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A Comparison of the Tenacity and Extension of Mohair and Kemp Fibres

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ABSTRACT

The tensile properties (extension at break and tenacity) of mohair and kemp fibres have been compared at different gauge lengths, for various Cape and Basutu mohair types. At a gauge length of 10 mm the extension at break of the mohair and kemp fibres generally did not differ significantly while at the longer gauge lengths (40 mm, 50 mm or 100 mm) the extension at break of the mohair fibres was generally, but not consistently, higher than that of the kemp fibres. Very few kemp fibres in the Cape mohair types investigated were, however, long enough to be tested at gauge lengths of 50 mm and longer.

The tenacity (gf/tex) of the mohair fibres was nearly always higher than that of the kemp fibres, although, more often than not, the reverse was true in the case of the absolute fibre breaking strength.

KEY WORDS

Mohair — kemp — fibre extension — fibre tenacity — gauge length — Cape mohair — Basutu mohair — heterotype.

INTRODUCTION

In a recent article[1] a method was proposed for the removal of kempy/heterotype fibres from mohair by what was termed the "stretch-break" process. This appears to have been based on the findings of another study[2] in which it was found that the extension at break of mohair fibres was often considerably higher than that of the kemp fibres present in the same sample. The proposed method involves passing carded and once-gilled mohair slivers through the back and front rollers of a gill-box from which the fallers had been removed and using a draft of about 1,5 and a ratch of 10 cm (4″). It was claimed that the long kempy/heterotype fibres broke preferentially due to their lower extensions and that this facilitated their subsequent removal. These long fibres are normally very difficult to remove during conventional processing. It is apparent from the ratch used that only kempy/heterotype fibres 100 mm in length or longer would in fact be broken and then only those fibres (both mohair and other types) having extension at break values below the extension imposed by the drafting system.

Srivastava[2] found that only in the case of certain types of mohair were the differences between the extension at break of the mohair and kemp fibres sufficiently large for the above process to be effective, at least, theoretically. For instance, in the case of those particular S.A. winter kid and S.A. adult mohair types which had been tested, the differences between the extension of the kemp and mohair fibres appeared to be too small for the method to be effective. It must be stressed, however, that the above comparisons were based on a gauge length of either 20 mm or 50 mm and therefore need not necessarily be valid for longer gauge lengths since it can reasonably be expected that the difference between the extension of kemp and mohair fibres will become larger at longer gauge lengths (such as at the ratch used in the stretch-break process). This expectation is based on the greater inherent irregularity in the cross-sectional area of the kempy type fibres. This appears to have been confirmed by the results obtained at gauge lengths of 20 mm and 50 mm respectively[2], and may also be the reason for apparently contradictory results having been obtained in an earlier study[3] carried out at a gauge length of 10 mm, where it was found that, if anything, the kemp fibres had a slightly higher extension at break than the mohair fibres. Another possible reason for the latter results is that mentioned previously, namely that the difference in extension at break between the kemp and mohair fibres apparently depends upon the type of mohair[2].

In view of the importance attached to the efficient removal of kemp it was considered worthwhile to ascertain whether or not the above mentioned process could be applied to the various Cape and Basutu mohair types. The first step in this direction, and with which this report is concerned, was to compare the tensile properties, more particularly the extension at break, of kemp and mohair for various types of mohair and employing different gauge lengths.

EXPERIMENTAL

Fibre samples were drawn from various Cape and Basutu mohair types. These were rinsed in the following sequence: first in petroleum ether, then in weak lukewarm Lissapol NX (ICI) solution, followed by de-ionised water, alcohol and finally ether. Subsequent to this the fibres were conditioned, in open form, at 65% RH and 20°C for at least 24 hours after which they were teased out carefully by hand to avoid damaging the fibres, especially the kemp fibres. The samples were then sorted into groups of mohair and kemp (and in a few isolated cases also heterotype) fibres, with preference being given to the longer kemp (and heterotype) fibres in view of the fact that these are the ones at which the "stretch-break" process is aimed and which are therefore mainly of interest here.

After the fibres had been allowed to condition, each fibre as well as each group of fibres were weighed separately, to an accuracy of 10^{-5} g on a Mettler balance and the length of each fibre was also determined separately. From these values the linear density (in tex units) of each fibre, as well as the average for each group of fibres, could be calculated. These will be referred to as the gravimetric results.

