TEN- AND EIGHTEEN-WEEK SUCKLING OF FRIESIAN STEERS

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SUMMARY

Trials were conducted in two successive seasons with Jersey and Friesian × Jersey cows and heifers, and Friesian and Friesian-cross steer calves. The effects of continuous multiple suckling for 10 to 12 and 18 to 20 weeks on subsequent milk production and calf growth were investigated together with their economic implications Bucket rearing on whole milk for 10 to 12 weeks was also investigated. The continuous suckling shortened lactation and did not stimulate subsequent milk production. Rearing feed costs were directly related to suckling time and calf/cow ratio. Later weaning produced heavier steers for slaughter at a younger age. However, under ruling relative prices for milkfat and beef 18- to 20-week suckling was less profitable than 10- to 12-week suckling, which was also less profitable than bucket rearing on whole milk 10 to 12 weeks. The implications of the continued liveweight advantage at 500 days to a group treated differentially during rearing, on selection of bulls on corrected final liveweight, are discussed.

INTRODUCTION

Dairy farming in New Zealand, being based largely on pasture, adopts predominantly spring calving. Consequently a major problem for a dairy company is providing adequate processing facilities to cope with the peak milk flow, which are not fully utilized later in the season. It was considered that suckling a proportion of the herd until just past peak milk flow, and then milking the cows, would more evenly distribute the seasonal milk supply. A profitable suckling method for the farmer would also benefit the dairy companies by reducing the capital input for new facilities and result in better utilization of existing ones.

A combination of these requirements resulted in trials comparing different calf-rearing systems being conducted on the N.Z. Co-operative Dairy Company's property at Buckland near Auckland.

This paper reports trials designed to investigate the profitability of three systems of rearing calves for beef production,

and provide a means of more evenly distributing the seasonal milk supply by multiple suckling young calves.

EXPERIMENTAL

PROPERTY

The property consisted of 100 ha of flat to rolling land situated 5 km south of Pukekohe, which was subdivided into 42 paddocks, ranging in size from 0.5 to 3.4 ha. One 2 ha paddock was split into 0.1 ha areas, with a temporary water supply, for use in initial imprinting of calves on cows.

STOCK

Trial 1 (started July 1, 1969): 120 Jersey and 10 Friesian × Jersey two-year-old heifers, in calf to Jersey bulls and due to calve July 1 to mid-August, were available on the property. Friesian and Friesian-cross bull calves of 34 kg and over were purchased from local dairy farmers.

Trial 2 (started July 1, 1970): 94 Jersey and 6 Friesian × Jersey three-year-old cows and 30 Friesian and Friesian-cross two-year-old heifers, in calf to Friesian bulls and due to calve July 1 to September 1 were available. Additional Friesian and Friesian-cross bull calves were purchased from local farmers.

SUCKLING

Cows were allocated at random at calving to one of the following groups.

M. Milked from calving for the whole lactation.

S10. Suckled for 10 to 12 weeks, then milked for the remainder of the lactation.

S18. Suckled for 18 to 20 weeks, then milked for the remainder of the lactation.

In Trial 1, the heifers were allocated 2 calves each. In Trial 2, Friesians and Friesian-cross heifers and 3-year-old cows were given 3 calves each. The aim was to allow each calf 4.5 litres of whole milk per day. Calves were weaned on to pasture only. Cow milkfat performance was estimated from twice-monthly testing until all calves were weaned and then monthly testing to the end of lactation.

BUCKET REARING

In addition to the two groups of suckled calves a further twenty calves were reared artificially (B) in each year. These

calves were bucket-fed 4.5 litres whole milk per day for 10 to 12 weeks and then weaned on to pasture only.

MANAGEMENT

Milked and suckled cows rotationally grazed on the same area. Calves were imprinted on cows by suckling 3 times at 12-hourly intervals, and subsequently placing each cow and her calves in a 0.1 ha paddock for 5 to 10 days. Cows and calves were then amalgamated into increasingly larger groups over the next two weeks until the grazing group contained 20 cows plus calves. A new grazing group was then started. Cows plus calves of groups S10 and S18 grazed together until weaning of group S10 calves. Calves were castrated and dehorned at 5 to 7 weeks of age, sprayed for lice and drenched at 5 to 10 weeks of age, and then as required to the end of the first winter. All calves grazed together from weaning. Steers were wintered at 5 beasts per hectare in Trial 1 and at 3.7 beasts per hectare in Trial 2. Both Trial 1 and Trial 2 steers grazed at 5 beasts per hectare from early spring until slaughter.

All calves were weighed at 4 days, 5 to 7 weeks, weaning, and then monthly to slaughter. Steers were slaughtered as they attained 386 kg minimum liveweight. Dressing-out percentages were calculated from off-pasture morning liveweight and hot carcass weight minus internal fats.

