



NEW DATA ON NEGATIVE DCAD DIETS

Decades of research clearly demonstrate that multiparous transition cows do extremely well when fed a negative DCAD diet. A meta-analysis of published research in the *March Journal of Dairy Science* shows that in addition to reducing milk fever, negative DCAD diets also reduce subclinical hypocalcemia, retained placenta and metritis. They also increase milk production and fat-corrected milk in multiparous cows, Santos et al., (2019).

Despite all the known benefits from feeding negative DCAD diets, some questions still remain. That's why researchers continue to ask questions. New research from the University of Florida and the University of Illinois provide some answers.

HOW LONG SHOULD I FEED NEGATIVE DCAD?

How cows are fed during the 45- to 60-day dry period makes a big difference on how successfully they transition into lactation. In the last decade controlled-energy diets, also called the "Goldilocks" diet, have emerged as the most beneficial diet choice for dry cows. (Please see "Goldilocks' Diets Still Just Right for Dry Cows" in the May 2018 issue at <https://bit.ly/2EM9I4P>)

Negative DCAD diets are another piece of the puzzle for healthy and productive transitions. Negative DCAD diets that metabolically acidify cows to achieve a urine pH of 5.5 to 7.0 work well. But how long should cows be metabolically acidified—the entire dry period or just the last 21 days? That's the question University of Florida researchers recently answered.

Research by Lopera et al., (2018) examined the effects of feeding a negative DCAD diet for either the last 21 days of gestation or the last 42 days of gestation. Two different diets, -70 mEq/kg of DM and -180 mEq/kg of DM, were each fed to the short- and long-duration groups. After calving, all 114 Holstein cows enrolled were fed the same diet. Long-duration cows, fed either level of DCAD, had two days shorter gestation lengths, produced 5.5 lbs less milk per day in the first 42 days of lactation and tended to have increased days open. There were minor differences in ionized calcium (iCa) and measures of acid-base status pre- and postpartum between short- and long-duration cows. Researchers also identified differences between cows fed -70 and -180 mEq/kg of DM, regardless of the duration of

feeding. Prepartum cows on the more acidogenic diet ate 2.4 lbs less feed per day. Those cows were also in a more negative energy balance and produced less colostrum. However, after calving there was no difference in yields of milk, milk components, health or reproductive performance compared to cows fed the -70 mEq/kg of DM diet.

Researchers reached two conclusions: 1. Feeding acidogenic diets beyond 21 days might be detrimental to dairy cows, and 2. There was no benefit to reducing DCAD from -70 to -180 mEq/kg of DM. You can read the full study at <https://doi.org/10.3168/jds.2018-14580>

HOW MUCH CALCIUM TO INCLUDE?

Researchers at the University of Illinois presented six abstracts at last summer's ADSA meeting that sought to zero in on how much calcium should be fed in negative DCAD diets. The research team, led by James Drackley, professor of dairy nutrition, fed 81 Holstein cows one of three diets: Control +6 mEq/kg of DM with 0.4% calcium DM, Low -24 mEq/kg of DM with 0.4% calcium DM (40 grams/day) or High -24 mEq/kg DM with 2% calcium DM (220 grams/day). All cows were fed a high-forage, low-energy ("Goldilocks") diet at the start of the dry period until enrolled in the feeding trial at 28 days before expected calving date.

Findings of interest include: All cows fed a negative DCAD diet, with either low or high calcium, had greater iCa concentrations at calving (1.10 and 1.11 mmol/L) and at 24 hours after calving (1.11 and 1.05 mmol/L) when compared to control cows (0.98 mmol/L). There was no difference in immune function measurements between diets.

All cows fed a negative DCAD diet, with either low or high calcium, had lower postpartum BHB (0.91 and 0.88 mmol/L) at 24 hours post calving compared to cows fed the control diet (1.47 mmol/L). A BHB >1.0 mmol/L at 24 hours after calving indicates subclinical ketosis. There was no difference in NEFA levels.

Dry matter intake was higher in prepartum cows fed the control diet compared to cows on the low or high calcium acidogenic diets—26.6, 22.1 and 24.2 lbs/day respectively, says Drackley. But after calving, cows fed low or high calcium diets had greater DMI (41.7 and 43 lbs/day) and greater milk yield (98.3 and 99.6 lbs/day) than control cows (37.5 and 92.6 lbs/day).

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In the study, researchers were feeding to achieve a mean urine pH of 5.7 for cows on the low calcium and high calcium negative DCAD diets. The actual mean urine pH achieved was 8.12 for cows fed the control diet, 5.76 for cows fed the low calcium diet and 5.67 for cows fed the high calcium diet, says Drackley. They also examined the amount of calcium excreted in urine. All of the cows fed the acidifying diets excreted more calcium in urine than control cows did prepartum. Total calcium excreted was 8.4, 13.4 and 1.0 grams/day for low calcium, high calcium and control diets. Cows fed the low and high calcium acidifying diets all successfully created a calcium sink in the prepartum period to help prepare cows for the high calcium demand of calving.

