Ideal Suri Fiber in Llamas:

Can we have it all?

By: Mary Reed

Historically, llamas have been evaluated and selected by their conformation and general appearance.

In selecting llamas with suri style fiber, we consider conformation and general appearance, as well as the uniform evidence of locks of straight, lustrous fiber throughout the neck, body and legs of the animal. Due to a broad range in traits, we have sought to define breed standards for suri llamas.

The CLI Suri Llama Fiber Standard

• Suri type fiber is recognized for its unique appearance and distinctive character represented by the overall draping look of the fibers, which hang independently alongside the body of the animal and swing freely with body movement. A wide degree of variability may be exhibited among the traits inherent to Suri Style fiber, indicating a progression toward the more consistent ideal style.

Definitions

• Suri llama fiber is Straight - without evidence of crimp or Krinkle, the Zig-Zag formation of individual fibers.

• Suri llama fiber has Luster - the shiny, bright appearance of the fleece and locks, as a result of the smooth scale structure which reflects the light and enhances the smooth handle. Natural luster should be present on the outside and inside at the skin throughout the fleece.

• Suri llama fiber is naturally smooth and slippery to the touch; locks are slick and cool to the hand.

• Suri llama fiber is comprised of locks - the formation of individual fibers into groups that are defined from the skin out to the tips of each lock, independent from each other, dense and heavy within the lock, and uniform in structure both within each lock and across the fleece from the neck through the body and down the legs.

This article discusses issues to be considered in the evaluation of suri fiber on llamas.

Tightly formed locks correlate with higher yield, higher AFD, lower comfort factor and locks that reform after shearing.

It is fair to say that, in general, we use visual and tactile (touch to the human hand) criteria, rather than machine measurements to evaluate and select these fibers. We define them visually as straight fibers (without crimped architecture), and single coat, (with consistent fiber type and texture, rather than guard hair and down). The application and value of these fibers in the textile world is enhanced by the longer scale structure of the cuticle and almost unmeasurable height to the edge (or profile) of each scale. A visual trait associated with these long and flat scales is their superb ability to reflect light, giving the fiber a glass-like luster. In its extreme, luster - synonymous with a long, flat scale structure - is the most valued trait in the selection of straight or suri fibers.

This smooth scale structure has the greatest impact on our tactile (handling) evaluation of straight fibers. With a smooth scale height and reflective surface, suri fibers are silky and cool to the touch. We find that finer round fibers impact a silkier handle than coarse elliptical fibers, as less friction is created when touched. The low compressibility (lack of loft) of suri fibers further enhances their handle.

Uniformity of fiber diameter, a characteristic which we can see, feel and measure mechanically, plays a major role in the silky, smooth handle. Consequently, as we prioritize our selection of suri fibers based on visual and tactile qualities, we will rank uniform, fine, silky, lustrous straight fibers at the top of our selection.

As growers of suri fibered llamas, we must be concerned with yield. We know that it costs as much to feed an animal that produces one pound or five pounds of fiber. From an economic perspective, if the end product (sale of fiber) is important, then we will place a priority on fleece weight or yield.

Fleece weight is a product of the specific density of each fiber, coarse fiber having a higher specific density than fine fibers; staple length, growth rate of fiber per harvest; and density, or number of follicles producing fiber per square measure of skin surface. A priority of fleece weight may be contrary to our goals of producing fine, silky, lustrous straight fibers. Coarse or long fleeces will be heavier, but it is the high follicle, dense, fine fleece that we rate at the top of our selection process.

We have given high priority to phenotype in our selection of suri fibers - the evidence of individual locks.

• These locks may be straight, wavy, curled or twisted.

• They may be narrow or fat, ropey or flat.

• We select for locks that are uniform throughout the fleece, forming close to the skin and remaining independent.

• The appearance of locks is a criteria of breed type, not a textile requirement.

• A particular lock style, or even the presence of locks, may not be correlated to other priorities of a silky, cool handle or luster.

• Certain lock types are more closely correlated with density and weight.

• Goals of phenotypic appearance may be contrary to and inconsistent with ideal fiber use goals of silky handle and luster.

The Study:

We took fiber samples from the mid side of 31 llamas that exhibited suri llama phenotype. The llamas ranged in age from 6 months to 7 years. Thirteen paternal bloodlines were included in the study. None of the samples were washed prior to evaluation.

We sent the samples to Yocom-McColl Testing Laboratories, Denver, Colorado, for measurements of fineness defined by average fiber diameter (AFD), uniformity defined by coefficient of variation (CV), and medullation. We expected a fairly large range of fiber fineness (AFD) due to the age span of animals included in the study.

• Not surprisingly, younger animals were concentrated at the lower AFDs reported, averaging under 21 microns, ranging from 16.9 to 25.2 microns.

A priority of fleece weight may be contrary to our goals of producing fine, silky, lustrous straight fibers.

• We also found that fleeces that showed more definition of locks and were more tightly twisted, regardless of the age of the llama, were concentrated at the higher AFDs (coarser), averaging over 29 microns.

