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OBSERVATIONS ON THE BEHAVIOUR OF SINGLE-SUCKLED CALVES FROM BIRTH TO 120 DAYS

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SUMMARY

Observations on the suckling and grazing behaviour of a group of 24 calves sired by either a Friesian or Angus bull and suckling Angus and Angus \times cows were made from dawn till dusk at intervals of approximately 3 weeks from birth to 120 days of age.

An analysis of the 153 calf days showed a decline in suckling frequency but an increase in the duration of suckling up to 30 days of age after which suckling behaviour remained constant. The breed type of calf affected suckling behaviour. Friesian \times Angus calves suckled for longer than Angus calves. Calf grazing time increases rapidly with the age of the calf until at 120 days; grazing time was equal to approximately 70% of adult grazing time. Grazing time was affected by the milk production of the cow and was reduced by 11 min for every additional litre of milk produced by the cow per day.

The practical implications of these observations are discussed.

INTRODUCTION

The behaviour of suckling beef calves has received some study in New Zealand by Walker (1962), and more recently Kilgour (1972) has reported on the behaviour of multiple-suckled dairy-beef calves. The present work was carried out to extend the information available on the behaviour of single-suckled beef calves and to examine possible modifications caused by the sex and breed of calf and the level of nutrition of the dam in early lactation.

ANIMALS AND METHODS

Twenty-four two- and three-year-old Angus, or Angus \times Hereford or Angus \times Shorthorn cows suckling calves sired by either and Angus (A) or Friesian (F) bull were used. Cows and calves were observed from dawn till dusk for two consecutive days at approximately 3-weekly intervals, over the period mid-August to mid-November 1971, giving a total of 153 calf days.

Cows and calves were identified by large numbers spray-painted on to both sides of the animal, and were observed through binocu-

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lars from a stationary vehicle positioned outside the paddock. The two groups of 12 cows plus their calves grazed paddocks of approximately 5 ha. One group of cows was subjected to a low plane of nutrition for the first 40 days of lactation (L40). The milk production of all cows was monitored at 3-weekly intervals by the technique described by Lamond *et al.* (1969).

The behaviour of cows and calves was recorded to the nearest minute in activities of grazing, lying, idling and suckling. All