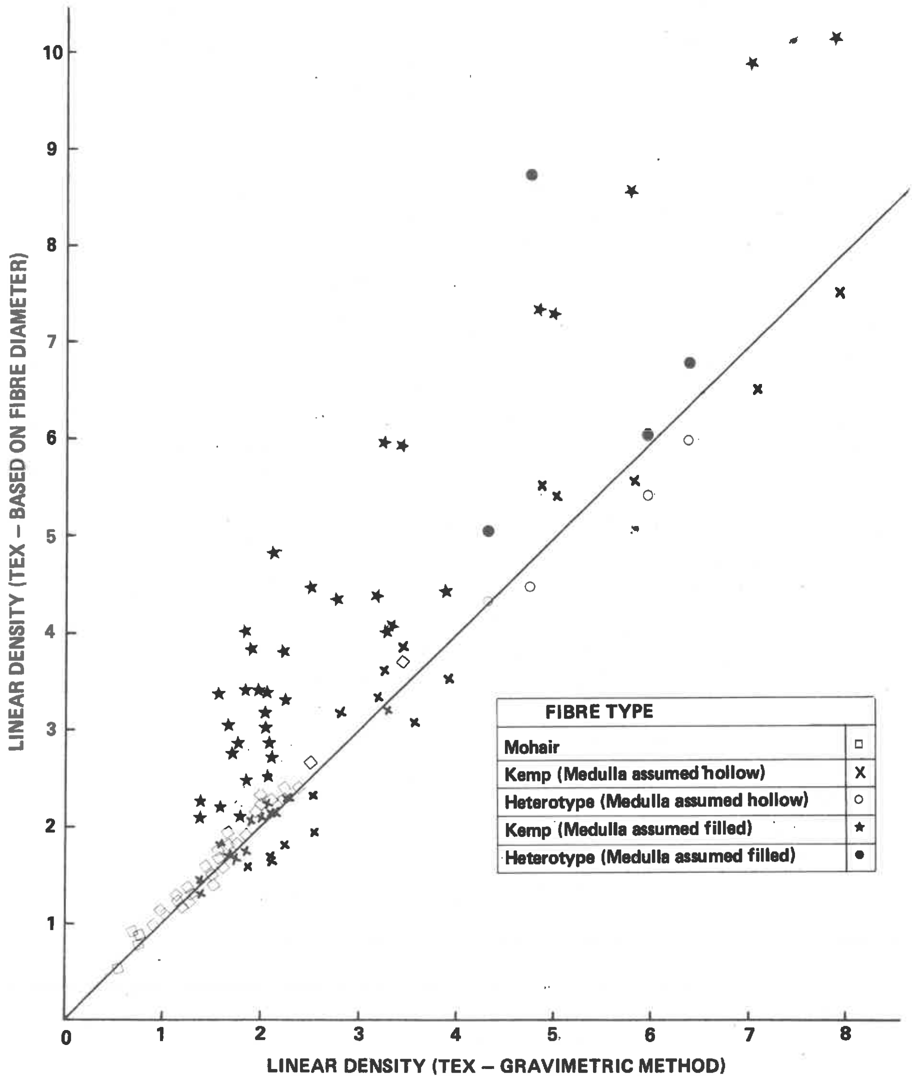

FIGURE 1

Linear density derived from mean fibre diameter and fibre density in linear density obtained gravimetrically (i.e. from the mass and length of the fibres)

The breaking strength and extension at break (the latter will here-after be referred to simply as extension) of the fibres were measured on an Instron tensile tester. Various gauge lengths, namely 10 mm, 40 mm, 50 mm and 100 mm, were employed to compare the tensile properties, more specifically the extension, of the mohair and kemp fibres at the different gauge lengths. Between 6 and 10 fibres per sample were tested at each gauge length. The rate of extension was adjusted to equal the gauge length per minute (i.e. the rate of extension was always 100 *per cent* per minute). A pre-tension of 1 gf was applied in each case and plug-type jaws were used although in a few cases rubber lined clamps were also used. The two different sets of jaws gave very much the same values for the tensile properties although there were indications that the plug type jaws caused slightly more "jaw breaks", probably due to the sharp angle through which the fibres are bent during mounting and testing.

After the tensile test had been performed, that fibre segment which had not been subjected to the tensile load was mounted in liquid paraffin and its diameter measured, at ten places, on a Visopan projection microscope. In the case of the kemp fibres both the outer diameter (D) of the fibre and the diameter of the medulla (d) were noted. By means of these values, and assuming a fibre density of 1,31 g/cm^3, the linear density (tex) of each fibre could be calculated. The values so obtained, assuming in the one case that the kemp medulla was hollow and in the other that it was not, have been plotted in Fig. 1 against the gravimetric values.

