The Deer Progeny Test project

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Genetic improvement is an opportunity for the venison industry to make significant gains in productivity. The New Zealand deer industry farms a recently domesticated animal with significant genetic diversity. Early selection programmes were dominated by culling for temperament and selection for velvet. A significant opportunity exists for the industry to focus genetic selection on improving venison productivity.

In 2005 DEERSelect was launched as the deer industry genetic evaluation system, providing across-herd breeding values for growth-related traits in deer (Archer et al, 2005). Since then estimated breeding values (EBV) have become widely accepted by industry as a useful tool for selection and sire purchase decisions. Additional features have been added, including the facility to analyse data from Elk and Wapiti, a new EBV for conception date and economic indices to optimise the trait balance for different situations. In the mean time recent successes in sequencing the deer genome, and the development of genomic BVs in cattle and sheep, have highlighted the potential for further technologies to be added to the tools currently available.

There are a number of issues in deer genetics which should be addressed.

1. Across-herd evaluation relies on genetic linkage being maintained between herds via use of common sires. Initial linkages were set up via a sire referencing scheme run at Invermay in the early 2000's, but these linkages need to be maintained. Sharing of stags via AI has not occurred uniformly across the deer breeding herds, so a specific strategy to reinforce the linkage would be useful to ensure that comparisons across herds remain robust and accurate.
2. Red deer and Wapiti are currently evaluated separately, and the EBVs are on a different base line and not comparable. This is a significant obstacle to the use of BV technology in Wapiti..
3. DEERSelect requires further development to evaluate additional traits that have been identified as having significant impacts on profitability. Further analyses are then required to investigate whether negative associations exist between traits as it's important that selection for one trait is not having detrimental effects on another important trait.
4. Maternal genetics require evaluation to benefit industry. The industry has moved its breeding hind base into hill and high country extensive systems. The question remains as to how different types of deer genetics perform under these systems, particularly for reproduction and survival. There is a diversity of opinion around this question, with little or no objective scientific information to support any particular view.
5. Resources of well phenotyped deer populations are required to enable further development of traits, associations with other traits and development of genomic tools that speed up genetic progress by reducing the generation interval.

Progeny testing

To address these issues, a deer progeny test project has recently commenced. The project has a series of strategic objectives including:

1. Supporting the Venison Industry Strategic Intent and the Productivity Strategy.
2. Form a core resource for venison industry bree**d**ing programmes and also for further genetic and genomic research and development.
3. Provide independent information for commercial breeders purchasing stags.
4. Increase market led focus and interaction among venison-focussed deer breeders.

Specific objectives of the project include:

1. Ensure linkage and robust performance comparisons of genetics across herds.
2. Provide an independent validation of DEERSelect results.
3. To develop, in combination with industry partner herds, a suite of new on-farm and in-plant traits for inclusion in DEERSelect.
4. To enable comparison of red deer and Wapiti for relevant traits.
5. Provide a resource for development of DNA-enhanced BVs.
6. Provide information on maternal performance, in particular reproductive performance and longevity of hinds under extensive farming conditions.

A range of current and new traits will be considered for measurement and evaluation. The list of core traits for consideration includes:

1. Conception date
2. Hind fertility
3. Hind survival/longevity
4. Growth
5. Meat yield
6. Venison quality
7. Pedicle development
8. Co-products e.g. tails
9. Johne's resistance
10. Temperament (will require development of a scoring system)
11. Parasite resistance (assuming an adequate diagnostic test is identified)

Other traits may be added to the evaluation where a good case is made and resources are available.

Management and funding

The Deer Progeny Test (DPT) project will be overseen by an industry committee, to ensure that the project delivers relevant outcomes to the deer industry in a timely manner. Funding will be provided for the first cycle of progeny testing by Alliance Group Ltd, Landcorp Farming Ltd and DEEResearch (incorporating both industry levy and government funding).

A number of partner herds are involved, having either provided semen from stags or using semen from one of the provided stags in their own herds. These partner herds are committed to implementing a parallel measurement and recording programme. The benefits of this are, to greatly expand the data resource and provide a direct pathway to implement the project outcomes via improved stags being immediately available to industry.

Progress

The project commenced in March 2011 with an AI programme conducted on over 800 hinds on two properties, White Rock Station (in the Rangitata gorge) and Invermay (Mosgiel). A total of 9 maternal and 5 terminal stags were represented in the AI programme. The maternal stags represent a range of genetics from moderate to high growth types (based on blood lines and EBVs for growth). All progeny will be measured for core traits. Carcass and venison quality traits will be measured on male calves from the maternal stags and both male and female calves from the terminal stags. Female progeny from the maternal stags will be retained as replacements on properties which have relevance to the extensive conditions that many hinds are run under currently. These progeny will be measured for on-going maternal performance and survivability, and will provide information on how daughters of different stag types perform under challenging environments.

Outcomes

The project will form a significant resource for the deer industry into the future. The majority of the outcomes will be delivered via DEERSelect in the form of newly enhanced EBVs and breeding tools available to breeding herds. These tools will facilitate more rapid and better balanced genetic progress in key industry herds, with the commercial sector of the industry benefitting through the availability of improved stags for use in the commercial sector. An preliminary cost:benefit analysis has suggested that the net present value of the project could be in the order of $9 million with an internal rate of return of 28%. Opportunities to leverage off the core resource to generate greater value from the investment will be sought. An example of this would be an identified need for a project to calibrate different yield measurement systems implemented by different processing companies with a standardised bone-out protocol, thus enabling yield measurement systems to contribute to EBVs for yield. Experience with the sheep Beef + lamb NZ Central Progeny Test project would suggest that these opportunities will prevail and will form a central platform for a range of industry activities.

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References

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