

Chapter 2: Fibers



As a knitter you have to make decisions concerning your selection of yarns.

All the various components of yarn, including the fiber content, and other yarn properties determine the final product's appearance and function. The aesthetics such as color has a high degree of influence on your choice of yarn. Understanding the properties of fibers and their special characteristics will help you in making the appropriate choices for garments and accessories.

Fibers are the raw materials from which yarns are made. They strongly influence a knitted textile's characteristics. For example, fibers affect the hand, or how the yarn feels running through your hands. Bamboo yarn feels slippery like silk, as compared to a coarse 100% wool, which feels rough and firm. Fiber content also affects whether the finished product will shrink or stretch.

Fibers are classified as natural consisting of fibers of vegetable (cellulose) origin, or animal (protein) origin, and manufactured fibers consisting of cellulose (manufactured but based on natural cellulose), synthetics, and mineral (metallic). There are only a few synthetics useable for hand knitting yarns.

Natural Protein Fibers

WOOL

Wool is by far the most popular and so much so that knitters term all yarn wool no matter what the fiber content. Wool is a hair fiber that comes from sheep. In its natural state it is coated with lanolin, used in other products. There are approximately 40 different breeds of sheep producing about 200 types of wool fiber of varying characteristics. The best quality come from breeds such as Merino, which produces a fine fiber, as soft as a high quality cotton, luxurious, and a favorite to knit with. Icelandic sheep produce a coarse, scratchy fiber that is highly durable and popular for outerwear.

Wool is popular because of its special properties. It is flexible and elastic making it easy to knit with. Wool springs back into shape or is resilient, wears well while resisting wrinkles. Wool is unique because it is comfortable to wear in both warm and cold climates. It has excellent insulating properties due to the natural crimp of the fiber that traps air. In addition it can absorb up to 1/3 its weight in water shedding liquid easily, and at the same time does not appear to absorb moisture.

The surface of wool is covered with scales that vary in size and determine the fineness and coarseness of wool. Fine, soft wool has as many as 2000 scales/inch, whereas coarse wool has as few as 700 scales/inch. These scales are responsible for that “itchy” feel some people complain of, particularly with coarse yarn. The scales are also responsible for the felting or shrinkage of wool. Felting can be deliberately done through a process that includes heat, moisture, and friction forming a matted fabric. Superwash is a finishing process that alters the scale structure so that wool can be machine washed.

Wool is susceptible to damage by moths and should be stored clean. Today, most wool is moth proofed by manufacturers so it is rare to see this problem. Wool protein is also damaged by bleaching agents, so white wool should never be bleached.

Specialty Hair Fibers

MOHAIR

This fuzzy fiber is shorn from the Angora goat not to be confused with angora from a rabbit. Kid mohair is the hair from the first two shearings of young goats. The fiber size increases with the age of the goat, thus a young goat yields fine, silky fiber used for clothing, and an older goat has thick, coarse fiber used in carpets and outerwear. It's durable, lightweight, and warm, with similar properties to wool. Mohair often comes blended with wool or nylon to help the fibers cling together.

Beginner knitters may find yarn with a large percentage of mohair difficult to work with, as it is not easily taken apart due to tangling of the long fibers. The loft or fluffiness of the yarn also hides a highly textured pattern.

CASHMERE

China is the largest producer of cashmere. Cashmere is one of the most luxurious and costly of the hair fibers. Contributing to the cost of cashmere, the down fiber is combed from the bellies of the Kashmir goat found in the high plateaus of Asia. Also, the hair fibers are only collected in the spring. Due to these factors, cashmere hand knitting yarns are often blended with wool to cut down the cost to produce. Cashmere is incredibly soft, resilient, lightweight, and warm, but is more easily damaged than wool.

ALPACA

Alpaca is a member of the camel family found mainly in South America. Today, other parts of the world are breeding alpacas. The fibers are long, durable, and lustrous. Alpaca has excellent warmth and insulation, warmer than wool. This fiber comes in more than 22 natural colors in the beige to brown color palette, therefore yarns can be produced without dyeing.

CAMEL HAIR

Camel hair comes from the Bactrian two humped camel in Asia. The under hairs are fine and soft and are used for yarns. The natural colors of camel are frequently maintained as the fiber is not very receptive to dye. This fiber is often found blended in yarns as neutral colors.

ANGORA

Angora is a very soft, fluffy, warm fiber, and high quality angora is combed from rabbits rather than shorn. This fiber is a very short staple and difficult to spin, thus it is usually combined with other fibers. Because it's a short staple it sheds as much in the yarn form as it would from the animal. As with mohair, it is difficult to see patterns because of the loft.

