and Ossimi and 8 ewes of Merino.

The results showed that Ossimi might have a better specific combining ability with Merino than Barki regarding the wool characters. This was apparent in the  $\frac{3}{4}$  O which had significantly higher mean secondary follicle density/mm<sup>2</sup> of skin (20.86±7.01) than its Ossimi parent (13.35±3.07). While the  $\frac{3}{4}$  B (14.65±3.10) did not differ significantly from the pure Barki (10.11±2.67) in this respect.

The increase in density of the secondary follicles in the  $\frac{3}{4}$  O or the  $\frac{3}{4}$  B caused by the 25% Merino blood had a low nonsignificant negative correlation with the clean fleece weight which indicated that the wool output was independent of the density and that other criteria might be of greater importance to the wool output. In other words 25% of Merino blood did not significantly increase the wool output in its offspring with either Barki or Ossimi.

The Fleisch Merino imported from East Germany in the 1960's was tried on the Ossimi and Barki ewes at different grades of crosses, the most recent of them, however, were the  $\frac{3}{4}$  Barki  $\frac{1}{4}$  Merino ( $\frac{3}{4}$  B) and the O  $\frac{3}{4}$  Ossimi  $\frac{1}{4}$  Merino ( $\frac{3}{4}$  O).

A study of the follicle population and the S/P ratio was thought to be essential to study the effect of introducing 25% of the Merino blood on the type of wool to be produced by the mentioned crossbreds.

### Material and Methods

Skin biopsies of 1 cm<sup>2</sup> were taken from the mid side area of all 11 ewes of the  $\frac{3}{4}$  O, 7 ewes of the  $\frac{3}{4}$  B, 9 ewes of each Barki and O Ossimi and 8 ewes of Merino. All the ewes were about 18 months old. The skin samples were prepared for surface parallel section using the method of Clarke (1960) with some modifications. The skin samples were corrected for the shrinkage during preparation.

The study of the skin sections included the density of the follicle groups/mm<sup>2</sup> of skin, primary and secondary follicle number within one group, the density of primary and secondary follicles/mm<sup>2</sup> and the S/P ratio.

Statistical analysis of the results was done as indicated by Snedecor and Cochran (1973).

Heterosis for the crossbreds was calculated as the percentage deviation from the mean grand parent values.

### Results and Discussion

#### *Follicle groups and primary follicles (Table 1 and 2)*

Breed groups did not show any significant differences in the number of follicle groups/mm<sup>2</sup> of skin or the number of primary follicles within each follicle group.

#### *Secondary follicles (Table 1 and 2)*

The number of secondary follicles within each follicle group or per square millimeter of skin varied significantly between Merino and all the other breed groups and between the  $\frac{3}{4}$  O and the other breed groups. These results confirm what was found by Dun (1958) and Elsherbiny, Elsheikh and Labban (1969) who found that the different breeds of sheep had almost similar numbers of follicle groups per mm<sup>2</sup> of skin and that differences in density were largely due to differences in secondary follicles numbers.

Ossimi and Barki possessed mean number of secondary follicles/mm<sup>2</sup> of skin ( $13.35 \pm 3.07$  &  $10.11 \pm 2.67$ ) quite comparable to those of the carpet wool breeds such as Welsh Mountain (11.0), Swedish Landrace (12.7), English Leicester (12.9) and Border Leicester (12.9) (Carter, 1955). The  $\frac{3}{4}$  O ( $20.86 \pm 7.01$ ), however, was very near to Romney Marsh (18.6) and Corriedale (21.0), while  $\frac{3}{4}$  B ( $14.65 \pm 3.10$ ) was almost similar to Ryeland of England (13.9) (Carter, 1955). These breeds are considered medium wool types. The heterosis in the number of secondary follicles/mm<sup>2</sup> of skin or per follicle group was greater in  $\frac{3}{4}$  O (+15.9 %) than in  $\frac{3}{4}$  B (-6.9 %). This result indicates that  $\frac{3}{4}$  O was declining towards the Merino parent while  $\frac{3}{4}$  B had a more decline towards the Barki parent. This result confirms the postulation of Guirgis (1967) that Barki is capable of transmitting genes of coarseness to its offspring when crossed with Merino. It might be otherwise true that there is better specific combining ability between Ossimi and Merino in the studied traits similar to that reported by Galal *et al.* (1972) regarding lamb performance and fleece weight.

#### *The S/P (Table 1 & 2)*

Ossimi and Barki possessed slightly different S/P ratios being  $4.98 \pm 8.98$  and  $4.05 \pm 0.65$ , respectively. The S/P ratios increased in both  $\frac{3}{4}$  O ( $9.30 \pm 2.66$ ) and  $\frac{3}{4}$  B ( $6.43 \pm 1.19$ ) compared to their local respective grandparents. The increase, however, was significant only in  $\frac{3}{4}$  O. This result conforms with that of Elsherbiny *et al.* (1969) who reported an increase in the secondary follicle density through crossing Ossimi with Merino.

