

BREEDING

HERITABILITIES

We are fortunate the heritabilities for the main cashmere production factors like Mean Fibre Diameter (MFD) and Down Weight (DW) are high. Much higher than other farm animals. This means rapid breeding progress is possible in cashmere production

Range of estimates of heritability and genetic correlations for liveweights and fleece traits in cashmere producing goats

	Liveweight	Fleece Weight	Yeild of down	Down weight	Down diameter	Down length
Liveweight	0.22 - 0.29 *	0.05 - 0.17	-0.2 - 0.24 **	-0.13 - 0.18	-0.06 - 0.14	0.00 - 0.31
Fleece Weight		0.25 - 0.35	-0.13 - 0.39	0.34 - 0.83	0.12 - 0.48	0.05 - 0.27
Yeild of down			0.23 - 0.90	0.74 - 0.85	0.33 - 0.63	0.41 - 0.78
Down weight				0.36 - 0.66	0.04 - 0.77	0.45 - 0.88
Down diameter					0.47 - 0.99	0.28 - 0.52
Down length						0.58 - 0.70

* Heritabilities are indicated in bold. The range is the variability measured from different studies

** Other numbers represent genetic correlations. Red are negative.

Genetic correlations - simply if you select for a trait what influence does that have on another you maybe selecting for.

- If selecting for one trait and the genetic correlation of another trait in positive that trait will be selected for also depending of the degree of correlation
- the closer to 1 the higher the relationship. If negative it will select against the associated trait.
- the closer to 1 the faster genetic progress can be made

Defining breeding objectives is the first and most important step in any breeding program because farming decisions come from them.

To do so

1. Identify the various sources of financial returns and costs; eg fibre, meat, live sales, weeds
2. Determine which animal characteristics influence the financial returns and costs; eg fleeceweight, fibre diameter, bodyweight
3. Rank economic value of each characteristic.

NOTE : The fewer factors selected = greater selection pressure = faster genetic gain

High heritabilities of economic traits associated with cashmere, produces rapid genetic progress that can be made.

With foundation flocks rapid fibre production gains can be achieved. The 1990's industry downturn resulted in significant selection on remaining flocks with only productive, sound and good fibre goats being retained. Today we have a different genetic base following 30 years of breeding with much improved flocks from early industry times. Through many ensuing generations the natural resilience of New Zealand feral goats has also been maintained.

We see significant improvement each generation. Our summer wet environment has allowed challenge and selection of only the best. Being able to produce and use our own homebred sires brings big benefit. With no cashgora and angora complication and influence feet today are seldom an issue.

Goat conformation and size is also an important consideration when selecting replacement sires and does. Goats natural ability to produce high kidding percentages gives many available replacements with high selection pressure. Faster flock improvement and productivity gains comes from shorter generation intervals and higher genetic turnover. We test buck hoggets annually and mate well grown doe hoggets.

Another benefit from having large numbers of young animals is they produce the highest value prized precious fibre.

SELECTION CONSIDERATIONS

COLOUR

White, Grey and Brown cashmere all have value. White cashmere has a premium and other advantages and should be a medium-term breeding aim.

White genes quickly accumulate in flocks. Kid crop colour will be influenced by their mothers colour background and the sires being used. Base or foundation flocks will likely have multi-coloured does. When white bucks are consistently used for annual matings and preference given when selecting replacements and cull does a white cashmere flock results. Some coloured kids will be born but an increasing proportion will be white with less dark coloured animals.

With high replacement rates from superior subsequent progeny farmers can quickly move to predominately white flocks. Our 2017 crop of kids after 32 years farming saw only 4 kids with darker colour (one brown, 2 blue and one dark ginger) out of over 350 born. From starting with feral does of all colours our doe flock was mainly white after 3 generations. Many coloured feral, F1 and F2 does produce excellent cashmere being very good and retained for breeding, but need to make way and room for better younger does coming on.

FIBRE DIAMETER

There is a premium for fine cashmere fibre. Classing grades the fibre into 3 micron bands; grade "0" < 15.5 um averaging 14's; grade "1" 15.5um to 17um averaging 16's um; and grade "2" 17um to 18.5um averaging 17's

Fibre diameter also coarsens with age, typically 2 to 4 microns during the goats lifetime. Kid fibre will naturally fall into finer the higher paying grades. Fleece weight also increases to the second fleece shearing fleeces as 2tooths and are a very good indicator of lifetime performance.

Traditional Chinese cashmere is approximately 15 to 16 microns with highest quality most valuable kid cashmere at approximately 14 microns. There is a negative correlation between fibre diameter

and downweight. If farmers select solely for one you compromise the other, meaning selecting for increased downweight can result in increased Medium Fibre Diameter (MFD) and lower price per kg. Farmers need to make an economic judgement as there are compromises of how fine to go.

DOWN WEIGHT

Fibre is bought on a per kg basis so increasing downweight increases returns. Heritability of downweight is high but there is a negative correlation between downweight and fibre diameter. This means fleeces tend to coarsen as downweight increases. Careful buck selection can counteract this.

FERTILITY

Goats are naturally fertile if well feed, in good condition and healthy. Numbers of kids weaned can be more influenced by the environment. Our experience is that if kids survive the first few days they have a high likelihood of being there at weaning. High kidding percentages results in more kids that are available for selection which helps increase genetic turnover and genetic and production gains.