DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

4-H Consumer Judging Guide

Athletic Socks

The Importance of Socks

Athletic socks are an essential component of footwear for any athlete. Socks provide protection from contact with shoes in order to reduce skin irritation. They also absorb moisture to keep feet dry and act as a cushion to the feet along with keeping them warm. For the athlete, good socks make the difference between success and failure. However, socks are also vital in preventing injury and enhancing performance. Shockingly, the importance of socks was not recognized through scientific research until the 1980s. A good pair of socks is particularly important for diabetics and those with arthritis.

Fibers

The ability for a sock to do its job in protecting the feet has a lot to do with its fiber composition. It is important to understand the characteristics of the fibers of a sock in order to pick one correctly.

Hydrophobic fibers are those that repel moisture. Hydrophilic fibers are those that absorb moisture. Cotton fiber retains three times more moisture than acrylic and 14 more times than CoolMax®. When exposed to ambient air, cotton retains moisture 10 times more than acrylic. Hydrophilic rankings in descending order: cotton, wool, acrylic, CoolMax® and polypropylene.

Also important is the wicking gradient. Moisture from the feet can far exceed any sock's absorption capacity. In order to minimize moisture accumulation on the skin's surface, the sock needs a wicking gradient to the shoe. A wicking gradient occurs when the shoe upper is breathable (nylon mesh) so that ambient air can evaporate the water vapor. Most common is a shoe liner that contains hydro-philic fibers that draw moisture from the sock material. Socks that are extremely hydrophobic (polypropylene) repel water so effectively that wicking cannot occur. The mechanical structure of the fiber and the compressibility of the fiber determine the overall wicking capacity. The fibers that wick moisture the best are (best to worst): CoolMax®, acrylic, polypropylene, wool, cotton.

Studies were done with runners to compare synthetic fiber socks and cotton socks. The study found that when cotton fiber socks are wet, they stretch and lose their shape inside the shoe, which leads to bunching and wrinkling. Also found after multiple wash-wear cycles, cotton fiber socks became abrasive causing irritation on the skin surface.

Also important is the fiber's thermal-insulation quality. A synthetic fiber composed of hollow core material, Thermax, has shown to insulate effectively. Preferable among the outdoor industry are natural wool fiber socks due to their ability to maintain heat even while wet. However, 100 percent wool fiber socks tend to be more abrasive than a wool-synthetic blend.

Some studies have found that acrylic fibers show superiority in protecting against blisters when compared to cotton fibers. Friction blisters that occurred while wearing acrylic fiber socks were smaller and of less severity and occurrence. In order to reduce blisters, the military issues a sock that is 50 percent cotton and 50 percent wool cushion-sole sock. In a study, the use of a CoolMax® liner significantly reduced the occurrence of blisters. In another study, synthetic fiber socks outperformed standard wool socks when protecting against blisters.

An overview of common athletic sock fibers is listed below:

- **Cotton** is durable, absorbent and easily machine washed and dried. It does not have static electricity. To maintain shape at the top and to stay in place, all styles need ribbing at the top and/or a stretch yarn around the top.

- **Wool** is warm and absorbent. It never feels clammy. The high absorbency keeps the foot feeling dry. Wool does not lose its insulating quality when wet. Thus, it is an excellent choice for outdoor winter wear. In addition, it is cushiony and spongy. Lambswool and cashmere are luxury animal hair fibers that are grounded with wool.

- **Nylon** is strong and resistant to abrasion. This makes it a good fiber for reinforcing heels and toes. Blended with cotton or wool, it adds strength and durability. Textured for extra stretch, it makes a good support sock to ease muscle strain and give support to a person who walks or stands for long periods of time. Nylon is relatively non-absorbent. It is subject to static electricity. In hot weather, it is clammy to wear, especially for the person whose feet perspire heavily. It dries fast after laundering.

