

# Genetic Improvement Programmes for Alpacas

## by Adrian Stewart

This isn't the first time I have written about this topic in my column, but the level of interest in the USA is now reaching fever pitch. This is for two reasons. Firstly, at the Fibre to Fashion conference in Las Vegas one of the speakers was Brett Kaysen from Colorado State and he spoke about Expected Progeny Differences or EPD's and the potential in the alpaca business. Secondly, the Alpaca Registry Inc (ARI) has expressed an interest in collecting and storing the data necessary to calculate EPDs.

### **What are EPD's ?**

Back to the future. Since the dawn of time, when man first began to domesticate animals, this not only meant feeding and caring for the chosen animals but also influencing their breeding. Regardless of whether the outcome is to breed dairy cows with increased milk yield, or sheep with finer fleece, the first step for any breeder is to identify individual animals that can most easily pass on their superior characteristics to their progeny. And it is this desire to continuously improve the breed that has driven the development of EPDs. EPDs are used by all the major livestock industries. Why? Because they are the most effective tool available for animal breeding.

But I am getting ahead of myself. Identifying superior individuals for breeding purposes seems straight forward, surely. You simply select the ones that have the most desirable traits or features. For thousands of years farmers and herders have been selectively breeding their plants and animals to produce more useful hybrids using this process. It was somewhat of a hit or miss process since the actual mechanisms governing inheritance were unknown. Knowledge of these genetic mechanisms finally came as a result of careful laboratory breeding experiments carried out over the last 150 years.

This history of animal breeding partly explains why animal shows came into being and remain part of the livestock industry to this very day. However, as breeders embraced the new science of genetics and gained a deeper understanding of why offspring tend to look and perform like their parents, pedigrees took on a greater importance in animal breeding and the idea of "bloodlines" began to guide breeding decisions, especially with racing horses where it was very easy to see and measure differences in relative performance.

Eventually bloodlines were replaced by statistical genetics. As Dr Sara Via from the University of Maryland says; "The new methods of statistical genetics were a breakthrough for animal breeders because they allowed the genetic value of an individual to be estimated separately from the effects of the environment. These statistical methods were rapidly adopted by both animal and plant breeders. Between 1940 and the present, livestock and plant breeders have invested vast amounts on research and development to improve the accuracy of tools in statistical genetics."

Developed in the 1980's, the Expected Progeny Difference (EPD) is the jewel in the crown of genetic tools when it comes to animal breeding. EPDs represent an advance over earlier methods for estimating the genetic value of individual animals because EPDs utilize information from all animals in the herd in the context of the entire pedigree. Compared to when breeding decisions were based on pedigree and/or show results, using EPDs to inform breeding decisions has produced dramatic improvements in the quality of cattle, pigs and sheep.

### **EPDs and Alpacas as at April 2008**

Alpaca breeders in America, Canada and Australia + New Zealand have started to embrace programs that estimate genetic values for individual alpacas.

In North America the IAC (Ideal Alpaca Community) is working with Dr. David Notter, at Virginia Tech. where EPDs are currently being calculated for US alpaca breeders. Dr. Notter also produces the statistics for the National Sheep Improvement Program (NSIP). Currently, only alpaca fleece traits are included in the analysis. For 2007, over 3000 fleece samples were measured and submitted together with pedigree information. Within the IAC, there is a group of reference herd sires known as the Studmasters. These are jointly owned by IAC members, and travel around to different farms. This produces the connectedness required for the EPD analysis. In future, additional Studmasters will be added from members' herds to increase connectivity within the overall "virtual herd".

[www.ideal-alpaca.com](http://www.ideal-alpaca.com)

The Canadian AHEAD (Alpaca Herd Evaluation for Advancement) program is currently limited to an estimation of Within Flock EPDs, that is, estimates of relative genetic value of alpacas within single herds. This limitation arises because the Canadian scheme does not have a set of reference herd sires. As a result Canadian breeders will only be able to use the results of the program to compare animals within their own herds.

<http://www.hummercountry.org/feb08ahead.html>

The Australian and New Zealand programme AGE (Across-herd Genetic Evaluation) is able to produce estimates of breeding values (not EPDs, but similar) across herds, using the pedigree information from the national registry. Again they do not have a specific set of reference herd sires. In this program, breeders choose which traits to measure from a list of 27 alternatives. This programme has data from two years, 2006 and 2007, and they publish the distributions of breeding values for each trait.

[http://www.alpaca.asn.au/pub/AAA/age/age\\_intro.shtml](http://www.alpaca.asn.au/pub/AAA/age/age_intro.shtml)

I believe now would be a good time for the British alpaca industry to take a long hard look at EPD programmes and have a meaningful debate about establishing a national scheme. The writing is on the wall.

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