



BULLETIN 723  
MARCH, 1959  
University of Missouri  
Agricultural Experiment Station

**BOYS'**

# Cotton Flannel Shirts

## Cotton Flannel Shirts

By Adella E. Ginter  
and Charlotte Perry

It takes a good shirt to satisfy both the school boy and his mother. Boys want shirts that are bright and attractive. Mothers are more interested in how long they will wear, what they cost and how much care they will need.

The proof of the garment is in the wearing. So to school, to play and to the laundry went these gay print and plaid cotton flannel shirts as a group of Columbia boys and their mothers assisted the Home Economics department at the University of Missouri in a study of their serviceability.

### The Shirts and Their Treatment

Fifty size-eight cotton flannel shirts in two varieties, along with four yards of each fabric, were used for the study. One kind of shirt cost \$1.49. It was a plain weave, napped on one side. A design in dark and light blue checks with yellow was printed on the surface. The label stated that it was wash fast according to CS 59-44 Test No. 3, and that it was Sanforized. Directions for care stated that it could be washed under commercial or home laundering conditions without boiling or bleaching agents, and that it should be dried away from direct sunlight.

The other shirt cost \$1.29. It was a yarn dyed twill, woven in a red, blue and white plaid. Both sides of the fabric were napped, making a slightly thicker fabric than that used in the printed variety. This was labeled "machine washable" with directions for washing and drying identical to those on the other shirt. This fabric was also Sanforized. Both labels contained the same chart for size.

Laboratory measurements were made and compared for three groups of shirts in each variety as follows:

1. Five as purchased garments.
2. Thirty worn and laundered. These were rotated for wear among 21 boys, who wore them one day, or about 10 hours, before they were returned to the laboratory for laundering. In groups of five, these shirts were withdrawn from use after 5, 10, 15, 20, 25 and 30

times respectively.

3. Fifteen laundered without wear. In groups of five, these were laundered 10, 20 and 30 times.

The shirts were all laundered alike in an automatic washer, using softened water at a temperature of 120-130° F for a nine-minute wash cycle. Neutral soap to make a good suds was used for washing an eight pound load. The shirts were damp dried in an automatic gas dryer and ironed on a rotary ironer.

In the laboratory, the shirts were measured and judged for construction defects. Count, thickness, weight, abrasion, breaking strength, elongation, shrinkage and color changes were determined.

### What the Study Revealed

#### Shirt Construction

Both varieties of shirts were similar in measurement and construction details except that the printed variety had pocket flaps and an interfacing in the collar, which the yarn dyed plaid shirts did not have. The plaid shirts had longer sleeve plackets. The shirt backs of both varieties and the right sleeve in the plaid were generally cut off grain. The front and sleeve pieces in the printed shirts were sometimes off grain.

#### Results of Wear

On the whole, both varieties of shirts were well made. As was to be expected, wear due to construction defects was greatest in the garments worn and laundered 30 times. In the printed shirts, the points of wear were at the end of the sleeve plackets and the loops at the neck closing. A pulled off pocket, a sleeve pulled away from the cuff, and a worn collar point were also found.

In the yarn dyed plaid shirts, some holes were found in the body of the garment under the buttons and pockets. There were frayed buttonholes and sleeves pulled away from the cuff. The nap on the fabrics formed balls as the fabrics were worn. Very few defects were found in the garments laundered without wear.

*This study of boys' cotton flannel shirts was done preliminary to one in which researchers from the North Central region participated. The data were collected by Charlotte Parry, a graduate student in Textiles and Clothing. Columbia boys from the lower elementary grades wore the shirts.*

Abrasion, or wear from rubbing, which was measured on the fabrics, showed that neither fabric was easily abraded. The printed fabric withstood 248 cycles compared with 227 for the yarn dyed plaid when measured on a Stoll tester.\* The fabrics abraded on a Taber machine, then broken in a Scott tester, showed the printed fabric to be slightly superior. (See Table 1.)

