R-127

# Effects of Style and Character of U.S. Mohair on Top Properties[1,2,3]

D.L. Minikhiem[4], C.J. Lupton[4,5], F.A. Pfeiffer[4], K. Qi[4] and J.R. Marschall[4]

## Summary

Twenty-nine commercial lots of mohair were sampled and tested in the grease state and again after top manufacturing to: 1) establish the impact of objectively measured style and character in greasy mohair staples on fiber characteristics of top produced on the worsted system; and 2) determine correlations among staple and top fiber characteristics. Greasy mohair staples were measured for style, character, yield, average fiber diameter (AFD) and standard deviation (SD) of AFD, average staple length (ASL) and SD of ASL, med and kemp. The resulting top was evaluated for AFD and SD of AFD, average fiber length (AFL) and SD of AFL, med and kemp. Style of greasy mohair was not correlated with top AFL ($P > 0.55$) or SD of AFL ($P > 0.99$). Similarly, character of greasy mohair and top AFL ($P > 0.28$) and SD of AFL ($P > 0.43$) were not correlated. In contrast, style was negatively correlated with kemp in top ($r = -0.63$, $P < 0.0003$) and character was negatively correlated with top AFD ($r = -0.50$, $P < 0.006$), SD of top AFD ($r = -0.47$, $P < 0.01$), staple AFD ($r = -0.61$, $P < 0.0004$) and SD of staple AFD ($r = -0.57$, $P < 0.002$).

Objectively determined style and character have little impact on fiber length characteristics of mohair top. However, style does provide an indication of kemp in top and character is related to average fiber diameter, diameter variability and med content of top somewhat justifying continued interest in subjectively assessed style and character of raw mohair.

**Key words:** mohair, style, character.

## Introduction

Although few studies exist on the effects of mohair style and character on topmaking and spinning performance, most registered breeders and some manufacturers strongly contend that these characteristics should be considered when selecting Angora goats for mohair production. In this study, style is defined as the number of twists or curls per centimeter of relaxed staple, whereas character is the number of crimps or waves per centimeter of relaxed staple (Hunter, 1993). Topmakers claim that mohair having good style produces top with "better" fiber length characteristics (longer mean fiber length, more uniform distribution of fiber length) than mohair with poor style but reasonable character. Strydom and Gee (1985) found that wave frequency affects different measures of fiber length and contributes to variation in top and noil yields. However, this study involved a relatively narrow range of style and character, namely, good to super style (South African terminology) kid, young goat and adult mohair. In a similar study, Turpie (1985) concluded that mohair with good style and character showed more uniformity in the staple cross section. Compared to U.S. goats, many South African Angora goats exhibit a higher degree of style because South African breeders have selected based on this trait for a long time. Because it has never been proven that style is truly advantageous in any aspect of processing or in the final product, this trait has not been a primary selection criterion in many U.S. Angora goat flocks. As a result, true ringlet types do not comprise a significant proportion of the U.S. mohair clip (Lupton, 1992). Because of the uncertainty surrounding this issue and the lack of research results, this study was conducted to establish the importance of style and character in determining top properties.

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[4] Texas Agricultural Experiment Station, Texas A&M University System, San Angelo, TX 76901.

[5] To whom correspondence should be addressed.

## Materials and Methods

Twenty-nine lots of mohair (24 commercial lots from Texas International Mohair, Inc., Brady, TX; and five lots of about 200 pounds each that were processed at the International Textile Center, Lubbock, TX) were grab-sampled and then evaluated at the Texas Agricultural Experiment Station's Wool and Mohair Research Lab, San Angelo, TX, in the grease state and again after top manufacturing. The five small lots were obtained from warehouses in Texas and were representative of fine kid, average kid, yearling goat, fine adult and average adult mohair. The 24 commercial lots were representative of a broad range of U.S. mohair in terms of style, character and fiber diameter. Fifty staples were removed at random from each lot and later placed onto a black velvet board where their relaxed and straightened lengths were measured. The total number of ringlets were counted, and the number of ringlets per centimeter was calculated. Likewise, the staples were examined for total number of waves, and the number of waves per centimeter was calculated. A photographic record was made of the 50 staples from each lot so that objectively measured style and character values could be associated with commonly used trade descriptions. Greasy mohair was evaluated in terms of mean staple length (relaxed and straightened) and SD, style and character. In addition, clean mohair fiber present (CMFP) of the greasy mohair was determined following the American Society for Testing and Materials (ASTM) D584 procedure (ASTM, 1993b). The AFD and SD were measured using the Optical Fibre Diameter Analyser (OFDA) according to the procedures outlined in a draft method (International Wool Textile Organization [IWTO], 1993). The ASTM standard microprojection method D2968 (ASTM, 1993d) was followed to determine med and kemp content of staples and tops. Average fiber length and standard deviation (AFL and SD) in top as well as AFD and SD of AFD were measured at Yocom-McColl Testing Laboratories, Inc., Denver, CO, using ASTM Standard Test Methods D519 (ASTM, 1993a) and D2130 (ASTM, 1993c), respectively.

