The Indian Journal of Small Ruminants 2014, 20(1): 87-90

Indian Journal of Small Ruminants

IMPROVEMENT IN QUALITY AND MOTH RESISTANCE OF TRADITIONAL NAMDHA

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Manuscript received on 12.02.2013, accepted on 29.06.2013

ABSTRACT

Namdha, a felted wool product is traditionally manufactured by the artisans and used as floor covering. The problems associated with the namdhas during usage like fibre shedding, moth attack etc were analyzed. An attempt has been made to optimize the fibre blend for namdha making to reduce the fibre shedding. Similarly, a natural dye based process was developed for dyeing namdha for imparting moth resistance.

Key words: Carding, Felting, Fibre shedding, Namdha, Natural dyes

Namdha is a felted wool product used for floor covering, mattress, furnishing material etc. It is believed that the first people to make felt in India were the nomadic tribes who lived near the Himalayas. They employed a unique process of making thick blanket from loose wool on animal hide and rolled it around a wooden pole. The fibre roll was then wetted and dragged behind the horses on sunny days. The roll bounced behind the horse in time became a single matted sheet. This matted sheet was used then to make tents, blankets, and clothing (Anon, 1999). In earlier days, the namdha making process was kept secret because namda was used as protective armour against arrows during war. The namdha had good resiliency and strength and the arrows could not pierce it. Tonk district in Rajasthan is the largest namdha making pocket in India accounting for about 70% of total production. The traditional process of namdha making is adversely affected and now is limited to a few members of the community and is on the verge of extinction. In the era of mechanization, felting process is also carried out by machine.

The scaly structure of wool fibre due to directional frictional effect (DFE) helps in the formation of an irreversible structure i.e. felt by entanglement of wool fibre scales (Shakyawar et al., 2007; Gupta et al., 2007). Generally the quality of wool fibres influences the felt making process. The fibre fineness, number of scales per cross section and fibre length are the major factors affecting the feltability. Medium fine and coarse wool with diameter ranging from 30-50µ is used for making namdhas. The artisan blends fine and coarse wool in a particular proportion. The fine wool fibres increase the felting and coarse wool fibres provide necessary thickness and resiliency to the namdha. Generally, the wool fibre blend for namdha making contained at least 20-30% fine wool and length to get good feltability.

In the past, the felt was dyed with natural dyes obtained from babool bark, myrobolan (harda), cow dung and locally available plant materials. However, at present the natural dyeing process is discontinued and the artisans are using synthetic dyes for getting bright colours in place of natural dyes used earlier. In order to rejuvenate interest in dyeing of namadha with natural dyes, namdhas were dyed with tannin containing natural dyes in place of conventionally used synthetic dyes. The natural dyes selected for dyeing were madder, silver oak leaf extract and henna extract. The namdhas after milling were dyed with the above natural dyes using standard dyeing process (Raja et al., 2012).

The traditional namdha making though unique, is a time-consuming process. An artisan can card the process for 2-3 namdhas of 9' X 6' dimension in a day. With the introduction of mechanized process, the use of traditional method is in diminishing trend. The use of very coarse wool fibres containing kemp fibres causes fibre shedding during usage. Another important problem associated with namadha is moth attack. In order to solve these problems, a study was undertaken to optimize the wool blend as well as to reduce the kemp fibres by passing through modified cotton card to minimize fibre shedding and application of tannin-based natural dyes to protect from moth attack.

MATERIALS AND METHODS

In the present study, coarse wool (50-60 µ) and fine wool (20-22 µ) were taken. The fibres were blended in different ratios viz., 100:0. 80:20, 60:40, 40:60, 20:80 and 0:100. Silver oak, madder and henna were used to extract natural dyes. Wool was opened and cleaned by machine. The mechanical process consists of passing the fibre through willowing type opening machine which consists of a drum covered with spike rollers followed by passing the fibre through modified cotton carding machine for removal of kemp fibre.

The carding of wool was carried out by the artisans using traditional set up consisting of three parts namely, *Dhani*, *Pingen* and *Hathli* (Plate 1). Dhani is a bow type arrangement made up of steel. The string of the Dhani is made up of natural gut obtained from sheep intestine. The string is very strong and highly elastic. The Dhani is normally fixed in the roof and the string portion is attached vertically with Pingen through again string made up of natural gut. The Pingen is a unique structure and looking like elbow (Plate 2). The elbow is made up of hard wood of teak. The two ends of the elbow are connected horizontally with natural gut made strings. The Hathli (Plate 3) is a dumbbell shaped structure made up of teak wood. It is weighing about 2 kg. The Hathli is used to beat the string of the Pingen. The carding process is done by trained artisans by placing the Pingen in such a way that the string is touching the wool fibres (Plate 4).

