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Interport Differences in Processing Performance of Similar Wools

Part III: Yarn and Fabric Properties of A 12 Months 60/64's

by

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ABSTRACT

Three matched lots of wools derived from various growing regions of South Africa and marketed in Durban, Port Elizabeth and Cape Town respectively have been processed, spun and woven into identical fabrics. No significant differences were found during spinning or weaving and the physical properties of the yarns and fabrics were practically identical.

INTRODUCTION

A series of investigations have been carried out at SAWTRI to determine whether any differences can be observed in the processing performance of similar wools marketed at the ports of Durban, Port Elizabeth and Cape Town[1, 2], there being considerable geographical and climatic differences between the wool growing areas which feed these three widely spaced ports.

Turpie[1,2] found that specific types from the various ports were relatively well matched and the differences in processing performance were generally insignificant. Where differences were apparent it was considered that differences in the level of crimp (which is not one of the physical characteristics generally measured in an objective test) may have been responsible.

This particular report is concentrated on the yarn and fabric properties, of the same lots as investigated previously in order to determine differences, if any, that may be detectable in manufacturing and which can be related to the differences found by Turpie[1, 2] in respect of fibre properties or processing performance.

EXPERIMENTAL

Processing

Tops which had been produced from the December, January and February offerings of S.A. Wool Board's Type 49, from each of the three ports Durban, Port Elizabeth and Cape Town, were blended to make one composite sample from each port, respectively.

Dyeing, Backwashing and re-combing

The tops were dyed in a Libbrecht Top Dyeing Machine and the dyed tops were backwashed in a two-bowl Fleissner unit equipped with a suction drum dryer.

After backwashing and drying, the dyed tops were gilled three times on a Schlümberger gillbox type GNP. During the first gilling the slivers were sprayed with 0,6% (o.m.f.) ®Bevaloid 4027. The wool was then re-combed on a Schlümberger PB 26 comb at a gauge of 30 mm and using a top comb with a pin density of 30 pins/cm. The comb loading was 290 ktex. The re-combed slivers were finished by two passages through an NSC auto leveller gillbox.

Drawing and Spinning

There were four drawing operations from top to roving. During the first operation, the linear density of the tops was reduced on an NSC intersecting gill box type GNP. The second and third operations were carried out on an NSC intersecting gillbox type GN 4 and the final operation on an NSC double apron high draft draw frame, type FM 1. The linear density of the tops was reduced progressively from 20 ktex to 12 ktex, 6 ktex, 3 ktex and finally 450 tex respectively during these operations.

Spinning was carried out on a Rieter H6 worsted ring frame. Each lot was spun using 60 mm rings to 25 tex Z575 and plied to give R50 tex S675/2Z 575 yarn. Mean spindle speed tests were carried out on these lots, but spun to 19 tex. The singles yarns were not steamed. Anti-snarling devices were used to prevent snarling during the unwinding from the spinners packages.

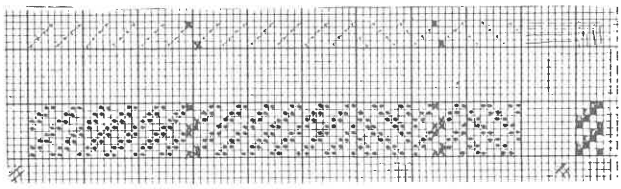
Clearing and Preparation

Each lot of plied yarn was steamed before clearing on a Schlafhorst winder fitted with an Uster Classimat recorder and electronic clearers.

Warping and Weaving

The fabric specification was as follows:

Design:



weave :	2/2 twill herringbone stripe
reed :	6,07 dents/cm (15,5/4 dents/inch)
width in reed :	170 cm
warp :	R50 tex/2 fawn with dark brown stripe
weft :	R50 tex/2 dark brown
ends per cm :	28,7 (finished)
picks per cm :	28,7 (finished)
fabric mass :	290 (g/m^2) approximately

Warp pattern repeat:

			58 x							
Ground (fawn)		13	23		34		11	25		3 982
Stripe (dark brown)				2		2				232
Selvedge (dark brown)	32								32	64
								TOTAL		4 278

The warps were prepared on a Hergeth Sample Warping Machine and woven on a 190 cm Saurer 100 WT 4-box pick and pick loom fitted with dobby running at 160 picks/minute. Each lot was identified by a different coloured end in the selvedge. The fabrics were perched, burled and mended and finished commercially.