From Fig. 1 it appears that the medullae of the kemp fibres are in general hollow, and it is evident, too, that the linear densities obtained by the gravimetric method agree reasonably well with those calculated from the fibre diameter and density. Nevertheless, in the case of the mohair fibres, there appears to be a tendency for the former to be slightly (about 6 *per cent* on the average) lower than the latter. The latter suggests that the density of mohair is possibly slightly (about 6%) lower than 1,31 g/cm^3 which lends support to the value of 1,27 g/cm^3 arrived at in another investigation[8]. It was found that the average linear density of a group of fibres, obtained by weighing all the fibres in that group together, agreed very well with that obtained by weighing each fibre in the group separately, with no consistent difference being apparent (see Fig. 2). From this it can be concluded that the balance was accurate even in the case of individual fibres.

In view of the above findings it was concluded that the linear density values obtained gravimetrically were probably as accurate, perhaps even more accurate in the case of the kemp and heterotype fibres, than the values obtained from the diameter results. It was therefore decided to use only the former set of linear density results hereafter.

The relevant results are given in Tables I to III together with the season during which the fibres were grown.

It is perhaps of interest to note here that, with the exception of the Basutu types, generally very few, if any, long (of the order of 100 mm) kemp or heterogeneous fibres were present in the samples. As a matter of fact, few of these

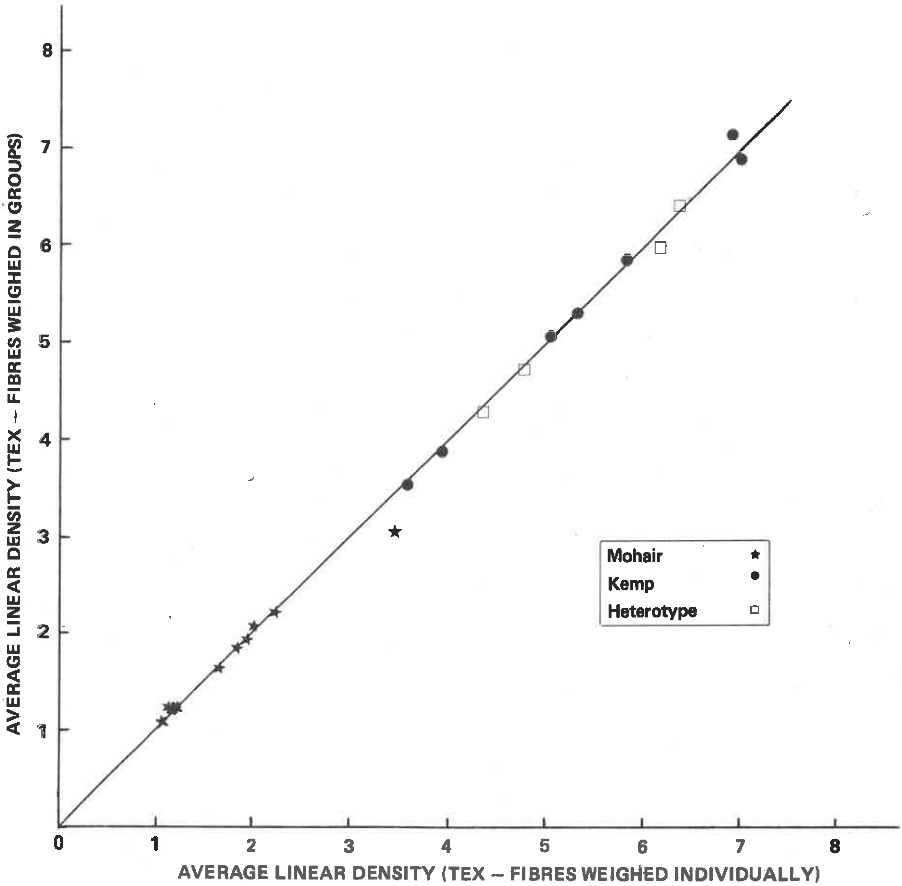

FIGURE 2

Average fibre linear density calculated from mass of fibres weighed in groups vs that calculated from individual fibre masses

fibres were sufficiently long to allow them to be tested at a gauge length of 50 mm, hence the use of the 40 mm gauge length in the majority of cases.

