FACT SHEET

RURAL INDUSTRIES
Research & Development Corporation

Quantitative genetic analysis of micron blowout in alpacas

The issue

Micron blowout is one of the major factors affecting long-term financial return on alpaca fibre. Fibre diameter is one of the most important fibre quality traits in apparel textiles because it is strongly related to softness and comfort of the garment. Some alpacas maintain fine fibre throughout life, while others suffer from significant coarsening of fibre as they age; this trait is known as micron blowout. Micron blowout results in reduced productivity, through reduced yield of high quality fibre over the life of an animal.

What is micron blowout?

For alpacas, as is the case with many fibre-producing species, the finest fibre is of the greatest value. It has been well established in many fibre-producing species that fibre diameter increases with increasing animal age; a phenomenon known as micron blowout. In addition, micron blowout can also be caused by over-nutrition, or by a combination of both factors.

Although all fibre producing species have the potential to suffer from micron blowout, the fault is particularly problematic for alpacas, because alpacas are kept as fibre producers for longer than sheep. McGregor and Butler (2004) calculated that the average micron blowout for alpacas over seven years is 7.5µm. This variation can lower the value of fibre from an older animal to less than 20% of the value of fibre from a young animal. And, because alpacas are retained as breeding and production animals for much longer than seven years, this can mean that the majority of the animals' productive life is at the lesser economic value. Micron blowout affects males and females, Suri and Huacaya of every colour; it is thus a problem for all alpaca producers.

As a result of micron blowout, animals produce less valuable fleeces over time, reducing the life-time value of fibre from the individual. Maintenance of low fibre diameter is one aspect of fibre biology that is of importance for the alpaca industry to assist in increasing yield and productivity. However, it is not an easy task to measure micron blowout, because of the many factors that affect micron diameter (for example, genetics, age of dam at parturition, nutrition status, health). Therefore, to accurately identify animals that either have little or lots of micron blowout, longitudinal data on a group of animals kept under the same conditions must be used. With accompanying extensive phenotype and pedigree records, the underlying genetic potential of the animals can be revealed.

Alpacas and micron blowout

In order to carry out research on the inheritance of micron blowout in alpacas, researchers worked with Grupo Inca (Peru), who own and manage a large alpaca herd at their farm, Pacomarca S.A. Pacomarca has kept extensive phenotype records on their animals, and has developed and successfully implemented in-house selection measures to generate estimated breeding values on their animals. This data was used to carry out a complex quantitative genetics analysis, to determine whether micron blowout in alpaca is heritable.

The project results showed that age, sex, colour, birth year, measurement year and measurement month all significantly affect micron blowout. White and fawn animals were less prone to micron blowout than coloured animals, while males showed a higher propensity to blowout than females. This may not have been due to any effect of sex; rather, it was probably due to the effect of different management between the groups.

Micron blowout was found to have moderately low heritability in alpacas. The heritability of micron blowout from year one to year two is the highest, but very low in the subsequent age categories. This implies that selection against micron blowout may be successful in reducing the extent of the problem, however more data is required to verify micron blowout at later ages.

Industry Opportunities

The results of this research confirm that micron blowout has a moderate genetic component in alpacas. Therefore, it may be possible for breeders to select animals that do not exhibit the trait (or do not exhibit it as strongly), thereby improving the yield of high quality fibre over the lifetime of an animal. However, progress on this research will not be fast, due to the time taken to get successive fibre diameter measurements to allow the detection of micron blowout.

The recommendation arising from this research is that breeders should directly select for reduced fibre diameter and include "change in year one to year two fibre diameter" as a component in their selection process, to take into account genetic predisposition for micron blowout.

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References

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PRJ-006076 Pub. No. 13/113