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WOOL PROPERTIES OF THE EGYPTIAN BREEDS OF SHEEP AS BLEND CONSIGNMENTS FOR THE CARPET MANUFACTURE

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SUMMARY

Some aspects of wool production were assessed and measured for a group of Ossimi, *Os*, Frafra, *Fr*, Saidi, *Sd*, and Rahmani, *Rh* ewes . The animals of the first three breeds were shorn twice whereas first shearing was only available for Rahmani. Fleece characteristics studied were fibre diameter, *FD*, and its distribution, prickle factor, *PF*, as well as clean scoured yield, *YLD*, staple length, *STL*, bulk, *BUL*, resilience, *RES* , staple strength, *SS* and elongation, *ELN*. Greasy colour grade, *GCG*, handle grade, *HG*, lustre grade, *LG*, bulk grade, *BLG* and kemp score, *KS* were also subjectively appraised. The present results were compared with the corresponding values obtained from the local Barki sheep. The effect of shearing on the studied wool characteristics has been discussed together with the likely impact of these characteristics on the national clip.

Most traits indicated significant differences among the studied breeds as well as between shearings. All *Rh* and some *Sd* samples were found to be coloured with black or brown pigments. *Os* wool seemed to be whiter, more lustrous with higher *KS* and higher variability of fibre diameter. *Rh* samples showed longer staples, harsher and more extensible wool with coarser *FD* and higher *PF* and *Med%*. Results of *Fr* and uncoloured *Sd* data indicated whiter and sounder wool. The present study provides an adequate evidence that there is wide range of wool types produced from the existing breeds of sheep. The implications would be of beneficial effects to processing performance regarding the utility of the local wool as blend components and for various end products.

Keywords: Local sheep, fleece characters, local sheep, carpet blend, shearing effect

INTRODUCTION

Sheep production in Egypt is largely based on dual-purpose breeds producing meat and wool. The survey of wool production all over Egypt is basic information and being essential if the best return is to be achieved for the growers and the local wool is to be exploited to best advantage for the national economy. Different breeds of sheep existing in the country often produce wools that differ in their fibre characteristics and therefore perform differently during processing and end products. However, the behaviour of wool is largely governed by its measured fibre properties, irrespective of breed (Hunter *et al.*, 1985).

Barki wool have been subjected to extensive studies and described to be closer to the carpet wool specifications (El-Gabbas, 1998; Ragab and Ghoneim, 1961). In other local breeds of sheep, some wool characters have been studied while others have never been investigated such as bulk, resilience and staple strength as well as some appraisals of colour, handle, bulk and lustre. These traits were considered to be of importance for the carpet industry. The present study aims to remedy this deficiency by considering various aspects of wool production in Ossimi, Rahmani, Saidi and Farafra sheep. In order to bring the wool properties produced by existing breeds in the country in one document, the present data were compared with some published and unpublished data obtained from Barki sheep.

During the recent years in Egypt, there have been growing demand for wool, which have led to the expansion of the national wool industry. This would initiate the necessity to improve the wool produced locally either in quantity or quality. On the other hand, carpets are often made from processing blends, not from single types. The local wool mills usually receive their raw wools from different farms which might comprise wool of different breeds. Hence, the manufacturers usually mix or blend the local wool with other imported wool so as to produce some woolen materials satisfying the consumer's taste. In this case, the requirements for the imported components will depend entirely on the properties of the indigenous wool. Thus, it is essential in today's competitive world to know the national clip precisely. Therefore, the present study was undertaken to investigate the properties of wool produced by various existing breeds of sheep and to assess the likely impact of these properties on Egypt's wool clip. Hence, enabling manufacturers from various sectors of the trade to choose the wool most suited for their particular interest and elucidate the possibility of forming wool blend appropriate for the national carpet industry.

