Mohair Research Update No. 15

--The influence of mohair style and character on processing and market value

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Introduction

Does the style and character of raw mohair affect the properties of processed mohair and the value of greasy mohair? Until 1994, there was no scientific information on the influence of the style and character of raw mohair on the processing of mohair. Only in the past 10 years has the impact of style and character on the value of mohair been accurately quantified. There are now three research reports relevant to this topic and they are briefly summarised and discussed.

One issue which causes confusion is just what the terms "style" and "character" mean. It is important to understand the differences in how these terms are used. In the Australian wool industry "style" is a term used in the subjective description of wool. A number of attributes of greasy wool are included in "style" including: character, evidence of environmental damage and contamination. In more detail, this includes attributes of character (staple crimp structure, crimp boldness, crimp frequency), staple tip shape, dust penetration into the staple, UV light damage, staple colour, stains, contaminants and handle. In this broad context, style is also used in the mohair industry. With mohair, poor style will also be applied to mohair with excessive kemp. Often the term "style and character" are used together to make it clear that staple crimp attributes are included with the other attributes of "style".

Texan study on mohair processing

Minikhiem et al. (1994) studied 29 lots of Texan greasy mohair (24 commercial lots > 4 tonne and 5 lots of about 100 kg). Samples were measured before processing and after top making to determine the effects of objectively measured staple and fibre characteristics and of style and character on the fibre characteristics of mohair tops. In this study style and character were defined as:

Style: the number of ringlets, twists or curls per cm.
Character: the number of crimps or waves per cm.

The attributes of the mohair are summarised in Table 1.

Table 1. Mean, minimum and maximum values for fibre attributes of 29 lots of Texan mohair processed by Minikhiem et al. (1994).

Measured attribute	Mean	Minimum	Maximum
Raw fibre attributes			
Mean fibre diameter (μm)	32.0	*23.2*	*39.02*
Staple length (mm)	99	75	127
Mohair base (%)	79.9	68.3	86.7
Style (ringlets/10 cm)	0.86	0	1.5
Character (crimps/10 cm)	4.5	3.0	6.0
Medullated fibre incidence (%)	0.75	0.15	7.50
Kemp fibre incidence (%)	0.38	0.05	1.25
Top characteristics			
Mean fibre diameter (μm)	32.4	23.8	38.0
Fibre length (Hauteur, mm)	42.5	35.2	48.9
Medullated fibre incidence (%)	0.76	0.10	1.60
Kemp fibre incidence (%)	0.47	0.10	1.20

Style and character were not correlated with top fibre length (Hauteur) or variation in Hauteur (CVH). Style was negatively correlated with kemp in the top. Character was negatively correlated with staple and top mean fibre diameter and variability of mean fibre diameter (CVD).

The authors concluded that objectively determined style and character of greasy Texan mohair had little impact on the fibre length characteristics of mohair tops. Style did provide an indication of kemp in the top. The authors advised breeders to use objective measurements for specific economically important traits, such as mean fibre diameter.

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South African study on mohair processing

Hunter et al. (1997) used 27 lots, each of 30 kg Cape mohair in a designed experiment with

3 age group Î 3 staple length grades Î 3 style and character grades.

The age groups were: kid, young goat and adult mohair.
The staple length grades were: B, C, and D length.
The style and character grades were: good, average and poor.

Style and character was regarded as a composite trait and was subjectively assessed including the traits of curliness and waviness of the staple, the kempiness of the mohair and other unspecified traits.

The mohair was processed using standard methods at the South African Wool Textile Research Institute (SAWTRI) making appropriate adjustments for length and fibre diameter during processing. Measurements were made of the physical properties of the greasy fibre, the processed tops and the yarns.

The results are summarised in Table 2.

Table 2. The relationship between the style and character of lots of Cape mohair and the physical attributes of the raw lots or processed tops or yarn when measured (Hunter et al. 1997). Note that the ranges for attributes are given in brackets.

