

# INFLUENCE OF FABRIC CONSTRUCTION CHARACTERISTICS ON PERFORMANCE OF SOME SELECTED PAKISTANI WOOLEN BLENDED FABRICS

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## Abstract

*The study on the fabric construction characteristics was carried out in 2011 in College of Home economics, University of Peshawar. The wool blended fabrics were divided into two groups according to the source of the fabric; Group 1 comprised of Bannu Woolen Mills Limited while Group 2 contains the fabrics of Lawrencepur Woolen and Textiles Mills. The study describes the fabric construction characteristics such as Threads per Inch (T.P.I) and Weight per Unit Area and its influence on the performance of the woolen blended fabrics. It was found that fabrics which have high thread per inch and weight per unit area have the closely constructed weave and suitable for winter wear. The values for both groups varied in the reading and the performance characteristics were observed to be influenced according to the values of the fabric construction characteristics. The average highest thread per inch belongs to Group 2 i.e. 42 to 78 in warp and 36 to 70 in weft direction. The weight per unit area of Group 1 was found to be from 139.25 to 289.5 g/m<sup>2</sup> and in Group 2, it was 188 to 269 g/m<sup>2</sup>. The higher the thread count and weight per unit area, closer weave pattern and strength was obtained.*

**Keywords:** Threads per inch, weight per unit area, weave pattern, wool blended fabrics

## Introduction:

Textile is the word which is derived from “texere” meaning “to weave”. In general, textiles term is used for woven and non woven fabrics also including their raw materials, manufacturing and characteristics [1].

Fabrics are either woven or non-woven; woven fabrics are produced from the process of weaving. Weaving is the interlacing of lengthwise and crosswise yarns. Whereas, non-woven fabrics are produced from process other than weaving such as knitting, felting, bonding and other methods.

Fabric construction plays an important role in imparting the characteristics to fabric. High twisted fabrics tend to be more strong, stiff, dull and fine whereas low twisted fabrics are soft, weak, shiny and bulky. Characteristics that can affect any woven fabric are the thread per inch, weave and weight per unit area. Thread per inch also called cloth count or thread count is the number of threads i.e. warp and weft present per square inch of the fabric. Weave refers to the arrangement of lengthwise and crosswise yarns interlaced. Weight per unit area, as the name indicates, is the weight of the fabric [2]. Higher thread count is an indication of better quality in terms of performance of the fabrics. Thread count is an indication of the quality of the fabric- the higher the count, the better the quality for any one fabric – and can be used in judging raveling, shrinkage and durability. Higher count also means less potential shrinkage and less raveling of seam edges [3].

Close weave pattern suggests fabrics with high number of warp and weft interlaced together; such fabrics tend to have good shrinkage resistance and dimensional stability. Durability also increases with the addition of warps and wefts per inch in the fabric [4].

Fabric construction and composition have an influence on the protective performance of the fabric. Fabric weight has a direct relation with the insulation ability of fabric. It has been observed that the more the weight of the fabric, more will be the insulation capability of fabric and suitable for winter wear. Weight of the fabric is the controlling factor in the thermal protective performance of the fabrics [5].

## **Materials and Methods:**

### **Sample:**

In order to carry out the research, ten samples of various kinds of coarse and fine woolen fabrics were taken from the two market leading industries of Pakistan i.e. Lawrencepur Woolen Textile Mills and Bannu Woolen Mills Limited. Code numbers were assigned to all the samples used in order to make the experimentation and handling of the data convenient and avoid full description of the samples every time. The samples were divided into two groups; the first group consisted of woolen fabrics of Bannu Woolen Mills Limited and they were assigned the code number from WBF 1 to WBF 5, whereas second group consisted of woolen fabrics of Lawrencepur Woolen and Textile Mills and assigned the code numbers, WBF 6 to WBF 10. The code number WBF stands for Wool Blended Fabric.

### **Testing:**

The research was conducted in the experimental textiles laboratory of College of Home Economics, University of Peshawar in session 2010-2011. The following tests were carried out according to the set procedures:

### **Thread per inch:**

Thread per inch, for both warp and weft of the fabric was determined by the method described by Block and Smith [6]. Threads per inch counted by measuring one inch square of a cloth and unraveled it by dissecting needle to count the individual warp and fill yarns.

### **Weight per unit area:**

Shirley cloth balance was used for the determination of weight per unit area of the fabric according to the method describes in B.S Handbook No. 11 [7]. The fabric sample was cut in 10 cm<sup>2</sup> using a template. The cloth balance was adjusted to its zero position with the help of a screw and the sample was hung from the centre with the hook of the balance. Weight per unit area was read directly from the scale graduated in g/m<sup>2</sup>.