MATERIALS AND METHODS

The present study comprises data on a total of 283 ewes kept in sheep flocks belonging to the Animal Production Research Institute, Ministry of Agriculture. They were 85 Farafra, 71 Ossimi (taken from Sids research station), 98 Saidi (collected from Mallawi research station) and 29 Rahmani ewes (picked from Al-Serow research station). The animals of the first three breeds were shorn twice (in March and September) whereas first shearing was only available for Rahmani ewes. The number of fleeces obtained from first and second shearing respectively were 45 and 40 from Farafra ewes, 31 and 40 from Ossimi ewes as well as 33 and 65 from Saidi ewes together with 29 fleeces obtained from Rahmani ewes in first (March) shearing only. The experimental sheep at each site were kept together with their flockmates throughout. Ewes of each breed were taken at random from their flocks and different animals were picked to represent first and second shearings. Management practices were almost the same in all studied flocks.

At shearing time, each fleece was spread and handful wool samples were taken at random to represent the entire fleece. These samples were kept in plastic bags for further analysis to represent each sheep and breed at first and second shearings. Later, these samples were used to assess the subjective wool traits such as greasy colour grade, *GCG*, handle grade, *HG*, lustre grade, *LG*, bulk grade, *BLG* and kemp score, *KS*. The objective fleece characteristics of clean scoured yield, *YLD*, fibre diameter, *FD*, staple length, *STL*, bulk, *BUL*, resilience, *RES*, as well as staple strength, *SS* and elongation, *ELN* were also measured.

The subjective assessments of *GCG, HG, LG, BLG* and *KS* were recorded on greasy samples according to El-Gabbas (1993). For each greasy sample, averages of *STL* and *YLD* were measured (El-Gabbas, 1993a). Fibre diameter, *FD*, percentage of medullated fibres, *Med%*, were also recorded for each sample together with fibre diameter distribution and prickle factor, *PF*, for each breed (El-Gabbas, 1998). Loose wool bulk, *BUL*, and resilience, *RES* were measured using WRONZ bulkometer (Bedford *et al.*, 1977). Staple strength, *SS*, was recorded for each sample using Agritest staple breaker (Caffin, 1980). Then the elongation of the staple, *ELN* was calculated as the percentage of the increase of the staple length when applying a force until it breaks.

Statistical procedures

Fleece characteristics data were analysed by analysis of variance using SAS computer package (1995). Two models were used. The first included the four studied breeds and hence comprised the effect of breed only. In the second model, Rahmani breed was excluded since it was not available to have the second shearing from that breed. Hence, the second model included the fixed effects of breed (Ossimi *vs.* Saidi *vs.* Farafra) and shearing time (first *vs.* second shearing) as well as their interaction.

RESULTS AND DISCUSSION

Aspects of wool production regarding the subjective and objective fleece characteristics were estimated for groups of Ossimi, *Os*, Farafra, *Fr*, Saidi, *Sd* and Rahmani breeds, *Rh*. On the other hand, results obtained from the local Barki sheep reached elsewhere regarding the subjective wool assessments (El-Gabbas, 1993), *STL* and *YLD* (El-Gabbas, 1993a), *FD* and its distribution as well as *PF* (El-Gabbas, 1998) were made available to compare these traits with those of the studied breeds. Furthermore, unpublished data of 320 Barki wool samples were used to estimate *SS*, *BUL* and *RES* and was utilized in the present study for the same purpose. The mean values of various wool properties of the studied breeds were expressed as a proportion of the Barki for a given trait (Tables 1 and 2). Ranking of the studied breeds has been made by using the Barki sheep, *BB*, as the base (=100), other breeds being compared to it. That is to identify the properties of various aspects of wool production for the studied breeds as compared to the Barki rather than studying the flock effect.

When assessing the greasy colour grade, *GCG*, all *Rh* samples as well as 46.9% of *Sd* samples were found to be coloured with black or brown pigments, hence they were excluded from the assessment of *GCG* since that grading system assesses the degree of whiteness in the samples. Tables 1 and 3 indicate no differences in *GCG* either among the studied breeds or between shearings. However, *Sd*, *Os* and *Fr* samples had whiter wool in such ranking (132.1, 126.4 and 117.9 resp.) compared with *BB* wools. Samples obtained from the first shearing had slightly whiter wool compared with the second shearing. As expected, *Os* samples had higher lustre, as lustrous as the *BB* wool compared with the other local breeds. It is worth mentioning that the studied breeds had been dipped shortly before shearing.

