Feedstuffs Reprint

Milk replacer feeding rate impact on weaning transition studied

Bottom Line

with
AL KERTZ*

I HAVE discussed several times the significance of the weaning transition period, which spans from two weeks before to two weeks after full weaning. Factors involved in this period include the amount of milk/milk replacer fed daily, whether it's fed in a step-up and step-down program, texturized or pelleted starter, days allotted for reducing milk/milk replacer fed and how that reduction is conducted and postweaning feeding and management.

A recent study by Dennis et al. (2018) addressed many of these issues.

For the study, two blocks of 48 male Holstein calves about three to four days old were transported from one farm to the Provimi Nurture Research Center nursery and housed in individual pens in a barn with curtain sides, natural ventilation and no added heat. Initial bodyweights averaged 94.7 ± 2.64 lb.

All calves were initially fed 1.45 lb. of dry matter (DM) from a 25% crude protein and 17% fat milk replacer and then were randomly assigned to one of four feeding programs: (1) 1.45 lb. of DM per day for the first 39 days and 0.73 lb. for three days in the morning feeding only (MOD6); (2) 1.92 lb. of DM per day for four days, 2.40 lb. for 31 days and 1.19 lb. for seven days in the morning feeding (HIGH6); (3) 1.92 lb. of DM per day for four days, 2.40 lb. for 42 days and 1.19 lb. for seven days in the morning feeding (HIGH8), and (4) 1.92 lb. of DM per day for four days, 2.40 lb. for 35 days, 1.92 lb. for four days, 1.45 lb. for four days, 1.00 lb. for three days and 0.50 lb. for three days in the morning feeding (GRAD8).

Calves were fed 14% solids in the milk replacer in equal meals at 0600 and 1530 hours.

A 35% whole corn/25% whole oats texturized calf starter (20% crude protein and 37% starch) and water were fed free choice during the nursery trial. On day 56, all calves were removed from the nursery, grouped by preweaning treatment and moved to pens (four calves per pen within treatment) until 112 days of age. The pens had outdoor and indoor space and were bedded with wheat straw.

The texturized calf starter used in the nursery trial was blended with 5% chopped grass hay (approximately 1 in. long) on an as-fed basis and was fed free choice along with free-choice water.

(I must commend this research group for consistently providing the most complete description of methods, conditions and data.)

During the first 56 days (Table 1), average daily gain (ADG) essentially increased significantly as more milk replacer was fed, but this was accompanied by less starter intake, except in the last two treatments, which did not differ. There were no differences in crude protein and metabolizable energy (ME) efficiencies, but greater milk replacer intake did increase feed efficiency — ADG / dry matter intake (DMI) — as would be expected, since milk replacer has a greater digestibility than starter. There were no differences in hip width increase. Digestibilities were determined at days 35, 49 and 60 of the nursery trial.

Digestibility of DM, organic matter, crude protein and fat were less ($P < 0.05$) for calves fed MOD6 versus others on day 35, which might be expected because the MOD6 calves were eating proportionately less milk replacer and more calf starter.

Digestibilities of acid detergent fiber

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1. First 56 days of nursery trial

	MOD6	HIGH6	HIGH8	GRAD8	Std. error
Initial bodyweight, lb.	95.3	94.5	94.0	94.7	2.60
Final bodyweight, lb.	167.8	170.7	176.2	178.8	3.59
ADG, lb.	1.29	1.36	1.47	1.50	0.04
Milk replacer intake, lb.	60.8	94.0	123.8	116.0	
Starter intake, lb./day	1.71	1.25	0.75	0.83	0.08
ADG/DMI	0.427	0.440	0.486	0.513	0.01
ADG/crude protein intake	2.07	2.01	2.08	2.18	0.20
ADG/ME intake	0.126	0.177	0.118	0.124	0.01
Initial hip width, in.	43.9	44.5	43.9	44.2	0.65
Final hip width, in.	53.3	53.6	53.6	53.8	0.56
Hip width change, in.	9.65	9.14	9.65	9.91	0.41
Medical days	0.9	1.5	2.3	1.1	0.28

