



## Pure Blood - Part IV

---

By Mike Safley

### ALPACA SHOWS, BREEDING OBJECTIVES AND BREED STANDARDS

Alpacas are one of North America's newest livestock breeds. There were few, if any, alpacas in the U.S. when Ronald Reagan first became president. When compared to the voluminous information available about sheep and cattle, a review of the world's alpaca literature reveals little about the alpaca's fleece and almost nothing about the alpaca itself. For instance, there are no breed standards published in South America, where 98% of the alpacas reside, and few, if any, books which address the breeding of superior alpacas.

For the past fifteen years, U.S. citizens, Canadians, and, more recently, Australians have raised alpacas. To date, no breed standards have been developed in North America and breeders have not even agreed on what constitutes an ideal alpaca type. The show ring is gaining more prominence, but even the show rules are ambiguous in their definition of a superior alpaca.

For the most part, the North American alpacas' standard of quality has been determined by: 1) imports and, therefore, the importers, and 2) the ranches with the biggest advertising budgets and, therefore, the big breeders' alpacas. This is not necessarily a bad thing; it is just how the industry has developed. I know, because I have participated in the process for better or worse.

It is time for alpaca breeders to collectively think about such issues as breed type, breed standards, breeding objectives, the show ring, and what really constitutes an elite alpaca. Breeders need to strive for an ideal alpaca that strikes a balance between form and function. We need to understand the influence of the show ring, breed type, an alpaca's cash value characteristics, and breed standards. In the past, the show ring and alpaca breed standards have been a controversial subject.

### THE HISTORY OF LIVESTOCK SHOWS

Livestock shows began at local markets, which were similar to today's state and county fairs. The original purpose of the fairs was to provide a place for the buying and selling of livestock. In the Andean altiplano, a person who has a few animals for sale still takes them to a weekly fair or market. If no buyer makes an acceptable offer, they take them home and wait for the next fair. It was a small step from displaying animals for sale to having their merits appraised by judges. Beginning in 1801, Charles Colling, a famous shorthorn breeder, toured the U.S. for more than six years with his "Durham Ox." He was one of the originators of livestock shows, although his tour was more like a sideshow than the show rings of today.

The first European public exhibitions corresponding to our modern livestock shows were held in Sussex, England in 1798, Denmark in 1810, and Germany in 1817. Most of this early showing was for advertising purposes, and the premiums offered were small or nonexistent.

### THE HISTORY OF BREED STANDARDS AND SHOW RULES IN NORTH AMERICA

I was co-chairman of the show committee in 1990 when the original alpaca show rules were adopted. Before we wrote the rules, we surveyed AOBA's members for their opinions about breed standards and what show system the industry should adopt. The following excerpt from the original show committee report (1989) reflected the AOBA membership's thinking on the subject of breed standards and their place in the show ring.

*“Breed Standards ...,”*

*“This topic is easily the most controversial addressed by the committee. There seem to be two basic schools of thought. One group believes that the standards should be established with specificity and in detail. The other group feels that initially at least, actual standards should be minimal ...,”*

*“With specific standards we would set ideal height, wool specifications weight and conformation qualities. Each of the qualities would be assigned scores and values. The animals would be judged accordingly ...,”*

*“The minimal standard group would generally include all type alpacas. Each animal would be evaluated in a manner which penalized negative traits; i.e., knock knees, sickle hock, cow hock, banana ears, etc. The positive traits would remain more subjective on the judge’s part ...,”*

*“For instance, wool would be considered important in each approach; with specific standards, fineness, softness, density, consistency would all be assigned particular value and quantified. Wool might further be considered 50% of the score. With the minimal standard approach, wool would be considered very important and the animal would lose points if there was excessive guard hair or noticeably poor coverage...,”*

*“More than one member has suggested a go slow approach to breed standards. The middle ground may be a periodic review of standards or the addition of more rigid standards as experience dictated ...,”*

*“One thing is clear; this issue will get plenty of debate. Hopefully a consensus will develop.”*

*“Issues that provoked most written comment from survey participants were as follows:*

*“Breed standards. While 58% of the respondents favored breed standards, the comments made it clear that these standards should be general and not meant to exclude marginal animals that were clearly alpacas.*

*“Judging Criteria. People are interested in protecting the gene pool by excluding animals who had clear faults but they were also interested in crediting animals for good wool and conformation.*

*“Wool Quality. The responses generally favored placing an importance on wool quality but rejected the concept of wool quality as being ‘primary’. Many people suggested that wool should be 40 to 50% of the total consideration.”*

That same report, which was adopted by the AOBA BOD, had some interesting comments on the subject of awarding championships in alpaca shows.

*“The show format has some unique and creative aspects. Alpacas will be judged in classes formed according to nine color categories. This approach will insure multiple champions, thereby diversifying quality bloodlines throughout the North American herd. With many classes, breeders will have a maximum of opportunity to promote champions; Alpacas will be promoted and displayed according to their most unique qualities; color and fleece.”*

The concept of color championships was never put into practice and today alpacas are the only livestock whose shows, according to the current Alpaca Llamas Show Association (ALSA) rules, as a practical matter, do not allow championships. This has been the tradition enforced by ALSA alpaca show rules for the past nine or ten years. More recently (since 1998), many regional shows and the National All American Alpaca Futurity have decided not to have ALSA sanction their shows and have incorporated AOBA's original idea of color championships into their show formats. For a show format to have a positive impact on the improvement of any breed, it must award excellence and recognize outstanding merit.

### THE POTENTIAL BENEFITS OF THE SHOW RING

Shows are primarily a promotional vehicle. They allow an industry to promote their breed and breeders an opportunity to promote their ranch and stock. It is a fact, right or wrong, that alpacas with blue ribbons and championships sell for more than ones standing at the tail end of their class. Winners are advertised and their sires are promoted, often commanding high service fees and a waiting line at the breeding paddock.

For breeders, shows are an excellent place to meet with other breeders and exchange ideas. The show ring provides an opportunity to learn about the better animals and to keep up to date on the alpacas and herds which are winning. A purchaser can learn a lot by standing at ringside. It is fun to place the class before the judge does and then try to see why the judge's placing was different from yours.

