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Growth Rates of Early and Late Weaned Single and Identical Twin Calves

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INTRODUCTION:

DURING recent years many farmers who formerly consigned cream to factories are now whole milk suppliers and as a result calves which used to be chiefly reared mainly on skim milk are now fed whole milk and other expensive dried milk products or meals. Not only those whole milk suppliers but many other farmers have repeatedly requested information on the feeding of calves up to weaning. One method which a few progressive farmers are using, and about which we have no factual data, is the weaning of calves at approximately six weeks from birth. This paper will present the results of an experiment in which calves were weaned at an early age.

In the past, calf nutrition work at Ruakura has been carried out on small groups of approximately ten calves as the experimental material in order to determine the effects of different levels of milk feeding. Recently, the availability of identical twin calves appeared to offer the opportunity of increasing the precision of calf experiments even with smaller numbers of animals. However, before effecting such a radical change in technique it was necessary to determine whether the initially lighter twin animal would grow at a rate comparable with that of singles.

This paper will compare the growth of single calves with that of identical twins up to the normal weaning age.

Experimental Procedure:

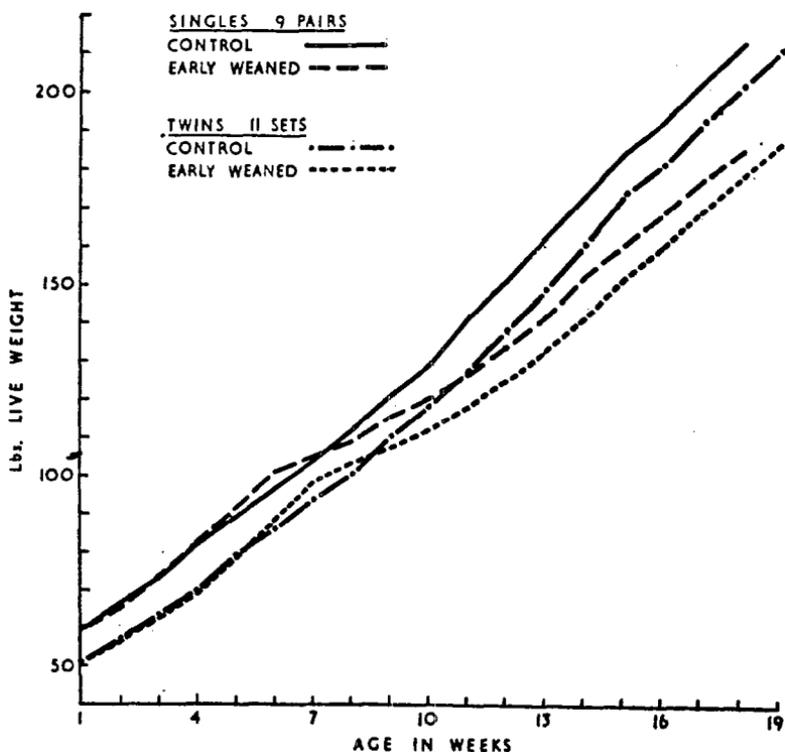
Eighteen calves born as singles during July and August were weighed each week from birth and fed whole milk up to 3 weeks of age. They were then paired on the basis of their weights at 3 weeks, and members of each pair allotted at random to two groups—one the control group the other the early weaned group. The whole milk rations of the control group were gradually substituted by skim milk during the 4th, 5th, and 6th weeks. Thus from 6 weeks of age they received skim milk only until weaned at 18 weeks. The early weaned group however continued to receive whole milk up to 6 weeks. From 6-8 weeks the whole milk ration was progressively reduced and they were weaned at 8 weeks.

In addition to the single calves, eleven sets of identical twin calves were split between a control and an early weaned group and they were treated similarly to their corresponding groups of single calves. However, as twins were known to be lighter in weight, in order to apply some age correction to compensate for the lighter initial weight, the commencement of treatments for the twins was delayed by one week. Thus twins were allotted to their groups at 4 weeks of age; the control twins were weaned at 19 weeks and the early weaned twins were weaned at 9 weeks.

All milk rations were fed twice daily, the feeding standard being 15% by weight of milk to the weekly liveweight. All calves were rotationally grazed as one lot on dairy pasture, from approximately four weeks of age. Each week all calves were measured for chest girth, height at withers and hip to pin-bone length.

Results:

Figure 1 shows the mean growth curves for the four groups of calves.



Early Weaning—Single Calves:—

At three weeks of age when treatment differences commenced, the control and early weaned groups of single calves were comparable in weight. Between 3 and 6 weeks during which period the early weaned group continued to receive whole milk, they grew at an appreciably faster rate than the controls who were gradually changing over to skim. At 6 weeks the control animals had completely changed over to a skim milk diet and they continued to exhibit a steady rate of growth until weaned at 18 weeks. Also at 6 weeks the whole milk ration of the early weaned animals was reduced and a marked reduction occurred in the growth rate from 6 to 8 weeks. Indeed the severity of this check, showed that at 8 weeks the controls were heavier than the early weaned animals, whereas at 6 weeks the latter group were the heavier. At 8 weeks the early weaned group were weaned from whole milk and it is noticeable that no check appeared in their growth curve at this period. In fact from 8 to 11 weeks these calves made a good recovery. From 11 to 18 weeks although the early weaned animals were not growing quite as fast as the controls, nevertheless, they were considered to be growing at a satisfactory rate especially as their growth was sustained on pasture alone. At 18 weeks there was an average difference in weight of 28 lb. in favour of the controls which was equivalent to 13% of the weight of the control group. This difference in weight resulted from the feeding of 30 gallons of whole and 140 gallons of skim milk to the controls compared with only 60 gallons of whole milk for the early weaned group. These quantities of milk in terms of energy represent a 40% reduction in rations received by the early weaned calves.

