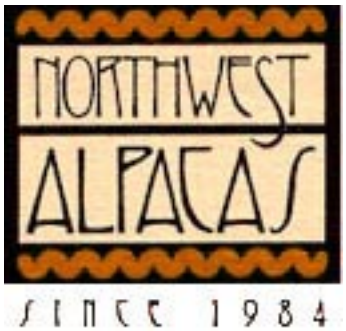

The Wool Industry Faces A Prickly Question: Are People Allergic To Wool?

By Mike Safley

It was Saturday afternoon and the Country Store was full of customers. I had volunteered to man the cash register while Julie fixed the children lunch. A tall blond lady, dressed in Levis and a cotton polo shirt entered the store. "Is Alpaca the same as wool?" she asked. "I'm allergic to wool."

This is a common question and I've always replied, "No, it's not the same. Try one of our sweaters and you'll see." In fact, many people who are "allergic" to wool shop at our store. They are delighted that they don't "react" to Alpaca.

As it turns out, over 30% of American consumers surveyed by the International Wool Secretariat reported that they were "allergic" to wool. After extensive study, scientists have determined that these consumers were not allergic to wool. The perceived allergic reaction to wool was actually a painful response by sensitive skin to coarse fibers. The consumers skin was being "prickled" by coarse guard hair or kemp-like fiber found in the wool.

Scientists have determined that it doesn't matter whether a garment is made of wool, Alpaca, mohair, or man-made acrylics, if over 5% of the fabric is comprised of fiber with a diameter in excess of 30 microns, it will prickle or itch. Research has also established that once the average diameter of the fiber in a fabric or sweater exceeds 22 microns, the prickle factor begins to appear. In other words, the person wearing the garment begins to itch.

I now realize that when I told people that Alpaca wasn't like wool and "no, they wouldn't have an allergic reaction to it," I was right -- only because most all the garments in Julie's store are made from baby Alpaca, which averages less than 22 microns. I would have been wrong if the sweaters were constructed of coarser fiber.

The "prickle factor" is a fairly recent discovery. Understanding the cause and how its effect can be minimized is an important issue for the Alpaca industry.

THE CAUSE OF FABRIC-EVOKED PRICKLE

Different sensory receptors in the skin are responsible for the various sensations we perceive as a result of the interaction of the skin and fabric. These receptors are classed as touch, thermal, and pain. The sensations perceived from clothes worn next to the skin will depend on how fabrics interact with these sensory receptors. The surface characteristics of fabrics have an important bearing on these responses. Some fabrics contain surface stimuli causing the skin discomfort, or PRICKLE.

Prickle results from high-load supporting fiber ends on the fabric surface indenting the skin sufficiently to activate pain receptors. The receptors responsible for fabric-evoked prickle are very close to the surface of the skin. The response of these receptors is a low level prickle sensation rather than pain. Prickle from fabrics usually has a pricking-itchy quality.

SKIN INFLAMMATION FROM PRICKLY FABRIC

Skin reactions from prickly fabrics may appear within one hour or more slowly after several hours of skin contact. They usually subside rapidly after removing the fabric from the skin unless skin contact over several days has produced a more severe reaction.

SENSITIVITY TO PRICKLE

The variation in sensitivity to a particular sensory phenomenon (light, sound, vibration, etc.) is determined by measuring the lowest value of the stimulus at which each person can perceive the sensation -- the sensory threshold. In a recent test of fabric-evoked prickle, the sensory thresholds were determined for 55 people (28 males and 27 females) with ages ranging from 20 to 60 years. This work showed that a wide variation in sensitivity was evident.

Mean prickle thresholds determined for sub-groups within this population showed that males were less sensitive and had a higher variation in sensitivity to prickle than females and that prickle sensitivity decreased with increasing age. (See Table 1.)

Table 1: The Variation of Prickle sensitivity (thresholds) within the whole group, and between different sub-groups, in a population of 55 subjects.

Group	No. of Subjects	Mean Threshold Stimulus Intensity*
Whole	55	5.4
Males	28	6.3
Females	27	4.5
Age 20-30	20	4.5
Age 30-45	24	5.7
Age 45-60	11	6.4

* The mean minimum number of high load-supporting fiber ends (per 10 cm2 of fabric surface) required for the prickle sensation to be perceived.