There are two ways that the show ring can help breeders develop better alpacas. First, it can help keep breeders informed about the ideals of the breed. If breeders follow the judges' preference in their selection of stock, and the judges are well qualified, the show ring can be an important factor in guiding the breed's development. Second, the show ring might become effective in identifying the best animals, allowing breeders to accept show ring placings as guides to their breeding decisions. This might also have some mild effect on the genetic composition of the breed if repeated year after year, since it would encourage a slow grading-up process in the direction of the prize winners. This form of selection would favor the phenotypes most frequently favored by the judges and their approval or disapproval might help determine which animals become paternal grandsires or great grandsires of the breed.

### THE NEGATIVE EFFECTS OF SHOWS

Ideally, the show ring would identify alpacas according to their breeding value, but the judging process is not very effective in this regard because: (1) the correlation between outward appearance and real productiveness is low for many characteristics; (2) such a small percentage of all purebred animals are shown; (3) considerable attention is paid to grooming, temporary conditions, and showmanship; and (4) many important things which the breeder may know, such as amount of milk and fat produced by dairy cattle, number of pigs weaned by sows, length of fleece on sheep, etc., is information which is not available to a judge.

Anyone reading books about animal breeding, written by geneticists, will immediately notice that they take a dim view of shows that are based on appearance. The following quote from *Animal Breeding* by Dr. A.L. Hagedoorn, expresses a common opinion held by geneticists about livestock shows and their negative role in the selection of animals for breeding programs:

*“Although as a geneticist I deplore the fact that in the selection of good, profitable animals the show yard ideals have made things unnecessarily difficult, I recognize that breeding animals for the shows is not only a hobby, but a paying industry for those who understand it and who make a success of it. This is especially true when the animals have some economic value. There is certainly more money in breeding draught-horses or sheep or pigs for the shows than there is in raising those animals for the ordinary market.*

*“Breeding animals for the shows is a very peculiar business, because of the fact that it is wholly competitive. Whereas the breeder of utility sheep or utility pigs produces something that has a certain market value, which is not changed very much even if ten of his neighbors start in with him to raise the same sort of sheep or hogs, breeding animals for the shows can only pay the man who succeeds in producing such stock as is pronounced by the judges of the moment to be the most beautiful and the most fashionable.”*

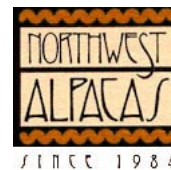
To many geneticists, the evolution of a show breed is interesting. They often see the process as follows. A certain type of head becomes the fashion for a particular breed. To improve on this new head type somebody makes an outcross to another closely related breed, and as a result they produce, in two or three generations, animals that consistently win. But, as a result of the cross, those prize winning animals have hair of a different type. When the judges first begin to see this type of hair, it is considered a small fault, next it is okay, and finally the new hair type becomes a desirable quality. So the process goes, until the breed is completely changed. There are many examples of dog breeds which have been entirely altered, to their detriment, by the vagaries of the show ring.

Show preparation can often be more important to an exhibitor's success than conformation or fleece quality. The fashionable winners in some breeds owe their success almost as much to the art of the trimmer as to their ability as a breeder. These grooming practices may prevent a judge from ranking the animals in the order of their breeding merit. For example, staple length is especially important in the Merino and Rambouillet breeds. Yet the length of fleece which the sheep wears when it enters the show ring may be so altered by shearing, blocking, and trimming that the judge cannot afford to pay much attention to staple length. In other words, the temporary condition of the animal distorts the judge's ability to evaluate the animal's true worth at the moment it enters the ring.

Once fancy points and the show judges preferences are included in the standard of perfection for a breed, the selection of breeding animals tend to conform to easily-judged phenotypic qualities rather than important economic and genetic qualities which can not be evaluated at a show. When geneticists have studied the relationship between show points and economic value, the correlations have always been insignificant. In the production of economically-useful animals, such as cattle, swine, egg-laying breeds of poultry, and horses, the show-ring can be more of a menace than an aid to breeding. The alpaca industry needs to work hard and be thoughtful to avoid these pitfalls.

#### BREED TYPE

If a Hollywood producer needed an alpaca for his movie, he would call central casting. They would try to send him an alpaca that would “look the part.” This would be perfect “type” casting. The picture at the beginning of this article is an artists rendering of Accoyo's Shere Kahn which many breeders believe represents ideal Huacaya “type”. The definition of breed type is created by the visual picture of the



characteristics which are considered typical or ideal for a breed. The ideal breed types are often based on the details of conformation and color which have no relation to the economic productivity of the animals. Examples include: the shape of horns and the color pattern in cattle, the shape of ear in swine, and the color of the face and shape of the ear in sheep.

Breeders pay attention to breed type mainly because it is a “trademark” and some additional evidence that the animal in question conforms to the ideals of the breed. Breed type is a matter of beauty to the breeders who have long been breeding and admiring a particular breed. But beauty is subjective. Most of us can bring ourselves to think that any particular type is beautiful if we work with it long enough, have our money invested, and find it profitable. The breeders of other breeds may not share our enthusiasm for alpacas, but that will never diminish our devotion to the beauty of our animals.

Breed type often originates unconsciously with breeders who embrace the traditional animal or their perception of the ancient purity of a breed. It is easy for breeders to persuade themselves that “the best animals of the alpaca breed with the purest blood are thus and so,” and to believe that any deviations from that description indicate impurity. This happened, to a certain extent, in the U.S. alpaca industry with the introduction of Peruvian imports.

The Hereford breed of cattle offers an example of how the insistence on a certain breed type changed a breed in a negative way. The original Hereford breed had red spots on their faces and red rings around their eyes. Many of the Herefords imported to America carried these red markings. At first they were preferred and breeders called them “brown eyed.” Later, the fashion became pure white faces and today few purebred Herefords have red rings around their eyes.

Why did Hereford breeders select the white-eyed type? The answer seems to be that among the first things to appear in the crosses of Herefords with other cattle were red spots on the face and red rings around the eyes. To many cattlemen, this indicated impurity. When this perception became the breeder’s customers’ opinion, it was almost inevitable that the breeder of purebred Herefords would select for those animals which had the whitest faces and eyelids.