TABLE 1--BREAKING STRENGTH (IN POUNDS) OF HALF-INCH STRIPS\*

Treatment	Blue Print		Yarn Dyed Plaid	
	Warp	Filling	Warp	Filling
Unabraded	14.1	6.3	11.5	13.4
Abraded				
100 cycles	13.4	4.8	9.5	13.9
200 cycles	13.1	3.7	6.9	13.4
300 cycles	11.3	3.5	3.4	6.9

\* Mean of 10 test samples

### Colors Stayed Bright

Only small color changes were found for either fabric. These changes were greater in the printed

than in the yarn dyed plaid. They were greater on shirts worn and laundered than on those laundered without wearing. This indicated that the colors were affected by both light and laundering.

### High Shrinkage

Shrinkage in both types of garments was greater than was expected from Sanforized fabrics. The high shrinkage coincided with the thickening and increased weight of the fabrics. This might help explain the small amount of change in breaking strength. The high fabric elongation probably contributed greatly to the wear life of the garments, which was good for both fabrics. (See Tables 2 and 3).

### Conclusions

The results of this study indicated that flannel shirts of this quality make good school shirts for small boys. Since they do shrink, mothers should be warned to buy them in an ample size.

TABLE 2--FABRIC PERFORMANCE OF THE BLUE PRINTED FLANNEL

Treatment	Fabric Count Per Inch		Thick-ness Inches	Weight Oz/Sq. Yd.	Breaking Strength in Pounds (Ravel Strip)				Elongation - Percent				Shrinkage in Percent	
					Dry		Wet		Dry		Wet		Warp	Filling
					Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling		
New Fabric	50	43	.019	4.62	34	23	39	28	6.73	21.36	8.66	19.59		
Times Worn and Laundered														
5	50	43	.027	4.75	30*	19*	29*	22*					3.95	3.75
10	50	46	.027	4.85	29*	24*	35*	32*					5.20	3.75
15	51	45	.028	4.83	31	26	34	29	8.90	17.80	10.90	18.60	6.45	3.75
20	49	43	.027	4.82	30	26	32	27	9.10	17.53	10.17	16.97	6.75	3.95
25	49	43	.026	4.62	29	26	32	27	10.03	18.57	10.50	17.50	7.50	3.75
30	49	43	.026	4.21	27	25	30	26	10.13	17.77	10.70	17.60	7.95	4.20
Times Laundered														
10	50	43	.028	4.91	27	25	28	25						
20	50	42	.028	4.84	30	28	33	28	10.40	20.40	11.07	19.30		
30	50	43	.028	4.75	29	28	32	27	10.23	18.66	11.40	17.80		

Breaking Strength and Elongation done in Minnesota Station except those starred.

TABLE 3--FABRIC PERFORMANCE OF THE YARN DYED PLAID FLANNEL

Treatment	Fabric Count Per Inch		Thick-ness Inches	Weight Oz/Sq. Yd.	Breaking Strength in Pounds (Ravel Strip)				Elongation - Percent				Shrinkage in Percent	
					Dry		Wet		Dry		Wet		Warp	Filling
					Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling		
New Fabric	48	48	.025	5.20	34	31	36	44	10.23	15.03	10.50	17.10		
Times Worn and Laundered														
5	50	49	.034	5.19	20*	31*	30*	42*					3.75	2.30
10	50	50	.034	5.32	19*	31*	29*	50*					5.85	2.30
15	51	48	.034	5.15	26	35	31	48	11.47	14.83	15.23	21.46	6.90	2.50
20	51	49	.035	5.24	26	37	32	52	11.23	14.66	14.30	18.16	7.90	3.35
25	51	49	.034	5.16	24	33	30	49	11.37	14.13	14.70	16.87	7.50	3.35
30	51	49	.033	5.11	25	35	29	49	11.70	15.17	15.17	16.90	8.55	3.55
Times Laundered														
10	51	49	.036	5.30	20	27	24	45						
20	51	49	.036	5.38	28	38	32	52	11.83	15.43	16.36	16.76		
30	52	50	.038	5.49	26	36	31	52	11.85	15.73	14.60	17.17		

Breaking Strength and Elongation done at Minnesota Station except those starred.

\*Stoll abrasion done at Wisconsin station.

*You can expect good service from boys' cotton flannel shirts. But be sure to buy an ample size. This study showed that these shirts will shrink enough that a rapidly growing boy cannot wear them a second season.*