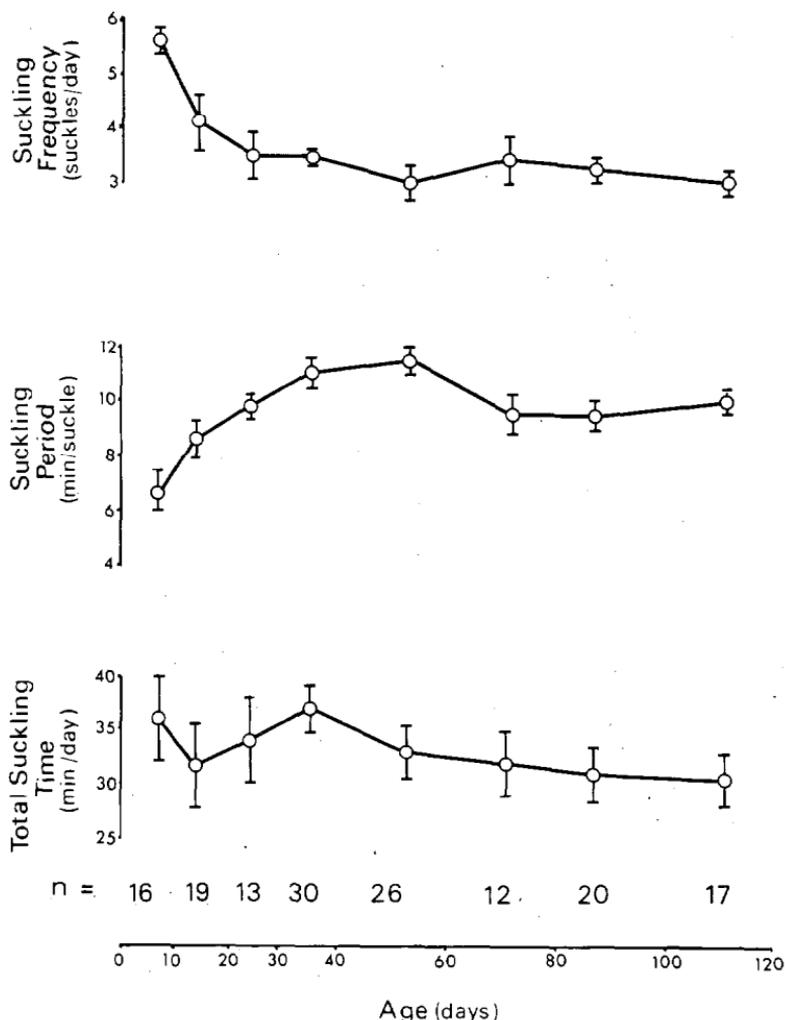


FIG. 1: The effect of age of calf on suckling behaviour.

observations were grouped in 10- and 20-day intervals on a basis of the age of the calf.

RESULTS AND DISCUSSION

SUCKLING BEHAVIOUR

Effect of Age of Calf on Suckling Behaviour

Figure 1 shows the changes in three suckling parameters in 10-day intervals from birth to 40 days of age, and 20-day intervals thereafter to 120 days.

Suckling frequency (SF), the number of times per day (dawn till dusk) that a calf suckled, declined rapidly from 5.6 times per day at 7 days of age to 3.5 times daily at 24 days and then remained reasonably constant at between 3.0 and 3.5 until observations ceased at 120 days. This decrease in suckling frequency was associated with an increase in the interval between sucklings from 160 to 360 minutes. Walker (1950) found that new-born calves suckle 5 to 8 times per day but that this falls to 3 to 5 from 2 weeks of age onward. Neither the present results nor those of Walker (1962) agree with Hafez and Lineweaver (1968) that suckling frequency increases with age.

The time spent at each suckling (SP) increased from 6 min per suckle to between 10 and 11 min by 35 days of age, and then remained fairly constant until 120 days. Wagon (1963) found the average time spent per suckle was 10.4 min for rangeland Herefords which compares favourably with the times for calves over 20 days old in the present work and mean suckling times given by Walker (1962).

The combination of the decrease in SF and increase in SP resulted in a relatively constant total suckling time (TST) of between 30 and 35 min at all ages. Total suckling time per 24 hours has been reported elsewhere as 49 min (Wagon, 1963) and from 37 to 57 min/24 h (Hafez, 1969), which is longer than in these observations, probably because of the possibility of a further suckling period occurring during the hours of darkness.

Influence of the Breed of Calf on Suckling Behaviour

Figure 2 shows the influence of the breed of calf on suckling behaviour. Friesian \times Angus (F \times A) calves suckled slightly more often (3.83 *v.* 3.37 times per day) and for a marginally longer period per suckle (9.98 *v.* 9.69 min), resulting in a greater TST (35.6 min *v.* 30.9 min $P < 0.05$) than Angus (A) calves.