On most of the parameters measured, the resulting difference from feeding a low or high calcium level was small, says Drackley. His current recommendation on calcium in the prepartum diet would be 0.9% to 1.0% calcium in the total diet DM (80 to 120 grams/day) if feeding a partial or moderate DCAD diet. If feeding an aggressive negative DCAD (fully acidifying) diet he recommends about 1.6% calcium or above in the total diet DM (>180 grams/day).

While current research has not revealed the optimal level of calcium to feed prepartum, it has shown that feeding a “Goldilocks” diet combined with a negative DCAD diet during the close-up period can produce healthier, more productive cows for many farms. As more research and meta-analysis are completed, the calcium question will eventually be answered.



HAPPENINGS

SoyPlus Team Receives Spirit of Excellence Award

Carroll Area Development Corporation (CADC) recently honored Landus Cooperative's SoyPlus team with The Spirit of Excellence award. The award recognizes Carroll County, Iowa, businesses that invest resources in projects that create quality jobs in the local community. Landus Cooperative was thanked for its \$27 million investment in Ralston, Iowa, to increase SoyPlus processing capacity by 50 percent. The expansion created 11 new full-time, family-wage positions.

As a farmer-owned cooperative, Landus Cooperative originates soybeans from its membership of more than 7,000 farmers in Iowa and parts of Minnesota. With the increased soybean processing capacity, nearly 40 percent of all soybeans purchased from farmer-members get processed into SoyPlus.

The quality and consistency of SoyPlus is owed not just to the quality soybeans grown by the cooperative's farmer-owners, but also to the team of employees who work around the clock at the manufacturing plant to oversee stringent quality assurance protocols.

Mark Cullen, chief animal nutrition officer overseeing the Dairy Nutrition Plus product line manufactured by Landus Cooperative, accepted The Spirit of Excellence award on behalf of the entire SoyPlus team.

For more information about SoyPlus and other quality dairy feed ingredients manufactured by Landus Cooperative, visit DairyNutritionPlus.com

FROM THE MATERNITY PEN

Benefits of Colostrum Go Beyond IgG

For years the goal has been to get enough high-quality colostrum (≥ 50 g/L of IgG) into the calf within six hours of birth to achieve passive transfer. But calves get more from colostrum than just IgG. Colostrum contains more energy, proteins, insulin, hormones and growth factors than milk.

Research now shows that colostrum also serves as a communication tool from the dam to the calf, says Mike Van Amburgh, dairy nutritionist at Cornell University. Dams put extra nutritive and non-nutritive ingredients in colostrum that direct calf development at the beginning of life outside the uterus. Colostrum provides signals that tell the calf how to develop. So far, research has demonstrated that whole colostrum improves gut maturation, increases villus height and growth in the small intestine, increases feed efficiency, enhances immune cell maturation and produces greater cellular immunity by using programmed cells from the dam.

Dams make colostrum for more than one day. The amount of extra nutritive and non-nutrients ingredients in colostrum slowly declines through the first four milkings. Given that colostrum provides so much more than IgG and initial passive transfer, new recommendations suggest that calves should receive colostrum for four days. Four quarts of first-milking colostrum should be fed to newborn calves immediately and then again in 12 hours. Then colostrum from the second through fourth milkings should be fed to calves on days two through four. The additional days of colostrum feeding helps ensure that the non-nutritive factors supplied by the dam are supplied to the calf. This allows all of the signals that mom is sending to get through which can help get heifers off to a good start and on the right track to achieve their genetic potential.

CONSULTANTS CORNER

Dry Period Heat Stress Affects Cows' Granddaughters



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It may only be March, but heat stress will be here before you know it. While most producers understand the value of cooling lactating cows to limit the very visible drop in milk production that occurs from heat stress, many still do not cool dry cows.

New research from the University of Florida shows that it's not just the dry cows that are affected by heat stress during the dry period. Their daughters and granddaughters are, too. That's right, if your late-gestation dry cows experience heat stress this summer, the negative effects will still be impacting your herd in four years when their granddaughters start to calve. Research now shows that heat stress today in pregnant dry cows negatively impacts the productivity of two generations of daughters.

Our research team used lactation records from nine summers of heat-stress research (2007-2012, 2014, 2016 and 2017 with temperature-humidity index >68) to determine if heat stress that occurs in utero affects the productivity of granddaughters in addition to daughters. The answer is an emphatic yes!

In the heat-stress trials, cows were dried off 46 days before expected calving date. Cooled dry cows had shade, fans and soakers. Heat-stressed dry cows had shade only. Milk yield, fat and protein records for the dams, daughters and granddaughters were used to estimate energy corrected milk from calving to 35 weeks in milk for two consecutive lactations. All three generations—the cows subjected to heat stress during the dry period, their daughters and granddaughters—experienced reduced milk production even when they were cooled during lactation.