TABLE 1. Mean density of follicle groups, primary and secondary follicles within groups and within 1 mm<sup>2</sup> of skin.

Parameter	Barki	3/4 B	Merino	3/4 O	Ossimi
Density of follicle groups/mm <sup>2</sup> of skin	2.41±0.04	2.40±0.29	2.52±0.38	2.64±0.43	2.94±0.54
C.V. % . . . . .	23.28	15.80	19.90	26.90	25.90
Primary follicles group . . . . .	1.02±0.08	1.05±0.05	1.00±0.12	1.67±0.05	1.06±0.15
C.V. % . . . . .	10.8	5.7	15.4	7.6	19.7
Secondary follicles group C.V.% . . . . .	4.13±0.47 15.9	5.98±1.10 23.9	10.9±1.87 22.2	8.57±1.93 33.5	4.54±0.51 15.6
Total follicle density mm <sup>2</sup> primary . . . . .	2.28±0.44	2.33±0.45	2.39±0.52	2.33±0.49	2.80±0.62
C.V.% . . . . .	27.1	19.2	28.2	31.3	30.9
Secondary . . . . .	10.11±2.67	14.65±3.10	1.96±7.10	20.86±7.01	13.35±3.07
C.V.% . . . . .	37.0	27.5	28.9	50.0	21.7
Total primary secondary . . . . .	12.39±5.05	16.98±3.35	34.35±7.82	23.18±7.26	16.15±2.55
S/P ratio . . . . .	4.05±0.65	6.43±1.19	13.44±2.19	9.30±2.66	4.98±1.98

TABLE 2. Duncan's test of comparisons among mean of follicle counts in the different breed groups.

Parameter	Barki	3/4 B	Merino	3/4 O	Ossimi
Density of follicle . . . . .					
Groups/mm <sup>2</sup> of skin . . . . .	A	A	A	A	A
Secondary follicles/mm <sup>2</sup> of skin . . . . .	D	D	—	—	D
Secondary follicles/group . . . . .	E	E	—	—	E
S/P ratio . . . . .	C	C	—	—	C

The breed groups showing the same symbol do not differ significantly from each other (P=0.05).

TABLE 3. Heterosis; the percentage deviation of the true mean from the expected weighted means of the grandparents.

Parameter	3/4 B %	3/4 O %
Number of follicle groups/mm <sup>2</sup> of skin	1-1.54	-16.75
Number of secondary follicles/group	-6.92	-15.88
S/P ratio	-4.53	+31.12

A high heterosis in the S/P ration of + 31.12% was calculated for the  $\frac{3}{4}$ O relative to the weighed mean of its grand parents, while a low but negative (-4.53%) heterosis was calculated for the  $\frac{3}{4}$  B. This result confirms the previous findings that the effect of Barki was predominant in its crosses with Merino, while the effect of Merino was predominant in its crosses with Ossimi.

Correlation coefficients (Table 4) between the clean fleece weight and the number of primary follicles per mm<sup>2</sup> of skin revealed that in all breed groups the correlations were nonsignificant and took a negative sign, which means that the number of primary follicles in the skin did not influence the clean fleece weight. This agrees well with the result found by Carter and Clarke (1957). The correlation between clean fleece weight and the S/P ratio although nonsignificant in all the breed groups, yet it took the positive sign in the purebred animals and was about to reach the level of significance in Barki (+0.602). In the crossbreds, however, the correlation were negative. This result indicates that the S/P ratio did not have a significant role in determining the clean fleece weight in the purebred animals, although it tended to increase in heavier fleeces. The negative correlations in the crossbreds, although nonsignificant may indicate the trend that the S/P or in other words the secondary follicle density is of minor if at all of any effect on the clean fleece weight. Schinckel (1956 and 1957) found a negative correlation between the number of fibres and wool weight per unit area of skin in medium and strong wool types of Merino.

TABLE 4. Correlation between the S/P ratio, the number of secondary follicles/mm<sup>2</sup> of skin and the clean fleece weight.

Parameter	Pooled r	Barki	3/4B	Merino	3/4 O	Ossimi
S/P ratio/clean fleece weight n	+0.239 44	+0.602 9	-0.468 7	+0.279 8	-0.253 11	+0.085 9
Secondary ollicles clean fleece weight n	+0.082 44	+0.366 9	-0.481 7	-0.144 8	-0.274 11	±0.043 9

In conclusion, it seems that Ossimi had a better specific combining ability with Merino than Barki regarding the wool characters. This was apparent in the  $\frac{3}{4}$  Ossimi which had a significantly higher secondary follicle density than its Ossimi parent while the  $\frac{3}{4}$  B did not differ significantly from the pure Barki in this respect.

