FARM REPORT

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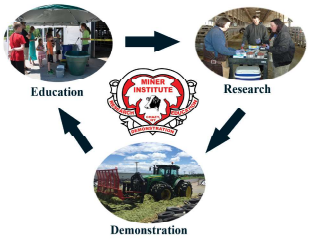

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FROM THE PRESIDENT'S DESK: DON'T NEGLECT FEED AVAILABILITY

Recently a nutritionist passed along a question to me from one of his clients about feed availability and how it affects feed intake and milk production. Essentially, the producer was wondering whether the potential benefits of feeding for refusals outweighed the cost of wasted feed and labor to clean out the bunks every day. I find that is still a common question in the field: How risky for milk yield is feeding to a slick bunk or very low feed refusals?

No one wants to waste high-priced feed dry matter and so the question is an important one. Upfront I need to stress that we could use more controlled research on the topic of feed availability throughout the day and intake or energy-corrected milk responses.

When I was at the University of Nebraska, we studied how a functionally empty feed bunk overnight (about 6 hours) affected feeding and resting behavior. In this on-farm case study we couldn't measure dry matter intake because it was on a pen basis. But making sure the feed bunk didn't go empty between midnight and 6 am doubled feeding activity at the bunk overnight, enhanced free stall use, made for less restless cows, and bumped milk up several pounds per cow.

Work by Alex Bach about 15 years ago found that herds that feed for refusals versus those that let the bunks go empty produce, on average, about 4 pounds per day more milk. This same paper clearly showed that keeping feed pushed up in front of the cow results in greater milk yield as well. More recently, Trevor DeVries at the University of Guelph has confirmed that the real value of feed push-ups is to keep feed within reach of the cow throughout the entire day.

Research also suggests that lactating cows are hungry with just 3 hours per day of feed restriction. Based on this sort of data I've advocated for 24/7 feed access as ideal. Certainly, exceeding three hours daily of empty feed bunk results in hungry cows and we need to avoid that situation especially with our high producers. Research from the University of British Columbia shows that extended time without feed (i.e., 10 hours per day) results in dramatic losses in dry matter intake, about 3.5 pounds per cow. Hopefully that extent of feed restriction rarely if ever occurs on farm!

Mac Campbell's PhD work here showed that, when cows are overcrowded and in a competitive environment, they experience the greatest degree of sub-acute rumen acidosis (SARA) when feed access was restricted by about 5 hours per day. Overcrowded cows with restricted access to feed had as much as 9 to 10 hours daily of SARA. These were short-term study periods, and so we couldn't accurately measure milk yield, but I would infer that SARA would negatively affect both intake and milk efficiency longer term given

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CUTTING COWS' VACATION TIME

The most challenging and demanding period for a dairy cow is the transition period, which is the 3 weeks before calving until the 3 weeks after calving. During this time cows typically will face a period of negative energy balance (NEB), immunosuppression, and hormonal changes. Such challenges increase cows' susceptibility to health problems during the fresh period and reproductive problems. During the transition period cows are not only working to recover from calving, but also to support high milk production. To do this cows need to consistently be consuming the proper amount of energy in the feed before and after calving. Cows that go off feed shortly after calving are typically the ones that have a metabolic disorder or disease. Such problems can impact their upcoming lactation and reproductive performance. Cows prioritize nutrients to maintenance, then lactation performance, then reproductive performance, but a cow that experiences a metabolic disease like ketosis which is commonly seen during the transition period, will still prioritize nutrients to maintenance but because energy is limiting there is not enough energy to maintain milk production; therefore, there is often a decrease in production. Cows with better metabolic health within the first few weeks of lactation have greater intake and feeding activity, and have earlier post-calving resumption of ovarian cycling. Therefore, it's in the farmers interest to use practices that will ease the challenging transition period.

One practice to help set cows up for a successful transition period is drying them off before calving. The dry period allows cows to prepare their bodies for the major changes they are about to encounter. The most common length of a dry period is 50 to 60 days, which has maintained the best balance between the loss of milk income during the dry period and the production yields reached in the subsequent lactation. On the contrary, there have been many studies conducted investigating the effects of shortening or completely omitting the dry period, and results have shown that this could be effective at improving metabolic status and energy balance during early lactation.