• Finer fleeces tended to have less defined lock structure and less definition of lock in regrowth after shearing.

None of the fleeces achieved the levels of uniformity valued in alpaca fiber. The sample low was a CV of 22.3 with the average reported at a CV of 33.7. Coefficient of Variation is a measure of uniformity that allows us to compare all the fleeces evaluated, regardless of average fiber diameter and age. As fleece becomes coarser with age, the CV tends to remain stable. The entire study showed less consistency and uniformity over every sample measured.

Loosely formed locks correlate with lower yield, lower AFD, higher comfort factor and locks that do not reform well after shearing.

The average fleece, regardless of age, reported 20% medullated fibers, a higher percent than we had expected, but perhaps consistent with the measurements of uneven fiber diameter and poor uniformity. Only light colored fleeces (12 of the 31 samples) were measured for their medullation, resulting in a much smaller sample. Further analysis is needed, due to the small sample size. There was no correlation to lock style.

Overall the comfort factor (percentage of fibers over 30 microns subtracted from 100 percent) was quite low, averaging 75%. However, it was encouraging that almost 23% of the samples had a comfort factor greater than 90%, with another 23% averaging 85% or higher. All but one of these samples (14 in all) also had low AFDs, ranging from 16.9 microns to 23.8 microns. The smooth scale of the suri type fleece contributed significantly to impart a reasonably soft handle to all fibers evaluated.

From a visual evaluation of the 31 samples, we can confirm that the finer fleeces exhibited:

• Greater silkiness, smoother handle, higher luster and a high comfort factor

• Less defined lock and lower fleece weight and density

The coarser fleeces exhibited:

• Well defined locks, well defined locks in regrowth after shearing and greater fleece weight

• Less silkiness, lower comfort factor and less luster

As shown in this study, selecting

for textile goals of fineness and luster sacrificed density and lock. Conversely, selecting for phenotype goals of density and lock sacrificed fineness and luster. A wide degree of variability was observed. The challenge, through selective breeding, is to achieve a consistent ideal fiber style, with the characteristics demanded by for the end product, and the phenotype demanded by the breed standard.

An interesting thought to consider: By defining a breed standard of an ideal fiber style, are we defining multiple breed standards: A light fibered and a heavy fibered suri; or straight, silky and lustrous fibers versus heavy, twisted locks with less luster? Is it possible to have it all?

Takeaway messages:

• Goals of phenotypic appearance may be contrary to and inconsistent with ideal fiber use goals of silky handle and luster.

• A priority of fleece weight may be contrary to our goals of producing fine, silky, lustrous straight fibers.

• In its extreme, luster - synonymous with a long, flat scale structure - is the most valued trait in the selection of straight or suri fibers, and was this study, correlated with less lock definition.

• A particular lock style, or even the presence of locks, at this point of the evolution of suri llama fiber, may not be correlated to other priorities of a silky, cool handle or luster.

Suri Llama Fiber Analysis • January 2006

Sample	Age	AFD	SD	CV	% > 30u	% Medullated
1	06/05	19.5	7.3	37.6	10.6	NA
2	06/03	29.2	6.5	22.3	36.3	NA
3	12/04	18.6	5.5	29.7	4.7	21.7
4	04/05	16.9	6.7	39.7	5.5	NA
5	12/04	23.3	7.0	29.9	14.1	29.1
6	11/03	29.8	12.1	40.7	28.1	68.0
7	12/03	18.5	6.3	33.8	5.8	NA
8	04/05	25.2	7.2	28.4	15.4	NA
9	03/05	19.8	5.7	28.8	6.1	NA
10	10/03	21.3	6.1	28.8	9.5	NA
11	09/02	31.8	17.0	53.5	27.3	NA
12	11/00	26.3	11.3	43.0	16.4	NA
13	03/00	28.8	10.5	36.3	33.7	14.2
14	11/02	23.4	6.1	25.9	10.0	NA
15	09/99	32.5	9.7	29.8	48.2	NA
16	11/02	29.0	9.9	34.1	25.9	13.0
17	05/03	30.1	11.7	38.9	32.0	NA
18	02/01	23.8	7.6	32.0	14.1	NA
19	04/02	35.9	9.8	27.4	68.6	NA
20	07/01	31.5	10.4	33.0	43.7	NA
21	09/03	30.0	11.4	38.0	35.7	12.9
22	07/05	19.0	7.3	38.4	8.4	13.3
23	05/05	21.5	8.6	40.2	11.2	NA
24	12/04	34.8	5.8	23.2	11.5	9.9
25	06/02	36.7	9.0	24.6	77.1	NA
26	11/04	21.5	8.6	39.8	11.0	12.5
27	11/04	34.1	10.9	31.8	56.5	20.5
28	07/01	29.0	11.6	40.1	25.2	NA
29	12/03	27.7	8.4	30.4	30.2	7.6
30	03/03	32.2	9.9	30.7	50.5	19.7
31	06/04	22.1	7.9	36.0	15.0	NA