Keeping the Suri Pure ®… ten years on

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At Alcazar Suri Stud, we have been breeding suris for ten years and have never departed from our strong commitment in "Keeping the Suri Pure".

As early as 2002, we made our views widely known about what constitutes a pure suri. [1] In short, let us summarise by saying that there are two schools of thought: those believing that a pure suri is simply a homozygous suri [SS]; and those believing that this is not sufficient and that you need a long pedigree of suris mated to suris to be able to claim that an alpaca is a pure suri. May be we need to go back a bit first.

The S gene in alpacas seems to come in only two different forms (two *alleles*): the S form (suri) and the s form (huacaya). S is supposedly completely dominant over s. Alpacas inherit ½ their genes from their sire and the other ½ from their dam. Therefore:

- [SS] gives a suri, called *homozygous;*
- [Ss] also gives a suri, called *heterozygous;*
- [ss] gives a huacaya, necessarily homozygous for the s allele.

Both homozygous suris and huacayas produce only one type of reproductive cells (as far as the S gene is concerned). Huacayas' reproductive cells only carry the s allele and homozygous suris' reproductive cells only carry the S allele. It is said that they *breed true* for this trait. *Breeding true* is an essential characteristic of a pure breed.

When you cross two different <u>pure</u> lines (necessarily homozygous) you obtain a hybrid called an F1 (first filial generation). Crossing a homozygous suri [SS] with a huacaya [ss] will always produce a heterozygous suri [Ss]. All F1's are suris in appearance. However, they do not breed true. Two F1's crossed together give an F2: F1 x F1 = F2 (second filial generation). In the case of alpacas, the F2 population will comprise, on average:

- ¼ of homozygous suris [SS]
- ½ of heterozygous suris [Ss]
- ¼ of huacayas [ss].

This is where Alcazar Suri Stud disagrees with some other alpaca breeders. We consider that the suri is a <u>breed</u>, not just a type. Therefore, how can you call an F1 a suri, when it carries the huacaya gene (s) and does not breed true? For the same reason, how can you call the 25% of huacaya types produced as F2's true huacayas when both their parents (the F1's) are suris in appearance? Even the

homozygous suris produced as F2's should not be called suris. They have indeed two suri-looking parents (the two F1's) and are homozygous for the S gene but they have two huacaya grand-parents and therefore have 50% huacaya blood. How can they be labeled "suri", let alone "pure suri"?
This is far too confusing and unreliable. An F1 is an F1; it is neither a suri nor a huacaya, whatever it looks like. The same applies to F2's.

A pure suri is an alpaca with at least 93% suri blood. Why 93%? Because this corresponds to 15/16 or:

- 2 suri parents
- 4 suri grand parents
- 8 suri great grand parents
- 15 pure suri great great grand parents
- and only 1 huacaya great great grand parent.

One huacaya out of sixteen great great grand parents: this is 15/16 suri blood or 93.75%. Such an animal is also called a backcross 3 (BC3). See Figure 1 below.

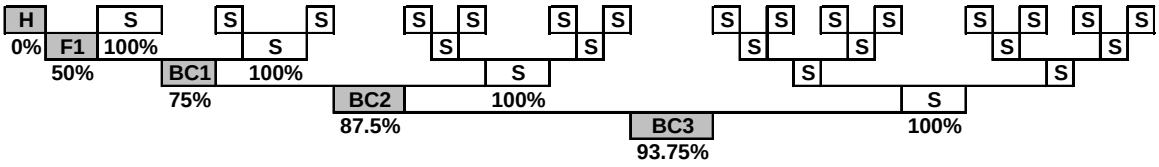

Figure 1 - Pedigree of a backcross 3 – The figures in % represent the % of suri blood (H huacaya, S pure suri, F1 first filial generation, BC1 backcross 1, BC2 backcross 2, BC3 backcross 3) – F1, BC1, BC2 and BC3 exhibit the suri phenotype.