Introducing 25% of the Merino blood into the local sheep did not improve the quantity or the quality of the wool produced for carpets, since the increase in density was accompanied by shorter and finer fibres which caused no increase in the clean wool output, meanwhile impairing the carpet wool characters of the Purebred Ossimi and Barki sheep.

#### R e f e r e n c e s

- Carter, H.B. (1955) The follicle group in sheep. *Animal Breeding Abstracts*, 23, 101.
- Clarke, W.H. (1960) A histological technique for the study of the skin follicle population in sheep. *C.S.I.R.O., Technical Paper No.3*.
- Dun, R.B. (1958) The influence of selection and plan of nutrition on the components of fleece weight in Merino sheep. *Aust. J. Agric. Res.* 9, 802.
- Elsherbiny, A.A., Elsheikh, A.S. and Labban, F.M. (1969) Studies on the skin of Fleisch Merino Ossimi and their crosses in the U.A.R. *J. Anim. Prod. U.A.R.* 9, 25.
- Galal, E.S.E., Aboulnaga, A., Eltawil, E. and Khishin, E.S. (1972) Estimation of combining ability and maternal influence in crosses between Merino and Barki sheep. *J. Anim. Prod., B.* 15, 47.
- Guirgis, R.A. (1967) The inheriting of birth coat characters in Barki, Merino and their crosses. *E. Afr. Agric. For. J.* 32, 305.
- Schinckel, P.G. (1956) Body weight-fleece weight relationships in a strain of Merino sheep. *Aust. J. Agric. Res.* 7, 57.
- Schinckel, P.G. (1957) The relationship between follicle numbers and wool production. *Aust. J. Agric. Res.* 8, 512.
- Snedecor, G.W. and Cochran, W.G. (1973) "Statistical Methods", 6th Edit., Iowa State University Press Ames, Iowa, U.S.A.

## دراسة هستولوجية لحويصلات الاليف في خلايط ٣/٤ برقى و ٣/٤ أوسمى مع المرينو

احمد الشرينى ، احمد سعيد الشيخ وعصام شحاته  
قسم الانتاج الحيوانى ، كلية الزراعة ، جامعة الأزهر ومعهد بحوث الانتاج  
الحيوانى ، الدقى ، القاهرة

أجريت هذه الدراسة الهستولوجية بمحطة بحوث الانتاج بسبخا التابعة لوزارة  
الزراعة المصرية لدراسة تأثير ادخال دم المرينو بنسبة ٢٥٪ مع الاغنام المحلية  
الاسيى والبرى على أنتاج الصوف وصفاته .

استخدمت فى الدراسة عينات من الجلد مساحتها ١ سم<sup>٢</sup> اخذت من ١١  
نعجة ١/٤ أوسيمى ، ١/٤ مرينو و ٧ نعاج ١/٤ برقى ، ٤ مرينو و ٩ نعاج من كل  
من البرقى والأوسيمى و ٨ نعاج من المرينو .

وقد أظهرت النتائج احتمال وجود أفضالية للأوسيمى فى قدرة توافقه عند  
خليط مع المرينو بمقارنته بالبرى بالنسبة لصات الصوف وقد ظهر ذلك فى  
صفة كثافة الحويصلات الثانوية فى وحدة المساحة ( ٢م<sup>٢</sup> ) حيث كانت  
٢٠٨٦ + ٧٠١ فى ١/٤ أوسيمى و ١٣٣٥ + ٣٠٧ فى أبائه الأوسيمى بينما  
لم تختلف هذه الصفة بدرجة معنوية بين أغانم ١/٤ برقى (١٤٦٥ + ٣١٠)  
والبرى (١٠١١ + ٢٦٧).

ولقد ظهر أن الزيادة فى كثافة الحويصلات الثانوية فى خليط ١/٤ برقى و ١/٤  
أوسيمى نتيجة ادخال دم المرينو بنسبة ٢٥٪ كان ذو تناسب سلبى ولكن  
بدرجة غير معنوية مع وزن الصوف النظيف الناتج مما يتضح منه أن انتاج  
الصوف لا يعتمد على كثافة الحويصلات حيث أن هناك عوامل أخرى أكثر  
أهمية فى تحديد هذه الصفة .

وبمعنى آخر فإن ادخال دم المرينو بنسبة ٢٥٪ لم يؤدى الى حدوث زيادة  
معنوية فى أنتاج الصوف فى خلاطة مع الأوسيمى والبرى .