J.Animal and Poultry Prod., Mansoura Univ., Vol. 7 (1): 33 - 38, 2016

SELECTION INDEX FOR WOOL IMPROVEMENT IN BARKI SHEEP

El-Gabbas, H.M* and Salwa I. El-Wakil**
***Wool Production and Technology Dept.,**
****Animal and Poultry Breeding Dept., Desert Research Centre, El-Matareya, Cairo, Egypt.**
Email:elgabbas@hotmail.com

ABSTRACT

The present study was carried out to estimate genetic and phenotypic parameters for some subjective and objective wool traits to develop a suitable selection index for wool improvement in Barki sheep. Over 937 fleeces were obtained from three Barki sheep flocks along the north western coastal belt of Egypt together with full pedigree information for those 937 animals descended from 74 sires and 896 ewes. After the first shearing, a composite wool sample was collected to represent the entire fleece of each animal. The greasy wool samples were subjectively assessed for kemp score, *KS*, greasy colour grade, *GCG*, handle grade, *HG*, lustre grade, *LG*, bulk grade, *BLG* and measured for staple length, *STL*. After scouring, the scoured colour grade, *SCG* was also assessed. SAS and MTDFREML statistical programs were used to generate analysis of variance and estimating genetic and phenotypic parameters as well as constructing selection indexes.

Results indicated that Barki wool had higher than average kemp content (2.45), slightly softer handle (3.20) and lustrous (3.48) and of average compressibility (2.41) with an average staple length of 10.31cm. Barki wool appeared to be slightly less than average of whiter greasy colour (2.02) and slight improvement occurred after scouring (2.83). Flock had highly significant effect on all studied traits while sire within flock showed highly significant effect on *KS, HG, LG* and *STL*. Heritabilities were estimated for *KS* (0.73), *GCG* (0.03), *HG* (0.62), *LG* (0.47), *BLG* (0.13), *SCG* (0.09) and *STL* (0.58). KS had highly significant and positive genetic correlations with all studied traits, while phenotypically it was significantly associated with harsher and lustrous wool. Estimates of genetic and phenotypic parameters were used to construct selection indices using different combinations of the studied traits for wool improvement. The maximum accuracy of selection (R_{TI} = 1.10) was obtained using the full index incorporating all studied traits**.** The present study recommended the utility of selection index included *GCG, LG* and *STL* (R_{TI} = 0.84 with relative efficiency of 76.4%) since selection based this index would be adequate for wool improvement and its application would lead to maintain low level of kemp content and reasonable level of harshness, improve greasy and scoured colour with marked increase in wool luster and staple length which could be contributed to enhance wool quantity produced.

Keywords*: Barki sheep, subjective wool traits, genetic and phenotypic parameters, selection indexes*

INTRODUCTION

Along the north-western desert of Egypt, Barki sheep is the most important local fat-tailed breed that produces coarse and white fleeces. While this breed is dual-purpose (meat and wool), they are mostly kept for their mutton production. The wool fibres not only protect the sheep from environmental conditions, however, it is also used by human beings to manufacturing of many woolen products. The evaluation of a particular wool type requires an assessment of its properties as well as its contribution in the processing and the performance of the end products together with their importance from the breeding point of views. The wool industry is concerned with the inspection of wool characters both subjectively and objectively. For the subjective assessment of wool quality, the expert appraiser appears to see, feel and compress handful of wool sample and rub the fibres between his fingers. Many breeders frequently using subjectively assessed wool and conformation traits during the selection of sires and dams for both meat and wool production (Matebesi *et al.,* 2009). Careful evaluation of wool traits, through objective measurements, comes later to supplement the "educated fingers".