This would have been a relatively harmless change, except that in the southwestern part of the United States, Herefords with white eyelids are more susceptible to cancer of the eyelid. While it is true that a rancher usually has time to cull those affected and to ship them to market without suffering a complete loss, many ranchers today wish that they had kept to the original breed type of “brown-eyed” cattle.

There is a similar potential for problems today in the alpaca industry. Breeders, their buyers, and some judges seem to prefer huacaya alpacas which have faces entirely covered with fiber -- the more, the better. I confess I like the look myself. But excess fiber on the face can inhibit vision and attract burrs and stickers, which can cause eye infections.

Breeders preparing for the show ring often clip the hair from an alpacas face. They can make the head quite handsome in this fashion and the judges respond. Will selection for heavy face fiber be a good thing in the future when alpacas are raised for commercial fiber? Probably not, if we carry it to extremes. I also realize that an alpaca’s face “cleans up” as it gets older, but this is an example of a trait which could get out of hand for the sake of type.

### WHY IS BREED TYPE IMPORTANT?

Breeders pay attention to outward appearance or type in making their selections for two reasons. First, the breeder may want to breed a certain type because it has a market value. If a market demand exists for a certain type, the breeder may not care whether that type really will furnish the maximum production profit. The fact that the buying public wants it and is willing to pay for it is the thing of immediate practical importance. Second, breeders may believe that type and productiveness are closely correlated and that if they select for type they will get productivity.

Type has some sale value in all classes of livestock. In extreme cases beauty may be the main object. This is often encountered in "pet and fancy stock," such as dogs, and is an important feature of horses. If the breeder's customers center their demand on type, breeding for productivity becomes secondary. If breeders' customers are looking for productivity, breeders may only be interested in type, if it helps them achieve productivity.

### ALPACA BREED TYPE

An ideal alpaca's look begins with the head, a dense top knot, and well covered cheeks converging with the wool cap to form a close "V" at the eyes, which are brown. The ears are shaped like an arrowhead and erect. The muzzle is soft and wedge shaped. The head and neck make up about one-third of an alpaca's height, with the neck connecting at a right angle to the back, which is straight, dropping off a bit at the tail. The ideal alpaca has a squared off appearance, with four strong legs setting squarely under the alpaca, giving it a graceful stance which is completed by abundant coverage down the legs.

The stars of any herd will catch your eye with an alert, erect appearance. Their fleece will open into well organized locks of soft, bright, and lustrous fleece, which handles like silk. Above all, an ideal alpaca will never be mistaken for a llama.

Hopefully, the alpaca breeder will give adequate attention to both type and productivity. The breeder, who pays too much attention to type, may sacrifice the selection necessary for superior production. To bring a balance between form and function, breeders need to understand the economic value of an alpaca's characteristics.

### ALPACA VALUE CHARACTERISTICS

An alpaca's characters or traits should not just exist to suit a breeder's fancy. To be included in a selection program they should have either a cash value, a breeding value, or a marketing value. A character may, at times, qualify on all three points.

The alpaca industry is really two industries in one -- fiber production and pure blood stud breeding. In North America, the fiber industry is currently economically unimportant relative to the sale of breeding stock, but in the future that will change.

**CASH VALUE CHARACTERISTICS**

A cash value character is one that is saleable or can have immediate effect on the price of a product. Examples of cash value characters in Alpacas are fineness, staple length, tensile strength, cleanliness, color, and degree of medullation. Each of these is saleable and are characteristics of high quality fleece. The market place creates price premiums for these characteristics. Studies have determined that manufacturers pay for all natural fiber based on the following criteria:

<b>Characteristic</b>	<b>Percent of Value</b>
<b>Fineness or average diameter (FD):</b> The primary determinant of value in the textile market is micron count.	65 - 80%
<b>Staple length:</b> Determines which spinning system will be used, woolen or worsted.	15 - 20%
<b>Tensile strength:</b> Please note, alpaca fiber is not sold based on tensile strength because it is rarely, if ever, too weak to spin.	5 - 10%
<b>Cleanliness:</b> Buyers of raw fleece estimate the clean yield of raw fiber when making pricing decisions.	5 - 10%
<b>Color:</b> Alpaca fiber is the only natural fiber which can command a premium based on color, although historically white fleece has been the most valuable.	Depending on current fashion
<b>Uniformity (C of V):</b> A uniform fleece spins finer garments with its better handle.	No premium currently paid
<b>Degree of medullation:</b> A highly medullated fleece indicates an Alpaca which may have llama blood in its background or is poorly selected.	Generally reflected in premium for fineness

Alpaca breeders should select Alpacas for their breeding programs that will produce commercially valuable fiber. Carefully selecting for fiber fineness, length, color, uniformity, and an absence of medullation should be important to every alpaca breeder. The relative importance of various traits to textile manufacturers are shown in figure one.

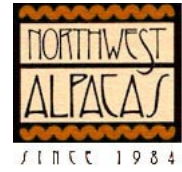


Figure 1: Traits of Commercial Importance to Textile Manufacturers

	Scouring & Topmaking	Spinning	Weaving	Dyeing & Finishing	Garment Manuf.	Garment Appeal
FD	+++	++++	+++	+++	+++	++++
CV	-	+	+	+	-	+
<b>Contamination</b>						
-Other fibers	+	+	-	+++	+	+
-Non-Fibrous	++++	+	-	-	-	-
Length	+++	++	+	-	-	-
Strength	++	+	+	-	-	-
Color	+	-	-	+++	-	+
Crimp	+	+	-	-	-	+
Style	++	+	-	-	-	-
Entanglement	+	-	-	-	-	-

Source: Whiteley (1994)

**Fineness (FD):** Fineness is the primary determinant of price because a fiber’s micron count determines its end use. Fine fiber is generally more valuable because it creates apparel which is soft and can be worn next to the skin. At the other extreme, coarse fiber is used for carpet wool. There are a whole range of uses for alpaca fiber each demanding a specific diameter of fiber. As you can see from Figure 2, which summarizes American consumer preferences for garments of the same style, color, and construction, consumers prefer soft, lightweight fabrics. To create these garments, fine fiber is required. Fully 40% of a consumer’s satisfaction depends on fine fiber. The balance of the properties preferred by consumers, such as shape retention, easy ironing, etc. have to do with manufacturing techniques and chemicals and are not determined by fiber qualities. Lightweight garments are the overriding long term fashion trend. They cannot be made with coarse fiber.

