FARM REPORT

FROM THE PRESIDENT'S DESK: KING SIZED BED OR SOFTER MATTRESS?

Lying down comfortably is crucial for dairy cow welfare – typically a cow will spend about half her day resting when housed indoors. When cows have access to comfortable resting areas, they respond with more lying down time, less lameness, lower stress levels, and perhaps greater milk production. That explains the continued focus in free-stall barns on ways to enhance stall comfort and recommendations to control overcrowding since it limits the cow's opportunities to lie down.

Cows are essentially aficionados when it comes to quality rest. Their preferences and priorities for the ideal resting resource are critical for us to understand. Research shows that cows prioritize lying down over feeding and socializing and even seem to have a required amount of lying time each day. When they are unable to achieve this needed resting time, they exhibit clear signs of discomfort, and become highly motivated to make up lost lying time.

Given the supreme importance of resting for the cow, an instructive question would be: "What's more important to you, Elsie – the size of your resting area or the comfort of the bed?" Of course, the immediate answer would have to be "both!" But a recent study teased apart how cows actually do rank the comfort of the lying surface versus the openness of the space allotted for lying down (J. Dairy Sci. 104:862-873).

In this study, Scottish researchers presented Holstein cows with three lying surfaces: sand, mattress, or straw with a free stall that could be inserted or removed as needed. The sand was about 8 inches deep, the mattress was a Pasture Mat bedded with sawdust, and the straw was about 8 inches deep. The free stall was approximately 47 inches wide with a bed of 74 inches and a lunge space of about 20 inches.

When given the choice of stall surface with free stalls in place, cows spent the most time lying on straw, then mattresses, and finally sand. It may strike some as odd that cows did not have a stronger preference for sand, but the researchers noted that the cows had no prior experience with it and that may have caused them to avoid it.

Next, the free stalls were removed, and cows were again allowed to choose their preferred lying surface. Once again, cows spent the greatest amount of time lying down with straw. In the final phase of the study, free stalls were again put into place on each cow's preferred surface and the cows were given a choice between lying on their most preferred

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YOUR GRANDFATHER'S CORN

I've been a proponent of brown midrib (BMR) corn hybrids for many years. This is based on Miner Institute research that found higher milk production from BMR corn silage, also from the experience of growing and feeding BMR corn silage when I managed the Institute's crop operation. Fed at the right rate to the right cows, BMR corn silage puts more milk in the tank. One year we ran out of BMR corn silage and switched to all conventional corn silage. Milk production dropped by 5 pounds per cow. Months later, after our "new crop" BMR silage had fermented, we started feeding BMR again and milk production increased by 5 pounds per cow. This isn't research but it's worth noting that our response of 5 pounds per cow was very similar to what Mycogen was claiming in its ads, also about the same milk response as in our lactation trial.

While BMR's standability problems aren't as severe as some detractors claim, BMR plants have less lignin so they tend to lean this way and that, and during a severe windstorm may "assume a horizontal characteristic". Those limber stalks bend but are less likely to break, so BMR corn will often bounce back soon after a storm. This is what happened at Miner Institute after a windstorm that blew down trees three feet in diameter. Conventional corn stalks broke off, ruining Cornell University's corn hybrid trial planted there. Several acres of BMR corn planted in the same plot area went flat but then popped back up with very little eventual yield loss. Many plants were still bent and/or leaning and you'd have needed a machete to walk down a row, but if the chopper can harvest a stalk is it really lodged? Something I call "functional standability".

Regarding the title of this article: I've often referred to BMR as "your grandfather's corn", perhaps irritating some Mycogen and DuPont-Pioneer seed company reps. I do so because in some ways BMR is similar to the corn hybrids of two generations ago: Compared to today's conventional corn hybrids BMR corn yields less, doesn't respond well to high plant populations, and is more susceptible to some foliar diseases. A Mycogen Seeds agronomist recommends "moderate" populations of 28,000-30,000 per acre for BMR, and several years ago Penn State found a dramatic difference in resistance to Northern Corn Leaf Blight in its silage hybrid trials, with BMR hybrids much more susceptible than were conventional hybrids. Yes, BMR corn yields have increased, but so has the yield of conventional hybrids so there continues to be some "yield drag". University testing programs confirm that BMR hybrids consistently yield less than conventional hybrids, though we continue to be hampered by a lack of data because so few BMR hybrids are entered in these trials. Decisions on the hybrids entered in these trials are made by the seed companies.

