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WOOL VARIABILITY OF BARKI SHEEP UNDER DIFFERENT LOCATIONS AND MANAGEMENT

Abdelaziz, N.M.
Department of Animal and Fish Production, Faculty of Agriculture, El-Shatby, Alexandria University, Egypt.

ABSTRACT

This study was carried out on three flocks of Barki sheep raised at three different geographic locations in the region namely; Sidi-Barani, Dabaa and experimental farm of Alexandria University. Number of ewes in each location studied were 50, 45 and 56, respectively. Ewes in each location were classified into two groups based on head colour. The wool traits and skin follicles were studied.

The results showed significant differences in wool growth, YLD%, STL, CR, FD, BUL, SS and EL% due to location. Barki sheep located at Sidi Barani gave more bulkiness, finer wool and shorter staples than those located at Dabaa and Alexandria farm. The head colour did not have any significant role in determining the wool traits and wool follicle characteristics in the skin of Barki sheep. Thus the head colour of Barki sheep could not be used as a marker to improve its wool traits. Differences among management in all wool traits studied except bulkiness were found to be highly significant. The influences of location and management on fibre type ratio and medullation index were significant. Variations in number of follicle group /cm^2 and number of primary follicles in the skin due to origin and age of animal were highly significant, while those due to head colour were not significant . Origin , age and head colour had highly significant effect upon secondary follicle and S/P ratio . From the present results it might be concluded that sheep flocks located at Sidi Barani gave fine fibres thus such flocks are preferable for apparel product , while the fleeces of Barki located at Dabaa are preferable for carpet .

Key words: wool, Barki sheep, location, management.

INTRODUCTION

Various authors reported that wool characteristics vary between and within breeds; moreover variation in wool has some correlations with the type of breeds and strains of sheep (Kishor *et al*., 1983 ; Mortimer and Atkins , 1989 and Lee & Williams , 1993) .

Barki sheep are mainly a desert sheep and the most numerous breed scattered in different locations in the North Western Coastal Zone which extends over 550 Km from Alexandia to Sallum close to Libyan boarder with a depth of 50-80 Km . It has a white coarse fleece and the head either white or reddish–brown or black of a solid colour It was found that wool characteristics vary widely among Barki individuals (El-sherbiny *et al*., 1979 ; Guirgis , 1980; El-Gabbas , 1998 and Azzam , 1999). It is greatly important to screen Barki flocks raised in this area in order to obtain coarse white fleeces to meet the demands of wool manufactures that produce different carpet textures.

The aims of this study were to : 1- Provide data on some wool traits and skin follicles of Barki flocks raised in different locations of the region. 2-

Compare wool validity under desert and farm conditions , and determine the possibility of improving wool traits using head colour as a marker .

MATERIALS AND METHODS

This study was carried out on three flocks of Barki sheep raised at three different geographic locations in the region namely; Sidi-Barani, Dabaa and experimental farm of Alexandria University. Figure (1) represented the location and number of ewes in each location studied. It should be mentioned that ewes in the experimental farm were bought at weaning age from the same source of Barki sheep in Sidi-Barani and Dabaa. In these flocks, ewes were classified into two groups based on head colour namely white and coloured head. The animals raised at the experimental farm of Alexandria University were fed on Berseem (*Trifolium alexandrinum*), which is available from November until May. In summer they grazed in the field and were given concentrates which usually consisted of one part of undecorticated cotton seed cake and one part rice bran. The feeding condition is similar to those of most farm flocks. The main feeding resource in Sidi-Barani and Dabaa during the trial in winter was natural range, barley shrubs might only be grazed in late February till end of July . In summer , animals were fed on dry feed stuffs in the form of grains and some concentrate mixtures , and barley straw was offered also in low quantities .

Wool samples were obtained by using fine scissors as close as possible to the skin surface forming a square of approximately 100 cm^2 from the right mid-side position. The dimensions of these squares were recorded to calculate the area shorn. Greasy wool sample taken from the area shorn was also weighed and the greasy wool production per unit area (GWA) was then calculated for each animal at one year of age. Ten staples were taken from each greasy sample and used for measuring fibre diameter (FD) I.W.T.O. (1966), staple length (STL), staple crimp (CR) and staple strength (SS) according to El-Gabbas, et al. (1999). The greasy sample was scoured to estimate clean scoured yield (Chapman, 1960), clean wool per unit area (CWA) (El-Gabbas , 1993) and loose wool bulk (BUL) (Bedford *et al*_ ., 1977) .