Fine fiber is in short supply and it can sell for ten times as much as coarser fiber. Approximately 7% of all alpaca fiber in Peru grades Baby at 21-22 microns. Most fiber animals grow fleece of more than 24-25 microns. Garments made of fiber averaging more than 21 or 22 microns often itch or feels prickly to the wearer. Cloth made of fleece containing 5% of fiber over 30 microns also itches, even if it averages only 21 microns.

**Staple Length:** Alpaca fiber’s staple length is important. Length commands a premium in the textile market because it enhances the manufacturers’ ability to spin fine, strong yarns for weaving. Fiber must be at least 2 1/2 inches and preferably 3 1/2 inches or more to be used in the worsted system. The finest, lightest cloth is made from worsted yarn. Short fibers are used in woolen yarns to make sweaters and generally sell at a discount.

**Color:** Ideally, color should be uniform over the entire body of the Alpaca. When producing fleece for commercial sale, breeders should avoid selecting for secondary colors which require additional labor to sort. Another problem with uneven colors within the fleece is that they do not take dye evenly.

**Uniformity (CV):** There is considerable research which establishes that a more uniform fleece is more “spinnable.” A fleece with a co-efficient of variation (CV) that is 5% less than a fleece of comparable micron will spin a yarn that performs as if the fleece is one micron finer. The most effective way to select for uniformity is to breed for alpacas with a lower average micron count. A finer fleece generally has less standard deviation. Many breeders also believe that a cria with a lower standard deviation is more likely to maintain fine fiber as it ages.

In the field, an alpaca with a uniform fleece can be detected in several ways. A uniform fleece opens cleanly, like a book, not a rose. The crimp or lock style found in the uniform fleece will have the same look and structure at the shoulder, midside, and hip. When the crimp or lock structure extends down the legs, under the belly, and up the neck, the fleece tends to be more uniform (photo A).

**Medullation:** Medulated fibers are the coarse thick bristles that constitutes the second coat of guard hair often found on a Llama. Alpacas should be selected against this trait. Medulated fiber often exceeds 40 microns and can range up to 100 microns.

A breeder can visually detect medulated fiber on an Alpaca. Medulated fiber is far less likely to crimp. Most alpacas have medulated fiber in their chest or apron and in the britch and belly. A breeders goal should be to first eliminate guard hair from the blanket area and then from the entire animal.

When assessing medullation, study the right hand tail of the histogram for evidence of coarse fiber. The percent of fiber over 30 microns is quantified on most histograms and is a guide to the amount of medulated fiber in a given fleece.

A breeder can cut a lock of fleece from an alpaca and then look for thick fibers among the finer ones. Pull at the lock from the tip, if an inordinate number of thick fibers slide from the lock the alpaca is likely to have a medulated fleece.

### BREEDING VALUE CHARACTERISTICS

Breeding values for genetically heritable traits allow for the effective selection of cash value characters and purchasers pay for alpacas with these traits. Fiber fineness, which was discussed at length above for its commercial value, also has a breeding value because it is highly heritable. Another example is fleece weight, which is the result of the number of fibers growing on a given area of skin, or “fiber density,” it has a genetic value to breeders, but you can not receive a premium for density from a fleece buyer. It is also possible that a fleece with a high number of fibers per unit area might offer better resistance to dust and help produce cleaner, more valuable fleece. Crimp, lock structure, color, and size are other examples of breeding value traits. Luster in a suri’s or huacaya’s fleece is valuable to the extent it can be passed on to the offspring.

**Density:** From the breeders point of view, density is one of the Alpaca's most important production traits. Ultimately, the purchase price for fiber of any grade is based on its weight. The textile manufacture doesn't place any value on an individual Alpaca's density, but buyers of breeding stock do.

A breeder can determine an alpaca's genetic predisposition to density very simply -- weigh each of the alpaca's crias' entire fleece annually at shearing time. Alpacas which produce dense cria have high breeding values for density. When assessing an unshorn animal in the field, density can be determined in at least seven different ways.

- 1) By feel, grab a handful of fleece. If your hand feels empty, the alpaca has a light fleece. If it feels full, the fleece is dense. This measuring technique allows you to quickly compare a number of Alpacas in a given herd.
- 2) Inspect the fleece's individual locks. If they are compact, firm, thick, and solid, the entire animal is likely to be dense.
- 3) Part the fleece and inspect the skin. If you see a lot of skin, the animal will tend to have a lighter fleece.
- 4) Look at the alpaca's head. If a huacaya has a strong, dense wool cap that grows at right angles to the skin, the balance of the animal will tend to be dense. In the case of the huacaya, if the forelock lays down or hangs, the animal probably has fewer hair follicles per square inch and is therefore less dense. A suri's forelock should be well penciled, not fluffy which would indicate a lack of density.
- 5) Look at an alpaca's overall fiber coverage. Does the fiber extend down the legs? Look carefully at the front of the back legs. Do you see fiber or skin and bone? Are the cheeks well fleeced or is the face open and without coverage? More coverage indicates higher density.
- 6) Does the fleece "crack" vertically when the animal walks or turns his body? "Cracking" indicates a dense and uniform fleece (photo C).
- 7) Place an open hand on the surface of the fleece and apply pressure toward the alpaca's body. The more resistance, the denser the alpaca.

Visual or tactile assessments will never replace a scale, but they can give you a quick appraisal of an animal's density. This is particularly important when selecting animals for purchase if production records are not available.