— *Ev Thomas*
ethomas@oakpointny.com

FORAGE SEEDING DEPTH IS CRITICAL

A big thanks to Mike Rankin, editor of Hay & Forage Grower, whose recent "e-Hay Weekly" newsletter included two University of Kentucky videos, one of alfalfa and the other of grass, that dramatically showed the importance of seeding depth. Following are the URLs — alfalfa first.

https://www.youtube.com/watch?v=P023FVVWZaE&feature=emb_logo
https://www.youtube.com/watch?v=ThMnsB396IU&feature=emb_logo

If you ever doubted the importance of seeding depth for small-seeded forages, you shouldn't after viewing either of these videos. A seeding depth of ¼" to ½" is the "sweet spot", and it doesn't take much variance from this narrow range to result in a poor seeding, or even a total failure. That's why it's so important not to work soils when they're wet, and during seedbed prep to do whatever it takes to produce a firm, level seedbed. When I was at Miner Institute one of the jobs our Crops Crew did well was establishing alfalfa-grass. That's primarily because we did a great job of seedbed prep, including cultipacking before seeding and then using a press-wheel grain drill. They were also prudent about tillage timing, not plowing when soil conditions were too wet. Plowing soils with a significant clay content when they're wet can result in large clods. Tandem disking (we didn't own a disk so no temptation) would result in converting softball-size clods into baseball-size ones with little actual granulation of the soil — a mistake that's difficult to undo.

— *E.T.*

ANNUAL CROP CONGRESS
IN COOPERATION WITH THE
NORTH COUNTRY REGIONAL AG TEAM

February 24 - February 25, 2021
10:00am - 12:25pm — Live via Zoom

Registration Fee: $25/person
https://ncrat.cce.cornell.edu/event_preregistration_new.php?id=1494
Please contact Tatum Langworthy with any registration questions.
tlm92@cornell.edu 315-788-8450

Cornell Cooperative Extension
North Country Regional Ag Team

NYS DEC Pesticide Credits are ONLY available on Day Two, February 25th
To receive pesticide credits, you must log on to the virtual meeting on time and sign out at the conclusion of the program to confirm attendance. The attendance will be monitored throughout the program.

Vermont Credits are in the process of being approved. To sign in for Vermont Credits please send your number and name to Wanda Emerich, emerich@whminer.com or call 518-846-7121 x117

Part One: February 24, 10 am - 12:25 pm

Getting Crops to survive the silo- storage considerations to maximize profitability
Allen Wilder, Miner Institute

Field Edge Drainage Water quality research
Laura Klaiber, Miner Institute

Precision Ag Technologies
Michael Dennis, DairyOne

Conservation Tillage in Northern NY
Kitty O'Neil, Cornell Cooperative Extension, NCRAT

Hemp Production Updates
Kitty O'Neil, Cornell Cooperative Extension, NCRAT

Part Two: February 25, 10 am - 12:25 pm

Soybean Cyst nematodes are Here
Jaime Cummings, Syngenta (formerly with NYS IPM Program

Spray Drift management
Jason Deveau, Ontario Ministry of Agriculture and Rural Affairs

Are Corn Nematodes Robbing Your Corn Yield?
Mike Stanyard, Cornell Cooperative Extension, NWNY Team

Herbicide Resistant weed management
Mike Hunter, Cornell Cooperative Extension, NCRAT

METHANE: A HOT TOPIC WITH COOLING POTENTIAL

Climate change increasingly dominates our world, and more attention is drawn to how our daily lives affect the environment. Industries must reduce emissions, and livestock production is no exception. The livestock industry contributes 14.5% of global greenhouse gases, including methane, carbon dioxide, and nitrous oxide. The predominant greenhouse gas from dairy farming is methane, resulting from the decomposition of manure and enteric fermentation (i.e., methane produced in the rumen by microbes and released through cow burps). Methane traps more heat in the atmosphere than carbon dioxide, making it a "hot" topic in today's research, politics, and marketing. Although the dairy industry contributes to the problem of climate change, it can become part of the solution.

During the California Dairy Sustainability Summit, Dr. Frank Mitloehner from the University of California- Davis emphasized that unlike carbon dioxide, which accumulates in the atmosphere over thousands of years, methane's lifespan is 12 years, making it a "short-lived" pollutant. A briefing from the University of Oxford presented a new approach to measuring methane that accounts for its short-lived characteristic. Figure 1 represents one of the concepts, which compares the behavior of carbon dioxide to methane in the hypothetical case that emissions decrease. Unfortunately, a sharp decline in carbon dioxide emissions won't result in an immediate temperature drop, as the cumulative carbon dioxide in the atmosphere takes centuries to break down. However, because methane has a short lifetime, a substantial decrease in methane emissions will lead to a cooling effect within a decade. Thus, if the dairy industry can cut its methane emissions, it has an opportunity to decrease atmospheric warming.

