

**FIBER LENGTH STUDY**  
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**Abstract**

The purpose of this research was to establish quantitative effects of increasing short fiber content and reducing fiber length of cotton on yarn and fabric production. In order to find bales that only varied in fiber length and short fiber content, seed cotton was ginned under varying conditions. The resultant four bales possessed distinct differences in fiber length. Each bale was prepared in the same manner through drawing. Yarns were then spun on the ring and rotor spinning systems. Finally, woven twill fabric and single jersey knit fabrics were produced from various yarn counts and twist levels. Textile mills and ginners alike can utilize the information presented in this research. This paper is Cotton Incorporated Report Number 2000-1. The entire text can be retrieved from Cotton Incorporated's web site.

**Summary**

Variances in fiber length and short fiber content (SFC) were created by employing different ginning intensities to show what, if any, impact these variances would have on the yarn and fabric. Compared to the current crop (1999) and of the same region, Bale A, the least ginned, had an above average Upper Half Mean Length (UHML) and Uniformity Index (UI), and an average strength. The other three bales were below average for UHML, UI, and strength. These properties decreased, due to ginning intensity, from Bale B to Bale C to Bale D to where Bale D is in the lowest 1% of the crop for UHML and UI.

Waste removal varied among the bales. Bale A had 80-100% more waste removed through carding than the other three bales due to lower gin intensity. Waste, as a manufacturing cost, becomes an important concern with less aggressively ginned bales. Once through carding, however, the visible foreign matter for all bales was similar regardless of ginning intensity.

Fiber length, SFC, and neps/g of the card sliver worsened due to ginning intensity from Bale A to Bale D. Comparing the four bales, Bale D had significantly shorter fiber length and a higher SFC. The carding machines were able to remove 83.6% to 89.7% of the neps for all four ginning intensities.

Ring spun yarn properties, evenness (%CV), IPI (Thins, Thicks, and Neps), and strength were severely impacted from Bale A to Bale D as UHML decreased and SFC increased. Rotor spun yarns had significantly lower strength as UHML decreased and SFC increased, while other rotor spun yarn properties, such as %CV and IPI were only slightly decreased. Ring yarns suffered the greatest impact from UHML and SFC.

Fabric strengths were also impacted by the different ginning intensities. Tensile and tear performance decreased with decreasing UHML and increasing SFC. The finishes applied also impacted fabric strength. Fabrics with resin finishes had lower strengths for both ring and rotor yarns.

**Conclusion**

The impact of fiber length and short fiber content is significant to yarn and fabric properties. In general, the greater the fiber length and lower the short fiber content, the better the yarn quality and fabric performance. Not only do the properties of the raw material have an impact, but the influence of the processing on this raw material could negatively impact fiber length and short fiber content. For instance, excessive/aggressive cleaning, incorrect machine settings, damaged wire or beaters are just some examples of where the fiber properties can be degraded. The information collected in this report demonstrates some of the influences of fiber length and short fiber content on yarn and fabric quality.