

Even for cows, less can be more

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With little research on how nutrition affects reproductive performance in dairy cows, it is generally believed that a cow needs a higher energy intake before calving. Research by University of Illinois scientists challenges this accepted wisdom.

Animal sciences researcher Phil Cardoso said that this line of research was the result of an "accident." Students in [animal sciences](#) professor James Drackley's group compared cows fed before calving with diets containing the recommended energy levels to cows fed reduced energy diets. They found that the cows fed the reduced energy diets performed better after calving.

Cardoso, intrigued by those results, wondered if diet might also be linked to [reproductive performance](#). Using data from seven experiments completed at the U of I from 1993 to 2010, he constructed a database of 408 cows containing data on prepartum diet and physiological status. He also looked at days to next pregnancy (DTP) after calving, which had not been considered in previous studies.

He found that, on average, cows fed the controlled energy (CE) diets (80% of the recommended amount) became pregnant about 10 days sooner than cows fed high-energy (HE) diets, an average time period of 157 versus 167 days.

"People say that if you give this CE diet, the cows don't get pregnant, but that's not true," he said. "If anything, they are a little better off."

They also lost less in body condition score (BCS) and had a lower disease incidence because they were eating more.

Cardoso said that the shorter time to conception for cows fed the CE diet is due to the fact that they eat more after calving than the cows fed the HE diet.

"Just after calving, the cows have a negative energy balance (NEB)," he explained. This is because they cannot consume enough energy to compensate for the fact that they are producing milk.

This NEB, which can be measured by looking at [metabolites](#) in the blood, causes them to lose weight, lowering their BCS. High levels of the metabolites just before calving or one to two weeks after calving are associated with metabolic disorders and certain diseases, which cause them to eat less. These in turn affect reproductive performance.

Both groups of cows showed reduced energy consumption around calving due to stress, but the drop was 4 times, or approximately 30 percent, higher in the HE cows and only 7 percent in the CE cows.

Cows fed the CE diet were able to start eating right after calving. "We want the cow to eat as much as possible just after calving because then she's going to be healthier," Cardoso said.

The researchers also noticed that cows fed the CE diet showed less prepartum versus postpartum variation in how much they ate. By contrast, the cows fed the high energy diet were eating more than they needed before calving.

"Cows and ruminants cannot export well from the liver," said Cardoso. "Any time a large amount of fat is going to the liver, that's going to cause a lot of problems. They are going to have lower levels of glucose and

ketone bodies will form. Feed intake will start to drop, and the cow will start feeling ill."

In a follow-up study that has not yet been published, the researchers tried to strategies to make the cows eat less. One was to give them just 80 percent of what they needed; the other was to increase fiber in the day so the diet would be lower in energy and the cows could eat more. They had similar results for the two strategies.

There are indications that a CE [diet](#) has other benefits. It may help food to remain longer in the rumen, which is beneficial to the cow if she is stressed.

In short, Cardoso advised, just give the cow what she needs and she will perform better metabolically and reproductively.

"There is money associated with this," he said. "Any disease costs money."

But long intervals between calvings also costs money. "In the dairy business, we'd like the cow to calve once a year and the calving interval to be around 12 to 13 months. Because to give milk, she needs to calve, so we want her pregnant as soon as possible," Cardoso explained.

He added that research has shown that every day after 90 days in milk that the cow does not get pregnant represents a cost of 2 to 3 dollars.

More information: "Prepartum Dietary Energy and Reproduction" by F.C. Cardoso, S.J. LeBlanc, M.R. Murphy, and J.K. Drackley, has recently been published in *Journal of Dairy Science* and is available at www.journalofdairyscience.org/article/S0022-0302%2813%2900465-7/abstract

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