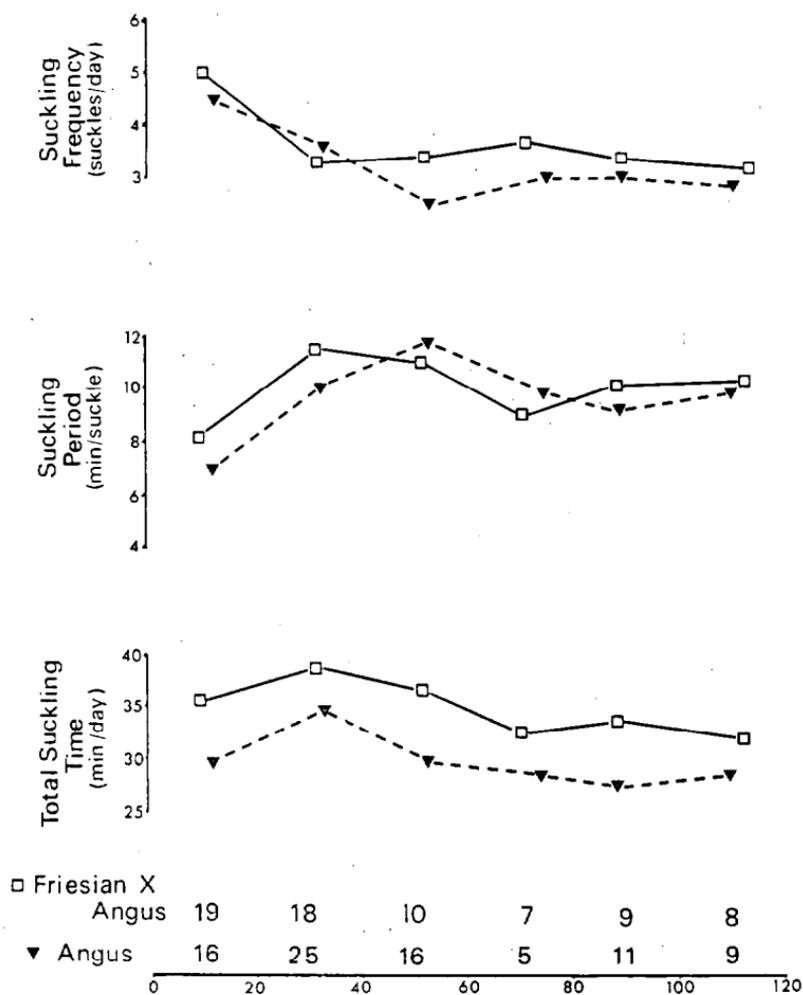


FIG 2: *The influence of breed of calf on suckling behaviour.*

The influence of breed type on suckling behaviour does not appear to have been discussed previously. It is tempting to hypothesize that the significantly greater suckling time of the $F \times A$ calves is one of the expressions of heterosis, which in turn may stimulate milk production and consequently permit higher growth rates in the calves.

Effect of Sex of Calf and the Level of Dam Nutrition on Suckling Behaviour

There was no real difference between the suckling behaviour of steer or heifer calves; bull calves were castrated at 2 to 4 days of age. Although calves suckling L40 cows suckled for 3.3 min longer per day (34.5 v. 31.2) this difference was not significant. A similar effect was observed by Wagnon (1963) where calves on cows on closely grazed pasture suckled 55 min compared with 44 min for those cows on lightly grazed pasture.

It is possible that this increase in suckling time helps to minimize the effects of poor cow nutrition on milk production.

Pattern of Suckling

At a young age a distinct pattern of 3 main suckling periods in the day was obvious, with the most marked peak soon after day-break. There was some suggestion that the pattern is less marked by the time the calves are over 100 days old.

The pattern of suckling involved three main periods in the day which is similar to that reported by Walker (1962), Wagnon (1963) and Kilgour (1972). The decline in the evenness of this pattern with age may be due to the increase in grazing time which shows a very marked three-peaked pattern by 100 days. If feed intake follows a three-peak pattern, then, as milk consumption gives way to grass intake, the requirement for suckling to follow this three-peak pattern may diminish.

Calves which suckled more often than the average did so consistently and had above-average TST. However, there was no strong relationship between suckling time and daily milk production of the cows ($r = -0.15$) but there was a low positive correlation between calf daily liveweight gain and suckling time ($r = 0.44$, $P < 0.01$). This effect was small, however, as calf liveweight gain increased by only 0.05 kg/day for an increase of 1.0 min in TST.

Both cows and calves were responsible for initiating a suckling period either by the calf approaching the cow or responding to a call from its mother. Wagnon (1963) reports that 83% of suckling periods started with the calf approaching the cow and the remainder were the calf's response to its mother's call. Our information is not as complete but both methods were observed.