Fr, Os and *Sd* wools grown in the south of Egypt seemed to be less yellow than *BB* wool grown in the northwestern coastal belt of Egypt. Probably, that might due to the less rainfall and less humidity combined with different shearing times. The increased whiteness of such wools would be expected to be of commercial significance. Clark and Whiteley (1978) stated that non-scourable colour is a significant factor in the determination of the value of raw wool since it limits the range of colours over which fibres can be dyed. Most buyers prefer white wool to have the advantages of greater dying flexibility. On the other hand, dark fibres are considered to be a serious problem in white wool and would yield severe penalties if detected. For plain carpets, good colour is critical whereas dark-shade carpets can be made from pigmented wools (Wickham, 1984). For the development of the small wool industries in particular, using natural-coloured wool would add more attractive features to their products and would help inhabitants to reduce the cost of dyes and fixatives.

The time of shearing is very important in determining the right environmental conditions as well as the properties of the wool. The fleece is a favourable environment for a number of organisms and the longer the fleece the greater the risk of these organisms and the lower the chance of limiting their effects. However, the extent of weathering in general and the damaging effects of sunlight in particular is perhaps much less in short fleeces and is substantial on open-woolled sheep. Many wool faults particularly yellow staining or canary yellow which is regarded as an unscourable stain often develop under conditions of rising temperatures and increased humidity together with highly alkaline materials within the fleece (Henderson, 1965). Thus, longer wools are more prone to discoloration, whereas shorter intervals between shearings tend to lead to less discolouration, partly because shorter wool tends to dry faster and is always sufficient to prevent canary yellow staining.

Significant differences in *KS, FD, and SDFD* as well as *Med%* were evident among the studied breeds and between shearings. Table 1 indicates that *Rh* samples had harsher wool and hence a lower handle grade, *HG* (82.4), coarser *FD* (103.1) as well as higher *Med%* (110.0) whereas *Fr* samples were of similar mean *HG* compared with *BB* wool (100). Moreover, *Os* wool indicated higher *KS* (106.7) as well as higher variability of fibre diameter (113.0) as compared with *BB* wool (100). Harsher and coarser wool are often associated with thicker diameter and higher content of medullated fibres. For most studied traits, the ranking of breeds differed between shearings which explains the significant breed x shearing interaction found in table 3. That wide range of wool types produced from the existing breeds would be of processing significance regarding the utility as blend components and for various end products.

Figure 1 shows fibre diameter distributions, *FDD*, which specifies the spread of fibre diameter for the studied breeds. The *FDD* was found to extend towards the right hand side in all breeds and hence had positive skewness. The latter was calculated as +0.64, +0.64, +0.77 and +0.76 in *Fr, Os, Sd* and *Rh* respectively. The corresponding value for Barki sheep was higher (+2.1) than the studied breeds (El-Gabbas, 1998). In the present materials, *Sd* and *Rh* wool indicated wider distribution compared with that of the other breeds. Furthermore, the prickle factor, *PF*, or the percentage of fibres exceeding 30 um (Whiteley and Thompson, 1985) for the studied breeds are presented (Table 2) and indicate that *Rh* wool had higher *PF* compared with other breeds. Since the *PF* was high for all breeds studied, it can be admitted that none of their wool would be suitable to be worn next to the skin as it would most likely cause skin irritation.

Differences of wool production traits were found among the local breeds of Egypt. Consistent breed differences in fibre length and diameter were reported among Barki, Rahmani, Ossimi and Merino breeds. These differences were not modified by season, although seasonal effects had different responses on diameter than on length (El-Sherbiny and Markotic, 1974). There is also highly significant breed differences observed among Awassi, Arabi, Karadi and Hamadani sheep in Iraq (Ashmawy and Al-Azawi, 1982). These differences while indicated highly significant contribution to the variations in fibre diameter and length, it had limited effect on *Med%.*

