

Effect of a range of concentrate intake thresholds to conclude weaning on the performance of calves fed using computerised milk and concentrate dispensers

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Introduction One key criterion used to signal the time to wean calves is solid food intake but if milk is fed at high levels solid feed intakes can be relatively low. Low solid feed intakes prior to weaning can result in post-weaning growth slumps (e.g. Hill *et al.*, 2006). In an effort to smooth the transition from liquid to solid food based diets, Morrison *et al.* (2010) examined the use of concentrate dependent weaning programs with computerised calf feeding machines. By initiating and concluding the weaning process when calves consumed 0.5 and 1.5 kg of concentrate respectively, the authors found weaning age and rearing costs were significantly reduced while live weight at 20 weeks of age onward was similar compared with calves weaned at fixed age. Therefore the objective of the present study was to investigate the effect of a reduced concentrate intake threshold to conclude the weaning process on the performance of calves reared using computer-controlled feeders.

Material and methods Group-housed Holstein-Friesian calves ($n = 70$), were randomly assigned to milk feeding systems with either weaning at 8 weeks (C) or weaning based on a range of concentrate intakes. All calves were fed individually through the feeding system with milk replacer mixed at 125 g/l throughout the study. For control calves, milk replacer was offered at a rate of 4 l/d from 4 to 51 days of age and then reduced in steps from day 51 to weaning at day 56. For calves weaned based on concentrate intake, milk replacer was offered at a rate of 4 l/d until concentrate intake averaged 500 g/d for 4 consecutive days at which stage the computer-controlled programme automatically reduced milk replacer intake. When calves on the concentrate dependent treatments consumed an average of 0.8 (L), 1.0 (M) or 1.5 kg/d (H) of concentrate over a 4-d period, milk replacer feeding ended. If calves did not achieve a concentrate intake of 500 g/d and initiate the auto weaning facility before day 51, they were weaned according to the standard treatment. Four calves were removed from the study for health reasons unrelated to treatment resulting in 16-17 calves per treatment. All data were analyzed by analysis of variance using the Genstat REML procedure. This fitted a model with individual calves as the subjects, and fixed effects for sex, birth weight and weaning system plus the sex by weaning system interactions. Female calf live weight from week 15 onward were analyzed by ANOVA with week 1 value used as a covariate.

Results Total milk replacer intakes until weaning were 23.7, 17.3, 17.7 and 19.1 kg DM/calf respectively, for calves on the C, L, M and H treatments respectively (Table 1). Weaning age was reduced by up to 13 days on the concentrate dependent treatments, resulting in calves that were up to 16 kg lighter at weaning ($P < 0.001$). However at 40 weeks of age, weaning treatment had no effect on calf live weight.

Table 1 Performance of calves weaned at a fixed age or based on concentrate intake

Performance parameters	Weaning system				SED	Sig.
	C	L	M	H		
Milk replacer intake until weaned (kg DM)	23.7	17.3	17.7	19.1	1.14	***
Concentrate intake until weaned (kg DM)	35.9	9.7	9.4	14.9	2.90	***
Weaning age (day)	56	43	43	47	2.5	***
Live weight at weaning (kg)	71.7	55.6	57.6	59.5	2.17	***
Feed cost until weaning (£)	44.31	27.57	27.99	31.58	1.983	***
Gain : kg DM until weaning	0.49	0.50	0.55	0.50	0.033	NS
Gain : £ feed until weaning	0.66	0.48	0.53	0.53	0.043	***
Live weight at 40 weeks of age (kg)	250	242	237	241	9.9	NS

Conclusions Weaning calves based on concentrate intake reduced the age and live weight of calves at weaning and reduced feed costs however no difference in live weight or body size was found at 40 weeks of age. Reducing the concentrate intake threshold to signal weaning below 1.5 kg tended to further reduce feed intake, feed costs and weaning age without effecting live weight at 40 weeks of age. Therefore the results from the current study indicate calves can be weaned when consuming 0.8-1.0 kg concentrate without reducing future growth and development.

References

- Hill, T.M., Aldrich, J.M., Schlotterbeck, R.L. and Bateman, H.G. 2006. Professional Animal Scientist. 22, 252-258
 Morrison, S.J., Kilpatrick, D.J. and Carson, A.F. 2010. Proceeding of British Society of Animal Science, 157, 342, and 343.