Stud sectors often ignore commercial realties, so genetic improvement suffers

Looking back to look forward

"Deer farming a decade from now will be no place for dabblers. Those deer farms that will be prospering 10 years hence will be the ones which are formulating their breeding objectives now."

By Paula de Rose

Thus wrote Invermay scientists Peter Fennessy and Peter Dratch well over a decade ago, in the last of their series of articles on deer improvement published in The Deer Farmer between 1984 and 1986.

Though technology has marched on in the last decade, much of the content of those articles is still relevant. But contrary to the hopes of Drs Fennessy and Dratch, the industry has not kept pace with the technology.

What has prevented genetic improvement from taking hold? A number of factors can be identified: the structure and (im)maturity of the industry, the volatility and lack of transparency of the markets, the attitudes of producers, and the lack of a strong infrastructure of programmes and services have all had an effect.

But these factors evolve, and the climate for genetic improvement seems to be improving. There has been a recent surge of interest in deer improvement. Perhaps we'll be wondering, 10 years from now, why the enthusiasm fizzled out – again.

Let's admit that genetic improvement can be complex, time-consuming and slow. But if the industry consigns deer improvement to the too-hard basket, it does so at its peril. For genetic improvement to be a success, breeders, researchers, service providers and industry organisations need to be more effective in tackling individual and co-operative improvement initiatives.

To get a picture of what's required, let's take a look at genetic improvement theory and the practical implications for the deer industry.

Defining breeding objectives

"The success of any programme of genetic improvement depends foremost on defining the trait we want to improve." That's Fennessy and Dratch again. They went on to list many important traits in deer farming.

The state-of-the-art science of animal breeding lets us combine genetic and economic information on various characteristics to define profit-oriented breeding goals. The science can produce tools (that is, selection indexes) to use in selecting genetically superior animals to move a herd toward the defined goal.

Of course, breeding goals can vary for different industry sectors, because different production systems and products – breeding stock, slaughter animals – alter the relative importance of traits. The science can take that into account. For example, stags could have indexes indicating their overall genetic worth as growth, reproduction, or velveting sires.

It's pretty much impossible to come up with tools as powerful as science-based breeding objectives and selection indexes at the kitchen table or the farm PC. Even breeders who give a lot of thought to their breeding programme could do much better by relying on the technology and the researchers.

How to best pursue the breeding goal depends on the animal population available. To quote from the past again: "It is the genetic variation within the population which provides the raw material for selection"; and "Hybridisation for rapid genetic progress in a valued character does not obviate the need for selection...but only postpones it".

With its blend of domestic stock, European strains and North American Elk, the New Zealand deer population couldn't have much more genetic variation. The challenge now is selection. But "hybridisation" does have an important impact on how selection should proceed.

Crossing programmes

Crossing programmes have a place if a population includes very different genetic types. These can show either heterosis, where hybrid vigour boosts the progeny above the average of the two parents, or complementarity, where different genetic types as sire and dam lines boost production efficiency.

While little heterosis appears to exist in the New Zealand deer population, complementarity is present and used to great

effect. Crossing is here to stay, and that's been evident for some time the most efficient herd would be comprised of mature females that are large enough to produce and rear fawns from a terminal sire, but no larger.

In other livestock species, breeds usually form the genetic groups used in crossing. The stud industry provides the breed resources, and the commercial tier puts them to use. The stud/commercial model assumes that market relevant genetic change will be created at the stud level.

It further assumes that the strengths and weaknesses of each breed will be objectively assessed, and that the stud level will use selection to improve each breed in keeping with its commercial niche (that is, terminal sire type, maternal type).

Unfortunately, stud sectors frequently become isolated from commercial realties. Genetic improvement suffers. Where registration barriers prevent elevation of superior commercial animals to the stud level, the commercial tier may develop unregistered lines and "synthetic" breeds to address genetic needs.

Food for thought

It's time to hit some controversial issues, without any supporting quotes from the past. What has the stud tier in the New Zealand deer industry got to offer?

A lot of effort has gone into importation. Selection has been fairly ad hoc, based on subjective assessment or performance data rather than modern genetic information.

Comprehensive performance recording is still not common enough, and not well supported by the usual stud tier infrastructure of registration (unique stud animal identification) and computerised pedigree systems.

Selection has focused on velvet. This is a highly heritable trait and improvements have been made. However, for all the other important traits, little change appears to have occurred. While imported genetics are concentrated in the stud herds, superior genetics, especially for venison, could exist anywhere.

Do strains have a role to play? Continuing in a controversial vein, the next logical question is: What do strains have to offer? Are they a logical and effective way of subdividing the New Zealand deer herd into "genetic groups" which are useful starting points for selection, and useful resources for crossing programmes?

What genetic package do you want on your farm?

To be suitable for genetic improvement, genetic groups need to be sizeable populations that are quite genetically distinct from one another, and made up of individuals that have similar genetic characteristics. In other livestock species, breeds offer ready-made groups. While they're often far from ideal, tradition and convenience favour their use.

Strains are not ideal genetic groups

In New Zealand deer, there is a continuum of genetic potential for weight, fat, fertility, mothering ability, velvet, fawning ease, and every other imaginable trait. Animals of the same strain may be far apart on the continuum. Even Elk and Wapiti may be widely scattered along the genetic continuum.

There is likely to be as much variation within genetic groups as between them. We don't have much objective data on strains and sub-species. These populations may not be very "pure", very well identified, or contain many animals. The usefulness of strains and sub-species as genetic groups will be further eroded, for the breeders involved with these populations have no common breeding objectives.

Choosing a "genetic package"

It makes sense to skip the strain and sub-species groupings and move straight to the individual animal level, where selection indexes can allow widespread animal comparisons. The breeder would then ask: does this animal, whether it is a pure strain, cross or hybrid, provide the genetic package I'm looking for?

There will be other factors that determine whether you really want that genetic package on your farm.

Perhaps the stag is only a 2-year old, and you're looking for one with more serving capacity. Perhaps its temperament is poor. Perhaps its percentage of Wapiti blood poses management complications you'd rather not deal with.

While making allowances for these non-genetic factors is understandable, genetic progress can be compromised as a result. Managing these trade-offs is a challenge, for both stud and commercial operators.

Lack of research information is a major problem for the New Zealand deer industry. Researchers are handicapped in examining heritabilities, heterosis, and other population characteristics. Without data, modern genetic information can't be produced. Without such tools, selection of superior animals for use in the stud and commercial tiers can't progress. ■