Dams subjected to heat stress during the dry period produced 5 lbs less milk per day than their cooled counterparts in the subsequent lactation. When the heat-stressed cows' daughters calved two years later, they produced 8 lbs less milk per day than their cooled counterparts. In the daughters' second lactations, the difference between heat-stressed and cooled daughters was 7.5 lbs of milk per day.

Milk production losses continued when granddaughters entered the milking string. Granddaughters, born to daughters that were heat-stressed in utero, produced 8 lbs less milk per day than their cooled counterparts in their first lactation. In the granddaughters' second lactations milk losses climbed to 14 lbs per day less milk than their cooled counterparts.

Heat stress during the dry period in late-gestation not only impairs the cow's productivity but the productivity of her daughters and granddaughters. It appears that heat stress while in utero prevents optimal growth and development of the mammary gland in daughters and in granddaughters, which leads to less milk production than their cooled counterparts. Heat stress causes a multitude of negative impacts on cows, their daughters and granddaughters.

We breed dairy cattle for excellence. Not cooling dry cows may be preventing daughters and granddaughters from reaching their genetic potential.

To learn more about the effects of heat stress during the dry period, please see "Cows Need Cooling During the Entire Dry Period," from the March 2018 issue of Dairy Nutrition Plus. It is available online at <https://bit.ly/2Ulpbhp>



BEYOND BYPASS

Transition Cows' Response to RPM and RPC Differs

Recent research shows that feeding transition cows rumen protected methionine (RPM) and rumen protected choline (RPC) increases milk protein yield and milk yield and decreases fat accumulation in the liver. Researchers at the University of Maryland took that research one step further to determine if all cows respond the same way. Their results show that primiparous and multiparous cows respond differently to RPM and RPC supplementation.

In the feeding trial cows received one of four diets: control (no RPM or RPC); RPM (12 grams/day prepartum, 18 grams/day postpartum); RPC (60 grams/day) or both RPM and RPC. Supplementation started three weeks prior to cows' expected calving date and continued through the first five weeks of lactation.

Overall dry matter intake (DMI) was not significantly affected by treatment. But there were slight differences observed—RPM increased DMI in primiparous cows on the day of calving, and RPC decreased DMI in multiparous cows during the first week after calving.

Big differences were seen in milk yield from RPC supplementation. Primiparous cows supplemented with RPC increased milk yield by 8 lbs/day; however, milk yield in multiparous cows did not change. Both milk fat and milk protein percentage were increased by RPM supplementation in multiparous cows during the first two weeks of lactation, but no change was seen in primiparous cows.

The researchers also looked at overall energy balance, which was not significantly affected by treatment. However, on the day of calving multiparous cows supplemented with RPC had 9.7 Mcal more energy than non-supplemented multiparous cows. And primiparous cows supplemented with RPM had 3.3 Mcal more energy than non-supplemented primiparous cows.

These results suggest that primiparous cows and multiparous cows do not respond the same to RPM and RPC supplementation. Separate transition groups for first-calf heifers and multiparous cows could allow nutrition to be better tailored to meet each group's need. This research was presented at the ADSA conference last summer.



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QUALITY CORNER

True Protein Means True Value

When it comes to dietary crude protein for pre-fresh dairy cows, quantity is not the only consideration. The type of protein also matters, and both SoyPlus and SoyChlor offer cost-effective contributions to the ration in the form of true protein.

Metabolizable protein (MP) is crucial to the health and performance of pre-fresh dairy cows, but delivering enough MP to high-producing dairy cows can feel challenging. And delivering enough MP is often overlooked in the pre-fresh diet. Because many lower-carbohydrate close-up diets are limited in their ability to support microbial protein synthesis, nutritionists often depend on a quality, consistent bypass protein, like SoyPlus, in order to meet MP needs. With a concentrated source of quality bypass protein in the diet, sufficient MP can be supplied with lower diet crude protein levels. That means less cost to the producer.

Feeding SoyChlor in the pre-fresh diet is another way to ensure that cows receive a quality source of true protein. When considering the true value of SoyChlor, it's important to not just focus on the source and amount of anions the ingredient supplements. Recognize and account for the contributions of all of its nutrients when formulating diets. Commercial anionic supplements vary greatly in their crude protein content, and for most, non-protein nitrogen (NPN) constitutes



a substantial portion of their crude protein. But SoyChlor has no added NPN. Almost all of its crude protein is true protein, making a direct contribution to MP supply.

The type of protein that individual feed ingredients contribute to your pre-fresh diet matters. Contact the Dairy Nutrition Plus team to learn more about how SoyPlus or SoyChlor can add value to the diet.