SELECTION FOR FEED EFICIENCY IN CATTLE

(Article for "The Cattleman" by Associate Professor Steve Morris, Veterinary and Animal Sciences, Massey University, Palmerston North

In recent years there has been increased interest in measuring differences between animals in their feed conversion efficiency. This has been driven in the main by Australian research at the Agricultural Research Centre, Trangie where large differences were observed between young bulls and heifers, and mature breeding cows, in their feed costs for growth and maintenance.

WHAT IS NET FEED EFFICIENCY (NFE)?

NFE refers to variation in feed intake between animals beyond that related to differences in growth and body weight. Consequently it is expected that selection for improved NFE may reduce herd feed costs with little or no adverse changes in growth performance. Ranking animals on NFE (sometimes this is called residual feed intake (RFI)) requires measuring differences in their feed intake, body weight and growth rate over a defined test period. An animal's expected feed intake is predicted from the test groups average feed requirements for a particular growth rate (say 1 kg/head/day) and live weight maintained (say 300 kg). An animals net feed intake is simply the difference between its predicted feed intake and it actual feed intake. A superior NFE bull will consume less feed than expected over the test period and have a lower (negative) net feed intake. An inferior NFE bull will consume more feed than expected over the test period and have a higher (positive) net feed intake. The difference in EBV's between the high NFE and low NFE bulls used in our 2001 matings translate to an expected 13% difference when the progeny weighed 300kg, achieved a 1.0 kg/day growth rate and consumed 8 kg of dry matter/day.

EBV's for net feed efficiency have been developed by Breedplan and are available for industry use. The Australians have some industry guidelines for conducting NFE tests. These tests are either conducted on-farm or at central locations where animals from different properties are tested together in uniform conditions. A feeding system that gives accurate measurement of individual animal feed intake is required. The test usually lasts for 70 days and uses automated self feeders (with a ration of grain and hay) and cattle with electronic ID. This trial at Massey University (Funded by MeatNZ through Meat and Wool Innovation) is being conducted to ensure that developing an NFE EBV is cost effective for our New Zealand grass-fed conditions. Firstly by evaluating if selection for NFE using Australian derived EBV's is valid under our grazing conditions and secondly, if it is, to devise systems of testing for NFE. We are using the n-alkane method to predict feed intake (which is okay for group differences but may have limitations with individual animal intakes) and the before and after grazing pasture measurements to estimate animal intakes.

Key players in the trial: Dorian Garrick, Guy Sargent, Jim Pharazen and Steve Morris

Selection for improved NFI needs to be assessed in conjunction with improvement in other traits such as live weight gain (for example 600 day weight EBV) and maternal traits such as the effect of milking and mothering ability on calf weaning weight. At the same time as we assess NFE we are comparing selection for high and low 600-day live weight EBV and 200 day milk EBV. Although not part of the original objectives of the trial we will be able to make an estimation of the value of using high 600 day EBV bulls (i.e. bulls in the top 10% for that particular trait) over commercial cows and then recording the performance of steer and heifer progeny under normal farming conditions. A separate report linking EBV's with actual performance of progeny will be generated for MeatNZ.

In year one only the high and low 600 day and 200 day milk EBV lines were generated and in the second year (calving 2002) the high and low Net Feed Efficiency progeny (and the appropriate link bulls with year one) were generated and will be moved to Massey University's Keeble Farm in April 2003.

TRIAL UPDATE

All the steers and heifers from the 2001 calvings were transferred from the four industry farms to Massey University in April/May 2002. The steers arrived at an average live weight of 255 kg and the heifers weighed 244 kg. The steers have been split into two groups - one group to be finished at 20 months and the other at 30

months of age. The live weight gain of the 20-month group of steers have ranged from 0.74 to – 0.82 kg/head /day from arrival until 25 November 2002 when they weighed 420 Kg. The 30-month group have not been given as generous herbage allowance and their live weight gains have been 0.48 – 0.55 kg/head/day since arrival and they weighed 360 kg on 25 November 2002. We have been measuring intakes on these animals but the laboratory analyses of these intakes have yet to be processed. Some differences are appearing between selection lines but we have yet to fully analyse the data and can not do so until we have complete data set.
The heifers are being run together and are being monitored for onset of puberty with tailpainting and weekly blood sampling to assess progesterone levels - an indication of when first oestrus occurs. Onset of oestrus has been quite slow this spring and some animals had not cycled (as indicated by progesterone assay of blood) when the bull went in on 25 November. The heifers were mated to four yearling bulls kindly supplied by John Jackson (Totaranui Angus Stud) all of which had similar EBV figures for growth and all were under 3.5 kg for birth weight EBV.

The first feed intake measurements on the heifers were made in late June and a second measurement was made in October. We are using the n-Alkanes indirect marker technique and a modified before and after grazing technique. The latter involves splitting the selection lines and placing each line into individual lanes within a paddock and then allocating each line a same daily allowance per kg of live weight (i.e. daily break size is dependent on live weight of group) to grow at the planned live weight gain (in this case 1 kg/head/day).

Feed is a major cost in our beef production systems. This has long been recognised by the pig and poultry industries, where cost of feed is easily quantified. These industries have made significant improvement in feed efficiency through genetic and non-genetic means. Costs of feed are difficult to quantify in a grazing system especially in our mixed species (sheep, deer and cattle) and seasonal grass growth patterns. Selection for Net Feed Efficiency is an attempt to quantify feed costs and breeders should watch with interest results from this important trial as they are reported.