Fibre types and medullation index was estimated according to the method and formula of Guirgis et al . (1978) as follows :

Where i = 1 , 2 , 3 and 4 as scores for fine , coarse , heterotype and

$$\text{Medullatio n index} = \frac{1}{10}\sum_{i=1}^{4} iPi,$$

kemp, P_i is the percentage of i^{th} class.

Twelve animals of each group with regard to their origin were chosen to represent each of the said flocks of Alexandria farm and divided equally into two subgroups according to head colour. Skin biopsis of 1 cm^2 were taken from the mid-side area of all 24 ewes at 6 months and one year of age . The skin samples were prepared for surface parallel section using the methods of Clarke (1960), Elsherbiny *et al.*, (1979) and Abdelaziz *et al.* , (1989). The

skin samples were corrected for the shrinkage during preparation. The study of the histological characteristics of the skin included the number of complete follicle groups per square millimeter of skin, and number of primary and secondary follicles per square and S/P ratio.

Different models were fitted. It was found that there was some type of confounding between location and management. Thus, the interaction between both was excluded from the analysis. So, the model used included the effect of location , management and head colour. These factors were assumed to be fixed except the error term which was assumed to be randomly and independently distributed with mean=0 and variance = $\sigma 2e$. Data were analyzed by the least squares analysis procedure with unequal subclass numbers (Harvey, 1977). The analysis was conducted using Generalized Linear Model Procedure on SAS (1995). Comparisons between each two means of any factor were carried out by Duncan Multiple Range Test, (Steel and Torrie, 1980).

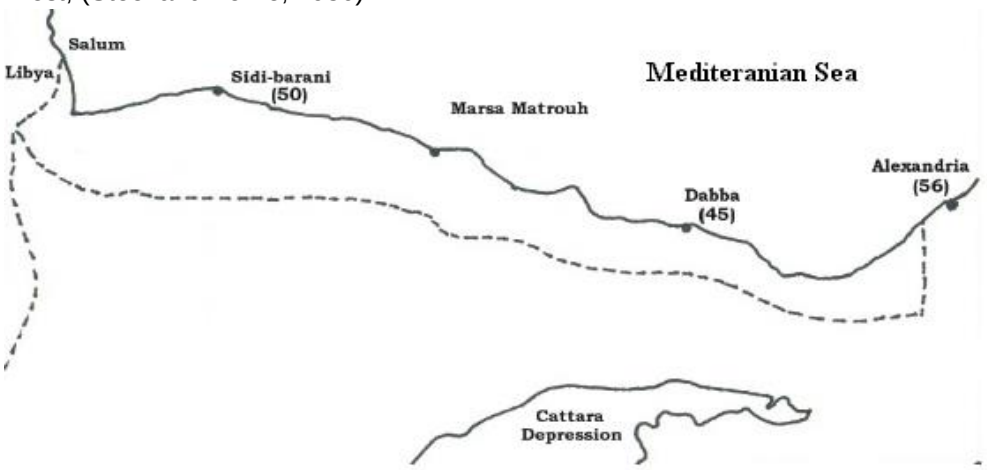

Figure 1. Map showing the main locations and numbers of Barki sheep.

RESULTS AND DISCUSSION

Tables (1 and 2) showed significant differences in greasy and clean wool growth, YLD%, STL , CR , FD , BUL , SS and EL% due to location . Barki sheep located at Sidi Barani gave higher number of crimps per centimeter , more bulkiness & elongation % , finer wool and shorter staple than those of flocks located at Dabaa and Alexandria farm . Lower number of crimps / cm might be related to longer staple length in Alexandria farm flock as compared with other two flocks located at Sidi Barani and Dabaa. Higher staple strength of Barki sheep located at Alexandria farm might be due to coarser fibres and longer staples (Ashmawi and Al-Azzawi , 1982 b ; Ahtash , 1998 ; Azzam , 1999) .

