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BLENDS OF WOOL ON THE COTTON SYSTEM We have had a number of inquiries recently about spinning wool blends on the cotton system. While there is nothing new about this, there does seem to be increasing interest in it. Therefore, we have decided to carry a condensed report on a program conducted at the Textile Research Center in 1983. This was sponsored by the Natural Fibers & Food Protein Commission of Texas and has already been reported to that agency.

As the cotton system of yarn manufacturing is designed for fibers 1½ inches in length and shorter, wool processed on this system must be short enough to pass through the various machines without causing difficulty. We have learned that a small percentage of fiber longer than 1½ inches does not seem to cause a serious problem, but processing is enhanced when excessively long fibers are kept to a minimum. Past research has shown that combed worsted top cut to 1½ inches is highly suitable for the cotton system when blended with cotton or other fibers. Some manufacturers prefer to have the wool stretch-broken, which is reported to be satisfactory, also. There is one other way to obtain short wool, and this is by clipping it from the sheep before the fiber length becomes too long for the cotton system. This has been found to be a spinnable material, particularly when blended with another fiber and if the percentage of wool is not too high. However, this type of wool has a higher variation in length than cut wool. Since some Texas producers shear their sheep twice a year, there is a significant amount of this wool available in this area. The Textile Research Center has evaluated the utilization of this fiber on several occasions, and the project we are reporting here was conducted with the short-clipped wool.

The schedule for twice-a-year shearing is usually in April and then again in August or September. This is done because of environmental conditions in some locations and to maintain animal vigor. Scientists at Texas A&M University have found, additionally, that the ewes are more productive when their wool is kept short. We learned at one meeting that shearing the female sheep twice each year, on a seven month/five month basis or every six months, increases lamb production by some 6 to 8 percent. On another occasion, we listened to a report given by a rancher whose goal was a 200% lamb production each year. He stated at the time of his report that his production was up to 148%. He was accomplishing this by building a flock of ewes that gave birth to twins and by shearing twice a year.

We are not sure why female sheep are more productive with short wool on their backs, but it does seem to be a reality. Whatever the reason, our research has concentrated on the utilization of the wool resulting from two shearings each year. The information given here shows that this wool does have possibilities when used in blends, although the coefficient of length variation is high. We have noted in past research that the CV of the length of cut combed top is considerably less than that shown in Table II. Even so, we found this program quite interesting and have concluded that the short-shorn wool can be used in the production of yarns on the cotton system. We recommend, however, that this be blended with some other fiber.

The processing procedure utilized in this program began with a blend of 100% cotton. This was used as a standard to which the other blends were compared. The three different wools (1½ inchs, 1¼ inches and 1 inch) were used in blends containing 60% cotton with all blending done at the beginning of processing where standard blending feeders were employed. After that, the blends were carried through an inclined cleaner, a second cleaner/blender, and then were processed through chute feeds to standard Hollingsworth cards. Subsequently, all blends were carried through two processes of drawing. At this point, part of each blend was taken to a Rieter M1/1 open-end spinning machine, and the remainder was taken to roving and then to conventional Saco Lowell ring spinning frames. These two systems were used to produce two yarns from each blend, N_e 11 and 22. Therefore, Tables III through VI give the testing

TABLE I

Raw Cotton Characteristics

Fiber Property	
Avg. Fineness (mic)	4.10
2.5% Span Length (in)	1.26
Short Fiber Content (%)	5.20
"0" Gauge Pressley (Mpsi)	105.00
1/8" Gauge Strength (g/tex)	31.5
Elongation at Break (%)	5.83
Non-Lint Content (%)	2.20
USDA Grade	SLM

TABLE II

Raw Wool Characteristics

Fiber Property	1"	1¼"	1½"
Mean Diameter (μm)	20.03	20.24	19.68
Coefficient of Variation of Mean Diameter (%)	20.05	18.46	17.43
Mean Length (in)	0.99	1.13	1.38
Coefficient of Variation of Mean Length (%)	46.86	68.39	55.15
Grade	70's	70's	70's