RESULTS AND DISCUSSION

THE EFFECT OF GAUGE LENGTH

Gauge Length: 10 mm

From Table I it is clear that, at a gauge length of 10 mm, there was not a consistent difference between the extension of the mohair and kemp fibres. If a

TABLE I

TENSILE RESULTS OBTAINED ON MOHAIR AND KEMP AT A GAUGE LENGTH OF 10 mm

TYPE*	MOHAIR										KEMP											
	Fibre Diameter		Linear Density		Breaking Strength		Tenacity		Extension		Fibre Diameter		Medulla Diameter		Linear Density		Breaking Strength		Tenacity		Extension	
	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV
	µm	%	tex	%	gf	%	gf/tex	%	%	%	µm	%	µm	%	tex	%	gf	%	gf/tex	%	%	%
BSK (Winter)	29,7	14,9	0,72	51,0	15,2	37,4	17,4	17,4	47,9	14,2	44,6	14,1	26,5	30,9	1,40	13,0	19,0	13,1	13,7	12,8	48,6	9,8
BSK (Winter)	41,2	7,6	1,58	6,3	30,7	18,3	19,4	13,9	47,5	7,2	51,7	6,9	32,0	19,6	1,74	9,9	25,5	11,9	14,6	3,4	43,7	6,7
BSK (Summer)	29,4	8,2	0,77	20,5	13,3	26,8	17,4	29,5	48,4	6,1	55,4	12,0	32,7	18,4	2,07	16,3	32,8	11,0	16,0	6,7	47,8	8,1
BSYG (Winter)	39,1	10,7	1,46	24,1	27,3	17,0	19,2	15,6	47,2	4,6	57,1	10,2	33,1	17,3	2,09	8,8	35,6	9,6	17,1	6,2	50,9	5,5
CSYG (Winter)	32,8	16,5	1,02	40,6	18,3	40,3	18,1	10,2	46,6	10,9	67,8	11,4	50,1	14,5	2,15	12,7	24,8	14,0	11,5	7,7	41,7	8,1
BYG (Winter)	34,9	22,9	1,31	39,0	21,8	39,5	16,9	16,8	47,9	10,7	60,1	20,8	40,8	22,1	1,91	38,8	28,7	32,9	15,3	6,0	48,4	7,4
BYG (Summer)	40,9	28,7	1,77	50,6	29,9	48,7	17,3	10,7	46,7	6,6	59,5	35,6	39,3	55,7	1,89	34,4	24,8	31,8	13,5	24,5	46,2	9,2
ASFH (Winter)	34,5	3,8	1,33	19,4	25,4	22,6	19,1	9,7	50,2	4,8	57,0	13,1	38,5	18,4	1,60	21,0	20,9	11,4	13,4	21,8	44,8	5,6
BSFH (Winter)	46,2	16,7	2,02	28,8	39,2	20,6	19,8	9,4	50,8	8,8	49,5	4,4	18,4	32,4	2,12	9,2	37,8	11,4	18,0	14,4	51,5	6,7
BSFH (Winter)	41,7	12,1	1,67	20,7	34,7	24,7	20,8	8,1	53,1	7,9	53,8	18,2	34,3	34,6	1,68	15,0	27,8	25,6	16,5	17,1	51,3	7,2
BSFH (Summer)	45,9	7,9	1,99	14,9	36,8	23,4	18,7	22,1	45,8	8,5	74,6	20,3	39,7	57,4	3,45	9,3	51,0	10,6	14,9	16,9	45,1	6,0
ASH (Summer)	34,1	18,1	1,27	22,3	20,7	22,5	16,5	16,2	47,2	11,1	62,9	7,8	26,6	16,2	3,20	18,1	57,0	29,7	18,3	33,3	46,7	12,7
BSH (Summer)	41,5	18,1	1,69	27,8	30,1	22,9	18,0	6,5	44,7	11,1	51,5	15,2	29,4	40,6	2,11	29,0	31,7	18,2	15,4	13,1	41,0	10,9
CSFH (Winter)	36,6	17,8	1,31	37,8	25,6	43,9	19,3	16,1	48,1	7,7	52,4	10,6	32,3	20,6	1,79	20,8	26,0	23,0	14,5	14,4	43,7	6,2
BMM (Basutu)	42,7	22,2	1,68	44,3	27,3	48,9	15,9	12,9	45,9	8,6	64,7	17,6	27,2	41,3	3,91	23,8	55,8	21,5	14,4	11,1	47,5	10,9

*According to Cape Mohair Classing Standards (1970) – Any discrepancies can be ascribed to sampling difference in mean extension of 5 *per cent* is taken as being statistically significant then it follows from Table I that, at this particular gauge length, in only one case (ASFH winter) was there a significant difference between the extension of the mohair and kemp fibres. The overall average extension of the mohair fibres was 47,9 *per cent* and that of the kemp fibres 46,6 *per cent.* These values show reasonable agreement with those obtained previously(3) at the same gauge length.

The breaking strength and tenacity results show that the tenacities (gf/tex) of the mohair fibres were, with one exception (ASH summer), always higher than those of the kemp fibres although more often than not the reverse was true for the actual fibre breaking strength values. The overall average value for the tenacity of the mohair was 18,3 gf/tex while that for the kemp was 15,1 gf/tex. The overall average breaking strength of the mohair fibres was 26,4 gf and that of the kemp fibres was 33,0 gf.