Head colour of Barki sheep had insignificant effect on GWA , CWA , YLD% , CR and FD . However , the results indicated significant head colour effect on STL , SS , BUL , and EL% (Table 1 and 2) .

Differences among management in all wool traits studied except bulkiness were found to be highly significant . The sheep flocks managed in the farm had higher wool growth , higher clean yield % , longer staples and more strength than flocks raised in the desert , while those raised in the desert possessed highest number of crimps /cm ., finest fibres and highest percentage of elongation (Aboul-Naga , 1976 ; Ashmawi & Azzawi , 1982a and Ahtash , 1998) .

Table 1: Least squares means and standard errors for greasy wool per unit area (GWA) , clean wool per unit area (CWA) , yield percentage (YLD%) , staple length (STL) and staple crimp (CR) according to locations , colour of head and management

Traits / Factors	No	GWA (g/cm^2)	CWA (g/cm^2)	YLD (%)	STL (cm)	CR (No/cm)
Overall means	151	0.123 ± 0.03	0.063 ± 0.01	64.69 ± 1.53	10.99 ± 0.63	0.82 ± 0.12
Locations (L)		**	**	**	**	**
Sidi Barani (1)	50	0.12 ± 0.01^{ab}	0.06 ± 0.002^{a}	64.25 ± 0.24^{a}	10.26 ± 0.10^{a}	0.91 ± 0.02^{a}
Dabaa (2)	45	0.11 ± 0.01^{a}	0.06 ± 0.002^{a}	64.01 ± 0.23^{a}	11.26 ± 0.09^{b}	0.80 ± 0.02^{b}
Alexandria (3)	56	0.13 ± 0.01^{b}	0.07 ± 0.002^{b}	65.55 ± 0.21^{b}	11.47 ± 0.09^{b}	0.74 ± 0.02^{c}
Head colour (C)		NS	NS	NS	**	NS
White (1)	94	0.13 ± 0.01^{a}	0.07 ± 0.002^{a}	65.01 ± 0.16^{a}	10.95 ± 0.08^{a}	0.81 ± 0.01^{a}
Black/Brown (2)	57	0.12 ± 0.01^{a}	0.06 ± 0.002^{a}	64.64 ± 0.21^{a}	11.28 ± 0.10^{b}	0.78 ± 0.02^{a}
Management (M)		**	**	**	**	**
Desert (1)	95	0.11 ± 0.01^{a}	0.06 ± 0.002^{a}	64.10 ± 0.16^{a}	10.76 ± 0.08^{a}	0.86 ± 0.01^{a}
Farm (2)	56	0.13 ± 0.01^{b}	0.07 ± 0.002^{b}	65.55 ± 0.21^{b}	11.47 ± 0.10^{b}	0.74 ± 0.02^{b}
L X C		NS	*	NS	NS	NS
1 1	36	0.13 ± 0.01^{a}	0.06 ± 0.003^{a}	64.28 ± 0.25^{a}	10.22 ± 0.11^{a}	0.93 ± 0.02^{a}
1 2	14	0.12 ± 0.01^{a}	0.05 ± 0.004^{b}	64.21 ± 0.41^{a}	10.31 ± 0.17^{a}	0.09 ± 0.03^{a}
2 1	25	0.11 ± 0.01^{a}	0.06 ± 0.003$^{a\,b}$	64.41 ± 0.31^{a}	11.25 ± 0.13^{a}	0.82 ± 0.02^{a}
2 2	20	0.11 ± 0.02^{a}	0.05 ± 0.003^{b}	63.61 ± 0.34^{a}	11.28 ± 0.14^{a}	0.79 ± 0.03^{a}
3 1	33	0.14 ± 0.01^{a}	0.07 ± 0.003^{ac}	65.68 ± 0.27^{a}	11.26 ± 0.11^{a}	0.75 ± 0.02^{a}
3 2	23	0.13 ± 0.01^{a}	0.07 ± 0.003^{c}	65.43 ± 0.32^{a}	11.69 ± 0.13^{a}	0.73 ± 0.02^{a}
M X C		NS	*	NS	NS	NS
1 1	61	0.12 ± 0.01^{a}	0.06 ± 0.002^{a}	64.34 ± 0.20^{a}	10.64 ± 0.09^{a}	0.88 ± 0.02^{a}
1 2	34	0.11 ± 0.01^{a}	0.05 ± 0.003^{b}	63.86 ± 0.26^{a}	10.88 ± 0.13^{a}	0.83 ± 0.02^{a}
2 1	33	0.14 ± 0.01^{a}	0.07 ± 0.003^{c}	65.68 ± 0.27^{a}	11.26 ± 0.13^{a}	0.75 ± 0.02^{a}
2 2	23	0.13 ± 0.01^{a}	0.07 ± 0.003^{c}	65.43 ± 0.32^{a}	11.69 ± 0.15^{a}	0.73 ± 0.03^{a}