In order to define those wool traits of significant processing performance to be included in the breeding program, two processing trials were conducted and indicated that wool manufacturers could attain considerable processing and economic advantages by using high bulk and harsher wools in order to attain good quality wool satisfying the requirements of the wool industry (Abdelaziz and El-Gabbas, 1999; El-Gabbas *et al*., 2009). This information should be translated into guidelines for producers to determine the importance of various wool traits for wool improvement plan in order to produce the proper wool for the industry. Estimates of genetic parameters for Barki sheep highlighted the dearth of those for wool traits in general and for the subjective ones in particular. Therefore, the objective of the present study was to estimate genetic and phenotypic parameters for some subjective and objective wool traits and develop a suitable selection index for the simultaneous improvement of the underlying wool traits in Barki sheep.

MATERIALS AND METHODS

Source of Data

Over 937 fleeces were available for appraising some subjective wool characters in Barki sheep. These fleeces were collected from three flocks representing Barki sheep along the north western desert of Egypt at Maryout research station of the Desert Research Centre (n=356) and two commercial farms at El-Nahda (n=330) and North Tahrir (n= 251). Full pedigree information were also obtained from those 937 animals descended from 74 sires and 896 ewes. After the first shearing, each fleece was spread over a sorting table and a handful wool samples were collected at random from various parts of the fleece to form a composite sample representing the entire fleece. These greasy samples were kept in a plastic bag for further analysis. On the greasy state, wool samples were subjectively assessed for kemp score, *KS*, greasy colour grade, *GCG*, handle grade, *HG*, lustre grade, *LG*, bulk grade, *BLG* and measured for staple length, *STL*. Then each sample was scoured and oven-dried at 105°C, the scoured and dried sample was graded for scoured colour grade, *SCG*. The assessment of *KS* was done according to Dry (1935) while appraising *GCG, HG, LG, BLG* and *SCG* were based on the grading system of El-Gabbas (1994). One experienced grader assessed all these traits. Such grading was repeated after a fortnight and the average of both grades was recorded for each sample. *KS* was assessed on a four-score system in which score one has no kemp fibres while score 4 has dense kemp fibres. The other five subjective traits of *GCG, SCG, HG, LG and BLG* were appraised using a five-score system in which score one represent yellow and the harshest wool with the least luster and compressibility, whereas score five being the perfect white, the softest with the extremely lustrous and compressibility. Ten staples were randomly subsampled for measurement of staple length, *STL*. Average length of ten staples taken randomly from each sample to be measured against a millimeter ruler without stretching. Some descriptive statistics of the considered traits are presented in table (1).

Statistical Analysis

Descriptive statistics, phenotypic correlations as well as analysis of variance were carried out for the current data using the general linear model (GLM) procedure of SAS (2004). Preliminary analyses with two fixed effects (flock and sex) were conducted and identified flock as being the important fixed effect (with three levels), so it is included in this analysis regarding the animal, sire within flock and dam as random effects. The following model was used:

$$Y = X\beta + Z_a a + e$$

Where:

Y = is a vector of observations for the studied traits,

X= is the incidence matrix for the flock fixed effect,

β = is the vector including the overall mean and the same fixed effect,

Z_a = is the incidence matrix for random effects,

a = is the vector of additive genetic effect of animal, and

e = is a vector of random residuals normally and independently distributed with zero mean and variance $I\,\sigma^2_e$.

Multiple traits animal model (MTDFREML) proposed by Boldman *et al.* (1995) was used to estimate the heritability and genetic correlations for the studied traits. Heritabilities were estimated using a series of univariate analyses for each studied trait whereas genetic correlation coefficients between each couple of studied traits were obtained using a series of bivariate analyses.

The present data proved to have reasonable count in each of the classes considered for the studied subjective traits. Moreover, many authors used animal model to analyze the subjectively assessed traits (Matebesi *et al.*, 2009; Hatcher *et al*., 2010; McGregor and Butler, 2014).

Selection index is an objective method of selection for a linear function of several traits (aggregate breeding values). A selection index combines information from an individual's phenotypic performance for multiple traits into an overall score. The following selection index equation was defined by Cunningham and Mahou (1977) as:

$$I = b`p$$

Where:

b: is a (n*1) vector of weighing factors for the n traits included in I and

p: is a (n*1) vector of phenotypic observations for the n traits included in I.