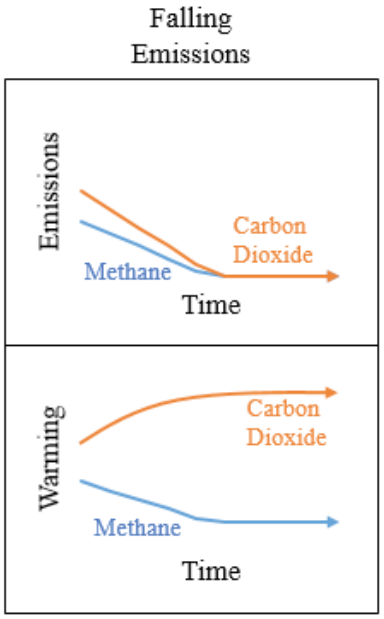

Figure 1: Emissions and warming behavior of methane and carbon dioxide over time if emissions decrease. Adapted from Allen et al., 2018 from Oxford Martin Programme on Climate Pollutants.

So, how can the dairy industry reduce methane emissions? One promising avenue is through changing the cow's diet. High forage digestibility, lipids, nitrates, tannins, and direct methane inhibitors (including seaweeds!) are dietary strategies for reducing methane emissions. However, Dr. Alex Hristov from the Pennsylvania State University has emphasized that more research is needed on feed additives to ensure their efficacy in methane reduction and cattle health. In addition, emissions from processing and transporting the feed product shouldn't surpass the amount of methane reduced from the cow.

Another strategy for reducing enteric methane is through increased animal efficiency (i.e., higher milk production with less intake and less waste from the cow). Methane is a form of waste from cattle, representing an energy loss for the animal and an economic loss for the farmer. Improvements in animal health, genetics, precision feeding, and animal feed efficiency contribute to more efficient animals. Working towards efficient animals isn't a new concept, and dairy farmers have embraced these goals for decades to make their cows comfortable and businesses profitable.

Dr. Sara Place from Elanco explored the relationship between methane and efficiency during the 2020 Cornell Nutrition Conference. She discussed emission intensity, which is the amount of methane produced per unit of milk, looking at both enteric and manure emissions. Dr. Place presented data from the EPA that shows some good news — enteric methane intensity has decreased since 1990 in the United States. This reduction is attributed to a decrease in the number of dairy cattle and an increase in milk production per cow, reflecting increased efficiency.

Although enteric methane intensity decreased, manure methane intensity has increased over the past three decades in the United States. The consolidation of farms led to manure lagoons, which grew into a major source of methane emissions due to their anaerobic environment and long storage time. Higher temperatures, rainfall, and wind contribute to increased methane emission from manure lagoons. New technologies are being developed to reduce these emissions and accompanying odors, including bio-covers and manure additives. Once removed from storage, injection rather than surface application results in less methane and more nutrients captured in the soil. Another approach for reducing emissions from manure is a methane digester, which captures methane for electricity production. This electricity can power the farm and the surrounding community, bringing economic and public image benefits.

See **METHANE**, Page 5

DRY PERIOD STRATEGIES FOR THE INDIVIDUAL COW

As the dairy industry advances it's become necessary to reevaluate the typical recommendation of a 6- to 8-week dry period, and it may be more beneficial to determine dry period length on an individual cow basis. When a cow transitions from her dry period into the lactating herd, she undergoes a negative energy balance as her intake levels struggle to meet the demands of milk production. This negative energy balance can lead to health problems such as milk fever and ketosis, as well as fertility issues. Research has shown that shortening the dry period can help mitigate disease occurrence associated with a negative energy balance, but comes at the cost of lowered milk production in early lactation. However, if individual dry-off strategies are employed the decreased milk production in early lactation may be offset by the extended production in the previous lactation.

By taking traits such as somatic cell count, parity, and milk production into account, farms can determine an appropriate dry period length for each individual cow. For example, suppose a cow's milk production is still high late into lactation, and her somatic cell count is low. In that case, it may be beneficial to extend her lactation for a week or two to make her transition more manageable and to maximize milk production during that lactation. Producers may customize the dry period to the individual cow in another way by selectively using dry cow therapy. Instead of choosing a blanket dry cow therapy course of action, it may be valuable to only treat those with high SCC at the end of their lactation or those with a history of mastitis in the dry period. This will help cut down on drug expenses as well as unnecessary antibiotic use and antibiotic resistance.

A recent *Journal of Dairy Science* study from the Netherlands compared different customized dry period strategies, following cows 8 weeks before calving to 14 weeks post-calving. Cows were given a 60, 30, or 0-day dry period and were dried off with an antibiotic treatment or teat sealant based on predetermined criteria. This study assigned cows randomly to one of three pre-planned decision trees. These trees accounted for parity, somatic cell counts, and milk yield when assigning dry-off strategies. Two of the decision trees employed can be seen in the figure: the control group and the second treatment. The figure on page 7 shows the choice made regarding dry period length and dry off treatment based on the criteria.

