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Studies on camel hair - merino wool blended knitted fabrics

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Effect of blending camel kid hair with merino wool on performance of resultant yarn and fabric has been studied. Camel hair (CH) has been blended with merino wool (M) in three different ratios, viz. 25:75, 75:25 and 50:50 on khadi hand spinning system. Knitted fabric samples are then prepared on circular hand knitting machine. Properties of yarn and knitted fabric are also evaluated. It is found that the blending of merino wool with camel hair improves fineness and strength of yarn. Performance of CH75:M25 knitted fabric is found better in terms of strength and warmth, whereas CH25:M75 fabric shows higher abrasion resistance and better knitting performance and hand.

Keywords: Abrasion resistance, Bursting strength, Camel hair, Clo value, Knitted fabric, Merino wool, Yarn tenacity

Camel hair fibres belong to the class of speciality hair fibres. These are the rare animal fibres which have unique characteristics such as luster, softness, warmth and natural colour. These fibres form the minor part of world's fibre resource. Speciality hair fibres are the most valuable asset when used in optimum proportion with other fibres. These fibres modify and improve handle and appearance of the final product either alone or in blended form. Unlimited combination of speciality fibres with wool, silk and synthetic fibres are possible.

In India only Dromedaries camels are available, which generally produce short and coarse fibres. Hair obtained from younger camel is finer and softer than that of hair of adult camel. 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 fibres, as well as to develop newer products. This will not only modify functional and aesthetic qualities of fibre but will also diversify its utility.

Wool of different origins has a wide structure and property spectrum. Each type of wool has its own specific characteristics. Merino wool is used in the best type of wool clothing. Blending of wool with camel hair will help in assimilation of the good properties of both the fibres.

Studies on blending of camel hair with polyester, silk and wool have already been reported[1,2]. Work on utilization of blended camel hair yarn for woven fabrics has already been done[3,4]. Therefore, investigator thought to extend its application to knitting.

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 and hence its more appropriate use is in the decentralized khadi sector.

Attempt to utilize kid camel hair either in pure or in blend with other fibres for apparel use has not been reported so far. An endeavor has been made in this study to find out effect of blending kid camel hair with merino wool in different ratio on properties of knitted fabric.

Kid camel hair of Bikaneri breed and merino wool were selected for the present study. Properties of selected fibres, viz. fibre length**,** fibre diameter, single fibre tenacity, medullation percentage and crimp frequency are shown in Table 1.

Khadi spinning system was used to prepare blended as well as pure yarn. Camel hair was blended with merino wool in three ratios, viz. 75:25, 50:50, 25:75. Both camel hair and merino wool yarns were also prepared separately for base reference. Hand spinning was done on Ghantaria Charkha to prepare single

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yarns. Conditioned yarns were tested for yarn count in NM, twist in yarn, single yarn strength and elongation. Table 2 shows the properties of pure and blended yarns.

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 and unevenness. Weight per square meter (IS: 1964-1970), wales per inch, courses per inch, fabric thickness (IS: 7702-1975), stitch density and stitch length, tightness factor, bursting strength (BS: 4768), thermal Insulation, air permeability (IS:11056-1984), abrasion resistance (ISO:12947-2-1999) and pilling (IS:10971-1984) of knitted fabrics were determined.

Knitting performance of the yarn was assessed from the number of yarn breaks during knitting of two meter of fabric. Fabrics were evaluated for hand by touch and feel method considering twenty experts from the field of textiles on five points rating scale, which were very soft, soft, medium, harsh and very harsh.

Table 3 shows that knit fabric made of 100% merino yarn is lightest in weight. Weight increases with increase in camel hair ratio. This might be due to the increasing order of yarn thickness in each blend. It is found that high negative correlation (-0.856) significant at 1% level exists between yarn count and fabric weight.

Fabric made of 100% merino wool shows minimum thickness value. All blended fabrics show higher thickness as compared to pure merino wool fabric. Thickness of fabric is related to thickness (fineness) of component yarns. High negative correlation significant at 1% level (-0.892) is observed between fabric thickness and yarn count. It

Table 1—Physical properties of camel kid hair and merino wool fibre

Fibre property	Camel kid hair	Merino wool fibre
Average fibre diameter, microns	23.49 (43.05)	22.97 (18.15)
Medullation, %	25.99	03.06
Fibre length, cm	7.08 (24.73)	8.37 (12.13)
No. of crimps / cm	1.61 (15.03)	3.12 (15.42)
Tenacity, g/tex	21.99 (22.56)	13.19 (14.43)
Elongation, %	31.73 (15.04)	28.77 (7.27)

Values in parentheses are CV%.

