Alpaca Fiber Facts

Alpaca Fiber Facts is a list of things that are commonly misunderstood in the alpaca industry.

Myth

Primary fibers are guard hairs

Fact

Guard hairs (often called 'kemp' in wool) are hairs designed to primarily protect the softer under-fleece of primitively fleeced animals. They are 100% medullated, are longer than the under-fleece fibers, are stiff and are often rather sharply pointed. They are designed to provide a protective shield to the chest, the under-legs and the britch or crotch from tall grass, brush, shrubs, etc as the animal walks through natural environments. As the animal walks these hairs lay on top of the under-fleece and deflect the grass, shrubs, etc toward the legs and belly thus providing the necessary protection. They are not part of any follicle group in the skin and always stand alone.

Primary hairs are the essential building block of a follicle group and are the only fiber that has an erector muscle which is the only way to identify them from the more numerous secondary fibers. There is only one primary fiber in any follicle group and it is the first fiber to be laid down in the developing embryo. A follicle group cannot form unless built around a primary fiber. Primary fibers are indistinguishable from secondary fibers in a staple with many fitting within the micron profile of the secondaries.

Myth

Density can increase after the first shearing

Fact

Density is set very early in the development of the embryo and is expressed in the third trimester of the pregnancy – it cannot be increased but it may have some late-maturing follicles in the early weeks and months following birth.

The developing embryo sets follicles by converting fibroblasts to primaries over a roughly two week period in the first trimester after which it sets the secondaries. Leftover fibroblasts turn into collagen which then becomes the skin of the embryo. No more development of the follicles happens until the start of the third trimester when hair begins to grow – both primary and secondary.

There is no mechanism by which any new follicles can be set after the first trimester.

Myth

Primary hairs are coarser than secondary fibers

Fact

Follicles groups vary in the number of hairs within each group. A number of secondary hairs gather around a single primary hair and vary in number from 6 to as high as 14 (in merino sheep this number can be as high as 25:1) with an average of about 10. When viewing a histogram the primaries are measured as being no different to the secondaries – when viewing an opened staple or lock there is no way to visually differentiate between the two fibers.

To assume that the higher micron fibers are all primaries is a huge mistake because biopsy work clearly shows that to be a false narrative. The only way to truly identify a primary is by biopsy when the primary is identified by an attached erector muscle. When the diameter of the hair is measured it is as often as not of similar or smaller diameter than many or most of the surrounding secondary fibers.

In general, smaller follicle groups tend to produce higher micron fibers.

Myth

High frequency crimp is better than low frequency

Fact

This is one of the better fallacies in the industry.

Processors of fiber (and wool) look for the stretched length to get strength and fineness in their yarn – in fact, with wool it is the first thing they look for when buying. The weakest point in any yarn are the fiber ends which also happen to be the cause of pilling in the finished product. The longer the individual hair the fewer the ends so the finer the yarn can be for the same strength…..

Crimp itself is an architectural phenomena and disappears very early in the process of producing yarn – pulling apart a staple will clearly show crimp disappearing and when the fibers are laid out they do not lay out straight naturally – that happens later in the process when the fibers are aligned in the gilling stage. Crimp has no important role to play in processing, period.
For growers however, crimp itself, of whatever type, is an indicator of density when it is closely aligned in the staple and appears bright to the eye when opened. In suri the tightness and luster of the lock have the same result.

The obsession with 'zipper' style crimp is a carryover from the days when fleeces were graded using the Bradford system which held that the tighter and more frequent the crimp, the finer the micron. When the OFDA system of micron measurement was developed it quickly became apparent that this was not always necessarily the case and when Jim Watts' SRS philosophy was put to the test it was clear that lower frequency crimp-style fleeces could be as fine as high frequency styles. Research on these bolder, deep amplitude fleeces showed that these fleeces could process into high quality product equally as well.

Myth

If you cannot see the skin you have density

Fact

Less than 7% of an alpacas skin area is devoted to follicles.

