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STUDIES ON SOME FACTORS AFFECTING SOME WOOL TRAITS THROUGH VITAL STAGES OF SHEEP

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SUMMARY

The present study was carried out on four genotypes of sheep, namely Rahmany (R), Barki (B), R x B and Suffolk x B through five vital stages of ewes that were reared at the Experimental Station of Alexandria University. The main objectives were to determine the effects of some genetic and environmental factors on wool quality and quantity.

The results indicated that wool quantity and quality were affected by the factors studied, specifically those of reproductive stages, i.e. pregnancy and lactation. The crossbreds produced better wool than purebreds. They gave heavier fleece weights, lower shrinkage percentage, longer staples and fibers, higher number of crimps/ centimeter and finer wool. Pregnant and lactating ewes had lower fleece weight, lower shrinkage percentage, shorter staple & fiber length than the dry ewes. The marked influence on fiber diameter was observed in pregnant ewes at the end of their pregnancy period and at the beginning of lactation. Pregnant ewes gave higher number of crimps/ cm than the lactating or dry ewes. The results indicated that fleece weight, shrinkage percentage, staple length and fiber length and number of crimps/cm tended to increase with the advancement of age up to three years, while yearling ewes produced finer wool. Type of birth and season of shearing affected the wool traits studied.

The results indicated that the use of Rahmany or Suffolk rams for crossing with Barki ewes resulted in improving the wool characteristics. More attention should be paid to pregnancy and lactation stages to secure better ewe performance.

Keywords: Sheep, crossbred, wool, vital stages, pregnancy, and lactation

INTRODUCTION

Wool production is one component of sheep enterprises. Therefore, it is considered as a source of income for sheep producer. Furthermore, it is influenced by genetic and environmental factors. In order to achieve high income from wool production, it is of paramount importance to produce greater quantity of wool with higher quality of its characteristics. In this regard, the genetic and environmental factors affecting wool characteristics must be recognized. It was found that factors such as breed, age of ewe, body size, type of birth, vital stages, i.e. pregnancy and lactation, had a pronounced influence on wool and its characteristics (Gonzalez, *et al.*, 1997; Oliveria *et al.*, 1995; Ulloa, *et al.*, 1990). Thus, the objectives of this study were to determine the effects of genotype, age of ewe, type of birth and season of shearing on wool characteristics and to compare the performance of different genotypes during the reproductive stages regarding wool traits.

MATERIALS AND METHODS

The present study was carried out on 37 Rahmany, 36 Barki, 21 Rahmany x Barki and 10 Suffolk x Barki ewes. Ewes were sampled from a flock of sheep that belonged to the Experimental Station of Alexandria University. During winter, animals were fed ad lib. on Berseem (***Trifolium alexandrinum***). In summer time, animals were given concentrates (1 part bran+ 1 part cottonseed cake). All animals were drenched against worms twice yearly. Shearing took place twice a year, in the first weeks of April and October. All lambs were shorn for the first time when they reached one year of age. Fleeces were weighed immediately after shearing to the nearest 0.1 kg. Barki ewes were divided into three groups. The first group was introduced to Barki rams to produce replacements. The second group was served by Rahmany rams and finally the third group were mated to Suffolk rams. Rahmany ewes were mated to rams from the same breed to produce replacement. Ewes' body weights were classified into three categories, namely, less than 36 kg, from 35 to 45 kg and more than 45 kg.

The greasy samples (10 x 10 cm) were taken from the mid of the left side position. Samples taken were representative of the ewe's reproductive stages, i.e. pregnant ewes, lactating ewes, and dry ewes. Pregnancy and lactation periods were divided into two parts. The first one represented the first ten

weeks of pregnancy or lactation, while the second represented the last ten weeks of each. Thus, four different groups were constituted, namely a group representing the first ten weeks of pregnancy, another group representing the last ten weeks, a third group representing the first ten weeks of lactation and finally the fourth group of the last ten weeks of lactation, in addition to the dry group used as control. Each sample taken weighted about 100 grams. Samples were kept in moisture proof container immediately after taking them until the time of examination. Each sample was divided into two sub-sample. The first sub-sample was used for determination of fineness and the second sub-sample was used to determine fiber length, staple length and crimp measurements. Amount of shrinkage estimated in each wool sample, followed the procedures of Chapman (1960) and Ashmawy and Al-Azawi (1982).