**Crimp:** Crimp has been determined to be highly heritable in huacayas and, therefore, has a breeding value. Crimp is defined as the natural wave formation of the fiber, expressed as crimps per unit of length. Visually, crimp is most notable in the well organized staples or locks found in the fleece. Crimp also occurs along the shaft of a single fiber. This has been defined by Cameron Holt, of the Melbourne College of Textiles, as crinkle. There is a general relationship between fiber fineness and crimp in the huacaya. Suris do not exhibit crimp (photo D).

To understand why crimp is an important trait in huacayas, we must first understand why some fleece

exhibits crimp and others do not. Fine alpaca and sheep fiber have dual cortical cells, para and ortho. In coarse fibers a hollow core may be visible (medulla) and the cortex is less distinct. The cortical cells in alpaca fiber constitute a variable fraction of the fiber mass, being the lowest in coarse and the highest in fine fiber where the fraction may be 90%.

Alpaca fiber and wool have a bilateral structure. That is to say, the paracortex and orthocortex grow side by side. It is this structure which is believed to give fine wool and alpaca fiber its crimp. Think of a single fiber as a rope made of two independent strands which are twisted together. When twisted ever more tightly, the rope becomes finer and kinks or “crimps.”

As alpacas age, their crimp tends to broaden and disappear. The fleece becomes coarser each year. The orthocortex also tends to disappear as micron count increases. Breeders should understand this phenomenon and be more reliant on genotype than phenotype when assessing the crimp producing capacity of Alpacas, particularly older males.

Dr. Jim Watts, a well respected animal researcher and wool specialist, has spent several years studying alpaca fleece characteristics on behalf of Coolaroo Alpaca Stud in News South Wales, Australia. He had this to say about crimp as a characteristic in *Advanced Alpaca Production, Breeding from Fibre to Fabric*.

*“Because alpaca fiber crimps or waves at regular time intervals, faster growing fibers automatically display bolder crimp or wave frequencies. Do not assume that bolder crimp equates to stronger (coarser) fiber diameter; from recent textile research of Merino wool it is now known that bold, deep crimping wools are the softest, finest and best processing fibers. In the huacaya alpaca we should be looking for and breeding these bold, deep crimping wools.”*

At Northwest Alpacas, crimp has a breeding value. The crimp found in an alpaca’s fleece is evidence of the following characteristics:

- 1) Crimp generally indicates fineness. Typically, the more crimps per inch, the finer the fiber, while this is not always true, it does serve as a visual guide while assessing alpacas in the field. The most accurate way to measure fiber fineness is with a LASARSCAN or OFDA machine.
- 2) Crimp is an indication of density. A dense, crimped fleece often has a well organized lock and staple structure that allows for more and longer fiber to occupy a smaller space, much like a well folded newspaper occupies less space than one which has been wadded up in an unorganized fashion and piled on the floor.
- 3) Crimp indicates uniformity in the fleece. A highly uniform fleece will typically exhibit the same crimp characteristics over the entire body of the animal.
- 4) The presence of crimp indicates a lack of medullation in the fleece. Coarse medullated fibers lack orthocortex, grow straight, and do not crimp.
- 5) Once it is processed, a well crimped staple measures longer than a comparable length staple without crimp.

Understanding this allows the breeder to select for longer staple length by breeding crimp into the Alpacas' fleece.

6) A fleece with high crimp definition will stay cleaner and more compact from one shearing to the next.

Textile manufacturers don't pay a premium based solely on crimp, but it is considered an important trait in the manufacturing process (see Figure 1). For many years wool graders used crimp per inch to predict fineness and, therefore, price. But, with the advent of sophisticated electronic measuring devices, there is less and less reliance on crimp as an indication of fineness by manufacturers. But crimp assessment is still a useful selection tool for the alpaca breeder grading animals in his herd or for purchase, hence it has a breeding and a marketing value.

**Color:** Alpaca fleece is marketed in many colors and color is an inherited trait, which is easy to select. White is the color most desired by textile manufacturers because it can be uniformly dyed any color. Many mills will not purchase fiber if it contains more than ten dark fibers per 100 grams of fleece. Purchasers of breeding stock often pay premiums for certain colors and the rarest colors often bring the highest premiums.

**Size:** Size is highly heritable in all livestock breeds. Alpacas which are big and bold, exhibiting good vigor, fertility, and reproductive ability, are sought by knowledgeable purchasers of breeding stock. Small animals sometimes have more reproduction problems and produce less fleece per animal.

**Luster:** Luster in the suri and huacaya are thought to be heritable. A bright, lustrous fleece is of considerable value particularly to purchasers of breeding stock. The hallmark of the suri is luster and it is important to the textile manufacturer because almost all suri fleece is used in outerwear. Coats made of suri glisten like mink and are often called "green" fur coats.

When considering alpacas as the sale product, genetic or breeding values, such as density, crimp, color, size, and luster or brightness would be considered by most buyers to have a cash value.

### MARKETING VALUE CHARACTERISTICS

A character with marketing value affects the price realized for the product by improving its presentation for sale. In the case of alpaca breeding stock, a certain type or color might have market value even though the fleece of the animal lacking type might sell at the same or discounted price. Marketing value characters enable cash value characters and breeding value characters to realize a higher price by improving the marketing environment.

## Pure Blood - Part IV

Because the distinction between cash value characters, breeding value characters, and marketing value characters depends on the outlook of the buyer, the value of some characters may change from one category to the other, or even cease to be credited with any value at all. Many of the breeding value traits described above also have marketing value (figure 3). The manufacturer knows from experience that he can spin a longer and thinner yarn from wool with a low average fiber diameter and the wool buyer puts a cash value on fineness. Staple length is also of great importance in the manufacture of yarn and has a cash value. Type or density is of no value to the fleece buyer, but is very important to the buyer of breeding stock.