STATISTICAL ANALYSIS

Data were examined by analyses of variance allowing where necessary for grazing group effects. Results are presented as means, and differences together with their standard error (SE).

RESULTS

COW PERFORMANCE

Tables 1 and 2 record the mean milkfat productions and lactation lengths and differences for Trials 1 and 2, respectively. As 1969-70 was a severe drought year, all cows in Trial 1 were dried off by March 20. Although also a drought year in 1970-1, the last cows in Trial 2 dried off on May 18.

Group S10 showed a slight, but not significant, stimulus to suckling in Trial 1 but the reverse, again not significant, in Trial 2. In both years group S18 showed a negative stimulus to suckling and this was significant in Trial 2. Group S10 lactated 3 and 11 days less than Group M in Trials 1 and 2. Group S18 lactated 8 and 19 days less than group M in Trials 1 and 2, respectively.

TABLE 1: LACTATION PERFORMANCE — TRIAL 1

Differences are least squares estimates
Average number of calves per cow S10, 2.3; S18, 1.9

Group	No. Cows	Milkfat kg 0-10	10-18	18-end	Total	Days Milked	Suckled	Lactated
M	43	34.7	26.5	34.5	95.7	233	—	233
S10	35		28.3	35.3	63.6	153	77	230
S18	37			30.7	30.7	92	133	225
M-S10		34.7	—1.8	—0.8	32.1***	80		3
SE			±1.4	±2.3	±3.7			±2.0
M-S18		34.7	26.5	3.8	65.00***	141		8**
SE				±2.3	±3.7			±2.9

** $P < 0.01$, *** $P < 0.001$.

TABLE 2: LACTATION PERFORMANCE — TRIAL 2

Differences are least squares estimates
Average number of calves per cow S10 and S18, 3.1

Group	No. Cows	Milkfat kg 0-10	10-18	18-end	Total	Days Milked	Suckled	Lactated
M	33	54.3	36.4	59.8	150.5	276	—	276
S10	32		35.4	55.2	90.4	187	78	265
S18	26			50.2	50.2	126	131	257
M-S10		54.3	1.0	4.6	60.1***	89		11†
SE		±1.7	±1.5	±4.1	±5.5			±6.5
M-S18		54.3	36.4	9.6*	100.3***	150.5		19**
SE		±1.7	±2.3	±3.9	±5.8			±6.9

† $P < 0.10$, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Rearing Costs

The calves in Trial 1 consumed 15.7, 14.2 and 33 kg of milkfat on treatments B, S10 and S18, respectively. The corresponding intakes for Trial 2 were 15.7, 19.4 and 32.3 kg of milkfat.

As no significant stimulus to milkfat production after weaning was recorded, the cost of rearing the calves depended entirely upon the time the cows were suckled and the success in obtaining the desired average calf/cow ratio. As the price per kilogram milkfat increased, so the total cost of calf feeding increased.

TABLE 3: PERFORMANCE OF STEERS — TRIAL 1

Group	No. Steers	Days to Weaning	Age Corrected Liveweights (kg) 4 Day	70 Day	130 Day	500 Day
B	16	73	43	82	126	331
S10	60	76	39	78	115	313
S18	60	135	41	83	138	344
S18-S-10 actual		59	2.0* ± 1.0	5.2*** ± 1.7	23.2*** ± 2.0	31.2*** ± 3.7
adjusted[1]				3.4* ± 1.7	20.8*** ± 2.0	27.5*** ± 5.9
S18-B actual		62	—2.0 ± 1.5	0.8 ± 2.5	12.2*** ± 3.0	13.2* ± 5.7
adjusted[1]				2.6 ± 2.5	14.7*** ± 3.1	16.9** ± 5.8
S10-B actual		3	—4.1* ± 1.6	—4.4 ± 2.5	—11.0*** ± 3.0	—18.1*** ± 5.7
adjusted[1]				—0.7 ± 2.6	— 6.2* ± 3.1	—10.6* ± 5.9

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.
[1] Adjusted, by covariance, for birth weight.

TABLE 4: PERFORMANCE OF STEERS — TRIAL 2

Group	No. Steers	Days to Weaning	Age Corrected Liveweights (kg) 4 Day	70 Day	130 Day	500 Day
B	18	78	39	84	116	341
S10	66	78	38	83	116	347
S18	61	132	38	83	130	358
S18-S-10 actual		54	0.3 ± 1.0	0.0 ± 2.1	14.5*** ± 2.6	11.6* ± 5.1
adjusted[1]				—0.2 ± 2.1	14.3*** ± 2.6	11.2* ± 5.0
S18-B actual		54	—1.4 ± 1.5	—1.0 ± 3.1	14.5*** ± 3.9	16.9* ± 7.7
adjusted[1]				—1.5 ± 3.2	15.5*** ± 3.9	18.9* ± 7.7
S10-B actual		0	—1.7 ± 1.4	—1.0 ± 3.1	—0.1 ± 3.9	5.3 ± 7.6
adjusted[1]				—0.2 ± 3.1	—1.2 ± 3.9	7.8 ± 7.6

* $P < 0.05$, *** $P < 0.001$.
[1] Adjusted, by covariance, for birth weight.