Gauge Length: 40 mm or 50 mm

From Table II it is apparent that, at a gauge length of either 40 mm or 50 mm the extension of the mohair fibres was with one exception, always higher than that of the kemp fibres, with the overall average extension of the mohair fibres 38,3% and that of the kemp fibres 34,9%. The difference in extension between the mohair and kemp fibres was, in some cases, as much as 10% depending upon the particular sample.

The overall average tenacity of the mohair and the kemp fibres was 15,8 gf/tex and 12,7 gf/tex, respectively. Again there was only one case (ASH summer) where the tenacity of the kemp fibres was slightly higher than that of the mohair and it is interesting to note that it is also this sample which gave the anomalous result before. The overall average breaking strength of the mohair fibres was 25,9 gf and that of the kemp fibres was 38,4 gf.

The Basutu mohair samples generally showed the same trends as the Cape mohair samples.

Gauge Length: 100 mm

From the tests carried out on the Basutu mohair types at a gauge length of 100 mm (see Table III) it is evident that, at this particular gauge length, the average extension at break of the mohair and kemp fibres differed much more than at the previous gauge lengths, probably due to the inherently more variable nature of the kemp fibres. The average extension values for the mohair and kemp fibres were 30,2% and 21,8% respectively. These average values are misleading, however, since it is apparent that widely different results were obtained, for the three different Basutu mohair samples. In the case of the one BMM sample there was no difference between the extension of the mohair and kemp fibres while in the case of the other (BMM) the difference was small. Only in the case of the one BCM sample was there a very large difference between the extension values. On the basis of these results it

TABLE II

TENSILE RESULTS OBTAINED ON MOHAIR AND KEMP AT A GAUGE LENGTH OF 40 mm (AN ASTERISK DENOTES A GAUGE LENGTH OF 50 mm)

TYPE**	MOHAIR										KEMP											
	Fibre Diameter		Linear Density		Breaking Strength		Tenacity		Extension		Fibre Diameter		Medulla Diameter		Linear Density		Breaking Strength		Tenacity		Extension	
	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV
	µm	%	tex	%	gf	%	gf/tex	%	%	%	µm	%	µm	%	tex	%	gf	%	gf/tex	%	%	%
BSFK (Summer)	23,0	7,8	0,56	18,7	8,1	17,1	14,8	15,4	36,8	11,5	48,9	10,6	28,8	24,2	1,88	25,8	17,4	32,1	9,4	28,7	24,9	53,2
BSK (Winter)	32,6	11,0	1,07	16,8	15,4	21,0	14,4	11,5	36,7	9,1	46,3	15,4	26,9	27,4	1,40	28,5	15,1	18,6	11,1	18,2	29,9	19,8
BSK (Winter)	38,4	18,5	1,46	29,3	23,2	32,4	15,9	12,4	36,5	7,5	46,3	8,5	22,5	21,3	1,62	16,3	21,2	13,9	13,2	11,4	32,0	13,9
BSK (Summer)	27,9	12,8	0,79	26,6	8,9	34,3	11,2	18,3	30,9	27,8	53,8	11,4	29,1	15,8	2,09	10,4	22,2	23,2	10,7	23,0	27,7	44,3
BSYG (Winter)	36,2	8,4	1,30	24,2	22,7	21,1	17,6	9,2	40,9	11,0	56,7	8,7	31,2	16,7	2,26	6,7	38,3	3,7	17,0	6,4	44,4	10,3
CSYG (Winter)	31,2	8,9	0,95	18,3	14,6	12,5	15,6	9,4	39,4	5,7	60,6	10,0	43,7	12,9	2,25	16,6	20,9	32,4	9,1	19,4	29,2	46,0
BYG (Summer)	40,8	15,0	1,65	30,2	28,6	29,0	17,5	8,7	40,8	4,3	44,5	20,0	19,3	15,1	1,83	29,3	27,4	34,2	14,9	17,4	40,4	7,7
ASFH (Winter)	39,1	5,7	1,62	9,9	28,2	10,5	17,3	4,1	43,1	4,2	57,6	8,4	40,1	15,2	1,86	15,8	20,5	10,3	11,1	9,5	36,6	6,8
BSFH (Winter)	50,6	12,6	2,52	27,7	42,9	30,4	16,9	5,2	40,1	10,4	48,2	4,7	20,7	13,2	2,55	41,8	32,8	23,7	13,4	13,0	38,2	7,5
BSFH (Winter)	40,2	10,9	1,59	20,8	28,1	23,9	17,7	10,2	43,5	10,1	57,3	11,5	37,3	38,8	2,00	16,8	27,3	26,1	13,5	9,9	39,6	10,4
BSFH (Summer)	46,7	15,1	2,11	21,9	34,2	27,1	16,1	8,8	37,7	11,3	75,5	14,2	46,5	26,3	3,26	20,0	44,1	31,0	13,2	15,8	32,1	38,6
ASH (Summer)	37,2	9,2	1,54	17,9	23,3	19,5	15,1	5,7	39,7	2,3	61,9	12,8	26,8	29,0	3,30	21,7	52,8	30,3	15,7	11,5	38,2	6,7
BSH (Winter)	37,9	15,0	1,52	26,8	27,1	29,3	17,8	13,6	42,0	8,7	64,7	9,8	32,9	22,4	2,82	11,9	35,7	21,2	12,6	16,4	34,7	12,9
BSH (Summer)	36,1	19,5	1,27	31,2	21,9	38,1	16,9	10,5	39,1	6,6	64,7	19,4	44,1	28,2	2,53	15,4	34,9	7,4	14,0	13,9	36,3	8,6
CSFH (Winter)	43,0	8,6	1,87	21,5	33,5	23,0	17,9	9,8	41,3	7,8	51,0	10,9	31,0	20,4	2,12	40,6	25,0	24,2	12,4	17,7	38,4	5,7
BCM (Basutu) *	47,3	21,0	2,39	33,7	32,1	32,9	13,4	4,3	36,4	7,1	96,8	16,7	55,6	24,4	7,79	25,3	75,1	35,0	10,4	16,6	32,2	37,0
BMM (Basutu)*	58,3	18,6	3,45	38,5	55,9	36,6	16,5	13,2	38,2	8,3	90,8	10,3	52,4	25,2	5,82	15,7	75,5	13,8	13,0	9,4	37,6	8,4
BMM (Basutu)*	46,9	13,0	2,24	25,8	37,0	29,2	16,4	7,7	38,6	8,8	61,8	13,7	29,3	20,8	3,58	26,7	44,0	14,7	12,7	17,7	36,2	11,6
	MOHAIR (FINE)										HETEROTYPE											
BCM (Basutu)*	34,9	13,3	1,17	30,5	14,8	37,8	12,6	15,0	32,9	12,7	71,9	17,8	24,3	25,2	5,95	22,9	73,1	34,8	12,1	19,0	31,1	26,3
BMM (Basutu)*	35,7	14,0	1,16	31,1	16,9	41,1	14,3	31,8	30,7	44,7	70,4	8,5	26,5	21,9	4,76	16,1	63,9	15,1	13,6	13,5	37,4	5,7