^{a,b,c}Within a column followed the same superscript letter are not significantly different.
*** significant p < 0.05. ** Highly significant p < 0.01. NS: not significant**

Table 2: Least squares means and standard errors for fibre diameter (FD), Loose wool bulk (BUL), staple strength (SS) and elongation (EL%) according to locations, colour of head and management.

Traits / Factors	No.	FD (µm)	BUL (cm^3/g)	SS (N/Ktex)	EL (%)
Overall means	151	31.73 ± 1.1	29.81 ± 1.87	54.49 ± 1.94	20.11 ± 0.81
Locations (L)		**	**	*	**
Sidi Barani (1)	50	29.88 ± 0.17 [a]	31.19 ± 0.30 [a]	54.09 ± 0.30 [a]	20.86 ± 0.13 [a]
Dabaa (2)	45	32.83 ± 0.16 [b]	28.17 ± 0.28 [b]	54.04 ± 0.29 [a]	20.02 ± 0.12 [b]
Alexandria (3)	56	32.54 ± 0.15 [b]	29.62 ± 0.25 [c]	54.91 ± 0.26 [b]	19.48 ± 0.11 [c]
Head colour (C)		NS	**	*	**
White (1)	94	31.70 ± 0.17 [a]	30.42 ± 0.24 [a]	54.86 ± 0.21 [a]	20.15 ± 0.09 [a]
Black/Brown (2)	57	32.19 ± 0.22 [a]	28.82 ± 0.30 [b]	54.15 ± 0.26 [b]	19.75 ± 0.12 [b]
Management (M)		**	NS	**	**
Desert (1)	95	31.35 ± 0.17 [a]	29.62 ± 0.23 [a]	54.10 ± 0.21 [a]	20.42 ± 0.09 [a]
Farm (2)	56	32.54 ± 0.22 [b]	29.62 ± 0.30 [a]	54.91 ± 0.26 [b]	19.48 ± 0.12 [b]
L X C		NS	NS	NS	NS
1 1	36	29.83 ± 0.18 [a]	31.32 ± 0.31 [a]	54.70 ± 0.32 [a]	20.81 ± 0.13 [a]
1 2	14	29.94 ± 0.29 [a]	31.06 ± 0.50 [a]	53.49 ± 0.52 [a]	20.90 ± 0.22 [a]
2 1	25	32.78 ± 0.22 [a]	29.01 ± 0.37 [a]	54.25 ± 0.39 [a]	20.16 ± 0.16 [a]
2 2	20	32.88 ± 0.25 [a]	27.34 ± 0.42 [a]	53.83 ± 0.43 [a]	19.88 ± 0.18 [a]
3 1	33	32.36 ± 0.19 [a]	30.48 ± 0.33 [a]	55.20 ± 0.34 [a]	19.76 ± 0.14 [a]
3 2	23	32.72 ± 0.23 [a]	28.77 ± 0.39 [a]	54.62 ± 0.40 [a]	19.20 ± 0.17 [a]
M X C		NS	NS	NS	NS
1 1	61	31.04 ± 0.20 [a]	30.37 ± 0.28 [a]	54.51 ± 0.25 [a]	20.54 ± 0.11 [a]
2	34	31.67 ± 0.27 [a]	28.87 ± 0.37 [a]	53.69 ± 0.33 [a]	20.30 ± 0.15 [a]
1	33	32.36 ± 0.28 [a]	30.48 ± 0.38 [a]	55.20 ± 0.34 [a]	19.76 ± 0.15 [a]
2 2	23	32.72 ± 0.33 [a]	28.77 ± 0.46 [a]	54.62 ± 0.40 [a]	19.20 ± 0.18 [a]