TABLE III

100% Cotton

Type Spinning	Ring	Open-End	Ring	Open-End
Actual Yarn Number (N_e)	11.51	11.01	22.20	21.85
Tex Yarn Number	51.4	53.7	26.6	27.1
Yarn Number Variability (CV%)	0.88	0.94	1.90	1.24
Twist Multiplier	3.25	4.58	3.25	4.52
Skein Strength (lbs)	254	251	117	111
Skein Strength Variability (CV%)	2.86	4.15	4.67	3.39
Count-Strength-Product	2924	2764	2597	2425
CSP Variability (CV%)	2.84	4.34	3.37	3.57
Single Yarn Strength (g)	1026	856	606	380
Single Yarn Str. Variability (CV%)	7.89	7.18	10.89	10.25
Tenacity (g/tex)	20.0	15.9	22.8	14.0
Elongation (%)	6.90	7.50	5.70	6.30
Uster Non-Uniformity (CV%)	15.74	15.16	19.38	15.78
Thin Places/1,000 yds	9	8	78	20
Thick Places/1,000 yds	162	97	894	168
Neps/1,000 yds	93	210	432	347
Hair Count/100 yds	1762	417	1371	177

TABLE IV

60% Cotton/40% Wool (1½-inch)

Type Spinning	Ring	Open-End	Ring	Open-End
Actual Yarn Number (N_e)	11.51	11.23	22.32	22.21
Tex Yarn Number	51.4	52.7	26.5	26.6
Yarn Number Variability (CV%)	1.42	0.80	1.16	0.94
Twist Multiplier	3.25	4.52	3.25	4.55
Skein Strength (lbs)	155	140	75	54
Skein Strength Variability (CV%)	4.19	1.88	3.38	2.38
Count-Strength-Product	1784	1572	1674	1199
CSP Variability (CV%)	3.21	1.61	3.10	2.35
Single Yarn Strength (g)	551	483	314	191
Single Yarn Str. Variability (CV%)	11.80	8.70	14.34	10.88
Tenacity (g/tex)	10.7	9.2	11.8	7.2
Elongation (%)	6.40	6.90	6.40	5.46
Uster Non-Uniformity (CV%)	22.18	15.19	24.06	16.88
Thin Places/1,000 yds	284	8	522	79
Thick Places/1,000 yds	507	105	1180	191
Neps/1,000 yds	62	38	393	212
Hair Count/100 yds	2637	1286	1975	1748

TABLE V

60% Cotton/40% Wool (1¼-inch)

Type Spinning	Ring	Open-End	Ring	Open-End
Actual Yarn Number (N_e)	11.03	11.00	22.83	21.85
Tex Yarn Number	53.6	53.8	25.9	27.1
Yarn Number Variability (CV%)	1.43	1.23	3.22	1.90
Twist Multiplier	3.25	4.52	3.25	4.55
Skein Strength (lbs)	147	122	62	47
Skein Strength Variability (CV%)	3.58	3.06	5.61	3.15
Count-Strength-Product	1621	1342	1415	1027
CSP Variability (CV%)	2.57	2.07	4.13	2.26
Single Yarn Strength (g)	571	418	245	181
Single Yarn Str. Variability (CV%)	9.02	8.61	16.79	11.17
Tenacity (g/tex)	10.7	7.8	9.5	6.7
Elongation (%)	6.60	6.30	5.40	5.60
Uster Non-Uniformity (CV%)	20.81	15.35	23.88	17.39
Thin Places/1,000 yds	178	16	548	114
Thick Places/1,000 yds	401	100	1365	213
Neps/1,000 yds	46	24	482	198
Hair Count/100 yds	2952	1394	2299	1916

TABLE VI

60% Cotton/40% Wool (1-inch)