- **Acrylic** provides bulk without weight and is a warm fiber. It is used widely in sport socks and winter fashion socks for women. However, it is not absorbent, thus it dries fast and is subject to static electricity. Blended with cotton, it adds warmth and durability. Blended with wool, it reduces cost without reducing warmth.

- **Spandex** fibers have elasticity giving great stretch and recovery. Blended with other fibers, it increases stretch and recovery and provides leg support. As a separate yarn, it appears around the top of many sport socks.

- **Olefin**, polypropylene in particular, is the latest fiber to be used in socks. Sport socks made of olefin wick moisture away from the feet, keeping them dry. Olefin is not absorbent, thus dries quickly when laundered. It has less static buildup than nylon, polyester or wool. Socks made of 100 percent olefin are intended to be layered under socks made of an absorbent fiber such as cotton or wool. Olefin is also used as the inner part of the socks, with cotton or wool on the outside. Olefin yarns may be the inner surface of a smooth kit or may form the terry loops on the inside surface.

- **CoolMax®** is a registered trademark of INVISTA for certified performance fabrics containing proprietary fibers from INVISTA and may contain other companion fibers, such as cotton, polyester, rayon and LYCRA®.

Other Things to Look For

Yarn: Ply is the number of single yarns twisted together to make a longer yarn. Socks made of two-ply or three-ply yarn will have longer wear than socks made of single-ply yarn of the same fiber content.

Finishes: Finishes may be applied to yarn or the finished socks. An antistatic finish will ensure that static electricity does not cause your clothing to cling to the socks. Antibacterial finishes retard the growth of bacteria and fungi. These finishes help prevent athelete's foot and other irritations as well as reduce odor.

Construction and Quality: Socks are knitted. Check to see that they have enough stretch to be easily put on but spring back into shape at the ankle and at the top. Ribbed knits have more stretch than plain knit. Tops of socks are often ribbed.

Reinforced heels and toes give longer wear. Nylon is often used for this. In many socks, the yarn in the heel and toe area look different. Make sure the reinforced area in the heel comes far enough up the back of the heel to reinforce the spot where your socks usually wear thin.

Cushioned soles add comfort, which is an advantage for hiking and active sports. The cushioned area has extra loops like those in terry cloth on the inside.

Tops of socks should snap back into shape so they fit snugly but not so tight they restrict circulation. Ribbed knit construction is ideal. Elastic threads give an additional staying power.

Socks should be easily washed and dried. They should not shrink or stretch out of shape. On cotton socks, look for the words "shrinkage controlled" and "mercerized." On wool socks look for "machine washable." Line drying will further reduce the possibility of shrinking. Olefin will shrink and fuse in a hot dryer.

Color: Most athletic socks avoid fashion trends. Colors and patterns remain pretty basic. Usually athletic socks are white with an occasional embroidered logo or colored heels, toes or toe stitching.

Design, Construction and Fiber Suggestions		
Design	**Construction**	**Fibers**
Over the Calf: baseball, basketball, outdoor (including liners) skiing snowboarding, soccer **Mid-Calf:** skating **Slouch:** aerobics **Crew:** running, golf, tennis, racquetball, hiking	**Thin or Thin Double Layer Outdoor (liners):** cycling, running (racing), skiing **Padded or Thick Double-Layer:** jogging, skiing, hiking, tennis, basketball	**Acrylic:** golf, tennis, hiking **Acrylic/Wool:** outdoor-cold **Acrylic/Thermax®:** outdoor-cool **Acrylic/CoolMax®:** outdoor-warm **CoolMax®:** running, cycling, liners **MicroSafe®:** therapeutic hosiery, i.e., diabetes

Size		
Women's Shoe Size	**Men's Shoe Size**	**Sock Size**
4-6	–	S (7-9)
6.5-10	5-8.5	M (8.5-11)
10.5-13	9-12.5	L (10-13)
–	13-16	XL (13-15)

Sources

- Consumer Reports
- American Academy of Pediatric Sports Medicine <www.aapsm.org>

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