The above hair fibers are the most commonly found in hand knitting yarns, but there are others you might come across such as fiber from llamas, another member of the camel family. This fiber is often blended with wool. Qiviut from musk ox is a very fine, soft, warm fiber mainly used by the Inuit peoples, but has recently become a luxury yarn with a high price tag. The vicuna, found in South America looks like a miniature llama and is one of the softest of the hair fibers, but is very weak. It is rare and costly. A vicuna coat is comparable in cost to a fur coat. Mink, chinchilla, reindeer, beaver, and even dog hair have been spun to produce yarn.

SILK

China is the leading producer of silk and legend suggests it was discovered by a Chinese empress. Cultivated silk is raised under controlled conditions called sericulture, an expensive and labour intensive process. A variety of moths produce silk. The larvae live on mulberry leaves and the cocoons are subjected to heat whereby the fine, lustrous filaments are unwound in one continuous strand. Wild silk worms produce a coarser fiber, with an irregular surface (tussah silk) that is less lustrous than cultivated silk.

Silk is a strong fiber, an excellent insulator and dyes well, therefore it comes in many bright colors. Although silk is a strong fiber, it has other characteristics which make it less durable and not as versatile as wool. Silk is not as resilient or flexible as wool. It has a tendency to stretch with wear and is stiffer to knit with than wool. Silk tends to fade more readily with each cleaning and over time may develop a fuzzy surface. Because of the expense of producing 100% silk yarn, it is often found blended with other fibers, adding a sheen.

Natural Cellulose Fibers

COTTON

Cotton has a long history and India is the principal country in which cotton was used prior to 2500BC. Gandhi was responsible for reviving the cotton industry in India in the 1900's. It is the most widely used fiber in the world, but less popular for hand knitting yarns. Cotton is a seed fiber attached to the cotton plant, and grows best in warm, humid climates. Cotton is classified according to its fiber length or staple length, grade (color or brightness), and fineness. The fiber length is most important to the quality of the cotton. The longer the staple as in Pima and Egyptian cotton the better the fiber properties. These types of cotton are very soft. Available today are organic cottons and genetically engineered cottons that grow in subtle colors.

Cotton has high strength and is stronger when wet, which makes it easy to wet clean or launder. Generally, cotton has to be treated to prevent shrinkage. Cotton has poor elasticity and low resiliency, therefore it is not as popular to knit with as wool. Over-time with cleaning and wear a cotton garment tends to get a worn fuzzy appearance. A wool sweater will be enjoyed for many years longer than a cotton sweater, if taken care of properly.

Mercerization is a chemical finish used on cotton that adds luster and improves its dyeing properties. Mercerized cotton is also stronger and less prone to shrinkage.

Cotton does not attract moths, but mildew can destroy it, therefore garments must be totally dry before storage. Cotton blends well with other fibers including wool, rayon, and synthetics.

FLAX (LINEN)

Linen is the term that describes the fabric that is made from the stem of the flax plant, a bast fiber. The proper name for the fiber is flax, but "linen" is commonly used as a generic term to describe the fiber and woven textiles.

Flax is the oldest textile fiber that was used in the ancient civilizations around the Mediterranean as it made a cool, breathable fabric. It is rare to see 100% linen hand knitting yarns, as it requires a great deal of processing and is quite stiff to work with due to its low elasticity and low resiliency. These properties also cause the extreme

wrinkling of linen fabric. Flax is often blended with other fibers, particularly cotton to make it useable as a hand knitting yarn.

Flax is the strongest of the plant fibers and like cotton is stronger when wet. Its absorbency is higher than cotton and can withstand higher temperatures than cotton, thus it is easy to care for. These same properties are the main reason that linen fabric samples have been found in archeological digs in places like Egypt. The hot, dry climate of this area allows the fabric to survive.

RAMIE

Ramie comes from the perennial shrub, ramie. The fibers have similar properties as flax; high strength and poor elasticity. However, the fibers are more stiff, almost brittle, therefore it is blended with silk, flax, or cotton for hand knitting yarns.

HEMP

Hemp is the name of the soft, durable fiber that is cultivated from plants of the Cannabis genus. New modifications by manufacturers have improved the properties of hemp, making it useable as a hand knitting yarn on its own or blended.

BAMBOO

Bamboo fiber comes from the pulp of bamboo grass. It is considered a sustainable product in that it is quick growing, and usually requires no pesticides or herbicides, and farms can easily be kept organic. The fiber resembles cotton in its natural form, reminiscent of a puff ball.

