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A STUDY OF THE EFFICIENCY OF FEED UTILIZATION

IN YOUNG FRIESIAN BULLS FED CUT PASTURE

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requirements for the degree of Master of
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ABSTRACT

An investigation was undertaken into the efficiency of feed utilisation of Friesian bulls. Of major interest was the comparison of efficiency of feed utilisation in two groups of bulls selected for extreme differences in liveweight gains at pasture.

Data for yearling, Friesian bulls run at pasture over a period of six months at the Awahuri and Newstead Artificial Breeding Centres were analyzed. Nine bulls with the highest liveweight gain were placed in a high (H) group, and nine bulls with the lowest liveweight gains were placed in a low (L) group.

A standardisation period of four weeks was used to measure the voluntary intake of cut pasture of the two groups of bulls. At the end of this period the bulls were assigned to blocks on the basis of liveweight and one of three intake levels randomly allocated within blocks. Intake levels one, two and three were designed to give liveweight gains of 0.1, 0.5 and 1.0 kg/day respectively. Each bull within intake level one or two was allocated cut pasture in direct proportion to their metabolic liveweight ($W^{0.75}$). During the eight week comparison period, a concentrate meal was offered at the rate of 3.6 kg/day to those bulls on intake level three, together with ad libitum cut pasture.

Digestible energy intake and liveweight gain were measured in the comparison period, and measures of total and partial efficiency calculated from the data.

In the selection period the mean liveweight gains of the high and low liveweight gain groups were 1.35 and 1.00 kg/day respectively. However, in the standardisation period there were no significant differences between the high and low liveweight gain groups in either, voluntary intake or liveweight gain.

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PREFACE

In recent years there has been a large increase in the number of dairy bred calves kept for beef production. In 1968-69 the estimated number of calves bred for beef on dairy farms was 187,000, by 1971-72 this had increased to 385,000 (N.Z. Dairy Board, Farm Production Division, 1972). Of these calves an estimated 60.1 per cent were from Friesian sires, 31.6 per cent from beef breed sires and 7.5 per cent from other dairy breed bulls.

The world demand for beef is expected to continue (Philpott, 1970); and as a consequence there could be a need to increase the efficiency of beef production. In cognizance of this, the New Zealand Dairy Board has been recording the liveweight gains of yearling Friesian bulls, kept at the Awahuri and Newstead Artificial Breeding Centres as part of their progeny test scheme for dairy merit. It was envisaged that the data obtained on liveweight gain would allow farmers to select semen from weight gain tested bulls for use on cows that were to produce calves for dairy beef.

It is often accepted that the genetic correlation between liveweight gain and the efficiency of feed utilisation is high. However, there is scant information on the interrelationships between appetite, liveweight gain and intrinsic differences in the efficiency of feed utilisation for cattle.

In the present study liveweight gain data for yearling Friesian bulls at the Awahuri and Newstead Artificial Breeding Centres were analysed. As a result of this analysis, nine bulls with the highest liveweight gain, and nine with the lowest liveweight gain over a selection period of six months were assigned to two experimental groups. The investigation was designed to study the differences in voluntary intake, liveweight gain and various efficiency measures when these two extreme groups were fed cut pasture indoors; and relate these to the differences observed in the selection period.

In the comparison period there were no differences between liveweight gain groups in either, liveweight gain, total efficiency, or partial efficiency on any of the intake levels. However, the ad libitum intake of the low liveweight gain bulls on intake level three was significantly ($P < 0.05$) higher than that of the high liveweight gain bulls.

The DE requirements calculated from the data using two different biological models, were compared with other requirements reported in the literature. The variation in predicted requirements, using the different models, suggested that meaningful requirements will only be obtained when the growth process of cattle is more fully understood, and when measurement errors are much less than they were in this experiment.

It was concluded that the experiment was too short to allow differences in efficiency to be detected, either between groups, or between individuals. To enable meaningful efficiency comparisons to be made, either much longer experiments are needed, or, more sophisticated methods of determining the energy content of liveweight gain.

It was suggested that future work in efficiency of feed utilisation should determine how strongly appetite is inherited in a grazing situation, and the magnitude of differences in the intrinsic efficiency of feed utilisation. There appears to be a need for research into increasing the efficiency of the whole, meat production system. An isolated attempt to improve liveweight gain in male offspring may fail to increase the efficiency of the whole system because of a correlated increase in the liveweight of female breeding stock.

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