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Research Paper Home Science

Performance Of Camel Kid Hair: Acrylic Blended Yarn And Knitted Fabric

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ABSTRACT

The present study was undertaken to find out the influence of blending camel kid hair with acrylic fiber on performance of yarn and fabric. Camel hair was blended with acrylic in two ratios viz. 75:25, 50:50 on Khadi hand spinning system. Knitted fabric samples were prepared on circular hand knitting machine. Properties of yarn and knitted samples were evaluated. It was found that blending of acrylic fiber with camel hair improved fineness and strength of yarn. Performance of CH75:A25 knitted fabric was found better than CH50:A50 fabric in terms of strength, warmth, abrasion resistance, less yarn breakage during knitting and hand.

Keywords : Yarn Tenacity, Bursting Strength, Clo Value, Abrasion Resistance

Introduction

Camel hair fibers belong to the class of specialty hair fibers. Specialty hair fibers are the rare animal fibers which have unique characteristics such as luster, softness, warmth and natural color. In India only Dromedarian camels are available, which generally produce short and coarse fibers. Hair obtained from younger camel is finer and softer than that of camel hair of adult animal. It is more suitable for apparel purpose but has not been utilized in proper manner because of rarity and special requirement of the processing. It is essential to focus efforts on blending of camel hair with other natural and synthetic fibers, as well as to develop newer products. This will not only modify functional and aesthetic qualities of fiber but will also diversify its utility.

Studies on blending of camel hair with polyester, silk and wool have already been reported1, 5. Work on utilization of blended camel hair yarn for woven fabrics has also been done3. Therefore, investigator thought to extend its application to knitting.

Acrylic fibers are youngest in the generation of highly accepted synthetic textile fibers after nylon and polyester. They have unique characteristics such as bulk, wool like appearance, light weight, warmth, durability and resistance to sun-light, chemicals, moths and insects. Acrylic fibers are being used as substitute or supplemented with wool in major applications particularly in hand knitted and hosiery garments.

Some trials have been made to use acrylic fiber with other specialty hair fibers2, 4. But there is no report of acrylic fibers being used in a blend with camel hair. Blending of acrylic with camel hair will result in development of a better yarn in various aspects such as improved functional properties and unique aesthetic appeal simultaneously bringing down the cost of the final product.

Decentralized khadi sector today coexists with most modern spinning, knitting and weaving mills and faces tough threat from mill sector. Khadi industry is trying to evolve but is not able to keep pace with latest trends. Literature showed that wool and hair processing data on decentralized hand and khadi spinning is scanty. Systematic research needs to be carried out in this area for standardizing the processing. Further, camel hair having limited production cannot fulfill the demand of organized sector of textile industry hence its more appropriate use is in the decentralized khadi sector.

Experimental procedure

Collection of raw material

Kid camel hair of Bikaneri breed was selected for the present study. It was collected from the Gadhwala village, District Bikaner. Acrylic fiber was purchased from Ludhiana.

Method

Determination of physical properties of fibers

The fiber samples were tested for following properties-

Fiber length (IS: 1377-1971), Fiber diameter (ASTMD: 2130-90), Single fiber tenacity (IS: 235-1988), Medullation percentage and crimp frequency (Agarwal, 2006)

Development of camel hair- acrylic blended yarns

Khadi spinning system was used to prepare blended as well as pure yarn. Camel hair was blended with acrylic in two ratios viz. 75:25, 50:50.100%camel hair yarn was also prepared for base reference. Camel hair-acrylic blend in 25:75 ratios and 100% acrylic yarn could not be prepared due to processing difficulty in hand spinning system. Camel hair and acrylic fibers were thoroughly opened and blended manually with the help of cordes. After it sandwich blending technique was followed to prepare blend of fibers. Hair oiling was done to minimize the fiber breakage as well as to reduce fly waste and static electricity during carding. Woolen carding system was used for carding of blended fibers. Hand spinning was done on Ghantaria Charkha to prepare single yarns.

Testing of yarns

Yarn count in NM, Twist in yarn (IS: 832-1985) and Single yarn strength and elongation (IS: 1670-1991)

Development of knitted fabric samples

Knitted fabric samples were prepared on 6 gauge, 14" diameter circular hand knitting machine. Plain knit was used for knitting with the help of 210 needles. 100% camel hair yarn could not be knitted due to its coarseness.