The absence of any cross-suckling in the present work was a result of the cows preventing it rather than the absence of the occasional calf wishing to suckle another cow. This may be a

reflection, in part, of the young age of the cows but also was certainly due to the lack of a "fostering" period with other calves. Kilgour (1972) reported that a lot of cross-suckling took place following such a "fostering" period.

GRAZING BEHAVIOUR

Calves as young as 2 weeks of age spent time "picking" the pasture for short periods of up to 10 to 15 min at any one time. Because of the difficulty of objectively deciding when calves were picking as opposed to grazing, both have been included as grazing time (GT). Over 6 successive 20-day periods from birth grazing time increased rapidly and almost linearly from an average of 23 min at 10 days of age to 360 min at 111 days. At this latter age calves were grazing for 38% of the day or for a period equivalent to 68% of cow grazing time.

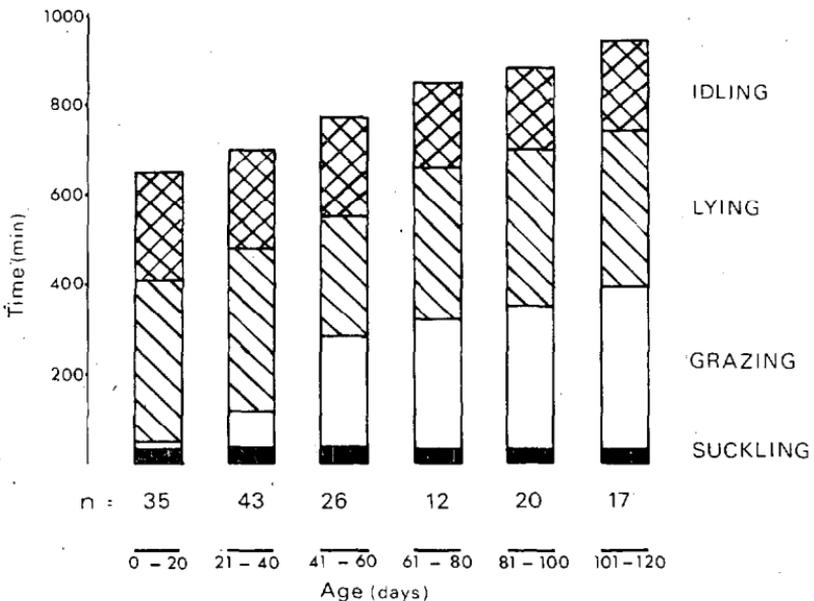


FIG. 3. *Effect of age on the four main activities of suckling calves.*

Hancock and McArthur (1951) report that by 4.5 months of age the grazing time of dairy calves is equal to that of adults although their rate of grazing is slower. From the present work it was calculated that the calves received approximately 47% of

their ME requirements from milk, leaving 53% to be obtained from pasture in 68% of the adult grazing time. This tends to confirm indirectly that calves of this age graze more slowly than adult cows.

A number of multiple regressions using GT as the dependent variable were computed to study the effect of age and cow milk production on grazing time of calves in the various sub-groups. Details of the regression equations are given in Table 1.

Initial multiple regressions included day length as an independent variable but since there was naturally a high correlation between age and day length ($r = 0.87$), and the regression coefficient for age was much larger than that for day length, the latter was excluded for the subsequent regression analyses.

For all calves GT increased by 3.6 min per day of age but was depressed by 11.2 min for every additional litre of milk produced by the cow per day. $F \times A$ calves on average grazed for 8 min longer than A calves, not because of a higher regression coefficient for age, but rather because grazing time was reduced less with increased milk production than in the case of A calves. It is interesting that $F \times A$ calves, which had a greater suckling time, tended to graze for slightly longer than A calves despite the negative correlation between grazing and suckling times. This may well be another expression of heterosis.