**Figure 3**

<b>CHARACTERS WITH CASH VALUE FOR FLEECE</b>	<b>CHARACTERS WITH GENETIC VALUE FOR BREEDING STOCK</b>	<b>CHARACTERS WITH MARKETING VALUE FOR BREEDING STOCK</b>
Fineness	Fineness	Pedigree
Staple length	Density	Breed Type
Color	Uniformity	Fineness
Cleanliness	Crimp (huacayas) Lock (suri) Luster Color Size	Density Uniformity Crimp (huacayas) Lock (suri) Color Luster Size Fleece coverage

### BREEDING OBJECTIVES

Breeders need to assess their goals and determine their breeding objectives while taking into account the value of the characters they decide to include in their selection programs. There will always be a healthy difference of opinions on what objectives should be included in a breeding program. Some of the traits to be considered which would influence a breeder's objectives are:

1. Fiber fineness
2. Density
3. Uniformity
4. Color
5. Size
6. Conformation
7. Crimp Definition
8. Lock Formation
9. Luster
10. Vigor
11. Type or Visual Appearance
12. Show Performance

Generally speaking, the objectives at the top of the list are more easily measured and the traits toward the end of the list are more subjective. By focusing on the few easily measured traits, a breeder's goals will be more readily attained and progress will be easier to demonstrate. The subjective traits are harder to measure and will be more difficult to achieve. Breed standards are a starting point for the measurement of progress.

### WHAT ARE BREED STANDARDS?

Breed standards help define the ideal animal of a given breed. Standards often evolve over time. They provide goals for breeders who are trying to improve their stock. Standards become a breeder's objective in the form of a weighted combination of traits that help define the aggregate value or merit of an animal. They are a quantification of what constitutes the ideal animal. By having industry wide written standards, breeders will always have a bench mark by which they can compare the individual alpacas in their herds.

### DEVELOPING BREED STANDARDS

Regardless of species, the best animal should be the one that best suits the end user. When developing breed standards this is an important idea to keep in mind. Sometimes this concept gets lost in the effort to satisfy expectations that have little to do with the end use. An example of distorted breeding standards can be found in the emphasis that meat and dairy cattle breeders place on a particular spotting pattern or shade of coat color. Coat color has little to do with production efficiency in these species.

Competition among breeders can also create distorted breed standards. In an effort to convince buyers that their animals are superior to those of his competitors, a breeder may find it profitable to emphasize the qualities in his animals that set them apart, even if they are not particularly important production traits. For example, if a breeder's animals are especially large, they may be tempted to promote the value of

increased size whether or not size is inheritantly valuable. If the breeders promotional efforts are successful, they will be rewarded for having large animals and begin to promote even larger animals. Pretty soon the competition will react to the success of the first breeder and the race will be on.

To avoid these arbitrary variations in breed standards alpaca breeders should simply remember the end user. By understanding the characteristics affecting the end use of our alpacas and defining the best animal accordingly, we will all have a valuable herd improvement tool. This goal could best be accomplished by establishing industry wide breed standards, as opposed to having individual standards being set by individual breeders based on the alpacas they have in their pasture and the size of their advertising budget.

#### BREED STANDARDS AND GENETIC CHANGE

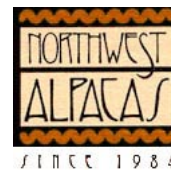
If we are going to improve animals genetically, it stands to reason that we will attempt to change them. Breeders ordinarily take this to mean that they should change them in an established direction. This is where breed standards could be helpful. But, should every trait be changed in a particular direction? Do we always want finer fleece, more milk, faster speed, higher fertility?

The answer is clearly no, and for some traits it is easy to see why. Take, for example, the conformation trait called hock set. Animals whose rear legs are too straight are postlegged, lacking sufficient angle at the hock, and they run the risk of going lame. Animals with too much angle at the hock are sickle hocked and can also develop soundness problems. The optimum hock set is somewhere between these extremes. The best animal has enough angle at the hock to be athletic, but not so much that it moves awkwardly. Clearly it would be a mistake to breed animals forever for increased or decreased set at the hock. Once an intermediate optimum has been reached, there is no reason for further change. These sorts of standards should be easy to establish.

Hock set is an obvious example of a trait with an intermediate optimum. Other traits with intermediate optimum are not always so obvious. Size in dogs and milk production in beef cows are examples. The balance of fineness and density in alpacas may also be an example of an intermediate optimum. For traits like these, improvement does not necessarily mean directional change. Improvement might better be defined as an increase in the proportion of animals with optimum or near optimum performance. In other words, improvement could be the increase in the uniformity of desirable traits. This is where breed standards can be of considerable help in defining the breeders' goals.

#### BREED STANDARD FOR THE HUACAYA AND SURI ALPACA

In the interest of stimulating a debate concerning industry wide standards, I have attempted to set out the following breed standards for the North American alpaca community. I have borrowed from the Australian breed standard, the Alpaca Lama Show Association rules, Maggie Krieger's excellent book, *The Secrets of the Andean Alpaca*, Rigoberto Calle Escobar's book, *Animal Breeding and Production of*



## Pure Blood - Part IV

---

*South American Camelids*, the ARI screening standards, and many years of personal experience breeding alpacas. The first set of standards for conformation and physical attributes apply equally to the suri and huacaya breed. The fleece standards, which actually define the difference between the two breeds, are found in two separate sections. I chose to call the suri and huacaya alpacas separate breeds based on the following definitions of a breed: 1) A race of animals within a species. Animals of the same breed usually have a common origin and similar identifying characteristics (ref. 1); and, 2) A type of animal defined by different characteristics and recognized by particular or official association. (ref. 2)

**Head:** The ideal alpaca's head is compactly formed, of medium length, with a dense top knot and a wedge shaped muzzle. The eyes should be oval, alert, and set well apart, protruding slightly from their sockets, giving the appearance of being large and round, and may be blue (ref. 3), brown, or black. The nose has two well defined nostrils. The upper lip is divided and mobile. The ears are of medium length, covered with short, soft hair, erect and spear-shaped, pointing forward in the alert stance. The jaw should be well covered with fleece and should fit together correctly, with the lower incisors meeting the upper dental pad.

Faults:

Muffled face at 30 months of age (fiber or hair on the bridge of the nose impeding vision)

Head very narrow or thick and llama-like

Roman or long nose

Lower jaw undershot or overshot

Short or long ears

Banana, rounded, or asymmetrical ears

Incorrect bite

**Neck:** The neck of an alpaca is long and slender, with its length in proportion to its body and legs. The ideal proportion of neck to legs to body is one-third, one-third, and one-third. The transition from back to shoulder to neck should be smooth and elegant.

