

**THE EFFECTS OF AD LIBITUM AND FORMIC ACID-TREATED  
COLOSTRUM ON INTAKE AND IMMUNOGLOBULIN  
LEVELS IN DAIRY CALVES**

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Feeding calves an appropriate amount and quality of colostrum in early life is vital for their immunity and health. No work to date has established the quantity of colostrum calves will drink if given ad libitum access. Moreover, bacteria grow rapidly in colostrum left at room temperature, and there are indications that bacteria in colostrum may depress immunoglobulin (Ig) absorption. Formic acid depresses bacterial growth, yet the effect of this treatment on calf intake of colostrum has not been tested. The objectives of this study were to determine 1) the effects of feeding colostrum ad libitum on colostrum intake, Ig absorption and behaviour during the first day of life, and 2) the effectiveness of formic acid in reducing bacteria in colostrum without compromising intake or Ig levels. Newborn dairy calves were fed 4 L of colostrum by esophageal feeder (“Control”; n=10), were offered untreated colostrum by nipple (“Ad lib”; n=10) or were offered formic acid-treated colostrum (“FA ad lib”; n=9) ad libitum for 24 h; colostrum intake was measured at 4.5 and 24 h after first feeding. A blood sample was taken 24 h after the first feeding to determine serum IgG. Bacterial counts in colostrum were determined at 0 and 24 h after being offered to the calf. Video recordings were used to monitor the effects of treatment on behaviour. The Ad lib group consumed approximately 2 L more colostrum than the FA ad lib group and the Control during the 24 h after first feeding (Table 1). The Ad lib group and the Control group had comparable serum IgG levels, and both were about 9 mg/mL greater than the FA ad lib group. The FA-treated colostrum had lower bacterial total plate counts compared to the untreated colostrum. There were no differences between treatments in the time spent standing, number of visits to the nipple and time spent at the nipple during the 24 h period. Although the addition of formic acid to the colostrum successfully reduced total bacteria counts, it also reduced consumption of colostrum. Formic acid is therefore not a practical preservation agent for colostrum offered ad libitum to newborn calves.

Table 1. Comparison of 3 methods of offering colostrum to newborn calves on colostrum and IgG intake, serum IgG and bacterial growth in colostrum over time.

	Control <sup>1</sup> (1)	SE	Ad lib <sup>2</sup> (2)	SE	FA ad lib <sup>3</sup> (3)	SE	Contrasts, P =	
							1 vs. 2	2 vs. 3
n	10		10		9			
Colostrum intake								
4.5 h, L	4		2.3	0.44	2.3	0.41	0.004	0.96
24 h, L	4		6.0	0.41	4.3	0.58	0.001	0.03
IgG intake								
4.5 h, g	295.2	28.46	170.2	28.46	160.7	30.00	.004	.82
24 h, g	295.2	36.48	445.8	36.48	301.8	38.46	.007	.01
Serum IgG, mg ml	28.1	2.7	27.8	2.7	19.4	2.9	.95	.04
Plate count, log <sub>10</sub>								
0 h	---	----	5.9	0.17	3.15	0.18	---	<.0001
24 h	---	---	8.3	0.16	2.72	0.16	---	<.0001