Determination of properties of knitted fabric

Following properties of knitted fabrics were determined-

Weight per square meter (IS: 1964-1970), Fabric thickness (IS:7702-1975), Wales per Inch and courses per Inch, Stitch Density (Parmar and Srivastava, 1999), Stitch length and Tightness factor(Padama, 2003), Bursting strength (BS:4768),Thermal Insulation (Shakyawar et al., 2007), Air permeability (IS:11056-1984), Abrasion resistance (ISO:12947-2-1999), Pilling (IS:10971-1984)

Knitting performance

Knitting performance of the yarn was assessed from the number of yarn breaks during knitting of 2 meter of fabric.

Hand of fabric

Fabric samples were evaluated for their hand by touch and feel method by twenty experts from the field of textiles. The hand was evaluated on five points rating scale which were very soft, soft, medium, harsh and very harsh.

Result and Discussion

Table 1 reveals that acrylic fiber selected for the study is finer and longer with less variation than kid camel hair. Medullated fibers were not found in acrylic because it is manmade fiber. Camel hair showed 1.61crimps/cm. The coarse wool devoid from bilateral structure and ortho and para cortex arranged in concentric arrangement, results in low crimp in coarse fiber. Acrylic is a manmade fiber, it does not have natural crimps but crimps can be imparted to it by texturising process. It showed 2.39crimp/cm.

Camel fiber showed good strength. Generally medullated fibers are coarse in wool. Their breaking load may be more because of their coarseness. This may be the reason of high strength of camel hair. Acrylic fiber exhibited higher tenacity compared to camel fiber. High tenacity of acrylic fibers is attributed to the very crystalline nature of polymer system as well as to very long polymers. Elongation of camel hair was more than acrylic fiber.

Table 2 shows that 100% camel hair yarn was coarsest among all the yarns with highest variation. Blending of acrylic with kid camel hair improved fineness of yarn because of presence of fine acrylic fiber. CH75:A25 blended yarn was found finer compared to 50:50 blended yarn. This was because of very irregularity of yarn having dominating lumps in CH50:A50 blend.

100% camel hair yarn gave minimum tenacity value with higher CV% as compared to blended yarns. In case of blended yarns CH75:A25 exhibited higher tenacity with less CV% compared to CH50:A50.

This might be due to manual process of blending and spinning which affected regularity and fineness of blended yarns. Thin places, whether in sliver, roving or yarn will be weak places. The more irregular a yarn is the greater will be the chances of break. This might be the reason for lowest tenacity of 100% camel hair yarn as it was very uneven. One way analysis of ANOVA was calculated to determine whether the influence of different blend ratio on strength of yarn is significant. Tenacity values were significantly different ($F= 30.23$, $P<0.01$).Thus it can be said that blending of camel hair with acrylic fiber significantly affected strength of yarns.

It is clear from table 3 that CH50:A50 blend exhibited slightly lower weight in comparison with CH75:A25. Acrylic is light weight fiber (1.16g/cm3 density). Presence of higher proportion of acrylic fibers in 50:50 blend decreased weight of the fabric. However, opposite trend was observed in thickness of the two fabrics. This was because of very irregularity of yarn having dominating lumps of acrylic fiber in CH50:A50 blend.

There was not much difference in wales / inch and courses/inch and stitch length of two fabrics. CH75:A25 blend showed higher stitch density compared to CH50:A50.

Tightness factor of CH75:A25 fabric was found 0.91 whereas in CH50:A50 blend it was found 0.86.It was observed in the present study that as yarn fineness increases, tightness factor also increases.

CH75:A25 blended fabric shows higher bursting strength as compared to CH50:A50 blended fabrics. Yarn strength is one of the factors affecting bursting strength of knitted fabric. This may be one of the reasons for poor bursting strength of camel hair 50: acrylic 50 blend. t -ratio calculated to find out significance of the difference between strength of CH50:A50 and CH75:A25 fabrics showed significant difference ($t-15.16$, $P<0.01$).

Thermal insulation of CH75:A25 fabric is higher than CH50:A50 fabric whereas opposite trend is seen with regard to air permeability. It is observed that as the percentage of camel hair in blends increases, thermal insulation value increases and air permeability decreases. Difference between air permeability of CH50:A50 and CH75: A25 fabrics was not found Significant ($t-0.66$, $P<0.01$).

CH50:A50 fabrics shows higher abrasion loss per cent compared to CH75:A25 blend. This may be due to less cohesion in acrylic fibers as compared to camel hairs, which possess scale.