When opening a fleece it is best to create an inverted viewing cone by using the tips of two fingers and the thumb (of each hand), placing them about an inch into fleece together and then spreading the fingers and thumbs. Using this technique shows the characteristics of the fleece in a more natural way than the usually practiced way of laying the edges of the hand along the body and parting the fleece so it looks like an open book. This latter way straightens out the crimp and creates a brighter reflection of light than is really there – the straighter the fiber, the brighter and deeper the perspective. It also stretches the fiber at the skin and does not give a true perspective of the follicle group structure that creates the staple.

In essence, if the skin cannot be seen as a series of small jagged pink (usually) lines around clumps of follicles it indicates one of two things:

a. there are not enough fibers leaving the skin close enough to force then into tight staples that align closely and hold their form along the total length of the staple, or
b. the follicles are so disorganized that when they leave the skin they do so at so many different angles that they are just a mass of tangled fibers.

In either case staples that are of this type usually carry far greater depth of soil contamination than the

more organized, denser animals because the dirt particles get caught in the tangle of open space between the fibers and find their way closer to the skin as the alpaca walks.

Myth

Fine is best

Fact

There has long been an obsession with breeding the finest fleeces possible and is one of the two most heard comments at alpaca shows and mentions in advertising material. It attracts the highest of grades and other descriptors used in the industry so, by default, is the implies most sought after feature of an alpaca fleece.

Yet the world demand for alpaca is squarely in the 22 to 24 micron range and has been for decades.

For every 10% increase in either density or length there is a 10% rise in fleece weight. For every 10% rise in micron there is over a 25% rise in fleece weight so unless a grower is getting at least a 30% premium for 20 micron fleeces, the grower is losing money on their annual fleece production. As micron goes down from there so the potential losses rise …...

For the average fiber producer chasing fineness without a compensating premium price is simply poor economics. Add to this the potential losses associated with fine fleeces (as against the 22 – 24 micron fleeces) that are more difficult to process.

Generally speaking, the finest fleeces come from the first year of production with the finest fibers being those produced *in utero* but these fleeces often do not process as well as in the ensuing years – yet advertising often highlights these fleeces as being ideal when they are clearly not.

There is little doubt that fleece evaluation is best done at least six months into the second fleece.

MYTH

Medullation is limited to primary fibers

Fact

Medullation is the existence of hollowness in the length of the fiber. Fibers can be fully medullated (such as guard hair) or partially meaning pockets of hollowness along the length of the fiber.

Biopsy work clearly shows that partial medullation occurs far more frequently than thought and is not limited to any one fiber population. In fact it could be said that partial medullation is a characteristic of alpaca fiber, both in huacaya and suri.

In processing, the hollow parts of the fiber take dyes differently than the solid parts with fully medullated fibers tending to stand out in a yarn more than those not fully medullated. It would seem then that as the majority of fibers are medullated at varying points those fibers create a consistent appearance in the finished product.

Myth

The AOA EPD micron count is the industry standard

Fact

The AOA EPD fiber test is done on a 2mm (about 1/8 inch) of fiber grown about 6 weeks before the samples are taken for testing. They are measured by an OFDA 100 machine developed for testing wool fibers.

At best this measurement reflects 3 days growth and in some, if not many, cases grown at a very stressful time nutritionally and environmentally – conditions that can create stress-related fineness.

Commercial buyers need to know the average micron along the whole length of the fiber as they know the micron varies depending on environmental, management and nutrition conditions – with variations of as much as 4 microns along the length over a full production year.

Sales catalogs regularly quote butt test results while many, if not most, potential buyers assume it reflects what the fleece is – no other country in the world uses this test either as a general breeding selection tool or as an EPD or EBV (Estimated Breeding Value) value so there is no way to compare animals or fleeces between countries – especially when comparing market prices for various grades of fiber either raw or processed.

The butt test also gives an inaccurate measurement of curvature – important if curvature is a breeding selection trait.

No other country in the world uses the butt test for either alpaca or wool.

Myth

Alpaca fiber is stronger than wool and has a higher insulation value

Fact

There is no evidence that either of these statements are true.