When the dry period is shortened to about 30 days or completely omitted, many studies have concluded that cows have improved energy balance during early lactation. And when comparing cows with a 30-day dry period to no dry period, those with no dry period had better energy balance than those with a shortened dry period. The current reason as to why cows with shortened or no dry period have better energy balance and metabolic status is because those cows typically have lower milk yield than those with a standard (i.e., 50 to 60-day) dry period. At the same time, some but not all studies observed that cows with shortened or no dry periods had the same or increased feed intakes. Thus, if milk production is lower but cows are still eating the same, cows with shortened or no dry period are able to easily meet their energy requirements and don't experience that severe period of NEB commonly seen for the first 2 to 3 months of lactation in cows with a standard dry period. Since cows with a shorter or no dry period don't experience NEB to the same extent as do cows with a standard dry period, they're less likely to mobilize body reserves and experience ketosis. A meta-analysis based on results from many studies concluded that cows with a shorter or no dry period had 25% lower odds for clinical ketosis compared to cows with a standard dry period. Three studies, two of which were included in the meta-analysis and one which was conducted after it was published, also reported that cows with no dry period didn't experience ketosis while the incidence rates of ketosis for cows with the standard dry period were ranged from 5 to 25%.

This begs the question whether this tendency to have reduced disease and potentially reduced treatment costs for cows with shorter or no dry period will outweigh the revenue lost from the decreased milk production. Studies that followed cows throughout their whole lactation or the subsequent lactation observed that cows with short or no dry period had increased risk of fattening in mid and late lactation. A study that looked at the effect of short or no dry period over multiple lactations found that when the dry period was omitted for a second time some cows had reduced milk yield losses while others spontaneously dried themselves off due to low milk production. Researchers have also observed that cows of second lactation or greater have reduced milk yield losses compared to those in their first lactation. For example, one study conducted at Wageningen University and Research Center in the Netherlands found that cows completing their first lactation and entering their second with shortened and omitted dry periods produced about 9 and 29 lb/day, respectively, less than those with a standard dry period, while cows with greater than second lactation lost 11 and 20 lb/day, respectively. There is a limited amount of research that looks at the impact of a short or no dry period over multiple lactations, therefore before such practices are recommended to farmers there needs to be more research on its longevity.

A 50 to 60-day dry period is a standard practice on dairy farms and has proven to be beneficial for many years. Reducing or completely omitting the dry period may be beneficial for some cows and can improve energy balance in early lactation; therefore, making the transition period a little easier for them. But it is unclear if this easement during the transition period is large enough to outweigh the effects

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SULFUR FERTILIZATION FACTSHEET

Cornell University recently published a fact sheet titled "Sulfur Fertilizer Value of Liquid Dairy Manure" containing some good information. It can be downloaded via the following URL: http://nmsp.cals.cornell.edu/publications/factsheets/factsheet120.pdf

Atmospheric depositions of sulfur are much lower than they were a generation ago. That's good news for the environment since it means that air quality has improved, but it also means that an essential nutrient that farmers used to get for free may now have to be supplemented. Typical yields of corn silage and alfalfa-grass silage each remove 10-14 lbs. of sulfur per acre each year, while grass and soybeans remove 6-8 lbs. Atmospheric depositions only supply 1 or 2 pounds per year — you do the math. For dairy farmers the easiest and cheapest way to supply sulfur to crops is via manure application. Liquid or slurry dairy manure supplies 3 to 5 lbs. of sulfur per 1000 gallons, only about half of which is plant-available. Therefore, an annual application of about 5000 gallons of manure per acre should meet most crop needs. Sulfur is quite leachable in the soil — especially in sandy, low-organic matter soils, so only a small amount of the sulfur applied (as manure or commercial fertilizer) is available the following year, and almost none after that. Therefore, supplying sulfur to your crops — particularly for corn silage and alfalfa — is something you may need to do on an annual basis, either as manure or purchased fertilizer. High organic matter soils (4%+ O.M.) are less likely to need supplemental sulfur, though I'd be more comfortable if this was confirmed by tissue testing. (A forage analysis is not a substitute for a tissue analysis because tissue testing involves sampling a specific part of the plant at a specific time in it's growth.)