### *Statistical Analysis*

Simple statistics (means and standard deviations) for raw staple and top characteristics were calculated using the MEANS procedure of SAS (1988). Pearson correlation coefficients between top and greasy staple properties were calculated using the CORR procedure (SAS, 1988).

## Results and Discussion

The mean, minimum, maximum and standard deviation values of most of the fiber properties measured on greasy staples and mohair top are presented in Table 1, which illustrates the broad range of U.S. mohair types used in this study. It is noted that while mean percentages of med content were 0.75 and 0.76 for greasy and top mohair, respectively, the maximum med content was appreciably higher for greasy mohair compared to top. This discrepancy is probably due to sampling technique. Whereas top fibers are well blended and truly representative, grease samples are grab samples and are therefore less representative. Lack of uniformity in grease samples could be responsible for this incongruity in results. Table 2 summarizes correlation coefficients between characteristics measured on greasy staples versus mohair top, and Table 3 contains similar information for style and character versus greasy staple properties.

Style of greasy mohair staples was not correlated ($P > 0.1$) with any of the characteristics measured on top except kemp. In this latter case, a significant negative correlation ($r = -0.63$, $P < 0.0003$) was observed (Table 2). Style was also correlated with med and kemp content in greasy staples ($r = 0.35$ and 0.33, respectively, $P < 0.1$; Table 3). This positive relationship between style and kemp in greasy mohair was contrary to the negative correlation of style and kemp in top. As stated previously, sampling technique involving grab samples of greasy mohair probably contributed to this disparity in results. Character of mohair staples was not correlated ($P > 0.1$) with either AFL or SD of AFL of top. In contrast, character of greasy mohair staples was correlated with AFD and SD of AFD of the raw material ($r = -0.61$ and $-0.57$, respectively, $P < 0.01$). The values of the correlation coefficients were somewhat reduced but still highly significant for the character versus AFD and SD of AFD of tops ($r = -0.50$ and $-0.47$, respectively, $P < 0.01$; Table 2). Character was not significantly correlated ($P > 0.1$) with any other property measured in the raw material (Table 3). However, a correlation between character and med content of top was observed ($r = -0.36$, $P < 0.1$; Table 2).

**Table 1. Mean, minimum, maximum and standard deviation (SD) values of fiber characteristics for 29 lots of mohair.**

| Greasy characteristics | Mean | Minimum | Maximum | Mean SD (within sample) |
|---|---|---|---|---|
| Relaxed staple length, cm | 9.93 | 7.50 | 12.70 | 1.93 |
| Straightened staple length, cm | 12.85 | 10.70 | 15.60 | 1.92 |
| Ringlets/cm (style) | 0.086 | 0 | 0.150 | 0.091 |
| Waves/cm (character) | 0.452 | 0.300 | 0.600 | 0.141 |
| Clean mohair fiber present, % | 79.91 | 68.34 | 86.74 | — |
| Fiber diameter, µm | 31.98 | 23.20 | 39.20 | 9.63 |
| Med content, % | 0.75 | 0.15 | 7.50 | — |
| Kemp content, % | 0.38 | 0.05 | 1.25 | — |
| Top characteristics: | | | | |
| Fiber length, cm | 4.25 | 3.52 | 4.89 | 1.31 |
| Fiber diameter, µm | 32.42 | 23.80 | 38.00 | 9.72 |
| Med content, % | 0.76 | 0.10 | 1.60 | — |
| Kemp content, % | 0.47 | 0.10 | 1.20 | — |