Tables 2 and 3 indicate that breed differences were highly significant in *BUL* and *RES*. Second shearing wool had higher *BUL* and *RES* compared with that of the first shearing. Although Fr, *Os* and *Sd* wools showed a slight difference in *BLG* relative to *BB* wools, when measured by the bulkometer, *BB* wools indicated remarkable increase in *BUL* and *RES* desired by the wool trade for several end-uses compared with the other studied breeds. Loose wool bulk is defined as the volume occupied at a given compressional force and being associated with resilience and bulky yarns; it results in better pile cover in the carpet (Wickham, 1984). It is reported that crimp and helical crimp in particular is a desirable feature associated with bulk and resilience (Story, 1978). The deficiency in crimp might be a disadvantage, then a good proportion of crimpy wools must be included in the blend if a bulky non-lustrous yarn is required.

Significant differences in *STL* were observed (Tables 1 and 3) among the studied breeds where *Rh* samples had longer wool while *Fr* samples had shorter ones. Second

Table 1. Some fleece characteristics for the studied breeds and shearings. Values in brackets are the mean values expressed as a proportion of the corresponding values of the Barki sheep, BB.

Item	GCG	HG	LG	BLG	KS	STL	YLD	FD
Breed								
BB	2.12	2.89	2.99	2.79	2.09	n.a	52.71	34.86
Fr	2.50±0.1	2.89± 0.1	2.86± 0.1	2.79± 0.1	1.45± 0.1	7.25± 0.2	82.2± 0.8	30.97± 0.5
	(117.9)	(100.0)	(95.7)	(101.1)	(69.4)		(156.0)	(88.8)
Os	2.68± 0.1	2.93± 0.1	3.01± 0.1	2.77± 0.1	2.23± 0.1	9.11± 0.2	83.35 ±0.8	32.19± 0.5
	(126.4)	(101.4)	(100.7)	(100.4)	(106.7)		(158.1)	(92.3)
Sd	2.80±0.1	2.84±0.1	2.63± 0.1	2.71± 0.1	1.97± 0.1	8.43± 0.2	78.98± 0.7	32.62± 0.5
	(132.1)	(98.3)	(88.0)	(98.2)	(94.3)		(149.8)	(93.6)
Rh	Colored	2.38±0.1	2.31± 0.1	2.34±0.1	1.31± 0.1	10.25± 0.3	71.79 ±1.3	35.95± 0.9
		(82.4)	(77.3)	(84.8)	(62.7)		(136.2)	(103.1)
Shearing								
1	2.79± 0.1	2.99±0.1	2.90 ±0.1	2.74± 0.1	1.93±0.1	8.73± 0.1	82.15±0.6	32.96±0.4
2	2.53± 0.1	2.81± 0.0	2.80± 0.0	2.74± 0.1	1.79±0.1	7.76 ±0.1	81.36±0.6	31.15±0.4

GCG= greasy colour grade, LG= lustre grade, HG= handle grade, BLG= bulk grade, KS= kemp score, STL= staple length, YLD= yield, FD= fibre diameter.
n.a. not available at 6 months growth

Table 2. Some fleece characteristics for the studied breeds and shearings. Values in brackets are the mean values expressed as a proportion of the corresponding values of BB sheep.

Item	SDFD	PF	Med%	BUL	Res	SS	ELN
Breed							
BB	8.02	45.07	19.84	28.50	9.81	33.57	19.72
Fr	5.31± 0.3 (66.2)	40.55 (90.0)	4.38 ±1.2 (22.1)	23.15±0.3 (81.2)	7.65 ±0.1 (78.0)	57.88± 2.0 (172.4)	20.12± 1.3 (102.0)
Os	9.06± 0.3 (113.0)	45.81 (101.6)	5.70 ±1.4 (28.7)	24.12±0.3 (84.6)	7.79 ± 0.1 (79.4)	47.98± 2.2 (142.9)	17.35± 1.4 (88.0)
Sd	8.64± 0.3 (107.7)	46.36 (102.9)	14.23±1.2 (71.7)	23.16±0.2 (81.3)	7.49 ± 0.1 (76.4)	43.21± 1.9 (128.7)	19.09 ± 1.2 (96.8)
Rh	6.73± 0.5 (83.9)	53.11 (117.8)	21.82±2.1 (110.0)	25.09±0.4 (88.0)	8.63 ± 0.2 (88.0)	54.91± 3.4 (163.6)	26.19± 2.2 (132.8)
Shearing							
1	6.58±0.2		7.57±1.1	22.54±0.2	7.21±0.1	49.96± 1.8	19.30±1.1
2	8.29± 0.2		7.89±0.9	24.01±0.2	7.90±0.1	49.73 ±1.6	18.35±1.0

