Feedstuffs Reprint

Feeding waste milk common despite data

Bottom Line

with
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FEEDING pasteurized waste milk to young calves seems to be gaining in popularity despite limited experimental data on the practice.

Until recently, there has been only one published report (Jamaluddin, 1996) on this practice (Kertz, 2002). Now, there is a second report (Godden et al., 2005).

This study was done through the Center for Animal Health & Food Safety at the University of Minnesota but with an 800-cow commercial central Minnesota herd and its contract heifer grower, which also had a 120-cow herd.

These operations were chosen to participate because of their interest and willingness to comply with study protocols and because they only had a moderate prevalence (5-10%) of paratuberculosis (Johne's disease) in their operations.

While this study has been characterized at times as being a milk replacer versus pasteurized waste milk nutritional study, its primary objective was to study Johne's disease transmission — specifically if calves fed pasteurized milk from a Johne's infected herd would experience a higher risk for Johne's infection than calves fed a milk replacer diet (Godden, personal communication).

All calves born in either herd between Dec. 23, 2001, and Aug. 12, 2002, were used in the study. Calves were fed four quarts of colostrum within two to six hours after birth. Calves were transported 25 miles daily or every other day from the 800-cow dairy to the calf facility.

Assignment to control (milk replacer) or treatment (pasteurized waste milk) was by even or odd sequential calf numbers given at birth. Housing was in individual pens in two greenhouses with control pens on one side and treatment pens on the other side in each greenhouse. Calves were weaned into groups at about seven weeks of age.

1. Growth data

	Control Mean ± SD	Treatment Mean ± SD
Serum total protein, g/dL	5.8 ± 0.8	5.8 ± 0.7
Age at weaning, days	47.3[a] ± 6.5	46.1[b] ± 4.3
Arrival weight, lb.	89.0 ± 12.3	88.3 ± 12.1
Weaning weight, lb.	133.9[c] ± 24.2	147.1[d] ± 24.4
Weight gain, lb.	44.3[c] ± 22.2	58.8[d] ± 20.5
Daily gain, lb.	0.77[c] ± 0.31	1.03[d] ± 0.29

[a,b]P < 0.01.
[c,d]P < 0.001.

2. Contributions from feeding programs

	Protein, g per day	ME, Mcal per day	Energy allowable gain, lb.	Protein allowable gain, lb.	Deficit gain contributed by starter, lb.	Starter intake for gain deficit, lb.
Milk replacer	90	2.47	0.48	0.55	0.29	0.50
Pasteurized waste milk	115	2.97	0.70	0.79	0.33	0.57

A 20% protein/20% fat milk replacer was used as being representative of what in the industry uses. (I cringe when others call this an "industry standard." While it may be the most commonly used, that does not make it a "standard.") The milk replacer was non-medicated and contained only milk protein sources. It was mixed at the recommended 0.5 lb. in two quarts of water.

Non-saleable waste milk was collected daily or every other day from the dairy and pasteurized twice daily at the calf operation using a 100 gal. commercial pasteurizer. Milk was heated to 145°F and held for 30 minutes, followed by cooling to the feeding temperature of 105°F.

Calves were fed equal volumes twice daily throughout the study. Volume fed was adjusted as follows: 2.0, 2.5 and 3.0 quarts when mean ambient temperatures were above 24°F, 5-24°F and below 5°F, respectively. Water was available at all times in the spring, summer and fall, but it was only available for about one hour after each feeding in the winter.

An 18% crude protein calf starter with decoquinate (30.25 g per ton) was available until about three weeks of age, when calves were switched to a 16% crude protein calf grower with monensin (32 g per ton). Starter/grower intakes were not measured, and no forage was provided until after weaning.

A total of 215 calves were analyzed for the control group and 223 for the treatment group. Unequal numbers were due to an error in allotting three more calves on treatment that should have been on the control and due to two calves ear tagged at the dairy that did not survive to arrival at the calf facility. Table 1 shows growth data.

Serum total protein and arrival weights did not differ by treatment. Weaning age was 1.2 days older ($P < 0.01$) for control calves, but this was not very meaningful and partly reflected greater variability in weaning age on controls and group weaning.

Weaning weight, weight gain by weaning and daily gain before weaning were all greater ($P < 0.001$) for treatment calves compared to the controls. What is somewhat surprising is that even with the large number of calves per treatment, the standard deviation (SD) was 50% of the mean weight gain for controls and 35% for treatment calves. For daily gain, SDs were 40 and 28% of means, respectively.

Lower variability on treatment than control is largely a function of slightly a smaller SD with higher weight and daily gain. Variability was also due to the dairy having heavier ($P < 0.05$) calves than the dairy at the calf facility and to a seasonal effect with calves arriving at the calf facility in the winter weighing 89.5 versus 87.8 lb. for summer arrivals ($P < 0.05$).

Data were not shown by sex, but that is another source of variation, with bull calves weighing 95 lb. versus 88 lb. for heifer calves in a published database (Kertz et al., 1997).

This disparity in weight gain for control versus treatment may have been due to differences in nutrient intake from milk replacer versus milk, from differences in calf starter intake and/or from health differences.

In regard to the first dimension, authors did some interesting calculations in the report. Using the Young Calf Model in the 2001 National Research Council publication for a 100 lb. calf and assuming that the waste milk would have had 25.6% protein and 29.6% fat if it were whole milk (they acknowledged that these figures may have been even higher if significant amounts of transition milk were in this waste milk), the contributions from these two feeding programs are as shown in Table 2.

The assumed content of waste milk is debatable, but only now are some data being collected to evaluate the highly variable content and quantity of waste milk. Starter intake was not measured — a major limitation for any nutritional study — but remember that this study was not done for nutritional purposes.

However, if we assume that the difference between projected average daily gain from milk replacer and pasteurized waste milk in Table 2 and actual average daily gain in Table 1 must have been made up by starter intake, then the daily gain deficit and starter intake to make up this deficit are shown in the righthand two columns of Table 2. I used 100 lb. bodyweight (as the authors used) in the other columns in Table 2, whereas average bodyweights for controls were 111 lb. and 118 lb. for treatment calves. So, starter intakes for the entire period before weaning would have been 23.7 lb. for controls and 26.3 lb. for treatment calves.

In reality, I would have expected starter intakes to be about double that. If this had been a nutritional study, the other component lacking would have been a two-week postweaning bodyweight. Why? Because one of the three critical time periods in a calf's life is the weaning transition period — two weeks before and two weeks after weaning (Kertz, 2002).

Too often, calves do great before weaning but then suffer after weaning because of too many changes at once — most notably not having adequate starter intake before weaning and not keeping calves in individual stalls/hutches for two weeks after weaning. Calves will then often slump, be stressed, have a respiratory problem and become impaired for life.

Health issues were greater ($P < 0.001$) for calves fed milk replacer in terms of both scours and pneumonia and for calves born in winter versus summer. The former may have simply been a reflection of level of nutrition, while the latter may have been due to additional energy requirements and winter stresses.

The Bottom Line

Level of nutrition coming from milk or milk replacer sources most often determines early calf performance. However, the complete picture requires measures of starter intake and a measure of postweaning performance.

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