TESTING PROCEDURES TO ENABLE SELECTION FOR IMPROVED NET FEED CONVERSION EFFICIENCY IN BEEF CATTLE

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SUMMARY

Potential benefits exist for the beef industry to lower costs of production through selection for improved Net Feed Conversion Efficiency (Net FCE). Central test stations or on-farming testing facilities need to be developed, combined with strict procedural guidelines and a central data processing agency.

Keywords: Feed efficiency, beef cattle, adoption.

INTRODUCTION

Research conducted at Trangie (Arthur *et al.* 1996a) has shown that considerable variation exists between individual animals and between sire lines for Net FCE, and that this variation has a strong genetic component. The opportunity exists for industry to identify and utilise sires with superior feed conversion efficiency in breeding programs, thereby lowering the costs of beef production.

At present, there are no visual or identifiable traits that can indicate the more efficient individuals, and no structure whereby industry cattle can be tested for Net FCE. To enable industry to select for improved Net FCE, testing procedures need to be adopted that will accurately and consistently measure feed intake over a standard time period, and a standard system developed to present this information in a useable format, such as an EBV or selection index.

For commercial acceptance of selection for net FCE, a financial advantage needs to be achieved in all sectors of the industry, particularly in premiums paid to seed-stock producers for superior genetics. Results have shown (Arthur *et al.* 1996b) that for the post-weaning grow-out phase of the production system, feed costs can be reduced by using cattle with above average postweaning Net FCE. By selecting for improved Net FCE rather than feed conversion ratio, it is expected that feed costs for maintenance will be reduced, hence lowering costs of production for the breeding sector (Parnell *et al.* 1995).

ALTERNATIVE MEANS OF TESTING

Either one, or a combination of the following procedures, could be used to test for Net FCE. In any case, there needs to be a co-ordinated national approach to testing, with strict adherence to accepted guidelines to enable data to be used and compared in an appropriate manner, particularly if that data is to be incorporated into a Breedplan EBV.

Centralised testing facilities. Testing for Net FCE could be conducted by sending animals to central test stations with facilities for measuring feed intake. This concept would be similar to that of central bull test stations used extensively to test bulls for growth rate in North America and South Africa, but not widely used in the beef industry in Australia. This option would allow close control of testing procedure and environment, and ensures that data collected is accurate and useable.

A major issue with centralised testing is the comparison of performance of animals from different pre-test environments. A mechanism is required to minimise the effects of pre-test environment or to account for these effects. This may necessitate the incorporation of design standards in central tests, with a minimum number of animals per head required in order to provide contemporary groups. It will also be necessary to provide genetic links - both between tests and between testing facilities to enable the data to be used for genetic evaluation.

Centralised testing is expensive and the cost of testing plus limited facilities available restricts the number of animals that can be tested. Only animals considered exceptional in other production and marketing traits, or those destined for use as AI sires are likely to be tested, with a subsequent limitation on industry wide application.

On farm testing. Testing on farm can entail manual feeding and weighing of cattle, or the use of semi or fully-automated systems such as developed by the Co-operative Research Centre for Meat Quality at Armidale, in their Tullimba feedlot. On-farm testing would be more feasible if a commercially built and serviced automated feeder unit was available. Data collection, such as feed intake, liveweight and growth rate could be performed on-farm, and sent to a central agency such as is currently done with data sent to the Agricultural Business Research Institute for inclusion in Breedplan analyses.

Establishing an automated on-farm testing facility would be expensive initially, but would provide longer term savings and enable a greater throughput per herd than central testing. Manual facilities offer considerable savings, but require high labour inputs and severely restrict numbers that can be tested, thereby limiting the value of data generated. Commercial development and subsequent leasing of automated facilities to seed stock producers, combined with a technical support service, may provide the best option.

Strict adherence to co-ordinated guidelines for testing would be required for accurate on-farm testing on a national scale.

Testing at pasture. To test animals at pasture requires accurate measurement of pasture eaten, through the use of controlled-release devices (CRD's) (Dicker *et al.* 1996). Currently, alkane CRD's are not sufficiently accurate to compare intake of individual animals. (Herd *et al.* 1996)

CO-ORDINATED GUIDELINES FOR TESTING

Nationally accepted guidelines for testing procedures are necessary to ensure standardised and acceptable data is generated for development of EBVs or a selection index. These guidelines apply to manual or fully automated testing, and to on-farm or central test facilities. These guidelines should include:

Format of tests. Testing could be carried out on an individual animal basis, or as a sire progeny test. Either test is acceptable for the generation of EBVs, and sire progeny testing can increase the accuracy of a sires EBV. Based on current estimates of heritability (Arthur *et al.* 1997) for Net FCE, approximately seven progeny would need to be tested to provide the same accuracy as testing the sire. Progeny testing would be useful to test the efficiency of AI sires currently in use, where those sires, if they are still alive, would be too old to meet current test criteria.
Individual animal testing would ideally be conducted on weaner bulls which may be widely used in major breeding programs, or as potential AI sires. This would rapidly increase the accuracy and adoption of Net FCE selection. The issue of individual vs progeny testing also raises the question as to the potential of testing bulls, heifers or steers. Individual testing would be of bulls and heifers, but existing progeny testing is generally carried out on steers. The costs involved may limit the feasibility of testing steers, and for management reasons, bulls would have to be tested separately to steers and heifers.

Length of test. Growth rate tests conducted in North American bull test stations generally use a four week pre-test period followed by a 140 day test. The test for Net FCE currently used at Trangie consists of a three week pre-test adjustment period followed by a 120 day test. Results from Trangie (Archer *et al.* 1997) indicate that a 70 day test period is sufficient to provide an accurate measure of Net FCE. The length of pre-test period is currently under review at Trangie, but three weeks is accepted as the minimum for weaner cattle to adjust to automated feeders. On-farm testing of home-bred cattle in manually operated facilities may be possible following a shorter pre-test period.

Age, Weight and Condition. Current tests at Trangie are conducted immediately post-weaning to coincide with optimum growth patterns. An appropriate range for age at test needs to be established, and may vary between breeds or types of differing maturity patterns. To minimise variation in pre-test environment and across tests, an acceptable range needs to be determined for weight and fat depth, again possibly varying between breeds and maturity types.

Type of ration. It is not known whether relative rankings for Net FCE on roughage based diets or high energy feedlot rations are the same. For this reason, all testing should be carried out using similar rations, standardised to available nutrient, ie. metabolisable energy, crude protein and digestibility. This would be critical where a common regression equation is used to calculate Net FCE across tests or testing facilities.

Current testing at Trangie is carried out using a pelleted roughage based ration, containing 10 to 10.5 MJ/kg and 15 to 18% crude protein. The ration is pelleted for ease of use in an automated facility and to minimise ingredient selection. The Co-operative Research Centre for Meat Quality at Armidale have developed automated feeders that can utilise a standard feedlot mix, and which could provide a prototype for commercial on-farm testing. Decisions on the type of ration would be based on the facilities available.

Processing and presentation of data. How the data generated from testing will be processed and presented for use by the seed stock producer requires careful consideration. Genetic theory suggests that the optimal way to use the information is to use data on each of the component traits of Net FCE (ie. Feed intake, growth rate and body weight) separately in an economic selection index such as Breed Object (Kennedy *et al.* 1993). However, as an aid to industry selection for Net FCE, an EBV would be more widely accepted than a multi-trait selection index. This issue should be resolved by the central agency responsible for processing the data, in consultation with industry.

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