HOW DO SHEEP BREEDERS BENEFIT FROM NEW TECHNOLOGIES?

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SUMMARY
This paper describes a model developed to estimate the direct and indirect costs of rearing ram lambs from slaughter age through to sale age at 15 months as a commercial breeding ram. The model has been used to help quantify the impact of Ovita sheep breeder technologies within a New Zealand ram breeder's business. Benefits can be accrued by the breeder through increased sale premiums due to the availability of gene test results or higher accuracy of genetic merit predictions. Alternatively, benefits can come from an increased number of rams sold by an individual breeder or through opportunities from sheep sales and multiplier arrangements.

INTRODUCTION
There are many factors that influence ram breeders when deciding if they should invest in new technologies for their breeding operation. There is a need to balance the cost of the investment versus the potential return, and make an informed decision on whether the technologies will provide value within their ram selling business and for a reasonable proportion of breeders, also within their own commercial farming operations. To date, most cost benefit analyses addressing Ovita technologies have focused on the total industry value of genomic technologies, which has been measured according to the added value realised through the sale of genetically superior rams for commercial use (Sise and Amer, 2009; Sise *et al.* 2011).

This paper focuses on mechanisms that breeders can use to realise their share of the added value, and thus attempts to understand what might motivate breeders to uptake the technology for their own benefit, resulting in benefits for the sheep industry as a whole.

As part of this, a model has been developed to estimate the full direct and opportunity costs associated with rearing ram lambs through to sale age at around 15 months. This allows the benefits of adoption of the technology to be weighed against the cost and savings through changes in management practices and investment in new technologies.

BREEDING RAM COST MODEL
The model assumed a base farm set up with 1000 breeding ewes weaning 1.4 lambs per ewe, and a ram breeder retaining a variable proportion of ram lambs/breeding ewe for sale to commercial buyers, with a 2nd variable used to describe the proportion of ram lambs/breeding ewes remaining unsold at the end of the season. Costs of raising ram lambs from slaughter age to sale at around 15 months of age were assembled. Results were then scaled to express costs per ram sold.
Based on real farm data, the model examines the value of breeding rams sold to commercial buyers, relative to costs. Costs include the loss of income from prime lamb sales to the meat processor that would have been received if the ram lambs had been slaughtered instead of retained, and the additional costs associated with feed and management of the growing ram lambs/hoggets including live weight recording, ultrasound testing and shearing. Allowance is made for additional costs associated with a ram breeding business such as management, pedigree recording and professional services including marketing, SIL bureau fees, and fees paid to consultants and stock agents.

RESULTS

Revenue for a stud ram breeder is primarily driven by the number of rams sold per breeding ewe and sale price. **Error! Reference source not found.** depicts the breakdown of average costs of raising rams lambs from slaughter age to sale on the model farm. Fixed costs account for 20% of the expenditure per breeding ewe, with the other major costs associated with feed (29%), stock agent fees (13%) and lost processor income (24%).
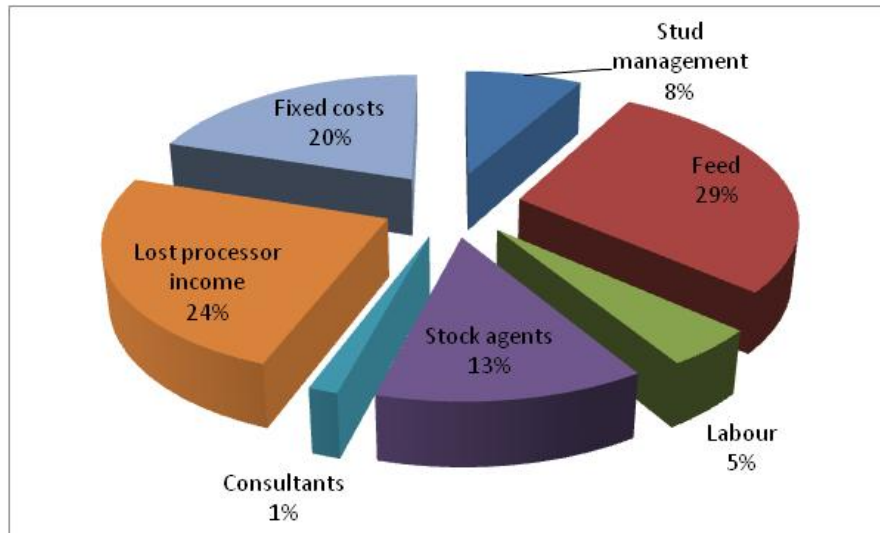

Figure 1. Average costs per breeding ewe associated with ram breeding, assuming 0.35 rams/breeding ewe are retained for sale, with stock agent commissions on 300 rams sold

Table 1 summarises the actual costs and expected returns of raising the ram lambs from slaughter age to sale for 2 model farms where the 2nd farm has adopted Ovita technologies to increase their market share and sell additional ram lambs. Assumptions made for Farm 1 were that 350 of the 700 ram lambs weaned are retained for sale at 15 months of age (0.35 rams/breeding ewe), with 50 rams remaining unsold at the end of the season. It was further assumed that 30% of rams are sold at a premium price of $850 whilst the remaining 70% are sold at a standard price of $700 per ram sold. Using the same assumptions Farm 2 invested $10,000 in the use of Ovita technology and sold an additional 30 rams for the same average price. The net return to the breeder per breeding ewe for Farm 1 is $100, increasing to $111 on Farm 2 where the additional ram sales resulted in a net gain of $11,406 after test costs.