Pilling tendency is moderate in both the fabrics. Acrylic fiber is stronger than camel hair so pills do not fall easily from the fabric. This is the reason for formation of pills on the surface of blended fabrics.

CH50:A50 blend exhibited more breakage during knitting compared to CH75:A25. This might be due to low strength as well as high unevenness and lumps formation in 50:50 blended yarns.

Table 1: Physical properties of Camel Kid hair and Acrylic fiber

S. No	Fiber Property	Camel Kid hair	Acrylic fiber
1.	Average fiber diameter CV%	23.49 43.05	14.29 1.41
2.	Medullation %	25.99	_
3.	Fibre length (cm) CV%	7.08 24.73	10.41 0.17
4.	No. of crimp per cm CV	1.61 15.03	2.39 00.88
5.	Tenacity (g/tex CV%	21.99 22.56	23.64 3.76
6.	Elongation% CV	31.73 15.04	35.02 3.03

Table 2: Properties of pure and blended yarns

S.No	Yarn characteristics	100% camel yarn	CH50:A50	CH75:A25
1.	Yarn count (Nm) CV%	8.88 16.90	11.28 9.87	12.05 7.78
2.	Twist per inch CV	9.93 15.73	12.71 5.69	11.30 4.64
3.	Tenacity (g/tex) CV	1.021 39.67	1.039 34.94	1.828 17.56
4.	Elongation (%) CV	4.619 42.71	5.120 36.74	7.431 20.82

Table 3: Properties of knitted blend fabrics

S. No.	Fabric property	CH50:A50	CH75:A25
1.	Fabric weight (GSM)	435.9	448.1
2.	Thickness (mm)	2.14	2.01
3.	Wales/inch (wpi) Course/inch (cpi)	10 13	11 13
4.	Stitch Density	130	143
5.	Stitch length (mm)	11	10
6.	Tightness factor (K)	0.86	0.91
7.	Bursting strength (KPa)	410.6	713.9
8.	Thermal insulation value (Clo)	1.34	1.50
9.	Air permeability ($cm^3/cm^2/sec$)	130.6	117.4
10.	Abrasion loss (%weight loss after 5000 cycles)	19.37	15.72
11.	Pilling grade	3	3
12.	No. of yarn breakage during knitting of 2 m fabric	10	4
13.	Hand(weighted mean score)	2.7	2.5

Conclusion

It can be concluded that acrylic fiber can be blended with camel hair to improve performance of yarn and knitted fabric. Blending of camel kid hair with acrylic in 75:25 rations will produce knitted fabric with higher strength, thermal insulation, abrasion resistance, knitting performance and hand than 50:50 blends.

Agarwal R. (2006) A study on feltability of Indian Wool, Doctoral Thesis, Banasthali University, Rajasthan. | Arora, R.K. Speciality hair blended products and their quality evaluation. Proceeding of short course on Speciality hairs-Their quality evaluation processing and products. Central Sheep and Wool Research Institute, Avikanagar, 21-30 May, 1988. | Goel, A., Rawat, S and Sharma, A. (2004). Improvement of angora fiber products by using khadi system. Proceeding of National Seminar on Angora rabbit wool and cashmere production and utilization. Held at Manali, 25-26 September, 2004, 213 P. | Gupta, N.P., Patni, P.C. and Sugumar (1989). Properties and processing of camel hair in India. The Indian Textile Journal, 99 (4), 180-190. | Ritu, Jahan. S. and Goel, A. (1996). Nepali wool and acrylic blend. The Indian Textile Journal, 106 (6), 14-16. | Padma, A. and Subramaniam , V. (2003). Principles of weft knitting. The Indian Textile Journal, 113 (5), 47- 51. | Parmar, M.S. and Srivastava, S.K. (1999). An unconventional way to incorporate comfort in Knitted fabric. Indian Journal of Fibre and Textile Research, 24 (1) , 41-44. | Patni P.C. and Dhillon, R.S. (1988). Area and prospects of utilization of camel hair and hide. Proceeding of National Seminar on Perceptions and potential of camel research in India. | Shakyawar, D.B., Patni, P.C. and Gupta, N.P. (2007). Studies on animal fibre blended handmade felts: Part II frictional, compressional and thermal properties. Indian Journal of Fiber and Textile Research, 32 (3), 301-305.

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