SDFD= standard deviation of fibre diameter, PF= prickle factor, Med%= percentage of medullated fibres, BUL= loose wool bulk, RES= resilience, SS= staple strength, ELN= elongation.

shearing wool was significantly shorter. No comparable *STL* data of 6-month growth on Barki sheep were available. The *STL* obtained from the studied breeds appeared to be shorter than the recommended length of 12 cm required by the carpet wool specifications (Story, 1978). It is obvious that these shorter staples resulted from practicing twice-yearly shearings in these flocks.

Some of the management practices associated with shearing have a considerable influence on the clip, and must be taken into account. The time of shearing and interval between shearings are usually dictated by convenience of stock management rather than by ambition to have a particular kind of wool to sell. Moreover, time and frequency of shearing have the greatest impact on subsequent manufacturing performance of wool. Frequency of shearing regulates *STL* and hence the likely processing routes as well as affecting the *YLD*, while timing of shearing affects *SS*, fleece discoloration which affects dyeing capacity. The mean *STL* of a fleece wool reflected the interval between shearing times and the seasonal wool growth cycle; the shorter the period between shearings the shorter the wool will be. Very short wool seems to fetch lower price.

The possibility of stimulating wool growth by shearing is a familiar subject of discussion. In few trials of twice-yearly shearing, some have shown it to increase while others decreased their wool growth as compared with those sheep shorn only once (Story and Ross, 1959; Wodzika, 1964 and Sumner and Scott, 1990). These trials suggested that the cumulative growth rate was greater than that of continuously growing samples but the difference in both cases is very small that it could not be measured and therefore, it is of no practical significance. Shearing can result in increased feed intake and protein utilization (Elvidge and Coop, 1974) and increase voluntary intake for 6weeks after shearing while the sheep attempt to maintain their body heat production (Wodzicka, 1964). Hence, the differences in the magnitude of wool growth are probably influenced by feed availability after shearing. Furthermore, shearing usually represents sudden and substantial change in the animal and perhaps be confounded with the effects of climate and nutrition on wool production and fleece structure.

As the wool fibre is made of hard keratinized tissue, it is not alive. It is therefore difficult to believe that shearing would have any effect on sheep. The important direct effect concerns the place at which the fibre is cut in different months of the year. However, the major shearing effect on the sheep is via the abrupt removal of much of the insulation from the sheep. The fleece is a very good insulator and provides an excellent barrier to heat loss in cold conditions and sometimes, in extremely hot conditions to heat accumulation. Shearing in cold conditions might bring a stress response from the adrenal cortex (Linder and Ferguson,1956). In order to control its temperature in hot conditions, most animals are able to lose some heat from the body surface when it is desirable, the fully fleeced sheep has little ability to do so. Shearing of the wool very close to the skin will substantially increase the chance of heat loss from the body which is accentuated by wind. A covering layer of 5-10mm normally left after shearing would provide a reasonable insulation in still conditions but a relatively poor cover in windy conditions. Hence, in still air, the animal needs wool more than 20mm long to provide almost the possible insulation of a full fleece.

Significant differences in *YLD* were observed among the studied breeds and first shearing had significantly higher *YLD* than the second one. All breeds studied showed higher *YLD* as compared with *BB* wool. It has to be mentioned that the studied breeds shorn twice a year and the sheep were dipped shortly before shearing while *BB* sheep had been shorn once a year without dipping before shearing. Short fleeces of the studied breeds are perhaps exposed less to the weathering agents and therefore expected to have fewer oddments.