### **Results:**

The results of the experiments for threads per inch and weight per unit area are presented here in two groups i.e. Group 1 and Group 2. The graphs and figures are plotted where necessary.

Table 1

Thread per inch and weight per unit area of group 1

Trade Names	Codes	Threads/Inch		Weight per Unit Area (g/m <sup>2</sup> )
		Warp	Weft	
Men's Suiting	WBF-1	42	38	189.5
Woolen Felt	WBF-2	28	30	139.25
Tweed	WBF-3	43	33	279
Tropical	WBF-4	48	43	289.5
Medium Weight Suiting	WBF-5	42	30	186.5

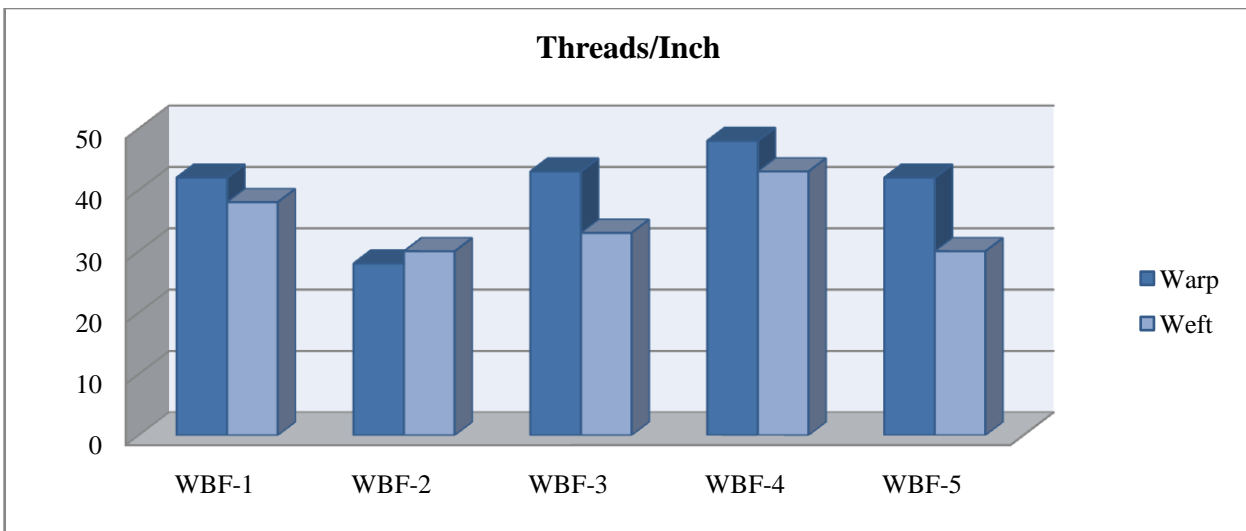


Figure 1 Graphical Representation of Thread per Inch of Group 1

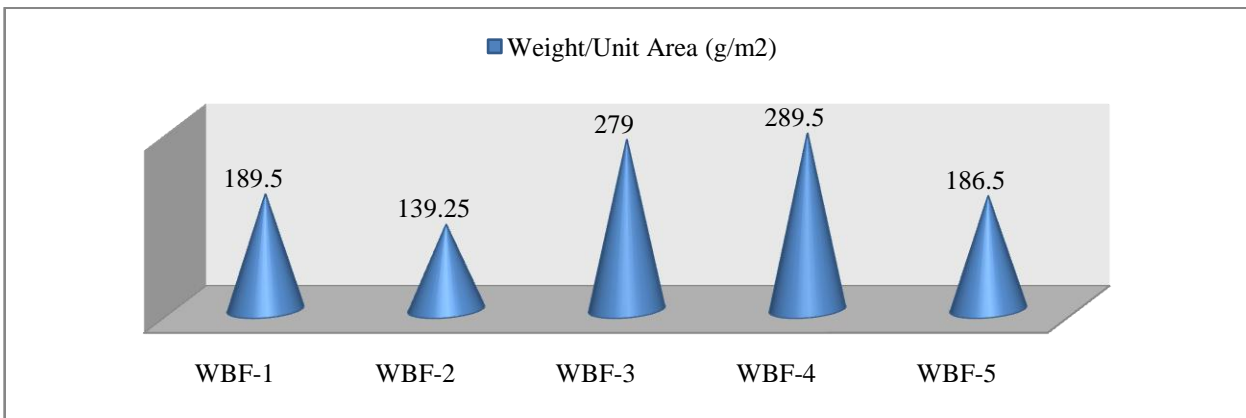


Figure 2 Graphical Representation of Weight per Unit Area of Group 1

Table 2 Thread Per Inch And Weight Per Unit Area Of Group 2

Trade Names	Codes	Threads/Inch		Weight per Unit Area (g/m <sup>2</sup> )
		Warp	Weft	
Tropical	WBF-6	66	52	186
Worsted Tweed	WBF-7	68	60	258
Medium Weight Suiting	WBF-8	42	36	261.5
Superior Serge	WBF-9	78	64	188
Tropical	WBF-10	52	70	269