Type Spinning	Ring	Open-End	Ring	Open-End
Actual Yarn Number (N_e)	11.13	11.29	21.70	21.86
Tex Yarn Number	53.1	52.4	27.3	27.0
Yarn Number Variability (CV%)	1.12	2.77	1.65	0.49
Twist Multiplier	3.25	4.52	3.40	4.55
Skein Strength (lbs)	155	140	76	57
Skein Strength Variability (CV%)	6.44	3.93	4.91	2.36
Count-Strength-Product	1725	1580	1649	1246
CSP Variability (CV%)	5.89	1.79	4.05	2.39
Single Yarn Strength (g)	798	532	316	210
Single Yarn Str. Variability (CV%)	10.99	10.70	10.56	10.86
Tenacity (g/tex)	15.0	10.2	11.6	7.9
Elongation (%)	6.50	6.80	6.40	5.50
Uster Non-Uniformity (CV%)	17.38	15.44	23.13	16.88
Thin Places/1,000 yds	28	12	381	72
Thick Places/1,000 yds	262	108	1165	231
Neps/1,000 yds	52	33	364	230
Hair Count/100 yds	2022	1361	2080	1939

results of four yarns for each lot, N_e 11 and 22, both ring spun and open-end spun.

A study of these tables shows that the 100% cotton blend resulted in high quality yarns. When 40% wool from any of the different lengths was added, however, some changes were evident. The most obvious was the decrease in strength. It was expected that the longest wool would produce the strongest of the blended yarns, but this was not the case. In general, the 1-inch wool gave stronger yarns than the other two blends, apparently because of its lower variation in length. It would appear that the higher variation in the longer wools offset any contribution that might have been made by the additional mean length. Table II, which gives some of the physical properties of the three wools, shows that the coefficient of variation on the 1-inch wool was better than that for the other two lengths.

As we stated earlier in this report, short wool shorn after a few months of growth can be used for production of yarns on the cotton system, although it would seem that the percentage of this fiber in a blend with another should be a minor portion of the total.

We appreciate the permission given by the Natural Fibers & Food Protein Commission of Texas to

report on this research. We feel this will be of interest to those of our friends who have inquired about the use of wool on the cotton system.

SMITH JOINS TEXTILE RESEARCH CENTER Harvin R. Smith, formerly chief of the Standards and Testing Branch of the U. S. Department of Agriculture's Cotton Division, has joined the staff of the Textile Research Center. He will participate in the Center's continuing studies in cotton fiber testing and evaluation, giving particular attention to investigations of the relationship between cotton fiber properties and yarn quality.

Smith has more than 30 years experience with the USDA in cotton marketing, testing and standards, and has been instrumental in promoting the use of electronic high volume instruments for classing cotton. He began his USDA work at the Ginning Research Laboratory in Stoneville, Mississippi in the early 1950's. He was later assigned to a similar position in University Park, New Mexico where he directed the cotton testing laboratory. In 1958 he was named assistant head of the USDA Testing Section in Washington, DC. In that position he reported on studies made on fiber and spinning tests and coordinated work of the department's five fiber and spinning laboratories. Two years later he was named assistant head of the Standards Section in Washington to conduct studies of standards and cotton classing and to evaluate various instruments used in establishing standards. He was then appointed head of the USDA Standards Section in Memphis, Tennessee where he was promoted in 1975 to head of the Testing Section for the agency's Cotton Division. In 1977 he was named chief of the Standards and Testing Branch of the USDA Cotton Division in Washington.

A native of New Home, Texas, Smith received his bachelor's degree in agricultural economics from Texas Tech University in 1949 and a master's degree in the same major from the University of Georgia in 1952.

VISITORS Visitors to the Textile Research Center during October included 21 participants in the Cotton Orientation Tour sponsored by the National Cotton Council, Cotton Council International and the United States Department of Agriculture. These were executives from textile organizations in Belgium, Canada, England, Finland, France, West Germany, Greece, Israel, Italy, Morocco, Norway, Spain and Switzerland. The group was accompanied by Miss Vaughn Jordan, National Cotton Council, Washington, DC; Gordon Wilson and Cotton Nelson, National Cotton Council, Memphis, TN; and Peter Scott, Cotton Council International, Brussels, Belgium.

Other visitors included Hideo Sekiguchi, Japan Spinners' Inspecting Foundation, Osaka, Japan; Peter F. Greenwood, International Institute for Cotton, Manchester, England; Slobodana Matic, University of Belgrade, Belgrade, Yugoslavia; Roger Bolick, Allied Plastics & Fibers, Hopewell, VA; Kurt Masurat, George A. Goulston Chemical Company, Monroe, NC; Andrew Jordan, National Cotton Council, Memphis, TN; and R. E. Pfeiffer, American Cyanamid Company, Milton, FL.

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