FIBER AND FABRIC PROPERTIES WHICH INFLUENCE PRICKLE

Work is currently in progress to define the properties of wool fibers and fabrics that contribute to prickle so that these properties can be selected and controlled to minimize prickle in next-to-skin garments. Any factor that reduces the buckling load of protruding fiber ends will contribute to a reduction in prickle.

Studies have indicated the importance of fiber diameter in skin irritation from wool fabrics. There is a high correlation between fiber diameter and the magnitude of prickle both in wool and acrylic knitted fabrics. A mean fiber diameter of 21 microns or less (with less than 5% of the fibers exceeding 30 microns) is necessary to reduce prickle intensity to a level which will not be perceived as skin discomfort by most people under normal conditions.

Under conditions which induce sweating, prickle sensitivity will be greatly increased and it is likely that even finer fibers would be necessary to ensure prickle at below detectable levels. This condition applies equally to acrylic and other synthetic fibers as it does to wool.

Fiber length is also likely to influence prickle. Short fibers intensify prickle since there will be more fiber ends per unit area of fabric surface. Prickle is reduced as mean fiber length increases. Fabric properties found to influence prickle are hairiness, structure, cover factor and processing method. Fabric hairiness is determined by the density and length of protruding surface fibers and both these properties are important in prickle. Processes such as brushing and raising are used to increase fabric hairiness. These operations cause a slight to moderate reduction in prickle (depending on how far they are taken) by increasing the average length of protruding fiber ends. Shearing, the fabric on the other hand, is extremely detrimental to prickle, since it shortens fiber ends and greatly increases their buckling loads, generating many new prickle stimuli.

Woven fabrics are more prickly than knitted fabrics. Fiber ends are less rigidly anchored in knitted fabrics because of the looser yarn construction. Woolen yarns also create more prickly fabrics than their worsted counterparts because they contain shorter and more randomly orientated fibers, which results in an increased density of protruding surface fibers.

COMPETING FOR CONSUMER PREFERENCE

Consumer requirements and preferences have been identified by a number of studies. Prickle and itch in garments is one of the most disliked comfort properties encountered by consumers. It is vital to manufacturers that yarns and fabrics have an absolute minimum of faults and that fabrics are suited to end-use requirements in terms of quality, tailorability, and comfort. Alpaca breeders should think about producing garments that merit high consumer preference ratings.

CASHMERE CACHET

The softness of fine cashmere depends largely on the extraordinary length and fineness of the hair of the kel goat (which originated in Kashmir, hence cashmere, an obsolete spelling of Kashmir). Cashmere fibers average 18.5 microns, one-third the thickness of human hair. The softest, finest, and most expensive goat hair is found in the eastern region of China's Inner Mongolia.

Numerous attempts to raise cashmere goats in such places as Texas, Maine, and Australia haven't worked. Americans and Australians feed their goats well, with the consequence that they grow thicker hair. The Monogolian goats live on a sparse diet and the hair is essentially starved for nourishment and therefore very fine.

Cashmere avoids any of the prickle stigma by requiring any fabric labeled as cashmere to average 18.5 microns and have no more than 3% of the fiber over 30 microns. As a result, the cashmere image is one of pure luxury and consumers look forward to its soft, comfortable feel.

POSITIONING ALPACA FOR THE HIGH END MARKET

If American Alpaca breeders want to create high unit value for their fleece production, they would be well served to study the prickle predicament of the wool industry. Alpaca is easily produced with a long staple at lower microns. Breeders need to select for low standard deviation and co-efficient of variation. Jane Wheeler's work on mummified Alpacas discovered in Incan ruins found that these animals had 15 and 16 micron fleece, with a standard deviation between one and two.

After the Spanish conquered Peru, Alpaca breeding became disorganized and inefficient. Alpaca and Llama bred promiscuously and the resulting hybridization coarsened the Alpaca fleece. Today, the Peruvian textile manufacturers pay only on the basis of weight. There is no premium paid for fineness. Sheep breeders around the world receive a premium for fine wool and merino flocks produce wool with micron counts below 20. American breeders have the opportunity to use scientific measurement and selective breeding techniques to continually refine the domestic herd. Julie and I would be "tickled" to death if American Alpaca fleece became a standard of luxury around the world.