Finishing:

The three fabrics were joined end to end and finished in an identical manner. The sequence of operations was blowing, jet scouring in rope form, crabbing, tenter drying, conditioning, steaming, cropping and rotary pressing and finally autoclave decatising.

Physical testing:

The yarns and fabrics were tested for physical properties and where possible standard testing procedures were employed as described by Smuts and Hunter[3].

RESULTS AND DISCUSSION

Scouring, Carding and Combing Results

Scouring, carding and combing results of the three lots of Type 49 have been discussed in detail elsewhere[1].

Spinning Results

The spinning trials were carried out on 19 tex yarns and the results are shown in Table I.

TABLE I

MEAN SPINDLE SPEED AT BREAK RESULTS TOGETHER WITH TOP DETAILS

Port	MSS at Break (rev./min.)	Fibre length (mm)	Fibre diameter (μ m)	Raw Wool Staple Crimp (crimps/cm)
Durban	Dec 12395 Jan 12201 Feb 12256 } average 12284	71,6	22,2	4,0
Port Elizabeth	Dec 12451 Jan 12478 Feb 12506 } average 12478	74,3	22,1	4,1
Cape Town	Dec 12069 Jan 12243 Feb 12173 } average 12162	70,7	22,0	4,8

From the above results it can be seen that there was little difference between the spinning potential of the wools from the different ports. The Cape Town wools gave a slightly poorer performance than the Durban wools and the Port Elizabeth wools performed best of all.

The physical properties of the yarns are shown in Table II and the Classimat results in Table III.

TABLE II

YARN PROPERTIES

Port	Yarn Linear Density (Tex)		Breaking Strength (cN)	CV %	Extension (%)	Irregularity (CV %)	Tenacity (cN/tex)	Hairiness	
	Nominal	Actual						Mean (hairs/m)	CV %
Durban	R50	51,1	385	10	17,4	12,6	7,53	8	17
Port Elizabeth	R50	50,6	388	9	17,3	12,8	7,67	10	9
Cape Town	R50	49,5	351	9	13,4	13,0	7,09	8	10

TABLE III

USTER CLASSIMAT RESULTS

PORT (R50 tex)	Faults recorded as per Uster Classimat/100 000 m			
	A4	B3	C3	D3
Durban	10,6	9,8	6,6	13,6
Port Elizabeth	4,9	5,3	3,8	9,4
Cape Town	5,5	13,6	4,5	10,0