Since no data were available for the impact of each studied traits on wool price, a kin of the relative economic weights were assigned as the reciprocals of the phenotype standard deviations for each studied traits according to Falconer (1981).

RESULTS AND DISCUSSION

Table (1) showed that Barki wool has higher than average kemp content (2.45), slightly softer handle (3.20) and lustrous (3.48) and of average compressibility (2.41) with an average staple length of 10.31cm. Barki wool appeared to be slightly less than average of whiter greasy colour (2.02) and slight improvement occurred after scouring (2.83). These estimates might be comparable to that obtained by El-Gabbas (1993) who found that *KS, GCG, LG, HG, BLG* had a range of 1.84 to 2.09, 1.81 to 2.12, 1.66 to 2.99, 2.42 to 2.89, 2.76 to 2.33 while *SCG* was 2.98. In Barki, Farafra, Ossimi, Saidi and Rahmani sheep, respectively, *KS* were 2.09, 1.45, 2.23, 1.97 and 1.31, *GCG* were 2.12, 2.50, 2.68 and 2.80 and 2.66, *LG* were 2.99, 2.86, 3.01, 2.63 and 2.31, *HG* were 2.89, 2.89, 2.93, 2.84 and 2.38, and *BLG* were 2.79, 2.79, 2.77, 2.71 and 2.34, respectively (El-Gabbas, 1999 a). In the Barki sheep flock of Desert Research Centre, Azzam (1999) estimated average *KS, GCG, HG, LG, BLG* and *SCG* as 2.06, 2.14, 2.77, 2.63, 2.72 and 3.01 respectively. As indicated from coefficients of variation, all studied traits seemed to be fluctuated from 26.4% to 38.6%). It is also evident from range values appeared in table (1) that all classes were represented for the considered studied subjective traits.

Table 1. Least square means ± standard errors (SE), range, coefficient of variation (CV%) for kemp score (KS), greasy colour grade (GCG), handle grade (HG), lustre grade (LG), bulk grade (BLG), scoured colour grade (SCG) and staple length (STL) in Barki sheep.

Trait	Mean± SE	Range	CV%
KS	2.45 ± 0.03	1- 4	38.6
GCG	2.02 ± 0.02	1- 5	30.9
HG	3.20 ± 0.03	1- 5	27.8
LG	3.48 ± 0.04	1- 5	37.9
BLG	2.41 ± 0.03	1- 5	31.9
SCG	2.83 ± 0.02	1- 5	26.4
STL, cm.	10.31 ± 0.09	4.2- 16.3	26.5

Number of records for all studied traits= 937

Analysis of variance results (Table 2) indicated that flock had highly significant effect on all studied traits while sire within flock showed highly significant effect on *KS*, *HG*, *LG* and *STL*. Differences between flocks while reflecting the impact of several environmental factors, it also reveals differences in the genetic makeup as a result of having different sires in each flock.

Table 2. Analysis of variance for kemp score (KS), greasy colour grade (GCG), handle grade (HG), lustre grade (LG), bulk grade (BLG), scoured colour grade (SCG) and staple length (STL) in Barki sheep.

Trait	Mean squares		
	Flock (DF=2)	Sire/ flock (DF=71)	Residual (DF=863)
KS	35.18**	3.08**	0.63
GCG	28.61**	0.35	0.32
HG	40.10**	2.21**	0.57
LG	340.76**	3.97**	0.69
BLG	107.98**	0.38	0.35
SCG	24.85**	0.68	0.49
STL	1267.12**	17.74**	3.47

DF= degrees of freedom, ** Significant at P < 0.01.