[a,b,c]Within a column followed the same superscript letter are not significantly different.
*** significant p < 0.05. ** Highly significant p < 0.01. NS: not significant**

As far as the influence of origin and management on fibre type ratio was concerned , results in Table (3) showed fibre type ratio of Barki sheep that varied markedly among different geographical areas .The Barki flock located at Sidi Barani had the highest percentage of fine fibres and lower percentage of heterotype and kemp fibres , whereas the Barki flocks at Dabaa excelled the other flocks in percentage of coarse fibres and medullation index . The Barki located in Sidi Barani in the desert excelled the Barki bought from Sidi Barani and kept or located at Alexandria farm in percentage fine fibres . In general the influences of location and management on fibre type ratio and medullatiom index were significant . These results agreed with those reported by Ashmawi and Al-Azzawi (1982a) and Ahtash (1998).

Table 3: Means and standard errors for the fibre types and medullation index of Barki sheep raised in different locations.

Management / Fibre types	Desert		Farm		Significant
	Sidi-Barani	Dabaa	Sidi-Barani	Dabaa	
Fine	88.55 ± 1.01 [a]	76.25 ± 0.88 [b]	84.20 ± 0.91 [c]	73.0 ± 0.98 [d]	*
Coarse	10.37 ± 0.17 [a]	20.80 ± 0.62 [b]	13.65 ± 0.42 [c]	23.5 ± 0.58 [d]	*
Heterotype	0.03 ± 0.00 [a]	0.20 ± 0.00 [b]	0.05 ± 0.00 [a]	0.30 ± 0.00 [b]	*
Kemp	1.05 ± 0.01 [a]	2.75 ± 0.01 [b]	2.10 ± 0.01 [c]	3.20 ± 0.02 [b]	*
Medullation index	11.36 ± 0.29 [a]	12.95 ± 0.24 [b]	12.01 ± 0.20 [c]	13.37 ± 0.34 [d]	*

[a,b,c]Within rows followed the same superscript letter are not significantly different.
*** significant p < 0.05.**

Tables (4 & 5) showed that the differences in number of follicle group /cm^2 and number of primary follicles in the skin due to origin (Sidi Barani or Dabaa) and age of animal were highly significant, while those that were due to head colour were not significant. Origin, age and head colour had highly significant effect on secondary follicle and S/P ratio. The interaction between origin and age possessed highly significant effect on all skin traits studied. The skin of farm sheep originated in Sidi Barani had significantly higher number of follicle groups, primary & secondary follicles and S/P ratio than those originated in Dabaa. It could be noticed that the average number of follicle groups and S/P ratio increased with advancing age. The present results were in accordance with those of Badreldin and Marai (1966) , El- sherbiny *et al* (1979) and Abdelaziz *et al*, (1989).

Table 4: Effect of Origin, age and head colour of animals on number of follicle groups (No. FG), primary (P), secondary (S) and S/P ratio in skin of Barki sheep.

Source of variance	D.f.	MS			
		No. FG	No. P	No. S	S/P ratio
Origin (O)	1	0.09 **	**	40.41 **	2.13 **
Age (A)	1	0.67 **	1.17 **	15.87 **	4.63 **
Head colour (C)	1	0.03	0.04	3.0 **	0.18 **
OXA	1	0.01	1.65 **	6.9 **	0.32 **
OXC	1	0.01	0.0002	0.61	0.02
AXC	1	0.01	0.01	0.07	0.0002
Residual	41	0.01	0.03	0.43	0.02

**** Highly significant p< 0.01.**

Table 5 Least squares means and standard errors of some wool follicle characteristics in the skin of farm sheep according to their origin, age and head colour.