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). The statistical model included the effects of genotype, age of ewe, weight of ewe, type of birth, season of shearing and reproductive stage. All factors in the model were assumed to be fixed, except the error term which it was assumed to be randomly and independently distributed with mean=0 and variance = $\sigma^2 e$. Comparisons between each two means of any factor were carried out by Duncan Multiple Range Test, (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Least squares means and their standard errors of wool traits are presented in Table 1. It could be observed that the crosses of Rahmany x Barki and of Suffolk x Barki had the heaviest fleece weights, the longest staple and fiber lengths. They had also the finest fibers and the greatest number of crimps/cm. The differences between characteristics of the above mentioned crosses and those of Rahmany and Barki ewes were significant. Shrinkage percentage of Barki fleece was significantly higher than those of the other genotypes. Fleeces of the crossbred ewes had the lowest shrinkage percentages compared to purebreds. The differences among shrinkage percentages of the four genotypes were significant. The results obtained in this study are in agreement with the findings of Oliveira and Kennedy (1989); Siquira *et al.* (1994) and Trikovicka and Kubek (1996).

Age of ewe had significant effect on wool characteristics studied except staple length. Generally, fleece weight, fiber length, fiber diameter and shrinkage percentage increased with increasing age of ewe, reaching their maximum at third year (Table 1). The results of this study are in accordance with the findings of Ganai and Pandy (1995).

Table 1. Least squares means and their standard errors of wool traits in different genotypes at different ages

Factor	No.	Fleece weight (gm)	Staple Length (cm)	Fiber length (cm)	Diameter (μm)	Number of crimps/cm	Shrinkage (%)
Genotype:		**	**	**	**	**	**
Rahmany (R)	185	759.44 ± 33.17^{a}	3.77 ± 0.08^{a}	4.68 ± 0.13^{a}	46.38 ± 0.28^{a}	0.97 ± 0.07^{a}	40.50 ± 0.69^{a}
Barki (B)	180	635.83 ± 16.78^{b}	5.15 ± 0.08^{c}	6.07 ± 0.13^{b}	35.0 ± 0.32^{b}	1.64 ± 0.09^{b}	38.60 ± 0.81^{b}
R x B	105	923.69 ± 26.60^{c}	5.57 ± 0.12^{b}	6.46 ± 0.02^{c}	33.73 ± 0.39^{c}	2.13 ± 0.12^{c}	28.14 ± 0.96^{c}
Suffolk x B	50	899.89 ± 32.01^{c}	5.78 ± 0.15^{a}	5.55 ± 0.24^{b}	32.46 ± 0.48^{d}	2.78 ± 0.15^{d}	27.06 ± 1.20^{c}
Age of Ewe (year):		**	NS	**	**	**	*
1	195	698.53 ± 20.15^{c}	4.87 ± 0.90^{a}	5.71 ± 0.15^{a}	36.80 ± 0.33^{ab}	1.88 ± 0.09^{a}	31.95 ± 0.84^{a}
2	125	817.82 ± 22.01^{b}	5.15 ± 0.10^{a}	5.89 ± 0.17^{b}	37.33 ± 0.32^{a}	2.03 ± 0.11^{a}	34.20 ± 0.80^{b}
3	115	863.57 ± 25.48^{a}	5.06 ± 0.12^{a}	6.18 ± 0.19^{b}	37.60 ± 0.34^{a}	2.10 ± 0.11^{a}	34.71 ± 0.84^{b}
4	85	838.94 ± 34.92^{ab}	5.19 ± 0.16^{a}	5.96 ± 0.26^{ab}	35.94 ± 0.51^{b}	1.46 ± 0.15^{b}	33.50 ± 1.30^{b}

Means with different superscripts differ significantly ($P<0.05$).
** Highly significant $P < 0.01$ * Significant $P < 0.05$ NS Not significant

Least squares means and their standard errors for the effects of body weight categories, type of birth, season of shearing are presented in Table 2. Ewes that weighed less than 35 kg gave heavier fleeces, longer staples and fibers, finer wool and lower shrinkage percentage than ewes with heavier weights, while ewes that weighed more than 45 kgs produced wool with high number of crimps /cm. Ewes which gave birth to singles produced significantly heavier fleeces with longer staples and fibers as well as higher shrinkage percentage. Ewes shorn in April gave heavier fleeces, shorter lengths of staples and fibers and higher percentage of shrinkage than those shorn in October. In general, body weight, type of

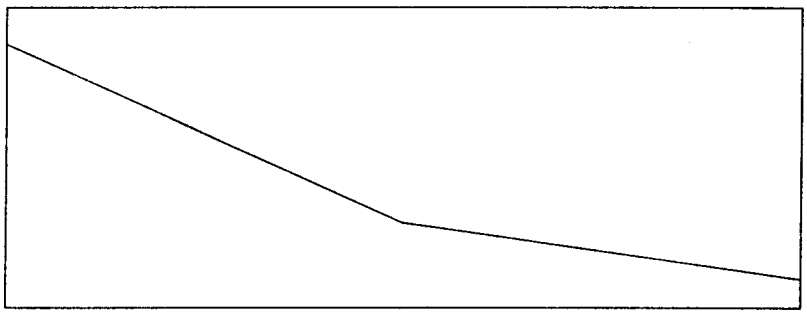
birth and season of shearing had significant effects of the majority of all wool characteristics. However, body weight had no significant effect on fleece weight and shrinkage percentage. On the other hand, type of birth and season of shearing showed insignificant effect on fiber length and fiber diameter. Sohier El-Masry (1994); Ali (1994); Siquiera *et al.* (1995) Macit and Aksay (1 996) and Ezzam (1999) came up to the same conclusion.