Referring again to the weights at 8 weeks, it seems reasonable to expect that had the control calves been weaned at this age, then their subsequent growth would have been at the very least no poorer than the growth of the early weaned group. Up to 8 weeks control animals drank 30 gallons of whole milk and only 36 gallons of skim milk which would represent a 50% reduction in the energy supplied in the form of milk.

Early Weaning—Twin Calves:—

When it is considered that treatment differences commenced one week later, that is at 4 weeks instead of 3 weeks for singles and so on, then it is apparent that the relative growth of the early weaned and the control twins was very similar to that already outlined for single calves. Consequently at 19 weeks there was an average difference of 25lb. in liveweight, equivalent to 12% of the weight of the control twins.

Over the periods of 3-18 weeks for singles and 4-19 weeks for twins both the early weaned singles and the early weaned twins made 82% of the weight gains of their respective control groups. Over the same period single and twin early weaned calves averaged 85% of the gain in chest girth of their controls. On the other hand the two skeletal measurements, height at withers and hip to pine-bone length showed that in each case single and twin early weaned groups made 90% of the gains of their controls. Thus early weaning has produced calves only slightly smaller in size, although carrying noticeably less condition.

Growth Rates of Singles and Twins—Control Groups:

At one week of age the control singles averaged 59lb. liveweight compared with 50lb. for the control twins, a difference of 9lb. in favour of singles. It is also apparent that at some time between 2 and 3 weeks, actually at 17 days of age, twin calves equalled the weight of singles at 7 days. Hence the initial weight difference of 9lb. at 1 week is approximately equivalent to an age difference of 10 days. The postponement therefore by one week of commencement of the experimental treatments for the twins has not quite compensated for differences in initial weight as the twins at 4 weeks averaged 3lb. lighter than the singles at 3 weeks. Thereafter there was reasonable concordance between the growth of singles and the growth of twins.

From approximately 12 weeks the data indicated that twins were growing at a slightly faster rate so that at 19 weeks the control twins were approximately only 7 days behind the growth of control singles.

Early Weaned Groups:

Again the results are similar, namely an apparent initial age difference of 10 days between the weights of single and twins, followed by a general agreement between the growth rates but again a tendency for twins to grow at a slightly faster rate resulting in an age difference of approximately 7 days at normal weaning age. Similar results to the liveweight data were obtained with the body measurement data.

CONCLUSION:

The results obtained from this experiment have shown firstly that early weaning from whole milk is capable of producing well grown calves with a saving of 40% of the energy normally supplied in the form of milk, secondly the data suggests that skim reared calves could be weaned early with a similar economising in milk and thirdly, that provided that treatment differences are started 10 days later, then twins will grow at a rate sufficiently comparable to that of singles to enable them to be used for calf nutrition studies in view of the many other advantages which they possess.

Discussion

Mr. GERRING: Was the growth rate after 8 weeks due to the effects of the skim milk or did the early weaning force the calf to eat more grass? Were there large or small differences between sets of twins?

Mr. PERCIVAL: After weaning at 8 weeks a satisfactory growth rate was achieved on pasture alone but the controls receiving in addition 2 gallons of skim milk per day grew at a faster rate. The early weaned calves were weaned in October on to good pasture both from the qualitative and quantitative aspects, while the controls were weaned after Christmas on to poor pasture. Both large and small differences occurred between sets of twins.

Dr. WALLACE: What is the minimum amount of whole milk that can be used for successful rearing without any skim milk or meal at all?

Mr. PERCIVAL: 50 gallons of whole milk is about the minimum.

Dr. HAMILTON: There is a sudden drop in growth rate after early weaning. Overseas workers claimed an improvement by supplying ruminal contents from mature animals to improve the rumen flora.

Mr. PERCIVAL: The overseas work was done with stall fed animals. The situation is probably quite different in New Zealand with animals grazing on pasture.

Mr. SWAN: As some fibre is essential for the development of the rumen would the use of some concentrate with some fibre in it, be beneficial.

Mr. PERCIVAL: The amount of fibre in meals is quite insignificant when compared with pasture.

Professor CAMPBELL: Could whole milk be fed in smaller quantities over a longer period?

Mr. PERCIVAL: Feeding for 10 weeks at a lower level would probably give the same result. Building up condition before weaning is an expensive way of feeding.

Mr. CLARKE: In rearing sheep live weight and production are correlated. There may be an effect on fertility on a low plane of nutrition.

Mr. PERCIVAL: Our calves were weaned on an age basis so there was a considerable range in body weight. One should perhaps wean at 100-120lb. irrespective of age.