**According to Cape Mohair Classing Standards (1970) – Any discrepancies can be ascribed to sampling would appear as though the stretch-break method of separating kemp from mohair would not be suitable for all types of mohair.

It is interesting to note that an average extension at break value of 26,2% was obtained for the heterotype fibres. The difference between the mohair and heterotype fibres was therefore much smaller than between the mohair and kemp fibres. The reason for the higher extensibility of the heterotype fibres compared with the kemp fibres may be explained as follows: usually the heterotype fibres consisted of a continuous kempy segment (which was, in the case of these samples, located on the tip side of the fibre) and a continuous mohair segment (at the root side). Where possible the fibres were mounted for testing so that half of the section to be tested was mohair and the other half kemp. There was in effect, therefore, one section relatively more even in diameter and internal structure followed by a section relatively more uneven in diameter and internal structure. The total effect was a fibre with an irregularity of diameter and internal structure intermediate between the two extremes (viz. mohair and kemp).

At this particular gauge length the average tenacity of the mohair fibres was 12,9 gf/tex and that of the kemp fibres, 9,0 gf/tex. This followed the same trend exhibited at the other gauge lengths, viz. the tenacity of kemp was lower than the tenacity of mohair. In this case the breaking load of the kemp fibres was on an average approximately double that of the mohair fibres. The overall average breaking load was 27,3 gf for the mohair and 50,2 gf for the kemp. The average tenacity (11,0 gf/tex) of the heterotype fibres was intermediate between that of the mohair and kemp fibres. The heterotype fibres had an overall breaking strength of 56,6 gf.

In Table IV the averages of the results obtained at the various gauge lengths are given. This table illustrates the average differences in tensile properties of the mohair and kemp fibres more clearly and also illustrates the large effect of gauge length on both extension and tenacity. The results in this table add confirmation to the findings of Srivastava[2] and show that one is more likely to have success in preferentially breaking the kemp by means of the stretch-break method if the kemp is long enough to permit the use of a relatively large ratch. Nevertheless, it was observed that at a gauge length of 100 mm many of the kemp fibres broke very near to their tips, possibly due to the natural taper of the fibres and weathering. This would have the effect of reducing the efficiency of the stretch-break process in that the length of the kemp fibres would generally not be reduced by all that much.