Faults: Length of neck disproportionate to body size (too long or too short) Crooked

**Forequarters:** The chest should be broad, deep, and well sprung in the rib. Ideally the chest would be free of medulated fiber. The wither should be relatively wide where the shoulders meet, well fleshed, and well set into the shoulders forming a straight line with the back. The legs should stand square and be spaced adequately apart.

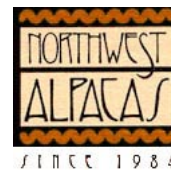
Faults:

Narrow chest

Loose shoulder blades

In or out at the elbows or knees

High or low wither



## Pure Blood - Part IV

---

**Body:** The back should be strong and the topline slightly convex. The loins should be broad, strong, and flat. The body condition should be well fleshed, not overweight nor underweight.

Faults:

Sway or humpy back

Too long or short

**Hindquarters:** The rump should be broad with a slightly convex top line. The tail should be straight, covered with quality fiber, and set slightly lower than in llamas. The thighs should be strong and well muscled. The height of the pin bones should equal that of the shoulders.

Faults:

High tail set

Narrow hindquarters

Crooked tail

**Legs:** The forelegs should be strong and straight. The hind legs should be straight and parallel when viewed from behind with heavy bone evident at the hock. The legs should be well covered with fleece (see photo E). The pasterns should be firm and upright. The feet should be neat, well formed, and bear two forward pointing toes, each carrying a long, strong toenail.

Faults:

Weak or cocked pasterns

Knock knees

Cow hocks

Sickle hocks

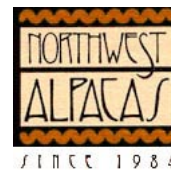
Post legged

Splayed toes

**Udder:** The udder should produce abundant milk, adequate to foster strong vigorous cria.

Faults: Nonfunctional teats

More or less than four working teats



## Pure Blood - Part IV

---

**Testicles:** The scrotum should be well attached, relatively small, and carrying two large, even sized testes of good consistency.

Faults:

Testes of uneven size

Relatively smaller testes at 30 months of age

Undescended testes

One testes

Soft testes

**Height and Weight:** The ideal alpacas will exhibit good type at their optimum size. Animals exhibiting any llama characteristic should be avoided. Ideally, an alpaca should fit into an imaginary square, not too tall for their length, harmoniously proportioned. A mature animal should measure a minimum of approximately 33" for females and 35" for males at the wither. Minimum weight of 130 pounds for fully grown females and 150 pounds for fully grown males. In general, appropriately sized females have fewer fertility and birthing problems

Faults:

Underweight

Undersized

Overweight

Oversized, lacking good alpaca type, particularly if there are any llama like characteristics present

**Color:** Alpacas occur in a range of colors from white and black to shades of fawn, brown, and grey. Ideally, alpacas should have a uniform color throughout the entire fleece.

**Gait:** Alpacas should exhibit a fluent, free stride with two distinct tracks, the hind feet following the front ones.

Faults:

Choppy, short stride

Throwing rear or front feet out or in as they walk or run pigeon toed

## Pure Blood - Part IV

---

### SURI FLEECE STANDARDS

#### **General Appearance:** (ref. 4)

The primary characteristics which distinguish a suri from a huacaya are its lock structure, high luster, silky handle, and longer staple length. The suri's fleece falls close to the body, moves freely, and gives the animal a lustrous, flat sided appearance. A more rounded or fluffy appearance can indicate volume, rather than density, in the fleece, which is undesirable. Due to the compactness of the fleece, suris often give the appearance of being smaller than the huacaya, but this is an optical illusion. The suri should be every bit as big and robust as a huacaya.

**Head:** Suris with well covered cheeks and bearded chins are desirable. The fleece locking should begin at the forelock and continue uniformly down the neck and across the body.

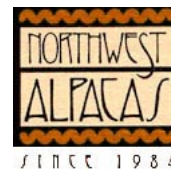
**Fleece:** The suri's unique fleece is the primary indication of the animal's quality. Luster is the most important suri quality. In addition, the fiber should have good handle (a more slippery feel than huacaya). Locks should be round, form close to the skin, and have uniform twist to the end. The fleece should display good architecture or definition of lock and good independence or free movement of the locks. The ideal lock should be uniform from the ear to the hock and particular attention should be paid to uniformity across the midside. Legs and underbelly should be well-covered.

#### **Positive Traits: (in their order of importance)**

Luster	30%
Fineness	30%
Density	30%
Staple Length	5%
Uniformity	5%

#### **Faults:**

Crimp  
Medullation  
Guard hair  
Flat, open fleece with no lock definition  
Short staple length for age of fleece  
Coarse handle  
Lack of density  
Rounded appearance indicating fluffiness rather than density  
Tender breaks



## Pure Blood - Part IV

---

**Locks:** The suri's locks should have a well-defined architecture, be narrow, independent, uniform, and start close to the skin. Locks may be twisted, curled, or penciled and should start from the forelock and continue through to the hocks. Spirals in the locks may twist from either left or right. Locks can be with or without a wave which should not be confused with crimp, which is a fault. The locks should hang straight and hug the body, giving a curtain like appearance. When the fleece is opened, the inside locks should be as well-formed as the outside layer and exhibit luster at their base.

### Lock Definitions:

**Lock Architecture:** The "lock definition" is also referred to as "architecture" and relates to the degree of twist or curl and the solidity in the lock. The best architecture has a tightly twisted lock.

**Independence of Lock:** The fleece should swing out freely from the skin when the animal is in motion or the fleece disturbed.

**Staple Length:** A suri, when compared to a huacaya of similar age and micron will have a longer lock (staple) in the fleece.

### HUACAYA FLEECE STANDARDS

**General Appearance:** (ref. 5) the ideal huacaya's fleece should be fine, beginning with a soft muzzle and dense topknot and continuing through a dense, uniform blanket and ending with well covered legs.