Calves suckling cows in the L40 group had a greater grazing time by 25% over those of the control group. However, this difference just failed to reach significance ($P > 0.05$ level). The difference was a result of both an increased daily increment to grazing time with increasing age and less sensitivity to variation in milk production. Some of this increase was established before the 40-day change-over into the control groups, and was maintained after this stage. Calves from the L40 cows grew slightly more slowly than control calves up to 40 days but showed compensatory growth after 40 days, presumably through increased grazing time, as there was no difference in the 130-day weights of calves from the two groups of cows. While milk production of the L40 cows recovered some of the difference between the groups at 40 days, it did not reach as high a level as the control cows and would not therefore be responsible for the higher weight gain of these L40 calves from 40 to 120 days. Steer calves tended to graze for longer than heifer calves.

By the time calves were 100 days old they were grazing to a pattern very similar to that of the cows. In fact, the grazing pattern showed rather more dramatic peaks than did the patterns

TABLE 1: DETAILS OF MULTIPLE REGRESSIONS OF GRAZING TIME ON AGE OF CALF AND COW MILK PRODUCTION

<i>Effect and Group</i>	<i>n</i>	<i>Grazing Time¹</i> <i>(min/day)</i>	<i>Age</i>		<i>Milk Production</i>		<i>R²</i>
			<i>Average</i>	<i>b ± S.E.</i>	<i>Average</i>	<i>b ± S.E.</i>	
All calves	153	159	49.6	3.55 ± 0.15	6.26	-11.2 ± 2.26	0.90
Breed of calf:							
F × A	71	164	48.1	3.38 ± 0.20	6.34	- 9.1 ± 3.00	0.89
A	82	156	50.8	3.78 ± 0.20	6.19	-20.1 ± 5.30	0.88
Level of cow nutrition:							
C	66	134	45.3	3.26 ± 0.24	6.95	-13.7 ± 5.70	0.87
L40	87	173	52.9	3.69 ± 0.18	5.73	- 9.2 ± 3.20	0.91

¹ Corrected for age and milk production.

of the cows. The difference in total grazing time between the cows and calves was made up by fewer calves grazing in the "off-peak" grazing times and a shorter peak grazing time. The pattern consisted of a very intense grazing period in the early morning followed by a longer, rather more diffuse period between 1000 and 1300 hours, and a further intense grazing period before dark.

LYING AND IDLING TIME

The time calves spent lying remained remarkably constant with age at 350 min, although, as a percentage of the day, lying time fell from 55 to 38%. Again, by 110 days of age the pattern of lying time was very similar to that of the cows, with a considerable proportion of the time being spent ruminating rather than apparently "sleeping" as was the case with young calves.

Idling time includes times at which calves "played" together, which could amount to up to 20 min per day at 30 to 40 days of age, but declined after this age. This "playing" took place mostly between 1800 and 1900 hours but with occasional "play" about 700 to 800 hours.

Idling time also includes the time cows spent grooming their calves. While on average this time would be very small, individual cows groomed their calves for up to 15 min/day while some paid little attention to them other than to permit suckling. There is no evidence that this close attachment had any beneficial effect on calf performance.

CONCLUSIONS

Unlike other workers (Walker, 1962) it was not considered possible to walk through the animals at night without disturbing their natural behaviour patterns. Neither were sophisticated radar tracking facilities available to enable 24 h studies to be carried out. However, reports of 24 h studies (Walker, 1962; Wagnon, 1963) show a low level of activity during the hours of darkness. In all cases in the present work observers were in position before daylight and the cattle were not disturbed by their arrival or change-over.

The suckling behaviour of the single-suckled beef calves in this work changed quite markedly from a high frequency of sucklings of short duration in the first weeks of life to a lower frequency but of longer duration at about 3 weeks of age. It then remained fairly constant until observations ceased at 120 days. The pattern of suckling and grazing is very constant and thus decisions on stock handling may be made with some confidence.

The breed type of the calf apparently can influence suckling behaviour and possibly, through it, milk production of the cow. This observation has practical significance in terms of breeding cow management.

The suckling calf appears to be able to compensate to a degree for a low milk production by the cow, whether this be genetic in origin or induced by low plane nutrition, by increasing its grazing time at any age. This knowledge may well have practical implications in decisions on the weaning of beef calves.

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