TABLE IV

PHYSICAL PROPERTIES OF A 2/2 TWILL HERRINGBONE SERGE FABRIC WOVEN FROM WOOLS FROM VARIOUS PORTS

Fabric Properties		Durban	Port Elizabeth	Cape Town
Fabric mass per unit area (g/m²)		279	283	285
Fabric Thickness (mm)		0,53	0,53	0,54
Fabric Sett				
ends per cm		28,0	28,0	27,3
picks per cm		23,2	23,6	23,5
Air Permeability (mℓ/s/cm²) measured at 98 Pa		5,9	5,9	5,9
Weave crimp (%)	warp	8,7	7,4	8,2
	weft	11,0	10,9	12,7
Martindale Abrasion (% mass loss at 10 000 cycles)		3,5	3,3	3,6
Martindale Pilling (IWS method 1 is poor, 5 is good)		5	5	5
Bursting Strength (kN/m²)		1162	1190	1115
Fabric Tensile Properties				
Strength (N)	warp	515	528	493
	weft	431	444	434
Extension at Break (%)	warp	33,0	36,5	35,1
	weft	32,4	32,1	31,7
Drape Coefficient (%)		54,4	54,6	54,3
AKU Wrinkling [S.D. of Wrinkle recovery curve (mm)]				
deaged*	warp	0,27	0,26	0,25
	weft	0,24	0,24	0,20
Wrinkle Rating (after 24 hrs recovery) mean		2,4	2,2	3,0
Monsanto Crease Recovery Angle (degrees)				
deaged*	warp	161	159	161
	weft	164	164	169
	W + F	325	323	330
Bending Length (cm)				
	warp	1,76	1,78	1,75
	weft	1,71	1,72	1,71
	mean	1,74	1,75	1,73
Flexural Rigidity (mN/mm)				
	warp	14,9	15,6	15,0
	weft	13,7	14,1	14,0
	mean	14,3	14,9	14,5
Relaxation Shrinkage (%)				
	length	4,0	4,1	4,0
	width	1,3	1,3	1,0
	area	5,2	5,4	4,9
Felting Shrinkage (%)				
	length	16,4	17,2	17,1
	width	10,8	10,3	10,4
	area	25,5	25,8	25,7

*To cancel any ageing effects the fabrics were soaked in water at 20° C for 30 min., centrifuged, steam pressed while still damp before being conditioned at 27° C and 75% RH for 24 hours before being creased, and recovered for 1 hour at 20° C and 65% RH.

From Table II it can be seen that yarn spun from the Cape Town wool was slightly finer and also had a slightly lower tenacity and extension at break than the yarns spun from the Durban and Port Elizabeth wools. This is probably due to the higher crimp for the Cape Town wool.

From Table III it can be seen that the yarn from Durban wools contained the highest number of Classimat faults and the Port Elizabeth wools the lowest number, with Cape Town in between.

Table IV contains the physical properties of the three fabrics. It can be seen that the fabrics were almost identical in all properties and sett and for all practical purposes could be described as identical.

From the results obtained it is apparent that the wools were very closely matched (except for slight crimp differences) displaying only minor differences during processing and even smaller differences as far as yarn or fabric properties were concerned.

SUMMARY AND CONCLUSIONS

Three lots of wool of the same description (T49) but originating from different areas in South Africa and marketed in three different ports, namely, Durban, Port Elizabeth and Cape Town were processed into yarn and woven into a standard suiting fabric about 280 g/m^2.

During previous studies on the topmaking characteristics of these wools it was found that the differences in processing performance were insignificant and slight discrepancies could be explained in terms of slight variations in crimp.

Tops from the three lots were then dyed and spun into a R50 tex/2 yarn and used in a standard worsted suiting as shown in the appendix, each lot following exactly the same manufacturing routes to give three lengths of fabric. There was little difference in spinning potential and the slightly poorer performance of the Cape Town wool lot could probably be attributed to the slightly higher raw wool staple crimp.. The yarn spun from the Cape Town lot was slightly weaker and not as extensible as the others and it also had the lowest number of removable faults in the yarn.

The fabrics produced from the three lots of wool to all intents and purposes were identical with no differences in physical properties.

THE USE OF PROPRIETARY NAMES

The fact that chemicals with registered proprietary names are mentioned in this report does not in any way imply that SAWTRI recommends them or that there are not others which are as good or better. ®Bevaloid is the trade mark of Bevaloid S.A. Ltd.

ACKNOWLEDGEMENTS

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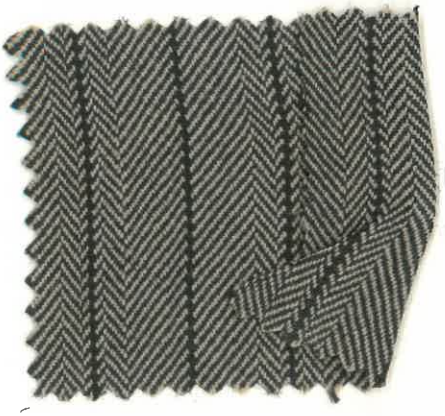
APPENDIX

SAMPLE OF FABRIC



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