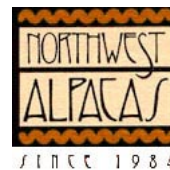
**Fleece:** The huacaya alpaca should be well covered with a soft, dense, crimpy, uniform fleece, except on the ears and the bridge of the nose of mature animals.

### Positive traits in their order of importance:

Fineness	30%
Density	30%
Crimp	10%
Staple length	10%
Uniformity	10%
Luster or brightness	10%

### Faults:

Coarse guard hair through the saddle or blanket of the fleece  
A high proportion of medulated fleece  
Tender breaks  
Muffled face on adults  
Lack of density  
Lack of overall coverage  
Chalkiness or lack of luster  
Coarse handle  
Short staple length for age of fleece



## Pure Blood - Part IV

---

### DISQUALIFYING FAULTS FOR ALL ALPACAS

#### **Body:**

Tail absent or abnormally short, bent, or twisted

Heart murmur

Fewer than two testes

Small, fused, or tipped vulva

#### **Head:**

Parrot mouth

Wry face

Cataracts

Fused ears (short stubby ears or fused at the tips)

Banana-shaped ears

#### **Legs:**

Extreme sickle hock or cow hock

Extreme knock knees

Extreme base narrow

Extreme splay footed, buck kneed, or calf kneed

Extreme cocked ankles

Luxating patellas

Polydactylism (more than two toes on each foot)

Syndactylism (fusion of the two toes of the same foot)

#### **Dentition:**

Jaw not properly aligned

Jaw overshot (bottom teeth extend considerably beyond top dental pad)

Jaw undershot or parrot mouth (roots of the central incisors recessed substantially behind the top dental pad)

### WEIGHTING THE BREED STANDARDS

All breed standards are not created equal. If breeders accept the premise that fleece is the primary end use of an alpaca, then it follows that the standards relating to an alpaca's fleece should be paramount. The Peruvian show standards allocate 70% of an alpacas score to fleece, the Australian's have a similar weighting. The original ALSA show rules (1990) weighted 45% conformation, 45% fleece, and 10% type. This was subsequently changed to 50% conformation and 50% fleece, where it stands today. The breed standards recommended here should be weighted 60% or fleece and 40% for conformation. The weightings for individual fleece characteristics have been noted in the text of the standards. In the future, say three or four more generations of alpacas, the 8 weighting for the North American standards should probably be reset at 70% for fleece and 30% for conformation.

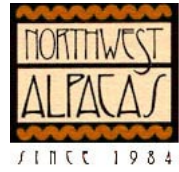
Conformation standards should be weighted as well, with an emphasis on traits impacting the ability to eat efficiently, walk, and reproduce easily. For instance, a good bite is critical if a female is to forage sufficiently for both her and her cria's needs. The legs must be correctly formed and positioned to allow the alpaca to graze pastures for sufficient time and distance to stay well nourished. A male must have large testicles to produce abundant sperm and strong, straight back legs for use in mounting the female. In other words, back legs on a male are more important than back legs on a female or front legs on either. Spring of ribs and a strong topline give a female good capacity to carry their young. Males, on the other hand, need the lung capacity to chase down females. Of the 40% allocated to conformation, the following order of priority is appropriate:

1. Bite
2. Testicles on male and vulva on female
3. Straight, strong legs, pasterns, etc.
4. Spring of rib
5. Strong topline
6. Correct proportion

The interrelationship of halter class shows, breed type, value characteristics, and breed standards are important concepts upon which the alpaca industry should agree. This does not mean that every breeder needs to agree to all the details of every standard. But by collectively defining the alpaca's major purpose, the important characteristics, appropriate conformation, and fleece standards, breeders will go a long way toward establishing the goals necessary to sustain positive improvement in the national herd.

THE VALUE OF CHARACTERISTICS FOR FLEECE VERSUS BREEDING STOCK

CHARACTER	FLEECE PRODUCTION	BREEDNG STOCK PRODUCTION
Fleece weight per head	As high as possible	As high as possible
Staple length	There is an optimum intermediate range of staple lengths. Shorter fiber is less valuable. Longer fiber is overgrown. Both may command a lower price per pound than wool within the optimum range of 3 ½”	The faster growing, the better
Fiber diameter	Fiber of a lower diameter commands a higher price per pound. More important in huacaya than suri.	Fiber of a lower diameter commands a higher price per pound and breeding stock with lower micron counts sell for premiums.
Crimps per inch (huacayas)	The higher the better for huacayas. A fault for suris.	The higher the better for huacayas. A fault for suris.
Lock structure (suri)	Not important so long as staple length is adequate and luster present.	Very important
Color	White fiber is, on average, more valuable over time	Color in breeding alpacas can attract a premium. Often the rare colors are more valuable. This premium changes over time to reflect breeder preference.
Handle	The softer the better. Largely dependent on fiber diameter.	The softer the better. Largely dependent on fiber diameter and is more readily assessed in the field than micron count
Medulation	Absence preferred	Absence required
Uniformity of color and fineness	The more uniform the better	Important, more uniform the better
Conformation faults, such as cow hocks, swampy backs, sickle hocks	Not applicable	Important
Clean face and points, absence of muffled face	Not applicable	Important



REFERENCES:

- 1) *Understanding Animal Breeding*, Richard M. Bourdon, page 426.
- 2) *Animal Breeding and Production American Camelids*, Rigoberto Calle Escobar, page 325.
- 3) I realize that blue eyes are a controversial subject. (Jeannie Flavin, I know you are out there). The fact is that there are no scientific studies for alpacas which establish that blue eyes are linked to genetic defect. The market place seems to discount the value of blue eyed alpacas, especially males. I personally would not use a blue eyed male for breeding, but might use a blue eyed female. Blue eyes seem to be an infrequent recessive trait.
- 4) Please note charts 1 and 2, which are reprinted from *Secret of the Andean Alpaca* by Maggie Krieger, for purposes of identifying specific parts of an alpaca's anatomy and fleece.
- 5) Please note figures 2 and 3 are reprinted from *Secret of the Andean Alpaca* by Maggie Krieger, for purposes of identifying specific parts of an alpaca's anatomy and fleece. Page 10