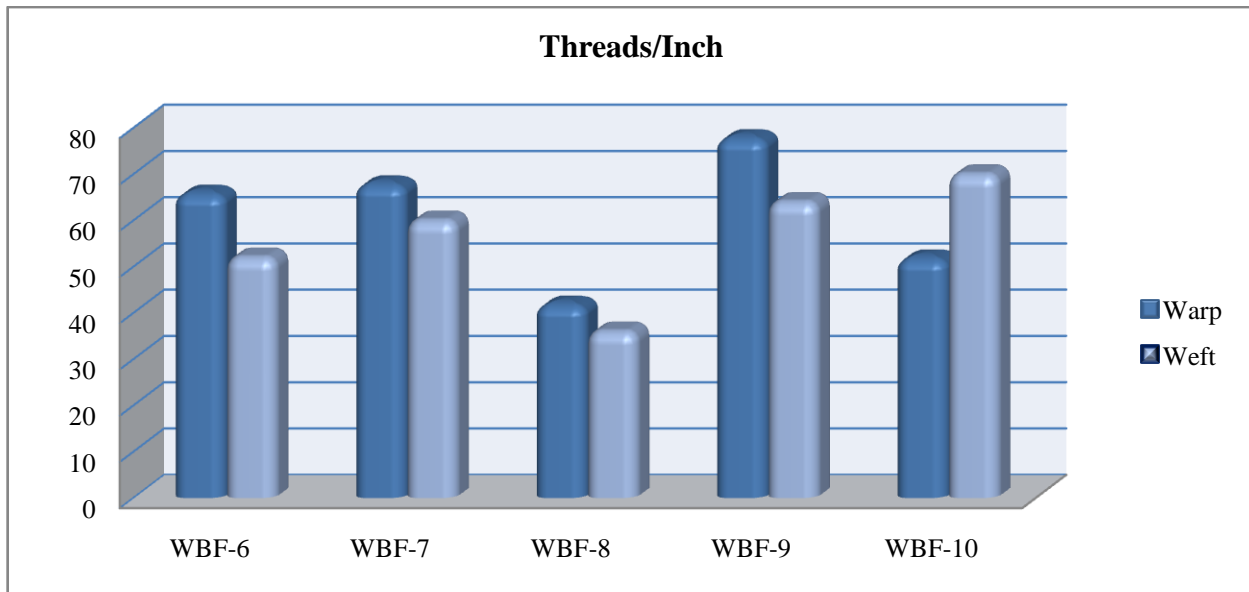


Figure 3 Graphical Representation of Thread per Inch of Group 2

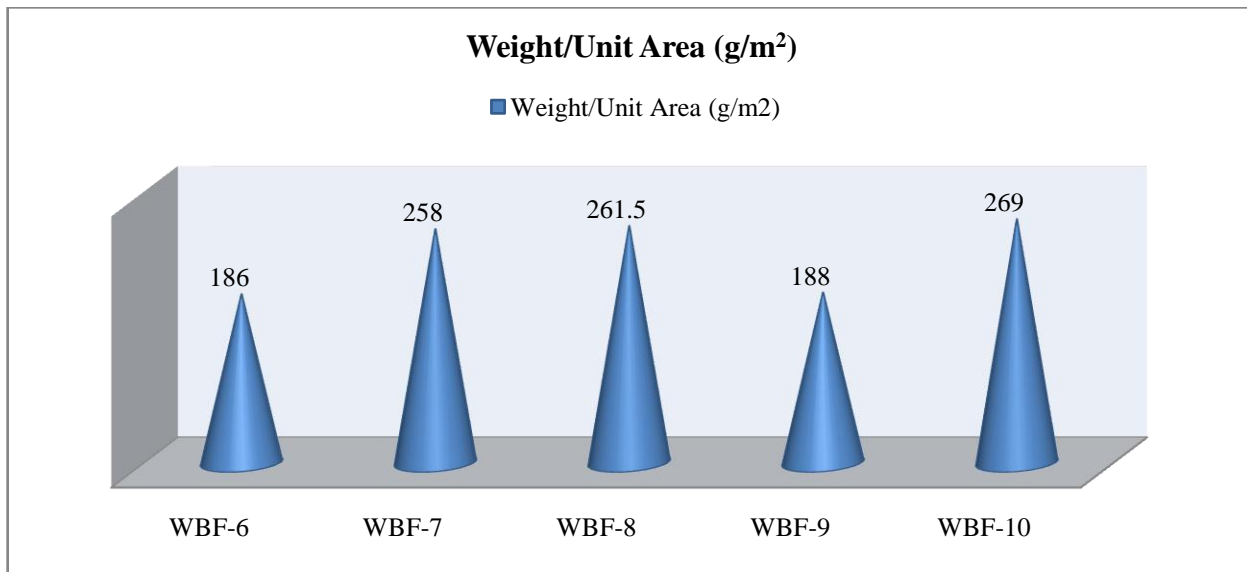


Figure 4 Graphical Representation of Weight per Unit Area of Group 2

**Discussion:** Table 1 includes the warp and weft values of thread per inch and weight per unit area of Woolen fabrics from Bannu Woolen Mills Limited. The WBF-4 indicated the maximum value of thread per inch in both Warp and weft direction in this group. The other values are as follows 28, 42, 42, and 43 in warp direction of WBF-2, WBF-1, WBF-5, and WBF-3 respectively. Values of thread per inch in weft direction are tabulated as 30 of WBF-2, 30 of WBF-5, 33 of WBF-3, and 38 of WBF-1.

The Table 1 also expresses the weight per unit area with WBF-4 with maximum weight of 289.5 g/m<sup>2</sup> and lowest weight belongs to WBF-2 with 139.25 g/m<sup>2</sup>. The rest of fabrics weigh as 186.5 g/m<sup>2</sup>, 189.5 g/m<sup>2</sup>, and 279 g/m<sup>2</sup> of WBF-5, WBF-1, and WBF-3 respectively.

Figure 1 is the graphical representation of thread per inch in both warp and weft direction of first group. Figure 2 gives the values of weight per unit area of Group 1.

Table 2 characterizes the values thread per inch and weight per unit area of the woolen blended fabrics samples from Lawrencepur Woolen and Textiles Mills. The highest number of thread per inch in both warp and weft direction is of WBF- 9 i.e. 78 in warp and 64 in weft, while the lowest number of thread count is of WBF- 8 i.e. 42 in warp and 36 in weft. The other values in ascending order of thread per inch of fabrics in warp direction were 52, 66, and 68 belonging to WBF-10, WBF-6, and WBF-7 respectively. Whereas, in weft direction the ascending values found were 52, 60, and 70 corresponding to WBF-6, WBF-7, and WBF-10 respectively.

