CAN WE UPDATE OBJECTIVE MEASUREMENT FOR MERINO BREEDING?

J. Coy

"Pine Glen", Wellington, N.S.W. 2820

After work at research stations in the 1950's, it was recommended that selection on high, clean fleece weight be adopted by studs to increase wool production. Later the micron value of the fleece was added. This method was adopted by many studs and flocks and is still used by some studs today. A large number have abandoned this system after a trial period.

Because this is the basis wool is sold on, it was the logical approach to increased wool production, in terms of return per head.

Now thirty years later where are the top producing flocks, and how are they bred?

As most studs run their breeding ewes at a similar DSE basis, flocks may be evaluated on a lambing percentage and average wool cut from the breeders. After all, this is the production level passed on to the commercial breeder, not that of a highly fed ram.

On the above evaluation, it is considered that flocks averaging 9 kg and above are highly productive. To the best of my knowledge, no flocks using clean fleece weight as a main selection requirement have attained this weight.

There are many flocks, however, attaining this level; some having only been in existence for 14 years. These breeders are using subjective methods only or greasy fleece weights on rams as a reference only.

We have a situation where commercial wool growers are being urged to purchase their replacement rams from studs demonstrating progress, where the measure of progress is that they are using clean fleece weight as a selection criteria.

May we look at this illogical advice. A stud whose breeders are cutting 5 kg using clean fleece weight and showing a gain of 1 percent p.a. is recommended before a stud whose breeders are cutting 9 kg. I am not a betting man, but I know from which stud my bank manager would like me to purchase my rams.

If we look at what these subjective breeders are doing, we may be able to improve our objective measurement to attain similar results, and so assist those who have not attained the skills of the old stud breeders.

Man has developed the Merino to suit his requirements to a greater extent than most domesticated animals. A ram cutting 18 kg out of the paddock is a far cry from nature's prototype. If a Merino flock is neglected, with no selection pressure placed on production, ram

introduction, or selection, the flock does not become more productive. These animals become lighter framed, visually finer wooled and wool production decreases.

In the stud industry, we call this reversion or regression. Obviously the geneticist cannot subscribe to this, or all his work using random selection flocks to measure progress would be worthless. So let us call it a feral situation where the lighter, plainer types have a better survival rate than the heavier more productive types. They are more vigorous, the rams sire more lambs and the lighter cutting ewes have a higher lambing percentage and rear more lambs.

The stud breeder makes allowance for this in his selection. His top sires, which will produce the sires of commercial rams, are stronger visually than required, are larger and heavier boned, have a lower yielding wool and carry more skin development than is required in general industry. This counteracts the reversion, oops, the feral situation and at least maintains a level of production if not increasing it.

From practical observations, I would expect clean fleece weight to be very heritable in a flock cutting 3 kg, marginally in a flock cutting 6 kg and if introduced into a flock cutting 9 kg a negative result would be attained.

Not being a scientist, rather a lowly shepherd who earns a living by running sheep and breeding stud sheep for other misguided souls who pay for results, I have tried many methods of breeding and selection, including selection on clean fleece weight. To date the combination of two basic characters is giving the fastest and most productive results, while the introduction of these characters from established flocks has hastened the development of recent breeders. The major factor in wool production is the animal's skin. How effective a highly productive skin is, depends on feed conversion and its balance.

We are no doubt aware of the skin structure - epidermis, dermis, fat cells and connective tissue. This can be related to our soils, the deeper and better nourished they are, the more productive. The reverse also applies.

As we select for clean fleece weight, we are selecting for a smaller sebaceous gland. This has a direct correlation with skin thickness. All flocks selected on a clean fleece weight basis over a period of years have a common skin character, that of being thin and poorly nourished.

A thick highly productive skin has characteristics quite different from the average. It has a visual appearance of thickness and softness and a rich colour. When cut and measured, it is quite thick, 2 mm+, expands and has deep connective tissue.

The fleece structure is also different. The wool has more pronounced crimp, the staple formation is larger and more regular, the wool is longer and has high fibre density within the staples. The follicle groups are large and regular in shape and size, allowing a greater follicle population per skin area, a higher S/P ratio and uniform fibre distribution. Density increases towards the centre of these large dense staples, and the micron value is much finer than the crimp indicates. The main visual characters are the large regular staple formation and strong crimp with a fine value.