Table (3) showed that *KS* (0.73), *HG* (0.62), *LG* (0.47) and *STL* (0.58) had high heritability while *GCG* and *SCG* (0.03 – 0.09) had lower ones while *BLG* had an estimate of 0.13 which clarify the level of relative importance for genetic factors in controlling these traits. Using Harvey computer program in Barki sheep of the Desert Research Centre, Azzam (1999) estimated the heritability for *KS* (0.62), *GCG* (0.01), *HG* (0.06), *LG* (0.00), *BLG* (0.12), *SCG* (0.17) and *STL* (0.32). Despite some similarities between the present estimates and Azzam ones, it is worthwhile mentioned that the current estimates were obtained from two other Barki flocks in addition to the that of Desert Research Centre flock using animal model (MTDFREML) computer program.

Table 3. Heritability (on the diagonal), genetic (above diagonal) and phenotypic correlations (below diagonal) for kemp score (KS), greasy colour grade (GCG), handle grade (HG), lustre grade (LG), bulk grade (BLG), scoured colour grade (SCG) and staple length (STL) in Barki sheep.

Trait	KS	GCG	HG	LG	BLG	SCG	STL
KS	0.73 (0.11)	0.36 (0.09)	0.41 (0.08)	0.42 (0.06)	0.46 (0.07)	0.61 (0.09)	0.43 (0.05)
GCG	-0.07	0.03 (0.01)	-0.02 (0.01)	0.08 (0.02)	0.77 (0.09)	0.86 (0.03)	-0.20 (0.09)
HG	0.38	-0.20	0.62 (0.09)	0.50 (0.05)	-0.32 (0.09)	0.31 (0.10)	0.26 (0.08)
LG	0.53	-0.28	0.68	0.47 (0.10)	-0.16 (0.07)	0.48 (0.06)	-0.13 (0.08)
BLG	-0.08	0.25	0.01	-0.04	0.13 (0.05)	-0.30 (0.10)	-0.32 (0.09)
SCG	-0.00	0.65	-0.02	-0.11	0.24	0.09 (0.02)	-0.20 (0.04)
STL	-0.02	0.06	0.19	0.16	0.34	0.09	0.58 (0.12)

Standard errors are in between brackets; Significance of correlation coefficient at 0.05=0.19; Significance at 0.01=0.25

KS had highly significant and positive genetic correlations with all studied traits, while phenotypically it was significantly associated (P<0.01) with harsher and lustrous wool. *HG* showed positive and significantly (P<0.01) genetic correlations with *LG*, *SCG* and *STL* and negative one with BLG. There are negative and highly significant genetic correlations for *BLG* with *SCG* and *STL*. *GCG* was positive and significant genetically correlated with *SCG* and bulkier wool and negatively with *STL* whereas *SCG* was genetically correlated positively and significantly with *HG* and *LG* and negatively with *STL*. Phenotypically, harsher wool was found to be significantly and positively correlated with lustrous wool (P<0.01) and longer staples (P<0.05) whereas bulky wool was positively and significantly associated with *SCG* (P<0.05) and longer staples (P<0.01). The present estimates of genetic and phenotypic associations between the studied traits are in the range reviewed for Barki (Azzam, 1999) and Libyan Barbary sheep (Ahtash, 1998).

Genetic and phenotypic parameters estimated in table (3) were used to construct 82 selection indices using different combinations of the studied traits to predict the aggregate genotype for wool improvement in Barki sheep. Some of these indices were presented in table (4) to indicate the b-values representing the partial or simple regressions of genetic value for net merit on phenotype for each trait, standard deviation, accuracy of selection (R_{TI}) representing the multiple or simple correlation of selection index with genetic value for net merit and relative efficiency for each index (RE%). The maximum accuracy of selection was obtained when using the full index I_1 (R_{TI}=1.10 with RE%=100).