Note that in this figure S represents pure suris, i.e. suris which themselves have at least 93% suri blood. The word "back" in the term "back-crossing" means back to the parental strain (pure suri in this instance). This creates some practical complications:
First, it should be remembered that alpacas have been introduced into Australia only fairly recently and pedigrees are still rather short. It is often the case that only parents or grand-parents are identified and the previous generations are not. Therefore we can only speculate whether or not there is a huacaya in the ancestry of a suri with such a short pedigree. As far as Alcazar is concerned we are ready to give these suris a chance and consider them pure until proven otherwise (i.e. a huacaya appears in their descendants) and proven heterozygous. This is the best we can do in our current state of affairs.
Secondly, as it is frequently not known for sure if a suri is pure or not, homozygous or heterozygous, some breeders are happy to consider anything with a suri phenotype fit for breeding. In Figure 1 above, S represents a pure suri. If any of the S's was in fact a hybrid (e.g. an F1) then the percentage of suri blood in the progeny diminishes accordingly. For more on how to identify homozygous suris, the reader can refer to previously published articles. [2]

To reinforce the message and be absolutely clear on what constitutes a pure suri, I need to make the following point again: it is not sufficient for a suri to be homozygous to be considered a pure suri. Unlike many other breeders, I do not use the two words interchangeably. A pure suri is very likely (almost certainly) homozygous (see Figure 2) but a homozygous suri is not necessarily pure. The best examples are the 25% homozygous F2's produced when mating two F1's together mentioned above. They are homozygous but with two huacaya grand-parents should not be considered pure suris.
The reader may have noticed that, in Figure 1, the figures in percentage represent the percentage of suri blood, not the probability of being homozygous. However, if we assume that all pure suris are indeed homozygous, then this BC3 pedigree can be redrawn and the probability (P) for each backcross being homozygous [SS] can be calculated. See Figure 2 below.

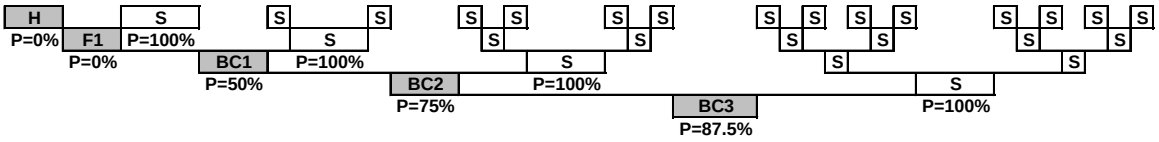

Figure 2 - Pedigree of a backcross 3 – The figures in % represent the PROBABILITY OF BEING HOMOZYGOUS [SS] (H huacaya, S HOMOZYGOUS suri, F1 first filial generation, BC1 backcross 1, BC2 backcross 2, BC3 backcross 3) – F1, BC1, BC2 and BC3 exhibit the suri phenotype

In fact, it is highly likely that the S gene only controls the presence of locks. Therefore simply breeding to obtain homozygous suris is basically breeding alpacas for locks, and not breeding for a pure suri line. At Alcazar we have always endeavoured to keep the suri pure as much as we can. We cannot completely eliminate the huacaya gene (s) but we can diminish its frequency considerably. Breeding pure suris is therefore slower and more demanding than just breeding homozygous suris. The reward is that they will breed true, not only for the S gene but also for all the other characteristics that make a suri a suri.
It is essentially the same breeding strategy which has allowed us to almost completely eliminate colour genes from our herd of white suris. Like the suri gene, the colour white is generally dominant over other colours and therefore we cannot completely eliminate these colour genes but we can diminish their frequency and their expression considerably.

On our farm in the Blue Mountains of NSW, we have observed that our pure suris are ideally equipped to thrive in Australia. Like all other Camelids, they can exploit marginal lands with remarkable efficiency, even more efficiently than sheep. Their unique metabolism enables them to extract more energy from a very poor diet and their ability to pace allows them to roam efficiently over large areas to find their sustenance, while not compacting the fragile Australian soils thanks to their padded feet. All these characteristics combined make them very robust animals. Their extremely silky and slippery fleece keeps cleaner than

crimpy fleeces and contamination with vegetable matter is less of an issue in suris. For the same reason, there is less grit accumulation at skin level and shearing suris is not as harsh on shearing equipment. Suris produce more fleece than huacayas, which is also easier to store, as a suri fleece takes about ⅓ to ¼ of the space needed to store a huacaya fleece of the same weight. Suris love the sun and the heat. They prefer dry heat but their open fleece makes them well adapted to cope with humid heat as well. Cold, wet and windy conditions are what they do not cope with well but this is easily avoided in Australia by not shearing in winter and/or providing shelter.

We have found these animals very easy to farm and quite interesting to breed, especially with our objectives of “Keeping the Suri Pure” and “Keeping the Suri White”.

References

1. BAYCHELIER P. – What is a pure suri? – Alpacas Australia, issue 39, pp 30-33, Summer 2002
2. BAYCHELIER P. – Homozygous suris in alpaca breeding – Alpacas Australia, Issue 42, pp 30-34, Summer 2003