Bamboo can be processed to create a silky, soft yarn that drapes well. Bamboo is highly absorbent with antimicrobial qualities maintained through multiple washings, and takes bright dyes well.

Bamboo fiber is manufactured by two different methods. “Natural” bamboo is mechanically processed much like flax or hemp, by crushing the stalks and

removing or combing the fibers. Bamboo can also be processed in the same manner as rayon (viscose) fiber, that is with chemicals and equipment that are used to make synthetic fibers. Manufacturers are now required to label these “rayon like” yarns with terminology such as “bamboo sourced viscose” rather than “natural” bamboo. The chemical processing of bamboo fibers destroys the antimicrobial properties.

Manufacturers are continuing to produce yarns from new sources such as soy, kapok, pearls, and milk (casein), adding to the variety of yarns available in the market place.

Manufactured Cellulose Fibers

RAYON

Rayon is not a true synthetic; it is regenerated cellulose manufactured by the same processes as for synthetic fibers. It is the oldest manufactured fiber developed around 1910 in the United States. There are two types of rayon produced; viscose rayon (viscose commonly found on labels) and cuprammonium rayon.

Rayon is a fiber with a softer hand than cotton and drapes better than cotton. It also dyes better than cotton because of its higher absorbency, but has low strength when wet. Historically, rayon was notorious for shrinking and stretching. Manufacturers over the years have developed better processing techniques to alleviate these problems. 100% rayon tape or ribbon yarns are available and rayon/cotton blends are common, adding absorbency, softness, and drape. Take caution when laundering and pay attention to the labels, as rayon is generally weaker when wet and may shrink.

SYNTHETICS

There are a variety of synthetics manufactured today, but only a few are used in hand knitting yarns. All synthetics are manufactured in filament form and then cut into staple lengths to be spun into hand knitting yarns, resembling the texture of natural fiber yarns.

Amongst knitters there is varied appeal of synthetic yarns. They are generally less expensive and easier to care for. However, as a rule synthetics absorb very little moisture and can feel hot and clammy. They are prone to pilling and look worn much sooner than natural fibers. Stains will set and are almost impossible to remove. With

knitting experience you will notice a characteristic hand of a synthetic; different from a natural fiber. Manufacturers are coming out with quality blends of synthetics and natural fibers that have favorable properties of both fiber types. The following synthetics are most commonly found in hand knitting yarns.

POLYAMIDE

Nylon is the generic name for one of the fibers found in the group polyamides. It was introduced to the market place just prior the second World War, as a cheap alternative to silk for producing hosiery.

The major advantage of nylon is its strength. It is one of the strongest textile fibers and therefore is used in blends to reinforce them. A common blend is a small percentage of nylon along with wool, as in many sock yarns.

Pilling is a problem because it is so strong; the fibers get tangled and cannot be broken off the surface of the textile, so one will notice unattractive balls on the surface. Nylon is also heat sensitive and if overheated will lose its shape. Due to the very low moisture regain of nylon, static cling can be a problem.

POLYACRYLONITRILE

Acrylic is the common name for this group of synthetics. The first production of acrylic was around 1950. This fiber began as a replacement for wool because it was less expensive and washable.

The best applications for acrylic are as “novelty” yarns, that is fake fur and other bulky, textured yarns. Acrylic as a blend with wool is easier to knit and has a better hand than 100% acrylic yarn.

Care must be taken when laundering, as it has poor resiliency and will stretch or elongate when wet. As with most synthetics acrylic is heat sensitive. A short dryer time is recommended at low temperature. Do not iron at hot temperatures, as it could melt or lose its shape. Acrylic is also prone to severe pilling and static cling. Definitely save acrylic for beginner and baby projects, and not for a complex items that you spend many hours knitting. The time will be wasted on a special item that won't last.

POLYESTER

Polyester is generally found in combination with other fibers. Polyester has excellent resistance to wrinkling and therefore helps a blend retain its shape. It also has very good strength. Pilling and static cling are problems, as with most synthetics.

METALLIC FIBERS

Metallic threads or yarns are the oldest form of fibers dating back to ancient Persia and Assyria. These early metallic fibers were actually strips or filaments of real gold and silver. Today, metallic fibers are made by laminating rolled foil with plastic film that can be colored and then cut into narrow strips.

Metallic fibers are not strong and are primarily used as a decorative effect. Hand knitting yarns are commonly blended with a small amount of the metallic fiber, as they will increase fabric stiffness. Some newer modifications are softer. Due to the plastic film, they are heat sensitive and caution must be taken when applying heat or cleaning.