Reproductive Performance

Milked cows were detected as on heat by eye appraisal and mated by A.I. Suckled cows were mated using entire bulls within chin ball marker harness for detection. In both trials 90% of the milked and the suckled cows showed heat in the first cycle, with no differences in conception rates. However, the milked cows came into heat at random over the first 21-day cycle whereas suckled cows all came into heat in the last 10 days (Trial 1) and 7 days (Trial 2) of the 21-day cycle. No explanation is given for this.

Steer Performance

Tables 3 and 4 show the average age-corrected liveweights for steer groups B, S10 and S18 and differences both actual and adjusted by covariance for birth weight difference. Days to weaning have been included for reference.

In Trial 1 the S18-S10 adjusted liveweight difference at 130 days of 20.8 kg increased to 27.5 kg at 500 days; in Trial 2 the difference of 14.3 kg at 130 days decreased to 11.2 kg at 500 days. In both trials the increase in S18-B adjusted liveweight difference between 130 and 500 days was not significant. There was no consistent or significant trend in the adjusted liveweight differences between the B and S10 groups in either trial.

Slaughter Data

Tables 5 and 6 show the mean age and liveweights at slaughter and carcass weights, together with the differences, for Trials 1 and 2, respectively. By killing at regular intervals with a minimum liveweight of 386 kg and assuming similar dressing-out percentages, the difference between groups can be expressed in days to slaughter. Owing to poor seasonal conditions, some animals in both trials had to be slaughtered at lower than minimal liveweights, resulting in some effect on carcass weight as well as age at slaughter.

In both trials, group S18 were killed at a younger age and at a heavier carcass weight than group S10 but the differences were significant only in Trial 1. Differences in dressing-out percentages were small and not significant in either year.

Cost Benefit

Table 7 shows the comparative cost-benefits between groups in the two trials. No attempt has been made to place a cost on any difference in labour requirement that may exist be-

TABLE 5: SLAUGHTER DATA — TRIAL 1

Group	*No. Steers*	*Age Days*	*Liveweight (kg)*	*Carcass Weight (kg)*	*Dressing-out %*
B	16	574	375	172	45.8
S10	60	602	365	169	46.2
S18	60	564	380	176	46.4
S18-S10		38***	14.4***	7.4***	0.2
SE		±6.0	±2.8	±1.4	
S18-B		—10	5.0	4.5*	0.6
SE		±9.8	±3.6	±1.9	
S10-B		28***	9.4*	2.9	—0.4
SE		±8.3	±4.8	±2.2	

* $P < 0.05$, *** $P < 0.001$.

TABLE 6: SLAUGHTER DATA — TRIAL 2

Group	*No. Steers*	*Age Days*	*Liveweight (kg)*	*Carcass Weight (kg)*	*Dressing-out %*
B	18	594	396	197	49.7
S10	66	577	392	191	48.9
S18	61	569	397	192	48.5
S18-S10		—8	4.8*	0.9	—0.4
SE		±8.3	±2.2	±1.4	
S18-B		—25	0.6	—4.6*	—1.2
SE		±12.5	±3.2	±1.9	
S10-B		—17	4.2	5.5**	—0.8
SE		±11.6	±3.1	±2.1	

* $P < 0.05$, ** $P < 0.01$.

TABLE 7: COMPARATIVE COST-BENEFIT/CALF

Group	*A Rearing Cost ($)*	*B Early Slaughter at $1/week ($)*	*C Carcass at $48/100 kg ($)*	*Total B + C — A ($)*	*Difference from Group B ($)*
Trial 1:					
B	11.10	4.00	82.40	75.30	—
S10	8.20	—	81.00	72.80	—2.50
S18	22.40	5.50	84.50	67.60	—7.70
Trial 2:					
B	13.90	—	94.50	80.60	—
S10	16.40	2.40	91.90	77.90	—2.70
S18	27.90	3.70	92.30	68.10	—12.50

Note: Rearing cost = Actual milkfat used adjusted for difference in 4-day liveweight between groups.

tween the two types of rearing — *i.e.*, suckling and bucket feeding. This, it appears, has to be substantial to place the suckling methods adopted in the trials ahead of bucket feeding in profitability.

