ALPACAS: Fibre matters!

Published in Alternate Farmer, July 1998, p.20

(Part I of a two-part article by Dr. Ian Davison, Director of the Australian Alpaca Fibre Marketing Organisation)

In 1997, the modern Australian alpaca industry celebrated its tenth birthday. In the same year, the merino sheep celebrated its bicentenary on Australian soil, having arrived from South Africa in 1797. Today, Australia is host to a massive wool industry, based on over 125,000,000 sheep; the fledgling alpaca industry boasts a mere 20,000 animals. How different this opening paragraph might have been, had not Charles Ledger's original (40) alpacas imported from (Peru) in (1867) not foundered on political indecision and financial uncertainty!

It is often said of alpacas that they are an animal that got lost looking for Australia. By that is meant that, as an industry, they are ideally suited to Australia, with their renowned hardiness in a wide range of climates, their efficient grazing habits and low nutritional requirements, the successful history of fibre production in Australia, our understanding of fibre and selective breeding, the relatively clean and disease-free environment of Australian agriculture, and our experience and expertise in veterinary medicine and animal husbandry.

So in 1998, the Australian alpaca industry already has a two hundred year experience in fibre production to guide the development of the industry. That experience is in merino wool production, and whilst it must not be forgotten that alpaca and merino are different animals producing different fibres, there are valuable lessons to be learnt by a critical appraisal of the wool industry and its history, development and research.

Perhaps first amongst those lessons is that the wool industry has been slow to embrace science, and reluctant to discard traditional dogma. The longheld nexus between fine crimp and fine fibre has now been broken by objective scientific measurements of fibre diameter, thanks to relatively recent optical and laser technologies, but there remain many breeders whose passion for crimp, of now arguable importance, burns undiminished by questions of commercial relevance.

To survive the inevitable, but thankfully slow, transition of the alpaca industry from a breeding-based industry to a fibre-based one, alpaca breeders will need to be astute in their selection of stock and their breeding practices. Decisions made now will determine their ranking as fibre producers in the 21st century, and those decisions should be based as far as possible on scientific fact, and not on market hype.

Figures analysing price variation per kilogram of clean merino fleece sold at auction consistently record an overwhelming emphasis on fibre diameter, accounting for 73% of price variation on 1994/95 figures. Staple strength was next in importance, accounting for just 8%. Vegetable matter and length accounted for only 3% each, and style (incorporating staple tip shape, dust penetration, and crimp definition) only 2%.

To realise maximum return from their commercial herd, breeders must therefore aim to produce fleece which will maximise the equation:

Total clean fleece weight x $(fibre diameter determined) = Income

Whilst this might seem elementary, clean fleece weight will tend to increase as fineness (and hence $/Kg) diminishes, and the maximum income will be determined by what premium the market will place on fine fibre. In practice, the maximum income is most likely to be for neither the highest fleece weight nor the finest fibre, but somewhere in the middle ground, and will vary from season to season.

Staple strength is another important determinant of fibre price variation. Recent research in wool has shown that there is considerable variation in staple strength between sheep in the one flock; that relative strengths between sheep in the same flock tend to remain the same, despite variations in absolute values; and that staple strength is a heritable characteristic (between 20-40% heritability). Furthermore, recognising that there is a variation in fibre diameter along each individual fibre, a strong correlation exists between low staple strength and the minimum diameter of that fibre, as well as the *rate* at which the fibre diameter changes around that point. Whilst staple strength can be measured directly, it is relatively expensive compared to the fibre diameter histogram. Fibre diameter variability, expressed as a coefficient of variation, is therefore a cheaper but reasonable basis on which to base breeding decisions for improved fibre staple strength.

Breeders also need to be discerning in interpreting the results of fibre histograms. They should recognise, firstly, that the date of the test is just that: the date of the *test,* and does not necessarily correlate with the date of *fibre sampling.* Secondly, Americans frequently do a *butt cut*, which measures fibre diameter at *one point* along the fibre, usually close to the skin. In Australia, samples are more frequently minicores, where the fibre sample is cut up into short lengths, and then 4000 individual fibre diameters taken. This method effectively measures fibre diameter at several points along the length of each fibre. The butt cut is an excellent reflection of the fleece diameters *at any one point in time*, representing only *inter*fibre variability. The minicore sample more truly represents the entire fleece, from the time of sampling back to the date of last shearing, and reflects both *inter*- and *intra*-fibre variability. The minicore method should always, therefore, measure a higher CV than a butt cut.

Whilst reflecting a high degree of accuracy and reproducibility, optical and laser fibre testing can only reflect the response of the fleece to the environment in which it is grown. Just as the environment may change between *locations* on the basis of climate and pasture, it can vary between *animals* on the basis of health and nutrition. Fibre tests must therefore be considered in that context, and are most useful when compared to those of other animals in a herd exposed to the same climatic and nutritional environment. A healthy animal in a favorable environment may produce a much coarser fibre histogram than the same animal in a harsh climate, starved of feed. His true genetic potential would be better defined by his *ranking* for fibre diameter amongst other animals grazed under the same conditions, irrespective of whether those conditions are favourable or unfavourable.