Table 2—Properties of pure and blended yarns

Yarn characteristics	100% Camel yarn	100% Merino yarn	CH25:M75	CH50:M50	CH75:M25
Yarn count, Nm	8.88 (16.90)	13.70(3.07)	12.91 (3.83)	11.98 (5.10)	11.50 (8.44)
Twists / inch	9.93 (15.73)	13.22 (3.79)	12.93 (4.30)	12.53 (8.20)	12.77 (8.25)
Tenacity, g/tex	1.021 (39.67)	2.017 (10.01)	1.773 (13.87)	1.546 (15.20)	1.666 (19.45)
Elongation, %	4.619 (42.71)	7.744 (13.46)	6.396 (17.60)	4.935 (23.04)	5.498 (23.59)

CH—camel hair, M—merino wool fibre.
Values in parentheses are CV%.

Table 3— Properties of knitted blend fabrics

Fabric property	100% Merino	CH25:M75	CH50:M50	CH75:M25
Fabric weight, GSM	400.4	430.0	434.6	445.4
Thickness, mm	1.52	1.79	1.95	2.02
Wales/inch (wpi)	11	11	11	11
Courses/inch (cpi)	14	14	13	13
Stitch density, wpi × cpi	154	154	143	143
Stitch length, mm	10	10	10	10
Tightness factor, K	0.85	0.88	0.91	0.93
Bursting strength, kPa	735.2	737.9	758.0	807.3
Thermal insulation value, Clo	1.29	1.39	1.44	1.50
Air permeability $cm^3/cm^2/s$	174.8	144.0	126.7	112.0
Abrasion loss, % (after 5000 cycles)	9.92	10.44	11.73	18.92
Pilling grade	4	4	4	4
No. of yarn breakage during knitting of 2 m fabric	-	-	2	3
Hand (weight mean score)	4.9	4.5	4.1	3.6

is also found that high positive correlation (+0.795) exists at 1% significance level between fabric thickness and weight.

Bursting strength increases with increase in camel hair proportion. Significant difference at 1% level is observed between bursting strength of different knitted fabrics ($F=14.35$, $P<0.01$).

It is also observed that as the percentage of camel hair in blends increases, thermal insulation value also increases. Thermal insulation value increases with the increase in fabric thickness in each case. Thickness is directly related to thermal insulation of fabric. Fabric thickness and fabric thermal insulation values show positive correlation (0.846) significant at 5% level.

Table 3 also indicates that air permeability decreases in blended fabrics with the increase in camel hair proportions. In the present study it is observed that tightness factor of knitted fabric also affects the air permeability. As tightness factor increases, the air permeability decreases in each blend. It is observed that the negative correlation (- 0.684) exists at 5% level of significance between tightness factor and air permeability. Fabric thermal insulation value and air permeability shows high negative correlation (- 0.942) at 1% significance level. Significant difference at 1% level is found between air permeability of different blend ratios of camel hair: merino ($F=131.37$, $P<0.01$).

It is also observed that in case of merino wool blended fabrics the abrasion loss increases with increase in camel hair proportion. This might be due to less cohesiveness between fine and coarse fibres in yarn or due to unevenness in yarn. All the blended fabrics as well as pure wool fabric show slight pilling. Wool pills are considered weak and sometimes drop off spontaneously.

Table 3 reveals that 100% merino wool yarn and camel hair: merino (25:75) blended yarn show no breakage during knitting, whereas other blends of camel hair and merino wool viz. 50:50 and 75:25 exhibit 2-3 breaks during knitting. The more uneven yarn contains thinner (and hence weaker) regions than the even yarn as a result of irregularity. Thus, a more irregular yarn will tend to break more easily when stress is applied. Table shows that blending of camel with merino adversely affects hand of fabrics, as the percentage of camel hair is increased the hand of blended fabrics is deteriorated.

Thus, it can be said that blending of merino wool improves hand of fabric and reduces fabric weight, thickness, and abrasion loss. On the other hand, camel hair fibre improves bursting strength and thermal insulation value and reduces air permeability and cost of the blended fabric.

References

1 Arora R K, Speciality hair blended products and their quality evaluation, *Proceeding, Short Course on Speciality Hairs-Their Quality Evaluation Processing and Products* (Central Sheep and Wool Research Institute, Avikanagar), 1988.

2 Gupta N P, Patni P C & Sugumar, *Indian Text J*, 99 (1989) 180.

3 Patni P C & Dhillon R S, Area and prospects of utilization of camel hair and hide, *Proceeding, National Seminar on Perceptions and Potential of Camel Research in India* (National Research Centre on Camel, Bikaner), 1988.

4 Sahani M S & Khanna N D, The camel fibre and its prospective utility, *Proceeding, National Seminar on Production and Utilization of Animal Fibres* (Central Sheep and Wool Research Institute, Avikanagar), 1993.