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Addition of fat to calf starters not beneficial

SOMETIMES what might seem intuitively correct does not work out to be so.

For instance, on a number of occasions, I have noticed fat sources added to calf starters. Most might think that would increase a calf's energy intake. However, I learned from studies I did about 20 years ago at Purina that such was not the case — including using an extruded fat supplement source.

Looking at published literature, I could not find any studies in which adding fat sources to calf starters had a positive effect. I am not talking about individual fatty acid supplementation but, rather, using either ingredients higher in fat or supplemental fat sources. In many cases, there was a negative effect on dry matter intake (DMI) and average daily gain (ADG).

Perhaps the study that most evidently illustrated this was by Kuehn et al. (1994). Some may recognize this study because it also showed that higher-fat milk replacers may reduce the total energy intake of the calf because, even though the milk replacer had more energy, that resulted in less starter intake and less total energy intake.

The Kuehn et al. study evaluated the effect of milk replacer fat at different levels with 120 calves at three locations (two sites used outdoor hutches).

Calves were started on the study at 14 days of age, having been on colostrum for the first four days, followed by feeding a milk replacer with 21.4% crude protein and 21.6% fat. On day 14, calves were started on a 2 x 2 factorial study using calf starters with 20% crude protein on a dry matter basis and either 3.7% total fat (low) or 7.3% fat (high).

Calves were weaned at 42 days of age, and milk replacer feeding was cut in half during the last week prior to full weaning. The added fat source in the starter came from 17.1% ground, roasted soybeans.

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Bottom Line

with
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Starters were fed *ad libitum* from day 14 to day 56. Water was available free choice to calves at all locations. The study was conducted from February through October, ensuring a cross-section of winter through fall seasons.

Prior to weaning, high fat in the starter had no beneficial effect on calf DMI or ADG. After weaning, there was a significant decrease ($P < 0.05$) in both starter DMI and ADG for calves fed the high-fat starter treatment. Prior to weaning, there was no difference in milk replacer or starter metabolizable energy (ME) intake when comparing low-fat versus high-fat starter treatments.

After weaning, ME intake was less ($P < 0.10$) for calves on the high-fat starter due to lower ($P < 0.05$) starter DMI (Table). Thus, the added fat from soybeans in the high-fat starter reduced DMI and ME intake compared to the starter with no added fat.

This reduction in intake could be due to ruminal and/or physiological feedback from the fat, or there was possibly some palatability effect, although all components of the starter except oats and rolled corn were pelleted together.

In the 1990s, a review of 10 other studies (available from me upon request) in the literature failed to show a benefit to adding fat to the starter.

More recently, a series of five trials (Suarez-Mena et al., 2011) was done to evaluate the addition of corn dried distillers grains with solubles (DDGS) in calf starters and growers (beyond eight weeks of age). The DDGS composition was not provided by the supplier or analyzed by the researchers.

In trial 1, 0% versus 49% DDGS resulted in no differences in DMI or ADG before weaning at 28 days or at the end of 56 days. The total percentage of fat in the calf starter was 2.8% versus 6.1% for respective starters.

Trials 2 and 4 used group-housed Holstein steers past eight weeks of age and fed them for 28 days. The calf grower contained either 0% or 39% DDGS in trial 2 or 8% versus 20% in trial 4. Trial 2 resulted in numerically greater ADG (9%), feed efficiency (10%) and hip width change (19%) for the 0% DDGS treatment compared to the 39% DDGS treatment.

In trial 4, ADG (4%), feed efficiency (5%) and hip width change (19%) were greater for steers fed 0% DDGS compared to those fed 20% DDGS.

In trial 3, there were no differences in ADG, DMI or feed efficiency among treatments that contained 0%, 10% or 20% DDGS.

Calves in trial 5 were sacrificed but showed no differences in rumen papillae development among treatments of 0%, 10% or 20% DDGS.

Results of feeding higher-fat starter to dairy calves (Kuehn et al., 1994)

	3.7% fat starter	7.3% fat starter
Starter DMI, lb./day		
Days 14-42	1.15	1.16
Days 43-56	3.91[a]	3.62[b]
ADG, lb./day		
Days 14-42	1.03	1.00
Days 43-56	2.18[a]	1.97[b]
ME intake, Mcal/day		
Days 14-42		
Milk replacer	46.4	45.3
Starter	46.1	48.0
Total	92.5	93.3
Days 43-56		
Starter	73.0[a]	69.8[b]

[a,b]Means within a row with different superscripts are different.

Suarez-Mean et al. acknowledged that the lack of change in performance (ADG and feed efficiency) in trials 3 and 5 and moderate decreases in trial 4 were consistent with two other studies. The researchers also cited some older data that showed that high levels of fat in calf starters could negatively affect the growth and performance of calves; this could be due to palatability or adverse effects on rumen fermentation.

In dairy cattle, increasing levels of unsaturated fat sources — such as contained in calcium salts of fatty acids or with daily dietary linoleic intakes approaching 1 lb. — can reduce DMI and can lead to milk fat depression due to intermediates of ruminal biohydrogenation (Bauman and Grinarri, 2001; Harvatine and Allen, 2005, 2006a, 2006b). Perhaps this same mechanism has an effect in calves as well.

Unsaturated fatty acids have been shown to reduce or eliminate ruminal protozoa (Sutton et al., 1983), and this could contribute to marginal ruminal acidosis and reduced DMI in calves. However, all fat sources added to calf starters, not just unsaturated sources, have shown this decrease in DMI.

The Bottom Line

The addition of fat or ingredients with high levels of fat, such as DDGS or oilseeds, to calf starters reduces DMI and can reduce ADG and feed efficiency. This may be due to a physical effect such as greasiness that calves and cows do not like, or it may be due to ruminal and metabolic effects.

This effect seems to be especially true during the first two to three months of age.

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