DISCUSSION

Breeders vary in size from small niche breeders with a single flock of less than 100 breeding ewes, to large corporate breeders with many thousands of ewes spread over multiple flocks and breeds. The size and location of the flock, tactical decisions made, and the reputation of the breeder, all have an impact on the ability of the breeder to attract commercial ram buyers. The ram sales model described above can be used to examine the cost effectiveness of using Ovita technologies to increase the return to the farmer. Test cost itself cannot be considered as a driving factor in its own right, since test cost (or investment) must be balanced against the return on investment of using the technology. We have demonstrated an example where a farmer has invested $10,000 to net an additional $11,000 in sale returns after costs. There are many other

mechanisms for generating value. Some of these mechanisms are described in Figure 2 with many likely to be affected by decisions a breeder may make about the adoption of Ovita technologies.

Table 1. Total sale value and costs of raising ram lambs for sale to commercial farmers, for a flock with 1000 breeding ewes, with 350 rams retained for sale and 50 remaining unsold and sent to the processor at season end.

		Farm 1	Farm 2
Commercial ram sales	No. of rams sold	300	330
	No. sale rams unsold	50	20
	Average price per ram	$745	$745
	Total value	$223,500	$245,850
Processor sales	Total no of rams slaughtered	352	322
	Average price per ram	$90	$90
	Total value	$31,540	$29,140
Gross return to breeder		$255,040	$278,207
Expenses	Test costs	$0	$10,000
	Fixed	$30,980	$30,980
	Variable	$124,044	$125,805
	Variable/breeding ewe	$124	$126
	Variable/ram sold	$413	$381
	Total Expenses	$155,024	$166,785
Net return to breeder		$100,016	$111,422
Net return/breeding ewe		$100	$111
Net return/ram sold		$333	$338

One product developed by Ovita and marketed by Pfizer Animal Genetics is Sheep50K. This product can be used to increase the accuracy of the predictions of genetic merit, through the estimation of molecular breeding values. Benefits associated with Sheep50K include immediate sales premiums for superior rams sold and future benefits from the sale of 1st and 2nd generation progeny of animals selected for breeding. The cost of Sheep50k and the proportion of total industry benefits retained by the breeder have a major impact on the net return to the breeder. The majority of the benefits are associated with an individual breeder using the technology to increase their ram sales. Alternatively, breeders could use the increased accuracy of breeding value estimations to increase ram sale price thus gaining additional revenue which covers the cost of Sheep50k testing and results in a net return to the breeder.

Opportunities also exist to use Ovita technologies (such as Sheep50k) to identify young rams for use in semen sales or in ram sharing partnerships. These opportunities hinge on the breeders realising the implications of being better able to reduce the generation interval through identification of genetically superior young animals. Ovita has developed models to predict the impact of selecting genetically superior animals at a younger age and these can be used as an input

into the ram valuation model described here so as to estimate potential net returns to the breeder after accounting for costs of investing in the technology.
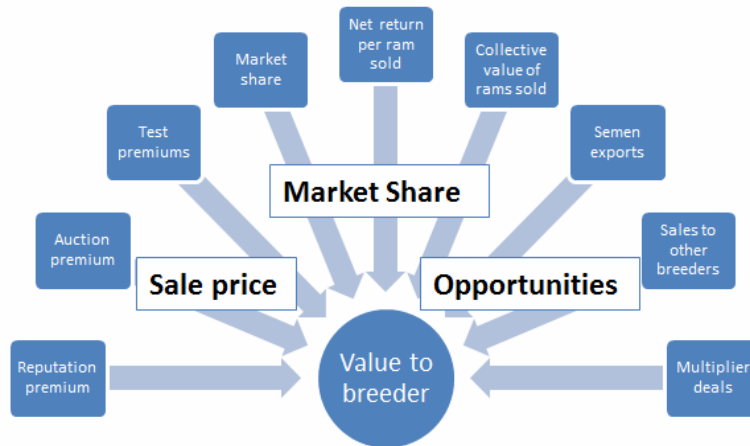

Figure 2. Factors that may influence ram breeders when electing to use Ovita technologies

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