

# The Case for Crimp

By Mike Safley

There are two ways that Huacaya breeders think about crimp in the United States. One group believes that crimp is not an important trait. The other camp says crimp is highly desirable. The show rings in all countries value crimp and many breeders around the world select for crimp. Is it important, or not?

Animal breeders are constantly faced with subjective decisions: Who to cull and who to keep. They often rely on subjective, type characteristics to make these decisions. If the type traits that they select for are positively correlated or linked to economically important characteristics then their decisions produce good results. If, on the other hand, these subjective decisions are negatively correlated to important traits the results can be harmful to the breed.

Crimp in alpacas is a subjective, type trait. The first question is whether or not it is positively correlated to any important economic traits. If it is we should select for it; if not we should select against crimp or pay no attention to it at all. The second question, which may be more difficult to answer is, which crimp style or frequency is most preferable?

## CRIMP IS NOT IMPORTANT

The argument that crimp is not important is primarily made by Eric Hoffman. Here is what Eric had to say in *The Complete Alpaca Book* published in 2003.

“Huacaya, as a breed, has some amount of curvature in fibers, in other words, crimp or crinkle. In some alpaca show systems, the various types of crimp are assigned different values. Such hair-splitting distinctions between styles of crimp may serve the purpose of identifying differences between individual animals in high-stakes alpaca shows, but the commercial processors in Peru who move tons of fleeces through their scouring vats based on handle classing (with some recently introduced micron sampling) are not making such distinctions in the fleece used to create their high-fashion end-products found in the top salons in Milan, Paris, and Geneva...

At the time of this writing, no research institution anywhere in the world has presented definitive information correlating crimp to other desirable fiber characteristics in alpacas.”

Eric’s primary argument is based on the fact that producers do not pay a premium for fiber with superior expressions of crimp.

## CRIMP IS IMPORTANT

On the other hand, Dr. Julio Sumar of Peru had this to say about crimp in Huacaya:

“In the Peruvian conditions of alpaca breeding crimpness is highly appreciated for the breeders. They used to say, “In 90% of the cases a crimped fiber is a visual indicator of fineness.” When I visited an alpaca textile factory in Peru, where the fleece sorting is carried out entirely by woman’s hands, the highly crimped fleeces end up in the very fine fleece section.

Dr. Sumar’s remarks were made at the Gold of the Andes Seminar at the Alpaca Western Extravaganza (AWE) Show at Redmond, Oregon in May of 2004.

## WHO IS RIGHT?

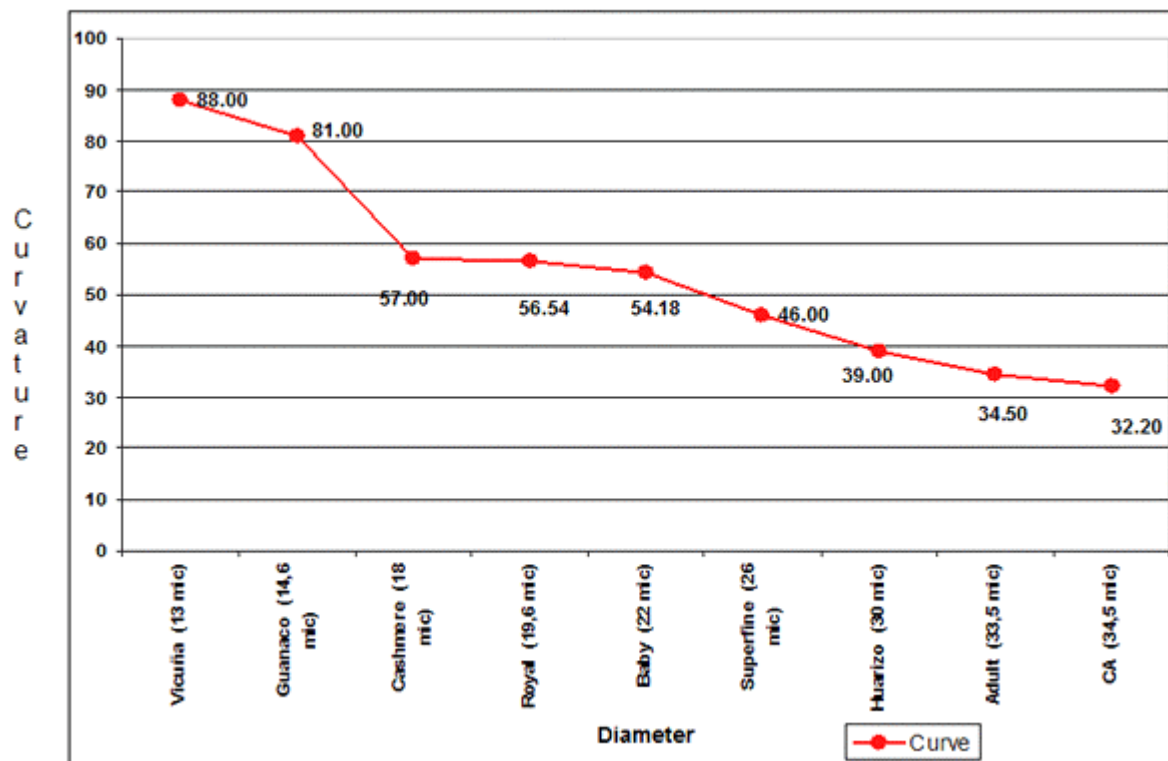
First, let’s exam Eric’s argument. It is true that fiber processors do not pay a premium for crimp. In fact, until recently, all fiber purchased in Peru was paid for based only on its weight. In 1998, Grupo Inca began paying a premium for fine fleece. They recognized that the market for finer fiber was strong and that their previous purchasing practices, of paying based on weight, were causing breeders to select for coarser fiber. The fashions they create depend on fine fiber.