Comparison of Present Results with Those Obtained by Other Workers

Mohair extension and tenacity values obtained by other workers[3–7] are given in Table V. In general the results obtained in the present paper show reasonable agreement with those given in Table V, although in most cases it is

TABLE III

TENSILE RESULTS OBTAINED ON MOHAIR AND KEMP AT A GAUGE LENGTH OF 100 mm

TYPE	MOHAIR										KEMP											
	Fibre Diameter		Linear Density		Breaking Strength		Tenacity		Extension		Fibre Diameter		Medulla Diameter		Linear Density		Breaking Strength		Tenacity		Extension	
	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV
	μm	%	tex	%	gf	%	gf/tex	%	%	%	μm	%	μm	%	tex	%	gf	%	gf/tex	%	%	%
BMM (Basutu)	45,0	13,1	1,96	24,1	26,9	38,4	13,3	22,1	30,6	33,6	82,2	23,2	38,8	47,3	5,03	35,0	45,8	22,4	9,8	29,3	23,3	57,5
BCM (Basutu)	48,2	12,7	1,97	28,7	26,4	43,0	12,9	20,9	30,7	18,6	98,5	13,9	49,1	25,1	7,01	16,2	47,4	24,5	6,8	28,4	12,6	93,7
BMM (Basutu)	49,2	18,1	2,23	33,0	28,7	47,8	12,4	26,0	29,4	29,9	82,4	11,0	40,6	26,7	5,34	10,6	57,3	12,0	10,5	9.3	29,4	8,5
	MOHAIR (FINE)										HETEROTYPE											
BCM (Basutu)	–	–	–	–	–	–	–	–	–	–	80,4	15,1	27,2	28,0	6,37	18,0	60,2	20,9	9,7	24,8	22,8	49,5
BMM (Basutu)	34,1	10,7	1,20	22,5	17,4	29,4	14,5	16,1	34,1	22,0	70,1	7,1	26,1	7,6	4,35	9,1	53,0	16,0	12,3	16,1	29,6	34,7

difficult to draw any definite conclusions or to make valid comparisons in view of the fact that all the parameters which influence the results such as the rate of extension, gauge length, mohair type, etc. were often not mentioned in the original papers.

The Effect of Season on Extension and Tenacity

In Table VI the results obtained on fibres grown in winter and summer, respectively, are summarised. The results presented in Table VI were taken from Tables I and II. From these results it appears that, although the average tenacity and extension values for summer mohair and kemp fibres tended to be lower than the values for the winter grown fibres, the summer samples did not consistently give lower tenacity and extension values than those obtained on the winter samples. The season did not seem to affect the *difference* between the tensile values of the mohair and kemp fibres in a consistent manner although the difference between the tenacity of the mohair and kemp fibres seemed to be slightly smaller for the samples which had been grown in summer.

The overall average extension and tenacity values for the winter and summer mohair and kemp are given in Table VII. There appears to be a tendency for the summer grown mohair and kemp fibres to have, on the average, a lower extension at break than the winter grown fibres, and the differences seem slightly more pronounced at the longer gauge length (40 mm). Again, season had apparently hardly any effect on the difference between the mohair and kemp results. In the case of the tenacity values the picture is not so clear since the summer mohair fibres had, on the average, slightly lower tenacities than the winter mohair fibres whereas in the case of the kemp fibres there was hardly any difference, if anything the trend was reversed.

TABLE IV

EFFECT OF GAUGE LENGTH ON THE AVERAGE TENSILE VALUES

GAUGE LENGTH (mm)	EXTENSION AT BREAK (%)			TENACITY (gf/tex)		
	Mohair	Heterotype	Kemp	Mohair	Heterotype	Kemp
10	47,9	–	46,6	18,3	–	15,1
40 or 50	38,3	–	34,9	15,8	–	12,7
100	30,2	26,2	21,8	12,9	11,0	9,0