Traits / Factors	No.	Number of follicle group	Number of Primaries	Number of Secondaries	S/P ratio
Overall means	48	1.58 ± 0.01	4.15 ± 0.03	19.88 ± 0.09	4.20 ± 0.02
Origin (O)		**	**	**	**
Sidi Barani	24	1.63 ± 0.02 [a]	4.43 ± 0.04 [a]	20.86 ± 0.13 [a]	4.23 ± 0.03 [a]
Dabaa	24	1.54 ± 0.02 [b]	3.87 ± 0.04 [b]	18.09 ± 0.13 [b]	3.81 ± 0.03 [b]
Age (A)		**	**	**	**
Six months	24	1.70 ± 0.02[a]	4.31 ± 0.04 [a]	20.45 ± 0.13[a]	3.71 ± 0.03 [a]
Twelve months	24	1.46 ± 0.02[b]	4.00 ± 0.04 [b]	19.30 ± 0.13 [b]	4.33 ± 0.03 [b]
Head colour (C)		NS	NS	**	**
White	24	1.60 ± 0.02 [a]	4.18 ± 0.04 [a]	20.13 ± 0.13 [a]	4.08 ± 0.03 [a]
Black or Brown	24	1.56 ± 0.02 [a]	4.13 ± 0.04 [a]	19.63 ± 0.13 [b]	3.96 ± 0.03 [b]

[a,b,c, d]Within columns followed the same superscript letter are not significantly different.
**** Highly significant p< 0.01. NS: not significant**

Generally, the present study indicated the importance of location and management as sources of variation in most of wool traits studied, fibre type ratio and some wool follicle traits in the skin. From the previous findings it could be concluded that the head colour did not have significant role in determining the wool traits and wool follicle characteristics in the skin of Barki sheep. Thus the head colour of Barki sheep could not be used as a marker to improve their wool traits. Barki fleeces seem to be heavily or moderately medullated and contain comparatively different percentages of kemp fibres. According to their localities and management , medullated

fibres are claimed to be preferable for carpet processing, thus the fleeces of Barki located at Dabaa might be preferable for such product. In view in the attained results, it might be stated that nearly 89% of the follicle population in Barki skin of flocks located at Sidi Barani gave fine fibres. Thus such flocks might be preferable for apparel products.

From the present study it appears that Barki wool is much closer to carpet wool specificans and apparel , thus it is very possible that Barki wool in the location could be distinctly improved through applying a breeding program and partially through appropiate system of grading . Barki sheep varied widely in most of their wool traits which wood increase the response of selection program. Selection for Barki wool traits might be based on increasing wool growth, Bulk and medullation to increase wool production suitability for the carpet industry.

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التباين فى صوف أغنام البرقي فى المواقع و الرعاية المختلفة

نبيل محمد عبد العزيز
قسم الإنتاج الحيواني والسمكي – كلية الزراعة – جامعة الإسكندرية

أجريت هذه الدراسة علي ثلاث قطعان من أغنام البرقي ترعي في ثلاث مواقع جغرافية وهي سيدي براني والضبعة ومزرعة جامعة الإسكندرية وكانت أعدادها علي التوالي كما يلي 50، 45، 56 حيوان و قسمت النعاج في كل موقع إلى مجموعتين تبعا للون الرأس.

وقد أظهرت النتائج وجود اختلافات معنوية في نمو الصوف ونسبة التصافي وطول الخصلة وعدد التموجات فى السنتيميتر، ونعومة وشدة ومطاطية ألياف الصوف والتي ترجع إلى تأثير الموقع الجغرافي. لم يكن هناك دورا معنويا للون الرأس على صفات و بصيلات الصوف في جلود أغنام البرقي. كما انه لا يمكن استخدامه كعلامة في تحسين صفات الصوف. كما بينت الدراسة ان الرعاية لها تأثيرا عالي المعنوية علي معظم صفات الصوف المدروسة ونوعية أليافه. كما أن الاختلافات في أعداد مجا ميع البصيلات وعدد البصيلات الأولية و الثانويةفى المليميتر المربع ونسبة البصيلات الثانوية للاولية والتي ترجع للمنشأ وعمر الحيوان كانت عالية المعنوية ولم يكن للون الرأس تأثيرا عليها.من الدراسة يمكن الاستنتاج بان أغنام البرقي التي تقع في منطقة سيدي براني تنتج صوفا ناعما ولهذا فان مثل هذه القطعان يمكن ان تكون مرغوبة في صناعة الملابس بينما جزات أغنام البرقي القاطنة قي منطقة الضبعة يمكن ان تكون مفضلة لصناعة السجاد.