$$I_1 = 2.76\ KS + 2.07\ GCG + 1.10\ HG + 0.66\ LG + (-0.09)\ BLG + (-0.91)\ SCG + 0.47\ STL$$

When the selection index included only one studied trait (I_2-I_8), it appeared that the index included *KS* alone had higher accuracy (R_{TI}=0.91) and relative efficiency (RE%= 82.7) followed by *LG* (R_{TI}=0.69 and RE%= 62.7) and *HG* (R_{TI}=0.66 and RE%=60.0). Accordingly, all indices containing *KS* showed higher accuracy (ranged from 0.91 to 1.08) and relative efficiencies (ranged from 82.7% to 98.2%) and when responded to selection tended to appreciably increase *KS* by 0.69 up to 0.80 compared with other indices (Table 5). For carpet wool specification, it is recommended that addition of medullation to the carpet wool is desired as it gives the crispy handle and natural look to the carpet while excessive medullation and kemp fibres are objectionable from the carpet industry since they have adverse effect on fibre strength and dyeing properties. A yarn containing kemp and highly medullated fibres appear to dye to a paler color than one with non-medullated wools although it absorbs as much dyestuff, causing irregular dyeing which is a serious defect in wool (Story, 1978). Thus, in order to maintain kemp fibres to a low level, adequate index has to ignore those indices containing *KS*.

Table 4. Weighing factors (b-values), standard deviation (σ_I), efficiencies of selection in absolute (R_{TI}) and relative efficiency (RE) values in various indexes used for wool improvement in Barki sheep.

No.		b-values							σ_I	R_{TI}	RE%
		KS	GCG	HG	LG	BLG	SCG	STL			
I-1	All traits	2.76	2.07	1.10	0.66	-0.09	-0.91	0.47	11.71	1.10	100
I-2	KS	3.5							7.99	0.91	82.7
I-3	GCG		1.57						0.94	0.31	28.2
I-4	HG			2.45					4.24	0.66	60.0
I-5	LG				2.21				4.62	0.69	62.7
I-6	BLG					0.18			0.01	0.03	2.7
I-7	SCG						0.69		0.24	0.16	14.6
I-8	STL							0.55	1.40	0.38	34.6
I-9	KS-GCG-HG-STL	2.91	1.49	1.45				0.46	11.22	1.08	98.2
I-10	KS-HG-LG-STL	2.81		0.92	0.64			0.49	10.59	1.05	95.5
I-11	KS-GCG-HG-BLG	2.88	1.59	1.58		-0.18			10.26	1.03	93.6
I-12	KS-GCG-LG	2.81	1.47		1.22				9.84	1.01	91.8
I-13	KS-BLG-SCG	3.48				0.04	0.22		8.01	0.91	82.7
I-14	GCG-HG-LG-STL		1.72	1.36	1.45			0.45	7.58	0.88	80.0
I-15	GCG-HG-LG-SCG		2.25	1.56	1.44		-0.70		6.83	0.84	76.4
I-16	GCG-LG-STL		1.61		2.19			0.49	6.80	0.84	76.4
I-17	GCG-HG-LG		1.80	1.51	1.42				6.66	0.83	75.5
I-18	HG-LG-STL			1.42	1.49			0.47	6.46	0.82	74.6
I-19	LG-BLG-STL				2.16	0.12		0.51	5.82	0.77	70.0
I-20	HG-LG-SCG			1.38	1.43		0.40		5.51	0.75	68.2
I-21	HG-BLG			2.45		0.13			4.24	0.66	60.0
I-22	GCG-SCG-STL		1.59				-0.15	0.53	2.26	0.48	43.6
I-23	BLG-SCG					0.08	0.68		0.24	0.16	14.6

KS= kemp score, GCG= greasy colour grade, HG= handle grade, LG= lustre grade, BLG= bulk grade, SCG=scoured colour grade and STL= staple length, RE% = (I_x / I_1) X 100.