The sulfur content of 1000 gallons of dairy manure will vary depending on what your cows eat and on the solids content of the manure. Therefore, you should be testing dairy manure at least on an annual basis — more often is better — making sure that sulfur is included in the analysis. Both sulfur and solids content can vary depending on what stage you're at in emptying your manure storage, so you may want to test the manure from your pit or lagoon two or three times as you unload. Of course by the time you get the results back from the lab you may be at a different level in the manure pit, but since dairy rations and manure solids content don't differ greatly from year to year this data will at least give you an idea of the typical levels for your operation.

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DRY PERIOD, Continued from Page 2

throughout lactation. There are also studies that have observed the effects of a short or no dry period on feeding behavior, udder health, and fertility. Overall, a 50 to 60-day dry period is still the best practice to maintain the best balance between the loss of milk income during the dry period and the production yields reached in the subsequent lactation. More research on the long-term effects of a short or omitted dry period must be conducted to determine if there are long term benefits, on the cow and cost side, of altering a practice that has worked for so many years.

References available upon request.

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what would likely happen to the rumen epithelium.

Finally, there is no controlled research that I am aware of that relates various levels of feed refusals to intake or milk in a competitive environment. The best on-farm, case study type data I know of is Diamond-V's TMR Audit database. An informative chapter by Tom Oelberg and Bill Stone in the Large Dairy Herd e-book published by ADSA summarizes most of their key findings. Using time-lapse cameras, they concluded that very few farms can actually achieve zero feed refusals without the cows running out of feed. The few dairy farms that successfully feed to low refusals have very frequent feed push-ups right up to when refusals are pushed out. They also stress that these farms deliver fresh feed within 15 minutes of when refusals are pushed out. That is a high bar to meet! In the future, we really need some controlled research to verify these key conclusions. The bottom line to me is that, if someone is set on feeding to very low or zero refusals, they need to not overcrowd, keep feed always pushed up so any cow can access feed any time, and be exceedingly consistent on feed delivery time. In my experience, when a producer takes a hard look at their feeding management, that is a tall order, and 2 to 3% feed refusals makes sense especially earlier in lactation.

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ABOVE & BELOW GROUND INSECT PROTECTION IN CORN FOR THE NORTH COUNTRY

Over the past decade more than 75% of the national corn crop has been traited to express the Bt endotoxin for insect protection. The technology may be controversial in some circles, but it's certainly made its mark when it comes to protecting corn from corn rootworm and the various lepidopteran (caterpillar) pests that love to munch on the crop. Below ground insect protection refers to Bt toxins that are targeted to control corn rootworm damage while above ground protection addresses certain stalk or ear feeders such as true armyworm, corn earworm, or western bean cutworm. The latter pest is now being found at high densities across many parts of the North Country and is only controlled by the best above-ground trait packages (those that include the Vip3A toxin).

While Bt traits can be very helpful as a pest management tool, they come at a cost. It takes considerable effort for corn breeders to add Bt traits to the newest corn hybrids, and they have to pay a royalty (of sorts) to the original trait developer to do so. As with everything else, these costs get passed on to the final consumer – the farmer. While paying a little more or less for a bag of seed may not make a huge difference in the grand scheme of things, a yield difference can add up quickly. For example, a bag of seed corn that gives you a half a ton of extra silage per acre is worth up to $75 more per bag (with silage at $60/ton).

With that in mind, a good trait package might sound like a cheap form of pest insurance for your crop. But not so fast: Seed cost isn't the only cost associated with Bt traits. As a general rule, whenever we make a corn plant do something out of the ordinary (like producing Bt proteins), all things being equal it will come at the cost of yield. The goal is to allow for higher corn yields by providing the insect protection, but if a pest is not present during the growing season, there may actually be a yield drag caused by the non-utilized traits. This is particularly evident in some below ground traits targeted for corn rootworm.