There is a limited supply of fine fiber. If the alpaca industry can find a selection pathway to finer fiber then the breed as a whole will become more valuable. The Quechua Indians are some of the world's poorest people. They breed alpacas in the Altiplano and could increase the value of their only cash crop: alpaca fleece, if they had a proven selection marker for fineness.

The pathway to finer fiber may be as simple as selecting for Huacaya with better defined, more frequent crimp. Luis Chavez, who is in charge of purchasing and processing alpaca fiber for Grupo Inca in Peru, presented the following tables ( 1, 2, 3 and 4) at the Gold of the Andes Seminar in Redmond, Oregon. His presentation was entitled, What Alpaca Processors Want from Your Alpaca.

The OFDA gives a measure called curvature (deg/mm) which is related to crimp. The curve has a direct relation with the fiber diameter such as we show in the following chart.

**TABLE 1**



Curvature which is an OFDA measurement is defined as:

Fiber curvature is related to crimp. Average Fiber Curvature (AFC) is determined by the measurement of two millimeter (2mm), (0.0787 inch or 5/64 inch), snippets in degrees per millimeter (deg/mm). The greater the number of degrees per inch, the finer the crimp. For wool, low curvature is described as less than 50 deg/mm, medium curvature as the range of 60-90 deg/mm, and high curvature as greater than 100 deg/mm. Source: [Fiber Testing Terminology](#)

Curvature loosely correlates to the number of crimps per inch. As you can see from Table 1, Vicuña (12-13 microns), which is the finest natural fiber used to manufacture garments, has more curvature or crimp than Guanaco at 14.6 microns. Both are finer and have more curvature than cashmere. Cashmere, which compares with Royal and Baby alpaca but is a little finer, has a little more curvature.

**Table 2**

Type	Diameter	Comfort	Curve
< 20	19.60	98.70	56.54
20 - 21	20.38	97.29	55.44
21 - 22	21.53	94.73	58.07
22 - 23	22.38	93.74	54.18
23 - 24	23.36	90.43	53.43
24 - 25	24.63	86.37	44.17
25 - 26	25.74	83.08	45.78
26 - 27	26.72	71.14	42.65
27 - 28	27.74	73.48	39.84
28 - 29	28.61	67.35	39.04
29 - 30	29.52	61.92	39.20
30 - 31	30.30	56.20	36.00
31 - 32	31.53	48.29	36.19
32 - 33	32.36	42.53	35.60
33 - 34	33.54	34.81	34.58
34 - 35	34.45	33.03	32.20
> 35	35.74	24.85	31.03

### Fiber Diameter vs. Curvature for Alpaca Fleeces

Grupo Inca is a vertically integrated fiber processor who owns a chain of retail boutiques called Alpaca III. One of their primary concerns is how to reduce the weight of alpaca garments. The solution is simple; they need to work with finer fibers. Chavez says, “Alpaca fiber and wool have almost the same density (1.32 vs 1.30 grams per centimeter) but the wool garments are lighter than the alpaca.”

**Table 3**

Quality	Royal	Baby	Superfine	Adult / Inferior		
				Huarizo	Coarse	M. Pieces
Diameter (Mic.)	19.50	22.50	26.00	31.50	34.00	33.00
Fiber/section	51	48	62	60	60	60
Max. count (NM)	50	40	24	16	14	11
Sweater weight (gr)	200	250	350	450	500	600
Fabric lineal weight (gr)	250	300	350	460	550	650

### The Effect of the Fiber Diameter in the Weight of a Garment

Chavez goes on to say, “If you have a small box filled with coiled springs made of the same diameter wire as a similar box filled with straight pieces of the same wire, the box filled with the springs will be the lightest.” In other words crimped fiber is not only finer but the curvature allows for a lighter weight yarn to be spun.

You can see from Table 3 that finer fiber spins into much lighter garments. Royal alpaca at 19.5 makes into a sweater that weighs 200 grams or 0.441 pounds. A sweater of the same design, made from the mixed piece grade, weighs 600 grams or 1.32 pounds. This is a 300% increase in weight, but the fiber itself is only a little more than 50% coarser.