Dipping sheep at regular intervals is a recommended practice in sheep management. Dipping sheep one week before shearing would facilitate shearing practice and increase the clean wool yield as well as control the ecto-parasites and improve the quality of the sheep' skin. It would also improve the quality of wool after shearing at the sale point. For desert sheep, using mobile dipping facilities might be useful.

Significant differences in *SS* were found among the studied breeds (Tables 2 and 3) in which *Fr, Sd, Os* and *Rh* wool had higher *SS* (172.4, 163.6, 142.9 and 128.7 respectively) compared with BB wool (100). *BB* wool appeared to be markedly weaker in tensile strength than the wools of the other studied breeds. This could be explained partly by the intrinsic strength of the wool fibres in the studied breeds or by the poor management and nutrition under which the Barki sheep are kept. Although the seasonality of the fibre diameter was not measured in this trial; it would be expected to be similar to that of wool growth rate as tensile strength is directly related to fibre cross-sectional rea Sumner and Wickham, 1969). A reduction in staple strength of the magnitude observed in this trial for the *BB* would be of considerable processing significance with increased fibre loss and a reduced yarn strength (Ross, 1983). Addition of wool from any of these breeds to the *BB* wools would improve the soundness of their blend.

Tables (2 and 3) reveal that elongation had significant differences among breeds and between shearings. *Rh* and *Fr* wool seemed to be more extensible (132.8 and 102.1 respectively) than *BB* wool. The durability of a carpet primarily depends on the resilience of the wool used which is considered to be one of the most important properties of the carpet wool. The resilience of the wool depends on the breed of the sheep, the health and the nutrition of the flock and the ratio of the medullated fibres in the fleece (Tellioglu, 1983).

The importance of genetic factors in determining wool type is indicated by the differences in the wool produced by different breeds of sheep existing in the same environment. These differences reflect variations at a number of genetic loci with each gene change producing only a small effect on the type of fleece. Thus, the wool type of each breed is due to the combined effects of many genes. During the selection for a particular type of fleece, the genes determining that type of fleece increase in

Table 3. Analysis of variance for the studied fleece characteristics.

SOV	Total	Breed (br)		Shearing(sh)		Br x sh		Residual	
	DF	DF	MS	DF	MS	DF	MS	DF	MS
GCG	207	2	1.40	1	3.14	2	0.75	202	0.34
HG	253	2	0.04	1	1.78	2	0.67	248	0.30
LG	253	2	1.91	1	0.58	2	1.31	248	0.28
BLG	253	2	0.24	1	0.00	2	2.08	248	0.39
KS	253	2	12.72**	1	1.16	2	4.29*	248	0.36
STL	253	2	76.64**	1	56.12**	2	40.76**	248	2.36
YLD	253	2	217.65**	1	36.55**	2	444.60**	248	44.47
FD	253	2	74.06**	1	196.33**	2	146.63**	248	19.02
SDFD	253	2	289.41**	1	177.82**	2	85.34**	248	5.39
Med%	253	2	1764.15**	1	6.20*	2	981.10**	248	117.08
BUL	253	2	25.71**	1	129.20**	2	107.40**	248	4.73
RES	253	2	3.69*	1	28.41**	2	15.40**	248	1.13
SS	253	2	4954.07**	1	3.27	2	828.85**	248	351.27
ELN	253	2	131.87**	1	53.96**	2	48.55**	248	130.56

GCG= greasy colour grade, LG= lustre grade, HG= handle grade, BLG= bulk grade, KS= kemp score, STL= staple length, YLD= yield, FD= fibre diameter, SDFD= standard deviation of fibre diameter, Med%= percentage of medullated fibres, BUL= loose wool bulk, RES= resilience, SS= staple strength, ELN= elongation.