Measured parameter	Style and character grade (mean value)*		
	Good	Average	Poor
Raw fibre attributes			
Mean fibre diameter (µm)	32.0 (27.7-36.0)	31.0 (27.4-35.9)	31.7 (26.0-35.9)
CV (diameter) (%)	*24.0 (21.9-26.0)*	*25.7 (23.8-27.8)*	*26.9 (24.3-29.0)*
Staple length (mm)	124	132	134
CV (length) (%)	*10.8*	*14.2*	*16.3*
Crimp frequency (per 10 cm)	4.3 (2.8-5.5)	3.8 (2.9-4.8)	3.2 (2.2-4.5)
CV (crimp frequency) (%)	*24*	*29*	*33*
Mohair base (%)	67.7	69.0	71.2
Vegetable matter (%)	*0.15*	*0.27*	*0.38*
Grease content (%)	4.7	4.9	4.1
Processed fibre attributes			
Scoured yield (%)	78.2	81.7	82.6
Hauteur (mm)	*95*	*91*	*83*
CVH (%)	39	47	52
Conversion ratio	*1.30*	*1.45*	*1.62*
Noil (%)	1.0	1.5	1.7
Top and noil yield (%)	*71*	*74*	*73.5*
Card waste (%)	8.2	9.0	10.6
Fibres < 25 mm (%)	*7.1*	*9.7*	*10.4*
Fibres < 40 mm (%)	12	17	22
Spinnability (mean spindle speed at break) (rpm)	*8,900*	*8,800*	*8650*
Yarn hairiness (/cm)	11.8	12.1	12.4
Yarn tenacity (cN/tex)	*5.9*	*5.7*	*5.5*
Yarn extension (%)	10	9.2	8.0

The measurements showed that there were differences in the raw fibre and processed fibre characteristics between the different style and character grades which would affect processing and textile performance.
Of great importance was the finding that a definite advantage existed in improved top fibre length (Hauteur) when using good style and character mohair. By dividing the staple length by Hauteur (the mean fibre length in the top) the conversion ratio was derived. Again good style and character mohair performed better than poor style mohair (the higher the value the more the fibres have been broken). The advantage of the good style and character mohair was shown to exist at staple lengths of 120 to 140 mm over poor style and character mohair.

It was found that a better style and character generally had other advantages, as a range of fibre properties changed ***with*** changes in style and character. Yarn characteristics were also affected by style and character grades.

In the study the effects of changes in mohair style and character could be largely attributed to associated changes in: topmaking performance being influenced by crimp frequency, variability of staple length (CV), and fibre diameter; spinning and yarn performance being influenced by top fibre length (hauteur), top fibre length variability (CVH) and fibre diameter variability (CVD).*Did style and character improve the prediction of the processing performance?*
To establish if the processing performance of greasy mohair and of the tops could be explained by measurements of greasy mohair or top properties, analyses, based on previous knowledge, estimated the predicted performance of processing lots. When the actual performance of these experimental lots was compared to the predicted performance, without exception, the style and character of mohair had ***little or no apparent*** effect on the textile performance. In general, once allowance had been made for all measurable differences in the fibre properties, style and character measurements added little to the accuracy of predictions of the processing performance.

What this means is that differences in style and character are associated with measurable differences in certain raw fibre properties, such as crimp, CV's of diameter and length and consequently with certain top characteristics, such as hauteur, and that such differences led to, and explained the observable differences in the textile performance of mohair.

The authors concluded that from a technological point of view a better price is justifiable for mohair of better style and character. As there are associations between style and character grades and other physical properties of mohair there is some merit for ascribing a greater value to mohair of superior style and character.

To what extent is style and character associated with other physical properties of Cape mohair?
Smuts et al. (1997) quantified the estimated effects of mohair style and character grades on other fibre properties using the equations obtained in their research. The significant beneficial effects of increasing style and character relative to fibre diameter and staple length are shown in Table 3.

Table 3.
The predicted effects of increasing the fibre diameter, the style and character and the staple length of Cape greasy mohair or mohair tops on the properties of mohair top or yarn (derived from Hunter et al. 1997).