After excluding those indices containing *KS*, it appeared that I_{14} *to* I_{18} had the highest R_{TI} ranged from 0.82 to 0.88 with RE% ranged from of 74.6 to 80.0 (Table 4). However, the index I_{16} seems appropriate and simple with only three candidates, *GCG*, *LG* and *STL* as follow:

$$I_{16} = 1.61\ GCG + 2.19\ LG + 0.49\ STL$$

(R_{TI}=0.84 with RE% of 76.4)

Table (5) indicated that selection based I_{16} would lead to optimize selection for the given aggregate genotypes (2.61), however it is slightly decrease bulkiness by -0.02. Such decrease in wool bulk could be dealt with in the industry by addition of higher bulky wool to the blend components. On the other hand, selection based on index I_{16} would be adequate for wool improvement and its application would lead to maintain low level of kemp content (by 0.47 score) and reasonable level of harshness (by 0.53 score), improve wool colour in greasy (by 0.16 score) and scoured states (by 0.08 score) with appreciable increase in wool luster (by 0.82 score) and staple length (by 0.81 cm.). Longer staples would have an impact on increasing wool quantity produced since staple length is regarded as one of the major components for wool production per unit area and hence for fleece weight (El-Gabbas, 1999 b).

Table 5. Expected genetic changes (per generation) in kemp score (KS), greasy colour grade (GCG), handle grade (HG), lustre grade (LG), bulk grade (BLG), scoured colour grade (SCG) and staple length (STL) when using selection indexes for wool improvement in Barki sheep (intensity of selection =1.0).

No.		Expected genetic gain							
		In the aggregate genotype	In related traits						
			KS	GCG	HG	LG	BLG	SCG	STL
I-1	All traits	3.42	0.77	0.22	0.63	0.67	0.04	0.12	1.07
I-2	KS	2.83	0.68	0.13	0.53	0.43	0.08	0.14	0.77
I-3	GCG	0.79	0.16	0.35	0.01	0.05	0.02	0.00	0.00
I-4	HG	2.06	0.51	0.01	0.58	0.72	-0.03	0.06	0.12
I-5	LG	2.15	0.36	0.03	0.62	0.94	-0.02	0.10	0.15
I-6	BLG	0.11	0.11	0.02	-0.05	-0.03	0.03	-0.01	-0.13
I-7	SCG	0.49	0.16	0.00	0.07	0.13	-0.01	0.05	-0.03
I-8	STL	1.18	0.29	0.00	0.05	0.07	-0.04	-0.01	1.70
I-9	KS-GCG-HG-STL	3.35	0.80	0.19	0.60	0.60	0.04	0.12	1.09
I-10	KS-HG-LG-STL	3.25	0.76	0.10	0.65	0.68	0.03	0.13	1.14
I-11	KS-GCG-HG-BLG	3.20	0.76	0.20	0.63	0.63	0.05	0.13	0.61
I-12	KS-GCG-LG	3.14	0.68	0.20	0.62	0.69	0.06	0.14	0.61
I-13	KS-BLG-SCG	2.83	0.69	0.13	0.53	0.44	0.08	0.15	0.76
I-14	GCG-HG-LG-STL	2.75	0.56	0.15	0.58	0.83	-0.03	0.07	0.73
I-15	GCG-HG-LG-SCG	2.61	0.51	0.20	0.62	0.87	-0.01	0.07	0.15
I-16	**GCG-LG-STL**	2.61	0.47	0.16	0.53	0.82	-0.02	0.08	0.81
I-17	GCG-HG-LG	2.58	0.52	0.17	0.62	0.88	-0.02	0.08	0.14
I-18	HG-LG-STL	2.54	0.53	0.02	0.61	0.86	-0.04	0.07	0.82
I-19	LG-BLG-STL	2.41	0.45	0.03	0.56	0.85	-0.03	0.08	0.90
I-20	HG-LG-SCG	2.35	0.49	0.02	0.66	0.93	-0.03	0.09	0.15
I-21	HG-BLG	2.06	0.52	0.01	0.58	0.72	-0.03	0.06	0.12
I-22	GCG-SCG-STL	1.50	0.32	0.23	0.04	0.08	-0.01	-0.01	1.30
I-23	BLG-SCG	0.49	0.17	0.01	0.06	0.13	-0.01	0.05	-0.04