DISCUSSION

In these trials suckling did not appear to stimulate milk production in later lactation. This is contrary to the reports of Everitt and Phillips (1971) in New Zealand, Walsh (1969) in Ireland and Ugarte and Preston (1972) in Cuba. Apart from the S10 treatment group suckling also shortened lactation, again contrary to the findings of Everitt and Phillips (1971). The long suckling period employed in these trials is not economically conducive to heavy slaughter weight at a young age.

Two reasons for not obtaining a response to suckling can be offered. First, both periods of suckling were longer than those employed by Everitt and Phillips (1971) and a reduction in response could have occurred as indicated by the difference between groups S10 and S18 in both milkfat production and length of lactation. Phillips (1965) found the stimulation requirement for cows increased markedly approximately 50 days from calving. D. S. M. Phillips (pers. comm.) also suggests that the transition from suckling to hand stimulation may be less effective with longer suckling periods. Secondly, Everitt *et al.* (1968) suggested that high producing cows may not respond as well as low producers. The Buckland herd was substantially above the regional average in milkfat production.

The improved growth performance of groups S10 and S18 calves in Trial 2 up to 10 weeks, which may have partly been due to an estimated increased average milk supply per calf, together with the fact that the variation in the group S18 calves remained comparable with group S10 from birth, suggests that greater emphasis should be placed on calf performance prior to 10 weeks of age. This supports Everitt's (1972) contention. The similar growth rate performance of group S10 and group B calves fed equivalent amounts of milk supports the proposal of Everitt *et al.* (1969) than multiple-suckled calves are generally heavier at weaning that artificially reared calves, owing mainly to increased feed intake of suckled calves.

The success of a continuous multiple-suckling venture depends on achieving a desired average calf/cow ratio. This implies allowing each calf a given intake of whole milk. Although cross suckling occurs to a high degree in multiple-suckled herds (Kilgour 1972), the decision as to the number

of calves per cow must be made at imprinting. A method of twice-daily suckling adopted by Everitt and Phillips (1971), particularly on dairy farms where the numbers of cows utilized could be varied, may overcome many of the problems of continuous suckling.

While group S18 was less profitable than group S10, the data support the claim (Everitt, 1972; Reardon and Everitt, 1972) that a difference in liveweight created early in the life of calves remains of much the same magnitude until 500 days of age. While the economics of such a change can be calculated, as undertaken in this paper, the implications in selection of bulls on performance test can be quite alarming. Selecting the top 10% of all animals in each trial based only on their own age-corrected liveweight (Carter, 1971) at 500 days, 93, 0 and 7% of the selected animals would have come from treatments S18, S10 and B, respectively. However, selecting the best 10% within each treatment group, the expected percentage for Trial 1 would have been 44, 44 and 12% from groups S18, S10 and B. In Trial 2 we would have selected 66, 27 and 7% when the expected percentages were 42, 46, and 12 from groups S18, S10 and B, respectively. The latter result was obtained as group S10 grew significantly faster than group S18 between 130 and 500 days of age. This test period is longer than present performance tests. The data support the view (Everitt, 1972) that little confidence can be placed on present performance selection criteria when the test period commences after 4 months of age.

CONCLUSIONS

The continuous suckling of these high producing cows did not promote a stimulus to subsequent milk production. The rearing cost for calves depended upon the suckling time and the success in achieving the desired average calf/cow ratio. Suckling for 18 to 20 weeks was less profitable than suckling for 10 to 12 weeks which, in turn, was less profitable than bucket feeding for 10 to 12 weeks under ruling relative prices for milkfat and beef. Suckling for 18 to 20 weeks in the manner practised in these trials could not be advocated as a profitable procedure for farmers in order to assist in reducing peak milk supply.

The continued presence, at 500 days, of the liveweight difference of groups treated differentially early in life has serious implications in the selection of superior bulls based on final corrected liveweights.

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REFERENCES

Carter, A. H., 1971: *Proc. N.Z. Soc. Anim. Prod., 31:* 24.
Everitt, G. C., 1972: *Proc. N.Z. Soc. Anim. Prod., 32:* 20.
Everitt, G. C.; Phillips, D. S. M.; Whiteman, D. P., 1968: *Proc. Ruakura Fmrs' Conf. Wk:* 158.
Everitt, G. C.; Phillips, D. S. M., 1971: *Proc. N.Z. Soc. Anim. Prod. 31:* 22.
Kilgour, R., 1972: *Proc. N.Z. Soc. Anim. Prod., 32:* 132.
Phillips, D. S. M., 1965: *Proc. Ruakura Fmrs' Conf. Wk:* 223.
Reardon, T. F.; Everitt, G. C., 1972: *Proc. N.Z. Soc. Anim. Prod., 32:* 26.
Ugarte, J.; Preston, T. R., 1972: *Rev. cubana Cienc. agric., 6:* 173.
Walsh, J. P., 1969: *Res. Rep., Animal Prod.:* 24. An Foras Taluntais, Dublin.