Table 2. Least squares means and their standard errors of wool traits as classified by body weight, type of birth and season of shearing

Factor	No	Fleece weight (gm)	Staple Length (cm)	Fiber length (cm)	Diameter (m)	Number of crimps/cm	Shrinkage (%)
Body Weight (kg)		NS	**	**	**	*	NS
< 35	165	839.87±29.95^{a}	5.27±0.13^{a}	6.18±0.22^{a}	35.71±0.44^{a}	1.81±0.13^{a}	32.49±1.10^{a}
35-45	175	797.78±23.09^{a}	5.12±0.11^{a}	5.63±0.17^{b}	36.92±0.31^{b}	1.76±0.11^{a}	33.84±0.78^{a}
> 45	180	776.49±20.25^{a}	4.82±0.09^{b}	5.99±0.15^{ab}	37.22±0.27^{b}	2.28±0.09^{b}	34.40±0.70^{a}
Type of birth:		**	**	NS	NS	NS	**
Single	445	829.64±17.00^{a}	5.22±0.13^{a}	6.07±0.17^{a}	37.01±0.20^{a}	1.96±0.07^{a}	35.57±0.46^{a}
Twin	75	779.79±24.67^{b}	4.91±0.19^{b}	5.80±0.19^{a}	36.83±0.39^{a}	1.780.13^{a}	31.58±0.99^{b}
Season of Shearing:		*	**	NS	NS	*	**
October	470	774.57±12.86^{a}	5.25±0.06^{a}	5.96±0.09^{a}	37.12±0.32^{a}	1.74±0.07^{a}	31.39±0.80^{a}
April	50	834.86±29.99^{b}	4.89±0.14^{b}	5.91±0.23^{a}	36.72±0.38^{a}	2.00±0.14^{b}	35.77±0.80^{b}

Means with different superscripts differ significantly (P<0.05).
** Highly significant P < 0.01 * Significant P < 0.05 NS Not significant

The effect of reproductive stages on fleece weight is illustrated in Figure (1), which indicated that fleece weight decreased during the pregnancy and lactation periods, by about 16% and 21%, respectively compared to the control and the differences were significant, except the difference between pregnant and lactating ewes. These results are in agreement with those obtained by Belteridge *et al.* (1992).



Least squares means and their standard errors for some wool characteristics throughout the four stages of reproductive cycle as well as the control are shown in Table 3, which indicated that ewes in their last ten weeks of pregnancy had the longest fiber and the finest wool. Lactating ewes at the end of their lactation period had the shortest staple length compared to those at the beginning of lactation. This might be due to effect of steaming up of ewes at the end of their pregnancy period (Ulloa *et al.*, 1990 and Masters, *et al.*, 1993). Number of crimps/cm increased throughout the pregnancy period and the differences between the two periods of pregnancy and the control were significant. The shrinkage percentages of the wool of pregnant and lactating ewes were significantly lower than those of the dry ewes. Moreover, pregnancy had greater effect on shrinkage percentage than lactation.

From the present study, it could be concluded that crossing resulted in better wool characteristics. Pregnancy and lactation had an important effect on wool traits. It was suggested that more attention should be given to the husbandry and management of the flock during the vital periods in order to obtain better performance and better quality and quantity of wool.

Table 3. Least squares means and their standard errors of wool traits as classified by the reproductive stages

Factor	No	Staple Length (cm)	Fiber length (cm)	Diameter (μm)	Number of crimps/cm	Shrinkage (%)
		NS	**	NS	**	**
Control	104	5.03±0.17 a	6.11±0.32 a	37.02±0.32a	1.54±0.20a	36.87±0.80a
Pregnant ewes at the first ten weeks	104	4.83±0.19 a	5.42±0.32 a	37.42±0.32a	2.37±0.20b	33.73±0.80b
Pregnant ewes at the second ten weeks	104	5.28±0.19 a	6.33±0.32 a	36.06±0.32b	2.34±0.20b	33.04±0.80b
Lactating ewes at the first ten weeks	104	5.41±0.19 a	5.95±0.32 a	36.85±0.32a	1.55±0.20a	31.34±0.80c
Lactating ewes at the second ten weeks	104	4.79±0.19 a	5.88±0.32 a	37.23±0.32a	1.55±0.20a	32.90±0.80bc

Means with different superscripts within each column differ significantly (P<0.05).
** Highly significant P < 0.01 * Significant P < 0.05 NS Not significant

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