CONCLUSION

To improve the profitability of the animal, selection of sheep in general and Egyptian sheep in particular seems complex since profitability depends on a number of productive traits such as fertility, growth, meat and wool in addition to milk and each of these attributes has many criteria to select for. The present study reveal that there are prospects for improving wool through selection and there should be a place for improving wool in the Egyptian sheep in general and in Barki sheep in particular together with other productive traits. The subjective wool traits could be used to achieve this target since they are simple with low costs and reliable to achieve the target. That could be a scope of further studies.

Acknowledgement

Valuable comments on statistical analysis received from Prof. Abdelhalim Ashmawy are greatly acknowledged.

REFERENCES

Abdelaziz, N. M. and El-Gabbas, H. M. (1999). Clip preparation procedures for Barki wool in relation to the coarseness and bulk of the raw wool and processing into carpet. *Alexandria Journal of Agricultural Research, 44(2): 85- 99.*

Ahtash, A. E. (1998). Wool characteristics of Libyan Barbary sheep. Ph.D. Thesis, University of Cairo, Egypt.

Azzam, A. H. A. (1999). Study of some subjective and objective coarse wool traits in Barki sheep. *PhD thesis, Faculty of Agriculture at Moshtohor, Zagazig University, Banha Branch, Egypt.*

Boldman, K. G., Kriese, L. A., Van Vleck, L. D., Van Tassell, C. P., 1995. *A manual for use of MTDFREML. A set of programs to obtain estimates of variances and covariances.* ARS, USDA, Washington.

Cunningham, E. P. and Mahou, G. A. T (1977). SEIND: A Fortran Computer Program for Genetic Selection Indexes. An Foras Taluntais. Dunsinea. Castleknock, Co. Dublin and Dublin University, Ireland.

Dry, F. M. (1935). Hairy fibres of the Romney sheep. Collected reprints from New Zealand J. Agric., 46,48: 1- 48.

El-Gabbas, H. M. (1993). Effect of seasons and body positions on the assessments of colour, handle, lustre, bulk and kemp in Barki fleeces. *Egyptian J. Animal Production, 30 (1): 71- 81.*

El-Gabbas, H. M. (1994). A survey study for the appraisals of some wool traits in Barki sheep along the north-western desert of Egypt. *Annals of Agriculture Science, Faculty of Agriculture, Ain Shams University, Cairo, Egypt. 39(1): 269-278.*

El-Gabbas, H. M. (1999 a). Wool properties of Egyptian breeds of sheep as blend consignments for the carpet manufacture. *Egyptian Journal of Animal Production, 36 (1): 9-23.*

El-Gabbas, H. M. (1999 b). Components of wool production per unit area on some body positions in Barki sheep. *Egyptian Journal of Animal Production, 36 (2): 111-120.*

EL-Gabbas, H. M.; Anous, M. R. I., Al-Betar, E. M. (2009). Wool grading and processing system to improve the utility of the Egyptian Barki wool. *Egyptian Journal of Animal Production, 46 (2)*: 113-128.

Falconer, D.S. (1981). "Introduction to Quantitative Genetics". Second edition, Longman Inc., London, New York. P. 299.

Hatcher, S., Hynd, P.I., Thornberry, K.J., Gabb, S. (2010). Can we breed Merino sheep with softer, whiter, more photostable wool?. Animal Production Science, 50:1089-1097.

Matebesi, P.A., van Wyk, J.B., Cloete, S.W.P. (2009). Genetic parameters for subjectively assessed wool and conformation traits in the Tygerhoek Merino flock. South African Journal of Animal Science, 39 (1):176-187.

McGregor, B.A. and Butler, K. L. (2014). The value of visual fleece assessment in addition to objective measurements in identifying Angora goats of greater clean mohair production. Small Ruminant Research, 120: 51-63.