Corn rootworm is considered to be the most economically damaging insect pest of corn in the nation. However, populations of this pest in the North Country often only reach low to moderate levels. Most of us agronomists don't worry too much about it as long as fields are rotated to grass or alfalfa after a few years of corn. There's also compelling evidence that alfalfa snout beetle biocontrol nematodes are effective at managing corn rootworm as well. Research from recently retired Cornell entomologist, Elson Shields, suggests that Bt rootworm traits may not be required for nematode treated fields at all.

Nematodes aside, it still might make sense to have a portion of your corn crop planted to a more basic trait package, or perhaps, a Bt package targeted for western bean cutworm in late-planted or late-maturing hybrids. While it's easy to dream about the ideal rotations, biocontrols, and trait packages to get the highest yields while warding off the pests, things always get more complicated in practice. The reality that many people face is that their favorite corn hybrid might only be offered in a single trait package. There's nothing wrong with a little dreaming though!

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HOW MILKFAT CONTENT IMPACTS CHILDREN'S PREFERENCES FOR FLUID MILK

What kind of milk did you drink when you were in school? What was your favorite flavor? Did the milk have a delicious taste? Today, schools participating in federal-funded programs, such as the National School Lunch Program and the National Breakfast Program, are limited to serving skim or low-fat milk. This concerns the dairy industry as milk consumption could possibly decline as children may find these limited options to have a less desirable flavor and mouthcoating. Although there are concerns with the sugar content in flavored milk, children who consume flavored milk do not have higher sugar intakes than other children because non-milk drinkers are more likely to drink juice or soft drinks, which have the same amount or more of added sugar. The federal guidelines also influence fat and sugar content as they relate to calorie count. Yet, as sugar contents are lowered, this begins to affect sensory properties, such as fat. Additionally, wasted milk and the overlooking of the nutritional benefits provided by milk are concerns. With these guidelines in place at many schools, researchers at North Carolina State University and Cornell University examined if children are capable of distinguishing between unflavored and chocolate flavored fluid milk with varying quantities of milkfat. This study also established children's preferences for fluid milk with certain milkfat contents.

Flavored and unflavored milks were high-temperature, short time pasteurized, blended, and standardized to contain four different percentages of milkfat (≤0.5, 1, 2, and 3.25%). Each type of milk was packaged in a half-gallon light-shielded milk jug and stored at 4°C in the dark. After 7 days, the milks were evaluated by children, ages 8 to 13 years old. The tetrad testing technique was used, which is where four samples, two from one sample and two from the other sample, were presented and the child were asked to group the two samples that were most similar. This testing was conducted in clear plastic tumblers (with visual cues) and foam cups (without visual cues) to decipher if selection differences were driven by visual, flavor, or mouthfeel cues. The children also participated in individual acceptance tests, which recorded their liking of each milk and perception of certain characteristics. The experiment was conducted twice, and trained panelists were responsible for documenting the sensory differences among the milks due to milkfat and the scores of the children.

Unflavored Milk

During the tetrad testing, children were able to visually distinguish all unflavored pairs except for 2% and whole milk. Overall, children had a higher liking for 1% and 2% milks than skim milk. Although these differences in liking were influenced by appearance and viscosity, they were primarily based on appearance. This establishes that milkfat plays an important role in the visual perception of milk that is stored in see-through containers. When visual cues were absent, the children could not consistently tell the difference and there were no differences between the milks that were driven by visual, flavor, or mouthfeel cues.

Flavored Milk

When visual cues were present, the children could tell a difference between all chocolate milks with all milkfat contents. They consistently liked chocolate milk with at least 1% milkfat over skim milk. The differences in liking were driven by appearance, viscosity, and flavor. The children penalized skim milk for being too dark and thin. Some children suggested the milk should have more or less flavor, indicating that there may have been differences in whether the children liked the chocolate flavoring selected. When visual cues were absent, the children could only tell the difference between skim versus 2% and skim versus whole milk. This may have been due to the chocolate milk having a more elaborate flavor and mouthfeel, making it more difficult for the children to differentiate between all the milks.