## Conclusions

It is apparent from this study that objectively determined style and character

have little impact on fiber length characteristics of mohair top. However, style does provide an indication of kemp in top and character is related to average fiber diameter, diameter variability and med content of top. These latter relationships somewhat justify producers' and processors' continued interest in subjectively assessed style and character of raw mohair. Further, it is recognized that adequate style and character provide the desired esthetics necessary for successful Angora goat showing. However, for production-oriented selection purposes, breeders are strongly advised not to rely solely on style and character of fleeces but to use objectively measured values for specific, economically important traits.

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**Table 2. Correlation coefficients between characteristics measured on greasy staple and mohair top for 29 lots of mohair.**

| | Greasy staple characteristics | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Top characteristics | S[a] | SD of S[b] | C[c] | SD of C[d] | RSL[e] | SD of RSL[f] | SSL[g] | SD of SSL[h] | CMFP[i] | AFD[j] | SD of FD[k] | Med[l] | Kemp[m] |
| AFL[l] | -0.11 | -0.07 | 0.20 | 0.26 | 0.35[n] | 0.39[o] | 0.60[q] | 0.41[o] | -0.12 | 0.15 | 0.07 | 0.20 | -0.10 |
| SD of AFL[m] | -0.00 | 0.01 | 0.15 | 0.04 | 0.42[o] | 0.35[n] | 0.65[q] | 0.47[o] | -0.02 | -0.02 | -0.12 | 0.04 | -0.21 |
| AFD | -0.10 | -27 | -0.50[p] | -0.02 | -0.27 | 0.13 | -0.21 | 0.03 | 0.31 | 0.87[q] | 0.72[q] | -0.13 | -0.05 |
| SD of AFD | -0.19 | -0.27 | -0.47[p] | -0.03 | -0.22 | 0.06 | -0.19 | -0.00 | 0.30 | 0.82[q] | 0.76[q] | -0.15 | -0.02 |
| Med | -0.18 | -0.33[n] | -0.36[n] | -0.09 | 0.13 | 0.18 | 0.06 | 0.20 | 0.25 | 0.43[o] | 0.43[o] | -0.04 | 0.10 |
| Kemp | -0.63[q] | -0.25 | 0.07 | 0.08 | -0.13 | -0.09 | -0.25 | -0.06 | -0.23 | -0.06 | 0.01 | -0.32[n] | -0.18 |

[a] S = style.
[b] SD of S = standard deviation of style.
[c] C = character.
[d] SD of C = standard deviation of character.
[e] RSL = relaxed staple length.
[f] SD of RSL = standard deviation of relaxed staple length.
[g] SSL = straightened staple length.
[h] SD of SSL = standard deviation of straightened staple length.
[i] CMFP = clean mohair fiber present.
[j] AFD = average fiber diameter.
[k] SD of FD = standard deviation of fiber diameter.
[l] AFL = average fiber length.
[m] SD of AFL = standard deviation of average fiber length.
[n] $P < 0.1$.
[o] $P < 0.05$.
[p] $P < 0.01$.
[q] $P < 0.001$.

**Table 3. Correlation coefficients for style and character versus other greasy staple characteristics.**

| | Greasy staple characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Criteria | RSL[a] | SD of RSL[b] | SSL[c] | SD of SSL[d] | CMFP[e] | AFD[f] | SD of FD[g] | Med | Kemp |
| Style | -0.18 | -0.25 | -0.10 | -0.32[h] | 0.25 | -0.25 | -0.24 | 0.35[h] | 0.33[h] |
| Character | -0.14 | -0.19 | 0.09 | -0.10 | -0.22 | -0.61[j] | -0.57[i] | 0.27 | 0.25 |

[a] RSL = relaxed staple length
[b] SD of RSL = standard deviation of relaxed staple length
[c] SSL = straightened staple length
[d] SD of SSL = standard deviation of straightened staple length
[e] CMFP = clean mohair fiber present
[f] AFD = average fiber diameter
[g] SD of AFD = standard deviation of average fiber diameter.
[h] $P < 0.1$.
[i] $P < 0.01$.
[j] $P < 0.001$.

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