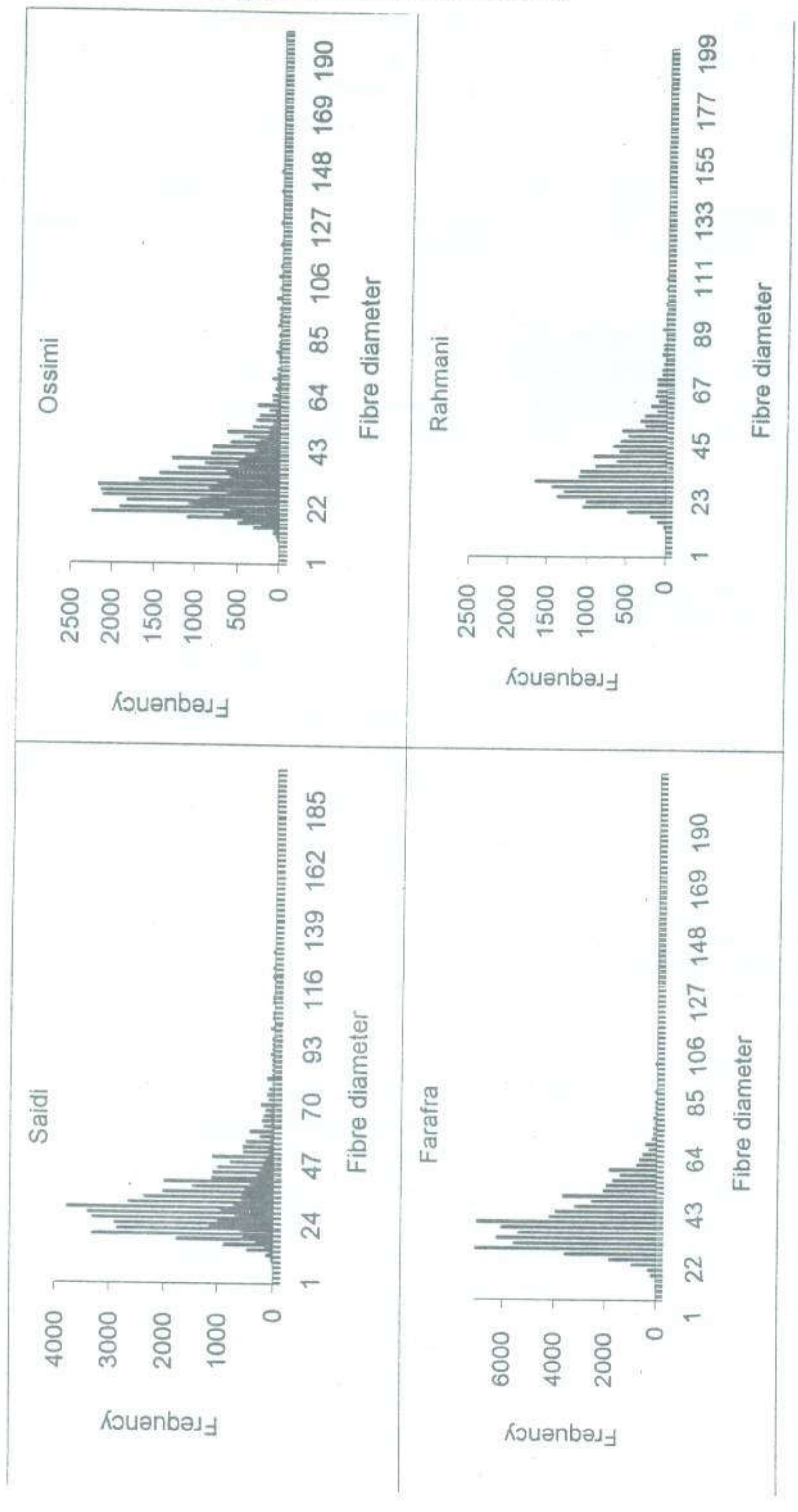

Figure 1. Fibre diameter distribution for the studied breeds.

frequency, perhaps to the stage where most sheep in the breed are homozygous for some genes having important effects on wool type and could be used to establish another type of wool. On the other hand, the breeding strategies can be used to change the processing performance of wool and the characteristics of their end products. The task of the ram breeder is to integrate a number of wool traits required by the market into a breeding objective. Both quantity and quality traits need to be considered. Before targeting any trait, the breeder must have an indication of its economic value to identify the additional income he will get from genetic improvement of the trait.

