POTENTIAL FOR REDUCING THE LENGTH OF NET FEED INTAKE TEST BY WEIGHING CATTLE MORE FREQUENTLY

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SUMMARY

Feed intake and liveweight data on 18 weaned Angus heifers were used in a preliminary evaluation to assess whether growth can be measured more accurately by more frequent weighing of cattle. This would allow a reduction in the length of net feed intake test. Net (residual) feed intake (NFI) is the amount of feed eaten, net of the requirements for maintenance and production. During the NFI test, cattle were fed a pelleted hay/grain diet for 70 days after a 21-day adjustment period. The cattle were weighed on automatic scales in front of the feeders any time they went to feed (continuous weighing). In addition the standard procedure of weekly weighing was employed. Approximately 8 weights per animal per day were obtained by continuous weighing. Phenotypic variances for average daily gain (ADG) were reduced more rapidly through continuous weighing than weekly weighing, indicating possible improvement in the accuracy of measurement of ADG. There was a very strong phenotypic correlation ($r \geq 0.94$) between the standard 70 day test with weekly weighing, and any test using continuous weighing which was 42 days or longer for NFI, or 56 days or longer for ADG.
Keywords: Feed efficiency, feed intake, growth, beef cattle

INTRODUCTION

Net feed intake (NFI) is the amount of feed eaten, net of the requirements for maintenance and production. Initial results from a study to investigate the potential for reducing feed costs in beef enterprises through genetic improvement of NFI indicate that postweaning NFI is heritable and that selection for this trait will result in reducing the amount of feed consumed for the same level of performance (Arthur *et al.* 1997). Results from the analysis of data from NFI tests in which weights were measured weekly, indicates that 70 days is adequate for measuring NFI, and that while 35 days was adequate to measure feed intake, 70 days was required to accurately measure growth (Archer *et al.* 1997). Hence if the accuracy in measuring growth can be improved, it may be possible to reduce the length of the NFI test. A reduction in the length of the test means that the cost of testing will be reduced, and more animals can be tested per year at the same testing facility. A preliminary evaluation was therefore established to assess whether growth can be measured more accurately by more frequent weighing of cattle, thereby reducing the length of NFI test.

MATERIALS AND METHODS

Automatic weighing systems were installed in front of two feeding stalls of the automatic feeding system in the Efficiency Testing Unit (ETU) at Trangie. The weighing system comprised of a weigh bridge with load cells which were connected to a computer. Thus each time an animal went to feed, its weight was recorded automatically. Eighteen weaned Angus heifers were put in the ETU with access to the two feeding stalls with automatic weighing. After an adjustment period of 21 days, they

commenced a test of 70 days duration. A pelleted diet composed of 70% lucerne hay and 30% grain, with approximately 10.5 MJ metabolisable energy (ME) per kg dry matter and 16% crude protein was fed. All cattle were given *ad libitum* access to feed, and the intake of each individual was recorded. A daily allowance of 0.5 kg/animal of oat straw (approximately 6.7 MJ ME/kg dry matter) was provided.

During the period in the ETU, each animal had its weight recorded automatically each time it went to feed. The data generated from automatic weighing are referred to as "continuous" weighing. The amount of feed eaten was also recorded automatically. In addition, the heifers were weighed weekly on a standard manual weighing scale, and these data are referred to as "weekly" weighing.

Growth of the cattle was modelled by linear regression of weight data against time, and the regression coefficients were used as average daily gain (ADG) for each animal. Thus a separate regression was fitted for each animal. The weight of each animal at the mid-point of the test raised to the power 0.75 (metabolic mid-weight) and ADG were used in a multiple regression with daily feed intake as the dependent variable. NFI was equated to the residual error term in the model. In the analyses, the length of test was progressively increased from 7 to 70 days in weekly increments, with all tests commencing at day 0. To assess the effect of the 2 weighing methods on accuracy of measuring growth, the changes in phenotypic variance of ADG calculated from the 2 weighing methods were examined. To assess the effect of the 2 weighing methods on length of test, the correlation coefficients between the weekly and the continuous weighing methods were examined for ADG and NFI.

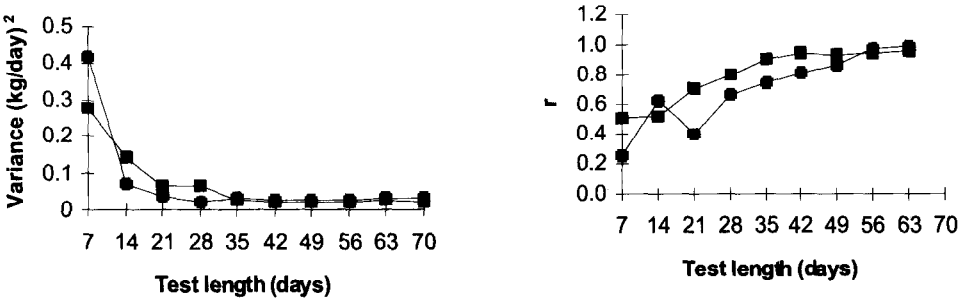
RESULTS AND DISCUSSION

On average, each animal was weighed 8 times a day by automatic weighing during the test. The results showing the effect of length of test on phenotypic variance are presented in Figure 1a. For the continuous weighing method there was a sharp reduction in the variance for ADG from day 7 to day 14, and variances stabilised from day 21 at < 0.04 $(kg/d)^2$. For the weekly weighing method the variances for ADG continued to drop until day 35 and stabilised at < 0.04 $(kg/d)^2$ thereafter. Phenotypic variance is made up of genetic variance and unexplained environmental variance (including measurement error). Thus if the two weighing methods are measuring the same trait, the genetic variance should remain relatively constant and any reduction in phenotypic variance is the result of reduction in environmental variance. It can thus be deduced that there is a reduction in the unexplained environmental variance with the continuous relative to the weekly weighing.

The correlation analysis provided an indication of similarities between NFI or ADG calculated with weekly weighing for a 70 day test and NFI or ADG calculated from continuous weighing for different test lengths. The results (Figure 1b) indicate a very strong phenotypic correlation ($r \geq 0.94$) between the standard 70 day test with weekly weighing, and any test using continuous weighing which is 42 days or longer for NFI, or 56 days or longer for ADG.

These results indicate that it may be possible to reduce the length of the standard 70 day test for NFI by continuous weighing of cattle. However, to confirm these results and to determine the optimal

length of test under continuous weighing, more animals with good genetic links need to be tested and a comprehensive genetic analysis conducted, as done in the study by Archer *et al* (1997).



(a) (b)

Figure 1. Effect of length of test (a) on variance of ADG by continuous (λ) and weekly (ν) weighing methods, and (b) on correlation coefficient (r) between NFI (ν) or ADG (λ) calculated with weekly liveweights for the standard 70 day test and those calculated with liveweights from continuous weighing for different test lengths.

ACKNOWLEDGMENTS

This work was funded by NSW Agriculture and Meat & Livestock Australia. The capable assistance of C. Oswin, K. Dibley, R. Snelgar, D. Mula and T. McAnally and the staff at the Trangie Agricultural Research Centre is gratefully acknowledged.

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