The stud breeder is interested in long term production, keeping good ewes to 13 or 14 years of age. A thick skinned animal will maintain its production and fleece quality into old age. A thin skinned animal loses production due to follicle loss at 4 or 5 years of age. A thin skinned ewe can give a fairly high fleece reading at 18 months, but will be very low by 4 years of age.

If we compare progeny of both skin types, those sired by a thick skinned ram of equal wool production to a thin skinned type, will outperform those of the thin skinned ram by a large degree over lifetime production.

Wool crimps roughly every 8 days. A wool visually 58^{s} (25μ) is growing faster than a wool visually 64^{s} (21μ). If our stronger crimped wool has a fine micron value, we are looking at high density and a thick skin. As we have selected for high production in this manner, wools tend to become finer as weight is increased.

With objective measurement of rams, we note the visual wool strength and score the staple formation - A=thick; B=average; C=thin - as we take the wool samples or select our sires. So, a ram visually 58^{s} with a fine micron and a staple score of A can be assessed as having a good skin. If the GWP is reasonably high and the ram is structurally sound bodily, he would fill the bill as a sire. We have found this increases our rate of gain and greatly improves the long term wool production of our ewes. It also keeps sufficient skin on our animals to counter the feral situation. This method of selection will never replace the trefine and microscope, but is on the same road at least.

It is of no use developing a highly productive skin unless the animal can service it and carry the wool weight around. The Merino is a very efficient forager, but generally a poor converter of feed. The industry has to run animals that are efficient converters of grass into wool and animal protein. The greater this efficiency the more profit per hectare of country.

Let us consider the following table to demonstrate this efficiency, based on a sheep cutting 4.5 kg of wool and requiring 6 food units per week; one cutting 6.8 kg and requiring 7 food units per week and one cutting 9 kg and requiring 8 food units per week.

Wool Cut kg	Food Units P/W	Food Units Per Year	Food Units Per kg Wool
4.5	6	312	69.3
6.8	7	364	53.5
9.0	8	416	46.2

These figures are realistic and demonstrate that high efficiency and production can be attained. We observed this first with shed feeding of rams. Heavy cutting strains ate little more than lighter cutting strains of Merino.

To put a value on what the animal is doing in the field, a practical method has been evolved which is also a good measure to compare flocks or strains.

An empty body weight is taken off shears at 4 to 5 months of age. At 12 months a further body weight is taken off shears, and the fleece weight noted.

The equation of $\frac{\text{Wool weight} \times 100}{\text{Body weight gain} \times 1}$ is used.

In a highly productive flock, the range can be from 12% to 53% or higher conversion into skin and wool. The optimum appears to be in the range of 35% to 42%. This gives the animal a balance of carcase to wool growth, enabling it to perform under paddock conditions and grow good wool weights. It also gives us a tool to manipulate the animals within a flock, for more wool or carcase growth as may be required. Obviously, all sheep are run together and receive the same management.

Slight variations may occur due to seasonal conditions, but animals will maintain their rank.

We observed that animals above 42% lacked carcase size and body maintenance in later life, while those under 35% demonstrated lower wool cuts in favour of carcase development.

Once these characters of skin and conversion had been developed and identified in flocks, it was quicker to introduce these into other flocks rather than to develop them within the flocks.

For those interested, the following procedure was found to be the most effective.

(a) Select a stud where the character required is demonstrated in all their sheep.

(b) Select a group (Not 1) of Sires similar to your own sheep from this stud.

(c) Select ewes from your own flock as close in type to the stud supplying the rams to be mated with the introductions.

(d) Select the top performing progeny of this joining, showing the required character, for mating with your general flock.

By using this method, introductions could be made without changing the appearance of the original flock, yet increasing production by up to 50% in one cross, depending of course, on the original production levels.

These are practical observations and the results of trial and error from a layman in the industry, presented to you in the sincere hope that through more discussion and research, a better method of breeding Merino sheep may be achieved.