If the strategy of breeding for better wool production is not feasible for the time being, hence, with the speculative nature of the wool trade in mind, it would appear that for planning of production some overall setting of breeding aims could be clarified and price differentials would provide a possible way for these aims to be attained. This would then control the pattern of production in a possible way by obtaining a given blend component from one breed and another component from another breed. That would enable the manufacturer to choose blend components appropriate to his end product. From the breeding point of view, it is much easier to have different types of wool from different breeds rather than bring all the fleece attributes in one sheep.

Carpets are often made from processing blends, not from single types. Different wools are blended together for a variety of reasons; price and availability to the manufacturer in addition to the technical properties appropriate to the processing system, carpet type, dying system etc. Probably the most important factor is price. The manufacturer usually looks for a cheaper wool to replace it instead of the expensive blend component. Inevitably, while wool selection and blending in the carpet industry is confused by personal preferences, it turns out to be a compromise to satisfy partially all the requirements. In order to reach this compromise a great deal of information is required on carpet wools and their properties (Ince, 1979). The industry wants different wools available such as medullated wools of good colour and sound, crimpy and bulky wools as well as other special types as separate entities for blending to choose from. Crutchings, pieces and oddments are included to the blend to reduce cost but they also provide more bulk to the yarn, while the medullated wools are used to produce a hairy look and to give a crisp handle and improve carpet appearance properties (Wickham, 1973).

The outstanding feature of the present study is that the existing breeds of sheep are capable of producing "cocktail" mixtures containing wide variety of wool types. Furthermore, the existing breeds of sheep and systems of farming would be expected to offer considerable variation in the national clip. The implications of such wide variety of wool characteristics produced in the country might be of beneficial effects to achieve a blend consignment appropriate for the carpet industry. A breeding strategy is needed for improving local wool taken into consideration the peculiar features of each indigenous breed of sheep. Moreover, surveying wool production from other ecotypes existing in the country has to be continued together with monitoring the likely impact of such wool on the national clip.

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صفات الصوف في أنواع الأغنام المصرية كمكونات لخلطات الصوف فى تصنيـــع السجاد

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استخدمت في هذه الدراسة مجموعات من النعاج الأوسيمى والرحمانى والصعيدى والفرافره وذلك لدراسة قطر الألياف وتوزيعاتـــها التكرارية -معامل الوخز -تصافى الصوف -طول الخصلة- مقاومة الصوف للضغط والاستطالة ، كما تم تقييم صفات الصوف الناتج من حيث اللون- الملمس- اللمعان وكثافة ألياف الكمب. وقد تم الحصول على جزتين متتاليتين من الأوسيمى والصعيدى والفرافرة بينما استخدمت جزة واحدة فقط من أغنام الرحمانى. وقدتم دراسة تأثير النوع وكذلك موسم الجز على هذه الصفات ومقارنة النتائج المتحصل عليها من هذه الأنواع بتلك التى سبق الحصول عليها من الأغنام البرقى ومناقشة تلك النتائج للتعرف على صفات الصوف الناتجة في جزات الأغنام المحلية.

أوضحت النتائج تأثيرات واضحة بين أنواع الأغنام المحلية وكذلك بين مواسم الجز في معظم الصفات المدروسة. وقد كان الصوف الرحمانى وبعض الصوف الصعيدى ملونا بالبنى و الأسود كما تميز الصوف الأوسيمى بأنه أكثر بياضا ولمعانا وبنسبة عالية من الكمب بالإضافة لوجود تباين كبير في أقطار الألياف الصوفية. كما أتضح أن الصوف الرحمانى كان أطول وأكثر خشونة واستطالة وذو معامل وخز عال مع نسبة عالية من الألياف ذات النخاع. كذلك تميزت أصواف أغنام الفرافرة والصعيدى غير الملونة بكونـــها أكثر بياضا ومتانة. وقد أعطت الدراسة دليلا على تنوع كبير لصفات الصوف المنتجة من الأغنام المحلية مما يعطى مؤشرا على إمكانية خلط هذه الأصواف وتكوين خلطات مناسبة من الأصواف المحلية يمكن أن تستخدم بكفاءة في تصنيع المنتجات الصوفية.