DRECA
DAIRY RESEARCH SUMMARY

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"Nutritional Approaches to Maximize Milk Fat Production"

Why is this important?

Feeding more grain in the rations of lactating dairy cows may be an effective approach to increase milk yield. However, increasing the amount of grain in the ration above a "threshold" will lead to many problems related to rumen acidosis. For cows experiencing rumen acidosis their rumen pH drops below 6 and remains low for several hours. Low rumen pH often causes milk fat depression, cows to go off-feed, laminitis, and liver abscess. It is important to understand ration formulation strategies to maximize milk fat production, but is it possible to increase milk yield without negatively affecting milk fat production?

What did we do?

Twenty-eight lactating Holstein cows (on average 141 DIM) were fed 4 different rations during the 12 week experiment; each ration was offered to 7 cows for a 3-week period, then rations were switched every three weeks so that all rations were fed to all 28 cows. All rations were based on barley silage and barley grain, and similar in forage content. The primary differences among the four different rations were sources of supplemental carbohydrates (e.g., beet pulp, corn grain, sucrose, and lactose), which results in different dietary starch content and dietary sugar content (see Table 1).

Table 1. Ration content

	Beet Pulp Ration	Corn Grain Ration	Sucrose Ration	Lactose Ration
Sugar	4%	4%	9%	9%
Starch	27%	32%	27%	27%
Crude Protein	17%	17%	17%	17%

The primary goal of this study was to evaluate the effect of feeding different types of carbohydrate sources (i.e., beet pulp, steam-rolled corn grain, sucrose, and lactose) on milk production of dairy cows.

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What did we find?

Dry matter intake was greater for the "sucrose ration" and the "lactose ration" compared with the "corn grain ration" (see Table 2). Milk yield was not affected by the different rations, and averaged 37.6 kg/day. However, milk fat yield was lower for the "corn grain ration" compared with the other rations. In addition, milk protein yield was greater for the "sucrose ration" compared with the "corn grain ration". Cows maximized productivity when they were fed the "sucrose ration".

Table 2. Dry matter intake and milk production results

kg/d	Beet Pulp Ration	Corn Grain Ration	Sucrose Ration	Lactose Ration
Dry matter intake	23.5	22.4	25.1	24.6
Milk yield	37.6	36.9	38.1	37.7
Milk fat yield	1.36	1.26	1.32	1.33
Milk protein yield	1.29	1.26	1.32	1.30

What does this mean?

Feeding high grain rations may not always maximize milk fat production. We do not need to solely rely on grains as an energy source, and several alternate nutritional approaches exist to increase energy supply to animals. Sugar is very fermentable in the rumen and almost 100% digestible. Some by-product feedstuffs, such as beet pulp, contain highly digestible fibre. These alternative carbohydrate sources have greater potential to increase milk fat production compared with grains. To maximize milk fat production, feedstuffs high in sucrose or lactose content (e.g., molasses, whey permeate, and etc.) or high-fibre by-product feedstuffs should be considered as alternative feed ingredients depending on the cost.

Summary Points

- Feeding high grain rations often decreases milk content, and does not necessarily maximize milk fat production.
- Partial replacement of starch in the ration with sugar or digestible fibre may increase milk fat production.
- Depending on the cost, feedstuffs high in sugar content or high-fibre by-products should be considered as alternative energy sources.

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