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THE COMPARISON OF PASTURE AND CONCENTRATES  
AS EARLY-WEANING FOODS FOR CALVES

A thesis presented in partial fulfilment of  
the requirements for the degree of  
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MALCOLM JAMES BYFORD

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## ABSTRACT

Fourteen Friesian bull calves, born May 1972, were used in an experiment to study the use of pasture compared with concentrates as an early weaning food for calves. Early-weaning was defined as the weaning of calves off a liquid diet to a solid diet by the time they were five weeks of age. The calves were housed indoors in metabolism crates, with the pasture (ryegrass/clover) being cut daily and fed to them fresh. The composition of the concentrate diet was 65% rolled barley, 14% meat meal (60% protein), 15% linseed meal, 5% molasses, and the balance minerals and vitamins. The concentrate diet was fed as a meal and to help ensure the health of the calves receiving it, 10% finely chopped hay was added.

The calves were randomly allocated to the two groups (seven calves in each) on arrival, when they were about four days old. During the pre-weaning period all calves were managed similarly and fed in accordance with early-weaning practice, i.e. restricted level of milk to induce a rapid development of the intake of solid food. In order to guarantee the ingestion of pasture the level of concentrates fed was restricted. The calves were weaned off milk by five weeks of age.

In the post-weaning period, from five through to eight weeks of age, one group of calves received pasture ad libitum and the other concentrate ad libitum plus a restricted level of pasture (500g wet matter/day - accounting for 8 to 10% of the total DM intake).

The mean live-weight gains of the pasture-fed calves and the concentrate-fed calves were respectively,  $0.42 \pm 0.03$  and  $0.40 \pm 0.03$  kg/day pre-weaning and  $0.32 \pm 0.01$  and  $0.58 \pm 0.06$  kg/day post-weaning.

It was concluded that pasture was inferior to concentrates in promoting live-weight gain in early-weaned calves. This occurred despite pasture and concentrates having similar DE coefficients; namely 75.16 and 74.25% respectively. The major difference was that of intake, with the calves receiving pasture having a significantly lower DE intake over the post-weaning period compared with the calves receiving concentrates. The difference in intake was probably associated with pasture having a lower bulk density than concentrates. Two possible mechanisms, gut fill and oropharyngeal, whereby this would have caused a difference in intake are discussed. Also discussed is the absolute growth rates of the calves receiving pasture in the context of the possible use of pasture as an early-weaning food for dairy replacement stock.

Between eight and ten weeks the calves receiving the concentrate diet were changed to pasture alone. This caused a decrease in the performance of these calves. However, these results were confounded by a decrease in the quality of the pasture over this period.

Between ten and twelve weeks all calves were receiving pasture alone ad libitum. The rearing methods were shown to have no effect on the calves' intake of pasture during the twelfth week, provided allowance was made for the difference in live weight which existed between the two groups.

The calves were put out to pasture when twelve weeks old and their post-experimental growth rates recorded. This period was terminated when the average age of the calves was 303 days. The results demonstrated that the mean growth rates of both groups during this period were very similar. This resulted in the live-weight difference established between the two groups when they were twelve weeks old being permanent.

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## INTRODUCTION

It was demonstrated as far back as the 1920's (Meads, Regan and Bartlett, 1924) that calves could be raised successfully when weaned off a liquid food diet onto a solid food diet as early as 30 to 40 days of age. Despite this, traditional beliefs that the calf requires a liquid food diet for at least the first three months of life persisted. However, in the United Kingdom during the 1950's because of increasing economic pressures and a shortage of labour, there was an upsurge of interest in early-weaning as a means of rearing calves. Early-weaning is defined as the weaning of calves from a liquid to a solid food diet by the time they are 35 days of age. This led to the formulation of the "Rowett Early-Weaning System" as proposed by Preston (1957) and later through modification of this earlier concept, to an early-weaning system applicable to New Zealand conditions as proposed by Khouri (1969).

These early-weaning systems have been based on the use of concentrate diets as the solid food onto which the calves are weaned. However, because these foodstuffs are expensive relative to pasture (especially in New Zealand) and also because they are in high demand for the Pig and Poultry Industries, there is pressure to introduce calves to their 'natural' foodstuff, pasture, at an increasingly earlier age.

It is therefore the purpose of this present study to investigate the potential of pasture as an early-weaning food for calves.