Increasingly, alpaca breeders will need to rely on their understanding of fibre production and selective breeding practices in order to remain competitive and productive in the commercial phase of the industry. In recognition of that need,

AAFMO is committed to the promotion of education and research in alpaca fibre. As a first step in that direction, AAFMO is to host a one-day seminar with the CSIRO on November 7th, entitled ***Fibre Science and Technology: Lessons from the Wool Industry***. This will be an unabashed scientific and technical seminar examining the CSIRO's experience in the wool industry, and looking for future direction for the alpaca industry. The seminar will be conducted by a range of CSIRO scientists, and will be held at the CSIRO's Prospect (Sydney) facility. *If you intend to be a part of the alpaca industry into the 21st century, this is a seminar you can't afford to miss.* Registration will be $180, to include catered lunch and breaks, and bound notes. For further information, contact Cobie Clifford on 015.884.570.

Look for the second part of this article, in the next issue of *Alternate Farmer*, which will address such issues as fleece weights and yields, the judging of alpacas, the need to establish practices and protocols suitable to broadacre farming, and avenues for alpaca research.

Published in Alternate Farmer: *Pathway to Profits*, Nov 1998, p 17.

In the first of my articles for Alternate Farmer, I discussed various matters relating to alpaca fibre production, and the scientific parameters by which that fibre is measured. I was emphatic that breeders should look now to where their profits will be made in five and ten years time, and make conscious breeding decisions now that will guarantee them success as the industry approaches commercial viability.

Income derived from alpaca fleece will be determined fundamentally by a breeder's success in maximising the weight of clean fleece available for sale, and the price per kilogram for that fleece.

Whilst that might seem self-evident, consider its implications.

Firstly, we are talking about maximising *clean* fleece weight. What we invariably measure when we shear and despatch fleece is *raw* fleece weight. If fleeces are highly contaminated by vegetable matter, dust or suint (oil and sweat), those raw fleece weights should be discounted, as the *yield* after removing the contaminants will be considerably lower than the nett weight of the fleece.

Yield is the term given to the clean fleece weight after scouring, expressed as a percentage of the greasy (raw) fleece weight. In Merino sheep, it is typically as low as 65%, and whilst figures as high as 95% have been predicted for alpaca, early results would suggest yields more typically in the 80's.

Whilst the average alpaca has much less grease and sweat content than the average Merino, it has a more open fleece, and is therefore potentially more vulnerable to contamination by the burr and dust that is frequently part of the environment of many wool-producing regions. Selective breeding can certainly improve on alpaca fleece density, but alpacas with very dense alpaca fleeces are often noted to have a smell not unlike greasy wool, reflecting a rising content of suint. These very dense animals may be more vulnerable to fleece rot and fly strike, but more importantly, the yield on their fleece will be reduced by their sweat and grease contamination, despite the relative lack of dust and vegetable matter.

Whatever the raw fleece weights, remember that it is the *clean* fleece weights that will determine profit, and breeding decisions based on raw fleece weights without adjustment for the wide range of possible yields may compromise the commercial success of breeding programs..

The second part of the equation relates to price paid per kilogram by the buyers of our product. It is well to keep a watchful eye on where alpaca fleece is going, what type of fibre is in demand, and what prices are being paid for it. In general terms, finer fleece will sell more easily and at better prices, and stronger fleece will be sold into niche markets for lower prices. AAFMO's experience to date suggests that fibre up to 26 micron is relatively easy to sell, as demand is generally greater than supply. It is likely that white fibre will also be sought after, given its versatility in dyeing, but coloured fibre of equal quality could conceivably produce higher prices because of the smaller amounts available. It is likely that fibre will be downgraded for a wide variety of reasons, including variation from the ideal length, strength, coefficient of variation, lustre, crimp, and guard hair content, but these criteria are likely to vary according to the processor's end-product, and their effect on price is therefore less predictable.

This brings us to another matter of vital importance to the industry: if commercial success can be predictably based on fleece weights and fibre fineness, showing and judging standards should reflect that fact. There is little argument that the showring has a profound effect on breeding decisions. This fact can be used to guarantee that the industry develops longterm viability by ensuring that breeding standards for commercial success and showing success are the same. Whilst fineness is already a criterion in the showring (arguably less recognised than it deserves), there is presently no accepted mechanism for assessing fleece weight, the most fundamental parameter of commercial concern. It has been said that it is too hard to measure and validate in the showring: my point is that it is too important to ignore. There are many possible ways in which it can be assessed; it is the job of our Association to ensure that our judges formulate and implement such methods.

Consider one such proposal: alpacas gather at one place for a show, are shorn clean on site, and judged for conformation. Twelve months later, at the next show, the same animals are judged again, for fleece. Whilst perhaps more involved than the usual "front and flaunt" style of competition, it is more meaningful, and the result more truly representative of the breed standard.