TABLE V

SOME TENACITY AND EXTENSION VALUES OBTAINED ON MOHAIR AND KEMP BY OTHER WORKERS

Source of Data	Gauge Length (mm)	Rate of extension (%/min)	Type of Mohair	Tenacity (gf/tex)	Extension (%)
Watson and Martin[4]	25,4	100	Mohair	16,4	40,4
Fröhlich[5]	10	—	S.A. Mohair	19,0	49,6
Fröhlich[5]	10	—	Texas Mohair	15,1	48,5
Hunter and Kruger[3]	10	20	S.A. Mohair	15,0	42,2
			Kemp	15,3	45,2
			Kemp	13,5	—
Harris[6]	10	—	Mohair	13,0	30,0
Hearle[7]	—	—	Mohair	13,0	30,0
Srivastava[2]	20	100	**S.A. Summer Kid**		
			Kemp	—	27,8
			Mohair	—	41,3
Srivastava[2]	20	100	**S.A. Summer Kid**		
			Kemp	—	38,3
			Mohair	—	38,8
Srivastava[2]	20	100	**S.A. Adult**		
			Kemp	—	37,3
			Mohair	—	44,9
Srivastava[2]	20	100	**Turkish Adult**		
			Kemp	—	26,3
			Mohair	—	39,7
Srivastava[2]	50	100	**S.A. Adult**		
			Kemp	—	28,1
			Mohair	—	33,3
Srivastava[2]	50	100	**Turkish Adult**		
			Kemp	—	23,9
			Mohair	—	30,0
Srivastava[2]	50	100	**Basutoland Adult**		
			Kemp	—	18,1
			Mohair	—	39,0
Srivastava[2]	50	100	**2^S Cape**		
			Kemp	—	24,9
			Mohair	—	38,5

TABLE VI

TENSILE VALUES OBTAINED ON WINTER AND SUMMER MOHAIR AND KEMP FIBRES

SAMPLE	WINTER				SUMMER			
	Tenacity (gf/tex)		Extension (%)		Tenacity (gf/tex)		Extension (%)	
	Mohair	Kemp	Mohair	Kemp	Mohair	Kemp	Mohair	Kemp
10 mm Gauge Length								
BSK	17,4	13,7	47,9	48,6	17,4	16,0	48,4	47,8
BSK	19,4	14,6	47,5	43,7	–	–	–	–
BYG	16,9	15,3	47,9	48,4	17,3	13,5	46,7	46,2
BSFH	19,8	18,0	50,8	51,5	18,7	14,9	45,8	45,1
BSFH	20,8	16,5	53,1	51,3	–	–	–	–
Mean	18,9	15,6	49,4	48,7	17,8	14,8	47,0	46,4
40 mm Gauge Length								
BSK	14,4	11,1	36,7	29,9	11,2	10,7	30,9	27,7
BSK	15,9	13,2	36,5	32,0	–	–	–	–
BSFH	16,9	13,4	40,1	38,2	16,1	13,2	37,7	32,1
BSFH	17,7	13,5	43,5	39,6	–	–	–	–
BSH	17,8	12,6	42,0	34,7	16,9	14,0	39,1	36,3
Mean	16,5	12,7	39,8	34,9	14,7	12,6	35,9	32,0

TABLE VII

AVERAGE TENSILE VALUES OBTAINED ON WINTER AND SUMMER MOHAIR AND KEMP FIBRES

GAUGE LENGTH	FIBRE TYPE	WINTER		SUMMER	
		Extension (%)	Tenacity (gf/tex)	Extension (%)	Tenacity (gf/tex)
10 mm	Mohair	48,8	18,9	46,6	17,6
	Kemp	47,2	15,0	45,4	15,6
40 mm	Mohair	40,4	16,8	37,5	15,3
	Kemp	35,9	12,6	33,3	13,0

SUMMARY AND CONCLUSIONS

The extension at break and tenacity of mohair and kemp fibres have been compared for different Cape and Basutu mohair types employing different gauge lengths. The extension of the mohair and kemp fibres did not differ consistently when a gauge length of 10 mm was employed, but at the longer gauge lengths (i.e. 40 mm, 50 mm and 100 mm) the extension of the mohair fibres was generally, although not consistently, higher than the corresponding kemp fibres. The effect of gauge length on extension was, therefore, more pronounced in the case of kemp than in the case of mohair. This then suggests that, in theory, the "stretch-break" process could be effective in certain cases provided that the average length of the kemp fibres present and the ratch were sufficiently large. Nevertheless, the presence of very few such long (i.e. of the order of 100 mm) kemp or heterotype fibres in the various Cape mohair types studied and the fact that the long kemp fibres were inclined to break close to their extremities (at a gauge length of 100 mm) would tend to reduce the usefulness of the "stretch-break" process. The fact that, even at a gauge length of 100 mm, one out of the three Basutu mohair types tested, displayed no difference between the extension values obtained on the mohair and kemp fibres indicated that the "stretch-break" process would only be effective for certain mohair types.

As far as tenacity is concerned the mohair fibres generally had significantly higher tenacities than the kemp fibres although the reverse was generally true in the case of the absolute fibre breaking strength as such.

As far as the effect of season on the tensile properties is concerned no definite conclusions could be drawn although there were indications that the extension of the summer grown fibres was lower than that of the winter grown fibres.

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