SAS (2004). STAT Software User's Guide, version 9.0, SAS Institute, Cary, NC, USA.

Story, L. F. (1978). Carpet wools - Carpet manufacture. Proceeding of a seminar held at the wool exchange, Wool Research Organization of New Zealand, Christchurch, New Zealand.

الدليل الإنتخابى لتحسين الصوف فى الأغنام البرقى

حسنين محمد الجباس* و سلوى إبراهيم الوكيل**
*** قسم إنتاج وتكنولوجيا الصوف**
**** قسم تربية الحيوان والدواجن- مركز مركز بحوث الصحراء- المطرية- القاهرة -مصر**

أجريت هذه الدراسة لتقدير المعالم الوراثية والمظهرية لبعض صفات الصوف التقديريه والقياسية وعمل دليل انتخابى مناسب لتحسين الصوف فى الإغنام البرقى. إستخدمت فى هذه الدراسة عدد ٩٣٧ جزة تم الحصول عليها من ثلاثة قطعان للأغنام البرقى فى الساحل الشمالى الغربى من مصر وكذلك السجلات الخاصة لعدد ٩٣٧ من الأغنام الأبناء لعدد ٧٤ كبش و ٨٩٦ نعجة. بعد الجزة الأولى، تم أخذ عينات من الصوف ممثلة لكل من هذه الجزات لتقدير درجة الكمب، اللون الخام، الملمس، اللمعان، القابلية للإنضغاط وكذلك تم قياس طول الخصلة كما تم تقدير درجة اللون المغسول بعد الغسيل. استخدمت البرامج الاحصائية ساس ونموذج الحيوان لاستنباط تحليل التباين وكذلك تقدير المعالم الوراثية والمظهرية لصفات الصوف لاستخدامها فى تكوين الدليل الانتخابى.

أوضحت النتائج أن صوف الأغنام البرقى أعلى من المتوسط فى محتوى الكمب، ذو درجة نعومة ولمعان طفيفة وذو قابلية متوسطة للإنضغاط بمتوسط طول الخصلة ١٠,٣١سم. كانت درجة اللون الخام أقل من المتوسط وكان التحسن فى درجة اللون طفيفا بعد الغسيل. كان للقطعان تأثير عالى المعنويه على كل الصفات المدروسة بينما كان تأثير الكبش داخل القطيع عالى المعنوية فى كل من درجات الكمب، الملمس، اللمعان وطول الخصلة. تم تقدير المكافئات الوراثية لدرجات الكمب (٠,٧٣)، اللون الخام (٠,٠٣)، الملمس (٠,٦٢)، اللمعان ((٠,٤٧ والقابلية للإنضغاط (٠,١٣) واللون المغسول (٠,٠٩) علاوة على طول الخصلة (٠,٥٨). كانت لدرجة الكمب إرتباطات وراثية عالية المعنوية وموجبه مع كل الصفات المدروسة ومظهريا مع كل من درجات الملمس واللمعان. تم استخدام المعالم الوراثية والمظهرية لتكوين دلائل انتخابية تتضمن التوليفات المختلفة من الصفات المدروسة لتحسين الصوف. تحققت أعلى كفاءة من الانتخاب (١,١٠) فى الدليل الذى يتضمن كل الصفات المدروسة. أوصت الدراسة باستخدام الدليل الإنتخابى الذى يتضمن درجات اللون الخام، واللمعان وطول الخصلة (الكفاءة الانتخابية للدليل=٠,٨٤ والكفاءة النسبية =٧٦,٤%) حيث أن الإنتخاب لهذا الدليل يكون مناسبا لتحسين الصوف ويؤدى إلى الحفاظ على درجة قليلة من الكمب ودرجة خشونه مناسبة بالإضافة إلى تحسين درجة اللون الخام والمغسول علاوة على زيادة واضحة فى لمعان الصوف وطول الخصلة والتى قد تؤدى إلى زيادة فى محصول الصوف الناتج.