Top or yarn property	Increasing fibre diameter 1 µm	Increasing style and character one grade	Increasing staple length 1 cm
Top fibre length (mm)	+ 2.1	+ 6.2	+ 3.0
Noil (%)	+ 0.42	+ 0.2	- 0.02
Spinnability (revs/min)	- 175	+ 105	
Yarn strength (cN/tex)	- 0.28	+ 0.26	
Yarn extension (%)	- 1.3	+ 1.0	

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Premiums and discounts for style and character

The impact of style and character on mohair price was evaluated in Australian mohair auctioned between 1998 and 2001. Data was obtained from two mohair selling agents was analysed to determine the effect on commercial sale prices of: year, selling season within year, agent, mean fibre diameter, coefficient of variation of fibre diameter, vegetable matter base, washing yield, visually assessed staple length, visually assessed fibre style, incidence of kemp, other faults, and interactions of these effects. The database consisted of 557 lots objectively measured by the Australian Wool Testing Authority.

The increase in relative value from poor to superior style mohair was 43% (Table 4). These discounts and premiums were consistent with time and with variation in mean fibre diameter.

Table 4. Effect of style, within main fleece lines, on the price of Australian mohair sold during the period 1998 to 2001 compared with average style mohair.

Mohair style	Price change	Percentage of sales
Superior	+ 12.5	4
Average	0	80
Poor	- 21.9	2

[A] The remaining 14% of mohair was sold without style grades e.g. cotted fibre

These results emphasise the importance of good husbandry and genetic selection at low mean fibre diameter to avoid the 20% discount seen with poor style mohair. The premium for superior style mohair suggests that better selection for style in fine mohair may be economic.

In Australia, mohair classed as Fine Kid, Kid and Young Goat and of superior style had on average a greater fibre diameter than similar mohair classed as having average style (Table 5).

Table 5. Effect of style grading within subjective fibre diameter classes on the objective mean fibre diameter (MFD) of sale lots. Bold value within subjective fibre diameter classes are statistically different.

Subjective fibre diameter class	Style grading	
	Superior style	Average style
	MFD (mm)	MFD (mm)
Fine kid	**24.8**	**23.7**
Kid	**27.4**	**25.5**
Young goat	**30.6**	**30.1**
Fine hair	33.7	33.3

Discussion

At first glance these three studies appear to produce contradictory results and so raise some interesting issues. The differences and similarities between these studies include the following points:

The Texan researchers claim that South African Angora goats have been bred with significantly more style than Texan goats. If this is true then it is likely that the Texan researchers may not have had a significantly broad a range in style characteristics to be able to adequately test associations between style and processing performance.

The textile researchers had similar ranges in the crimp frequency of processed mohair. The South African researchers did not give the range in style measurements as they used a generalised definition. There were also other characteristics included in their definition of style and character which the Texans did not use. These other characteristics may confound a comparison of their study with that of the Texans. For example, the inclusion of kempiness in the South African would have altered their assessments whereas it did not "bias" the Texan measurements. In other words the two studies may not be comparing apples with apples when they compared style and character results.

The processing methods were obviously different. For example the conversion ration (ratio of the staple length divided by the fibre length in the top) suggests that the processing in Texas may have been harsher than that in South Africa and may have overridden any effects of style and character on fibre length in the tops. The Texans used larger lots in a commercial plant where the conversion ratio averaged only 2.33, whereas the South Africans adjusted their plant for each small lot and obtained conversion ratios of 1.3 to 1.6.

The textile studies indicate that there are associations between style and character and top making characteristics of mohair which would be useful to buyers attempting to assemble commercial lots of raw mohair for top making.

The Australian marketing study indicated that buyers and exporters of mohair did value superior style mohair more highly and poorer style less as suggested by the South African researchers.

Buyers of Australian mohair discount mohair which has poorer style but these discounts may be masked by differences in the mean fibre diameter between sale lots.

Conclusions

The style and character of raw mohair is related to the processing attributes of mohair. Buyers and processors pay less for mohair with poorer style. The management of Angora goats growing finer mohair should be given a priority as the actual dollar amount of the discount for poorer style mohair will be greater for the more valuable finer mohair.

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