The heaviest fabric among Group 2 found was WBF-8 i.e. 261.5 g/m<sup>2</sup> while the lightest one was WBF-6 with 186 g/m<sup>2</sup>. The weights of other fabrics were as follows: 188 g/m<sup>2</sup>, 258 g/m<sup>2</sup>, and 269 g/m<sup>2</sup> corresponding to WBF-9, WBF-7, and WBF-10 respectively. The heaviest fabric in Group 1 was WBF-4, which were 289.5 g/m<sup>2</sup> while it was WBF-10 with 269 g/m<sup>2</sup> in Group 2. Both of the fabrics suggest a closely woven construction suitable for good quality, heavy weight worsted suiting. As described by Booth [8]“ a 20 oz worsted suiting would suggest a closely constructed woven material which is more suitable for winter wear as compare to 16 oz worsted which is a lighter material and suitable for summer wear.

Figure 3 gives the values for thread count in warp and weft direction for Group 2. Figure 4 showing the weight per unit area of second group.

The mean thread count on Bannu Wool Blended Fabrics varied as 28 – 42 (warp) and 33 – 43 (weft), which was lower thread count. However, in the Lawrencepur Wool Blended Fabrics it was 42 – 78 (warp) and 36 – 70 (weft). The results clearly indicate that Lawrencepur Wool blended fabrics have higher thread count, suggesting close weave pattern with greater strength.

The weight per unit area of first group ranged from 139.25 to 289.5 g/m<sup>2</sup> and the second group; 188 to 269 g/m<sup>2</sup>. Although heaviest fabric was from first group but the average of second group was more than group 1.

**Conclusion:** In this study, the fabric construction characteristics such as thread per inch, weight per unit area and its impact on the performance of wool blended fabrics were investigated. Following conclusions were drawn from this study:

1. The fabrics with higher thread count were found to be more durable in terms of abrasion resistance, pilling, and tensile strength. Light weight tropical fabrics of Lawrencepur proved to be pill resistant fabrics thread count is one of the vital reason of pill resistance.
2. Thread count and weight per unit area are the fundamental properties that affect the overall performance of the fabric in terms of durability and maintenance.
3. High thread count also raises the tear and tensile strength of the fabric; if the number of thread count is raised the tear strength would be higher.

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