Luis says, “that there are fleeces, particularly suri, that have low crimp frequency and are fine”. He finished his discussion about the relationship between fineness and crimp by saying, “According to our purchasing department the crimped fleeces are finer than the flat fleeces.” In other words, he agrees with Dr. Sumar’s conclusions. He concluded his remarks by saying, “As a yarn producer, I think crimp is important for the business.”

**TABLE 4**

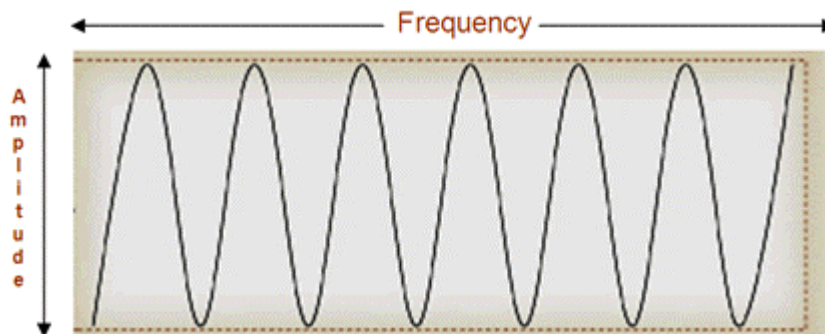
TOPS			
Quality	Diameter	Comfort	Curve
Royal	19.08	97.00	39.00
Baby	22.40	91.20	34.40
Suri	27.27	71.88	20.60
Superfine	25.84	79.85	32.57
<b>Adult alpaca</b>			
30 - 31	30.60	57.70	26.13
31 - 32	31.50	54.05	25.19
32 - 33	32.35	50.68	24.85
33 - 33,55	33.34	45.93	24.60
<b>Wool</b>			
< 24	22.93	91.53	69.30
24 - 25	24.68	85.28	71.23
25 - 26	25.60	81.09	69.89
26 - 27	26.52	76.57	64.62
27 - 28	27.50	70.57	58.80
> 28	29.08	64.05	54.25

### Fiber Diameter vs. Curvature for Alpaca and Wool

Table 4 demonstrates that alpaca fiber does not maintain the curvature found in the fleece when it is made into tops. Wool, on the other hand, maintains most of the original curvature in the tops. The increased curvature in wool is a major reason why it makes into lighter garments.

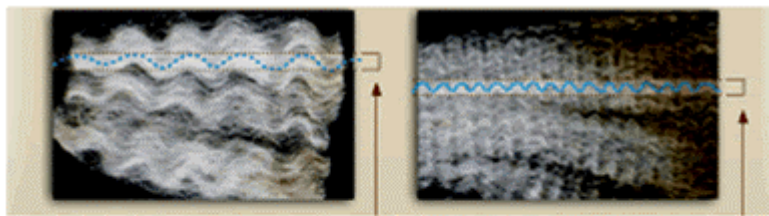
### CRIMP STYLE

If you are selecting for crimp in Huacayas and it leads to finer fleeces and there are many styles of crimp, then the question becomes; which style of crimp is best? In sheep, the wool with the most frequent crimp count is often the finest. The style of crimp in sheep is also moderately to highly heritable. In alpaca the style of crimp is variable. There are no bloodlines identified with a particular crimp style or frequency. The following illustration defines the various attributes of crimp.



1. Amplitude is the height of the wave as measured from the crest to the trough.
2. Frequency is the number of crimps for a given measurement, i.e., crimps per inch.
3. Deep crimp is defined as having high amplitude.

4. Bold crimp is low frequency wave that maintains high amplitude.



3 Crimps per inch

This sample shows a higher amplitude or deeper crimp which is also bolder than the sample to the right.

8 Crimps per inch

This sample shows higher frequency (less bold) crimp than the sample to the left.

It is likely that once alpaca breeders decide which style of crimp results in fleeces with the highest textile value that they will be able to fix that particular style. Grupo Inca's genetic improvement project at Paco Marca takes extensive measurements on each alpaca in their herd. They record fineness, curvature, staple length, and fleece weight for each fleece. Once an animal is shorn, and its measurements recorded, the individual fleece is transported to Arequipa where it is sorted for grade. Each grade in the fleece is sorted, weighed and valued at the current market price. This total becomes the textile value of the fleece.

The data that is collected from the Paco Marca herd should allow for correlations to be drawn between particular fleece traits such as curvature (correlated to crimp) or fineness and total fleece value. It will be a small step to visually identify the crimp style of each fleece and determine if there are positive correlations to a particular style of crimp. There may also be negative correlations such as fineness to staple length or fleece weight.

I am working with Alonso Burgos of Paco Marca and geneticists at a major university to analyze the data collected by Alonso and his team. We will also be conducting a similar study of suri lock style as it relates to textile value. The results of this analysis have the potential to revolutionize the selection criteria for Huacaya and Suri.

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