Plate 1. Traditional carding set up

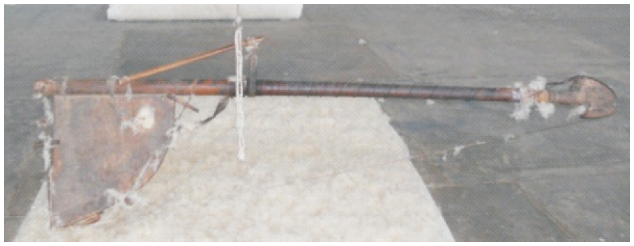

Plate 2. Pingen

Plate 3. Hathli

The placing of Pingen is facilitated by the elastic string connecting Pingen and Dhani. Then the horizontal string is beaten with Hathli which generates vibration on string. Due to the elastic nature of the string and vibrations, the wool fibres are opened, individualized and displaced to forward direction. This action is continued throughout the fibres present on the cotton grey cloth. By this process the fibres are carded and placed in a suitable flat surface. The carding set up is a unique arrangement that needs to be preserved.

Finally, carded web which is of fluffy nature is pressed with broom stall with coconut twigs. After carding, the carded web is arranged evenly with proper size. Then water is sprinkled on the carded wool in a horizontal direction and then the web is rolled into cylindrical bundle along with cotton grey cloth (Plate 5). The bundle is then moved to and pro manually for milling. After that the bundle is opened and again rolled into bundle. This process is repeated for 4-5 times. All the above process is done by the hand. During the process, water is sprinkled intermittently on the web for facilitation the milling of wool fibres. This process is done with the help of mustard oil soap. Mustard oil soap is traditionally prepared by the artisan himself by following unique process. In this process, 3 kg of mustard oil is taken and heated up to 50-60°C and then 600 g of caustic soda is added and continuously stirred for 30-60 min under heat until the soap formation. Then the soap is left as such for 2 days. After 2 days it is ready to be used for milling purpose. During milling, the pre-milled felt is sprinkled with soap oil solution. Approximately 200 g soap is required for milling 2 kg of wool. At this stage, the edges of the felt are properly set by aligning the sides. Then the felt is rolled into cylindrical form as done during pre-milling process and pressed by moving the felt in forward and backward directions. The process is repeated several times. Sometimes, artisans are used to press the felt by standing on the rolled felt. By this process, the felt is hardened. Nowadays, the milling process is mechanized where the carded web is passed through roller filling machine followed by milling machine.

Plate 4. Carding process

Plate 5. Pre-milling

Extract obtained from silver oak, madder and henna was used for dyeing of namdha. Milled namdha was dyed with 5% colorant at 90°C with 1:40 material to liquor ratio at pH 5-6 in the presence of 0.5 g per litre acetic acid solution for one hour in a copper vessel (Raja et al., 2012). The fibre shedding of the namdhas was characterized in terms of abrasion loss %. The tests were carried out using abrasion loss tester using the standard procedure (Shakyawar et al., 2011). The natural dyed namdhas along with conventionally dyed namdha (control) were kept in petri dishes by adding ten live adult carpet beetle moths. The petri dishes were kept in dark and humid conditions for one month at the temperature range of 25-30°C. After that, the anti-moth properties were characterized based on weight loss in the namdha due to moth attack and visual examination of namdha for damage.

RESULTS AND DISCUSSION

The results showed that due to the modified carding process, the kemp fibres present in the fibre blend were reduced by 30%. Similarly, it was found that 40% blending of fine wool was sufficient to produce namdha with good felting instead of 60-70% in the conventional process. The improvement in felting of wool resulted in low fibre shedding and low abrasion loss during actual usage. The moth resistance testing results of conventionally dyed and natural dyed namdha were given in Table 1. The results showed that natural dyed namdhas were resistant to moth attack compared to conventionally dyed namdhas. Among the natural dyed namdhas, silver oak extract dyed namdha was least attacked by moth followed by madder and henna dyed materials.

The conventionally dyed namdha was attacked intensively by moth which showed 10% weight loss. Visual examination result also showed that the conventionally direct dye used namdha (control) was intensively attacked by moth and small holes were created on the material making it not usable.

Table 1. Moth resistance properties of namdha prepared with natural and synthetic dyes

Dye	Weight loss% due to moth attack	Visual examination of namdha after test
Conventional	10.0	Attacked with small holes
Silver oak extract	0.5	Not damaged
Madder extract	1.0	Not damaged
Henna extract	2.4	Slightly attacked

The traditional namdha making process is very unique and has very good opportunity in the export market. In order to reduce the fibre shedding during the use of namdhas, the blend level has been optimized at 60% coarse wool and 40% fine wool. Similarly, a viable process of dyeing namdha with natural dyes in order to prevent the attack of moth has been developed. By these interventions, the value of the namdha could be improved. There is vast scope for product diversification like purses, bags, foot wears using the traditional process and exporting under the brand of handicraft items. Similarly, the namdhas can be converted into thermal insulation bats/panels and can be used in cold regions.

ACKNOWLEDGEMENTS

The authors are grateful to the Director, Central Sheep and Wool Research Institute and Central Wool Development Board for providing necessary facilities to carry out the work. The authors are also thankful to Mr. Noorudin for his help for making namdha.

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