Overall, when visual cues were present and package-related flavors were absent (the milk was not packaged in paperboard cartons), children had the highest liking scores for milks with at least 1% milkfat, flavored or unflavored. Interestingly, the children who consumed milks with higher milkfat contents at home had a more positive perception of milk, and therefore, higher liking scores for all milks than children who typically drink skim milk at home. Knowing this, government-funded programs and schools should reconsider expanding options for milks with higher milkfat contents as this may promote positive outlooks on milk and lifelong consumption. With chocolate milk standing as the most popular flavored milk amongst children and adults in the United States, some remain concerned about the sugar content in school lunches. This study used a formulation with minimal added sugar (8.8 g per 237 mL or 3.7%). Liking scores for this formulation were still relatively high amongst the children, demonstrating that sugar content and flavor can be valued simultaneously without losing the interest of children. This study establishes the importance of milk sensory quality for child preference and the need for processing efforts to maximize this quality for school lunches. This has been recognized by the USDA, as Tom Vilsack, the Secretary of Agriculture, announced last month that the USDA proposes to keep low-fat flavored milk as an option for school lunches.

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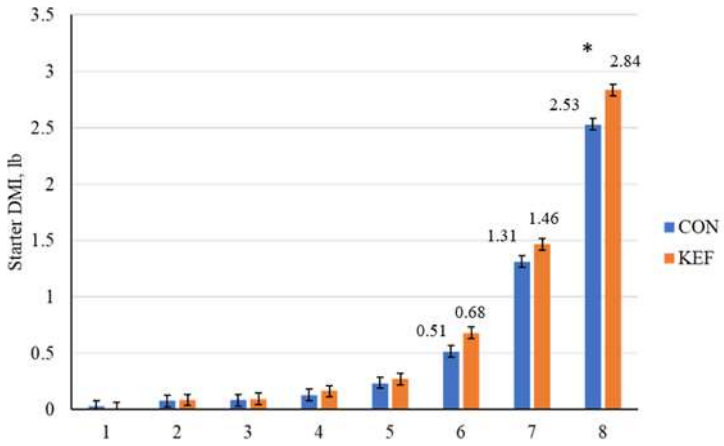
BREWING UP A POTENTIAL NEW PROBIOTIC OPTION FOR CALVES

Health and development of calves is a priority on all farms. Steps to secure the future of your dairy herd begin with the calf program, and it's important to recognize the relationships between management strategies and calf health. Diarrhea is the leading cause of death in calves less than 30 days (d) of age, with the first 21 d of life the period of greatest risk for illness. Aside from impacts to the calf's developing gastrointestinal tract, which can have negative effects up to and through first lactation, diarrhea and treatments can also affect time and resource budgets. If you're spending a lot of time treating sick calves, it doesn't leave you time to do much else. With the need to reduce antimicrobial use on farms and promote good antimicrobial stewardship, there is interest in exploring preventative approaches to disease management, especially those that are cost-effective and easily implemented on-farm.

Adding kefir grains to whole milk for fermentation.

Probiotic bacteria, such as those in the lactic acid bacteria family, can help promote good gut health and boost immunity through their antimicrobial and fermentative properties. The fermented milk beverage kefir (keh-feer), which has been lauded for centuries as a probiotic, may be one such option for an efficient, on-farm probiotic supplement. With a slightly tangy taste and consistency of drinkable yogurt, kefir is teeming with beneficial bacteria, yeasts, and fungi. It is easy to prepare, inexpensive, and its potential benefits are relatively understudied in pre-weaned calves. Could supplementation with kefir during the first 21 d of life improve growth, diarrhea incidence, and need for antibiotic use in pre-weaned calves on Northern New York farms?



Calf starter dry matter intake (DMI) during the preweaning period recorded for dairy calves at Farm A receiving either a control (CON; 60 mL salable whole milk) or 60 mL kefir (KEF) once daily in milk replacer for the first 21 days of life. Asterisk indicates significant differences in starter DMI at $P \leq 0.05$ observed at week 8.