2. Days 57-122 of nursery trial

	MOD6	HIGH6	HIGH8	GRAD8	Std. error
Final bodyweight, lb.	305.9	296.6	301.5	308.1	4.55
ADG, lb.	2.44	2.25	2.22	2.31	0.06
DMI intake, lb./day	6.74	6.85	7.22	6.94	0.28
ADG/DMI	0.35	0.32	0.31	0.32	0.02
ADG/crude protein intake	1.80	1.63	1.53	1.66	0.10
ADG/ME intake	0.12	0.11	0.10	0.11	0.01
Final hip width, in.	67.6	65.8	66.0	67.1	0.62
Hip width change, in.	14.0	12.2	12.3	13.2	0.43
Final body condition score	2.6	2.7	2.8	2.8	0.06

*Dr. Al Kertz is a board-certified, independent dairy nutrition consultant with AND-HIL LLC based out of St. Louis, Mo. His area of specialty is dairy calf and heifer nutrition and management.

(ADF), neutral detergent fiber (NDF) and starch were greater ($P < 0.05$) for MOD6 versus other treatments on day 35. Additionally, digestibilities of ADF and NDF were greater ($P < 0.05$) for MOD6 versus other treatments on days 49 and 60, perhaps because of greater functional rumen development with more texturized starter intake.

There were no differences among treatments in ruminating, eating and activity times from day 38 to day 56.

There were no differences (Table 2) in final bodyweight at 112 days, although ADG was greater ($P < 0.05$) for the MOD6 versus all other treatments that had received more milk replacer during the first 56 days. On the other hand, final body condition score was greater ($P < 0.05$) for those treatments with higher levels of milk replacer, likely indicating some fattening.

Remember, also, that these were male calves, which is why their ADG was likely greater than 1 kg (2.2 lb.) daily. With heifers, I prefer that they not gain more than 1 kg, because that is the maximum rate for protein deposition. Hip width change was also greater ($P < 0.05$) for the MOD6 treatment versus all of the other greater milk replacer feeding treatments.

Digestibility was measured at days 84 and 112. Digestibilities of DM, organic matter, ADF, NDF, crude protein and fat at day 84 were greater ($P < 0.05$) for calves fed MOD6 versus others. At day 112, starch digestibility was less ($P < 0.05$) for MOD6 than other treatments.

Increasing milk replacer feeding above 1.45 lb. daily (MOD6) resulted in reduced digestibility of DM and organic matter on days 56 and 80, similar to estimates by Hill et al. (2016).

The authors noted that these reduced digestibilities over a week to a month associated with feeding more than 1.45 lb. of milk replacer daily (MOD6) can explain much of the reduced postweaning growth. Perhaps this is too simplistic, but this phenomenon may be related to the degree of functional rumen development. This study used a well-texturized calf starter, or this result may have been even greater.

On the other hand, the durations for reduced milk replacer feeding in this study were as short as three days for the lower milk replacer feeding treatment (MOD6) weaned at 42 days, longer by seven days for HIGH6 with milk replacer fed up to 2.4 lb. daily when weaned at six weeks, by seven days when fed up to 2.4 lb. but weaned at eight weeks (HIGH8) and for progressive decreased feeding rates over periods of four, four, three and three days when weaned at eight weeks but fed up to 2.4 lb. daily (GRAD8).

It is possible to wean calves at six weeks on a high milk replacer feeding program, but that is pushing it, and the Stamey et al. (2012) study that suggested that also used a well-texturized calf starter. I think it requires two to three weeks of offering more than 1 lb. of daily starter intake before calves can be weaned with good functional rumen development — and that means using a well-texturized calf starter.

Such a starter provides a safety factor and also helps calves adjust to forage feeding, as shown when using a texturized starter (Overvest et al., 2016; *Feedstuffs*, Sept. 5, 2016). All of these studies illustrate the importance of describing what form of starter is fed and recognizing the form of starter in any other studies also cited (Kertz, 2017).

The Bottom Line

A good weaning transition requires consideration of the milk replacer feeding level, the level of starter intake, starter form and length of time for increasing starter intake before full weaning. With high milk replacer feeding levels and limited time for weaning transition, this will likely limit or reduce digestibilities, as noted in the Dennis et al. study.

References

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