A 2022 study funded by the producer-driven Northern New York Agricultural Development Program (NNYADP) enrolled 140 individually fed and housed Holstein calves on three farms (A, B, C) across Northern New York. After initial colostrum and transition milk feedings, calves were randomized to receive one of two treatments 1x/daily at the morning feeding in either whole milk (WM) or milk replacer (MR) for the first 21 d of life: a control of salable WM (Farm A) or no supplementation (Farms B and C), or ¼ cup (60 mL) kefir. Farm A fed MR at 13.6% solids, and Farms B and C fed salable and pasteurized WM, respectively. Kefir was prepared as needed on each farm by adding kefir grains to salable WM in a glass jar (Figure 1), sealed, and allowed to ferment at room temperature (20-25°C/68-78°F for 24 h. The grains were then strained from the kefir and either placed into a fresh jar of WM to prepare another batch, or stored refrigerated (4°C/39°F) in WM until the next use. All three farms fed calf starter, and water was available for ad libitum intake for the duration of the study on all three farms.

Feed intake and efficiency were measured on Farm A. Initial body weight and stature measurements were recorded for calves at all three farms between the first 1-7 d of life. Growth was then measured weekly on Farm A, and at weeks 4 and 8 on Farms B and C. Average daily gain (ADG) was calculated from week 0 to week 4, then week 4 to 8. Health scores (fecal, respiratory, hydration) were recorded daily on Farm A, and weekly at Farms B and C. All treatments given to calves on each farm were recorded, as well as the reason for treatment.

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LIEBIG'S BARREL

In 1845 German chemist Justus von Liebig popularized a discovery by botanist Carl Sprengel, that a plant's growth is limited by the most deficient nutrient or other resource. Liebig illustrated this concept by describing a wooden barrel with staves of various lengths, with each stave representing a different crop input. The level of the contents in the barrel is limited by the height of the lowest stave. In a corn field, for instance, the yield may be limited by low nitrogen levels even though phosphorous and potassium levels were ideal. (Liebig also invented the mirror and has also been called "the father of organic chemistry", a dubious honor given the difficulty college students often have with that subject.)

You're probably familiar with the barrel concept even if you had no idea who Liebig was. Long-term crop fertilization practices on dairy farms have resulted in changes in the lengths of the staves in the farm's barrel. Regular applications of dairy manure have resulted in a slow increase in soil P levels. Phosphorus isn't very leachable and most crops only remove a modest amount of this nutrient, so if soil P is built to a high level (a long stave in the barrel) it will probably stay high for many years even with no further P additions. We saw this on a Miner Institute field which got extremely high manure rates, and twenty years later we were still dealing with very high soil test P levels resulting from "the sins of the past". High P levels can reduce zinc uptake, so the stave representing zinc might be shorter than it used to be (although this is less likely if soil P was elevated by manure instead of commercial fertilizer). Greatly reduced atmospheric depositions has caused sulfur to become a low stave on some farms, particularly on fields that don't receive regular manure applications. (See the "Sulfur Fertilization Factsheet" article in this newsletter.) For farmers in the Western U.S., one of their lowest staves isn't a fertilizer at all — it's water, or the lack of it.

— E.T.

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Kefir did not affect MR dry matter intake (DMI) on Farm A. However, calves receiving kefir had greater starter DMI at week 8 (Figure 2) compared to calves in the control group (1.28 and 1.14 ± 0.02 kg/d; 2.84 and 2.53 ± 0.05 lb/d), respectively, but feed efficiency was not improved. Body weight, wither height, heart girth, body length, and ADG at all farms was not different between treatments. Calves receiving kefir on Farm B tended to have greater hip height compared to a control, and were more likely than calves receiving a control to meet or surpass their target weight at weaning, for which the recommendation is to double birth weight by 56 d of age. Fecal, respiratory, and hydration scores were not different between treatments at each farm. Cumulative days with diarrhea averaged 7.8 ± 0.8 on Farm A and was not different between treatments, nor was the likelihood of medical intervention for scours on all three farms.

While supplementation with kefir did not improve overall growth, diarrhea incidence, or need for antibiotic use, increased starter DMI prior to weaning indicates potential for residual metabolic or developmental benefit. Carbohydrate intake is critical to the development of the calf's gastrointestinal tract and rumen. Considerations include alleviation of weaning stress, or accelerated development of the small intestine to accommodate increased starter intake. These unexpected but intriguing findings invite an opportunity to further research the potential benefits of kefir supplementation in calves.

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