Treatment 2 included 63 animals, of which 51% qualified for a 30-day dry period and 30% qualified for a 0-day dry period. This group saw the greatest recovery in bodyweight post-calving and numerically the lowest disease occurrence. These animals also saw the greatest milk production in the 8 weeks before calving but lowered milk production compared to the other treatments in the 14 weeks post-calving. An interesting follow-up study would be to monitor these cows throughout their entire lactation to analyze full milk yield and this information's economic effect.

Producers can translate some aspects from this study into useful tools on the farm. While it seems time-consuming to make dry-off strategy decisions for individual cows, creating a decision tree like the one above could be a practical decision that cuts expenses and makes for a more manageable transition period. When deciding if this would be the correct move for a farm, it is essential to consider herd mastitis incidence and overall disease occurrence in transition cows. A 30-day or 0-day dry period may be extreme for some farms; instead, it may be more practical to cut down the typically recommended dry period by a couple of weeks.

By treating the cow as an individual, farms may offset some of the problems associated with the transition period's negative energy balance. Shortening the dry period and utilizing selective dry-cow therapy for cows who meet specific criteria could improve disease occurrence during the transition period and fertility of the herd in the long run.

— Emily Fread
fread@whminer.com
** See associated figure on page 7.*

METHANE, Continued from Page 4

Technologies and management strategies available to farmers for reducing methane emissions will continue to grow, and economic incentives and government support will follow. With the advancement of animal nutrition, milk production efficiency, and manure storage technologies, the dairy industry can contribute to atmospheric cooling.

— Julia Fouts
fouts@whminer.com

* References available upon request.

WHAT'S HAPPENING ON THE FARM?

As most are aware, the new lactating barn addition opened in September 2020. The opening of the new addition couldn't have come at a better time as the research group has lined up several research projects, and the added room allows 2-3 Calan bin studies to be conducted at the same time. The research group wasted no time in filling half of the new addition with an ongoing transition cow study, and thanks to 35 replacement heifers calving in the month of December, the other half of the new addition has also been filled. The herd size has grown by 70 lactating cows in the past six months and will add 30 more lactating animals by July 2021. This growth has come strictly through internal growth.

As the herd size grows, so does the number of heifer calves born each year. So, the next step is to calculate the number of heifer calves to retain each month to maintain herd size. There are many ways to calculate the number of replacement heifers needed to maintain herd size, but if a formula is used there are four pieces of information needed to calculate the annual number of replacement heifers. We need to know the Herd Size (total number of lactating and dry cows), Average Age at First Calving (in Months), Cull Rate and Non-Completion Rate of heifers (percentage of replacement heifers that don't make it into the lactating herd). The following is an example of one formula used to calculate this number:

Annual Replacement Heifers = Herd Size x (Age at First Calving [in Months]/24) x Cull Rate x (1 + Non-Completion Rate)
Example: 575 (500 lactating, 75 dry) x (23months/24months) x 35% x (1 + 10%) = 212 Replacement Heifers Raised Annually to maintain a herd size of 575 cows

Our dairy is fortunate to have been able to increase the size of the lactating herd strictly through internal growth, but the trade-off is the strain this increased number of replacement heifers puts on the existing heifer facilities. The transition heifer barn, a greenhouse barn built several years ago originally to house pre-weaned calves, is currently the biggest bottleneck in the heifer raising facilities. As plans are investigated to build new pre-weaned and transition calf facilities, to replace the aging greenhouse transition barn and move pre-weaned calves out of hutches into a new facility, an agreement has been negotiated with a neighboring dairy which had recently gone out of business to house pregnant heifers. All pregnant heifers are currently residing in the neighboring facility. The maintenance department and crops crew are busy renovating the free stall beds and feeding system in our old dairy barn which housed the pregnant heifers. This renovated space provides housing for 50+ breeding age heifers and helps relieve the strain on the replacement heifer facilities.

— Kevin Tobey, DVM
tobey@whminer.com

BEDDING, Continued from Page 1

surface with a free stall or their second and third preferred choices without a free stall (i.e., with more lying space available).

What did the cows tell us? Interestingly, 74% of the cows sacrificed the opportunity to lie down on their most preferred bed in order to have more space to lie down. Here's the take-home: cows spent the greatest amount of their lying time (about 66%) on their second most preferred surface, but with open lying space (i.e., no free stall). Only 20% of lying time took place on the preferred surface with a free stall. The cows in this study clearly placed a greater value on open, less restrictive lying space than bed surface or bedding type.

When lying down, cows really value a less restrictive resting area – even more than the resting surface. In this study none of the surfaces were terribly uncomfortable (sand, mattress with sawdust, or straw), and hopefully that would be the case on any commercial farm. What this research seems to tell us is that cows want a decent bed, but they really prioritize the size of the bed. In the future, we need more work on ideal lying space for cows with varying stall beds and surfaces.

— Rick Grant
grant@whminer.com

DRY PERIOD TREATMENT GROUPS

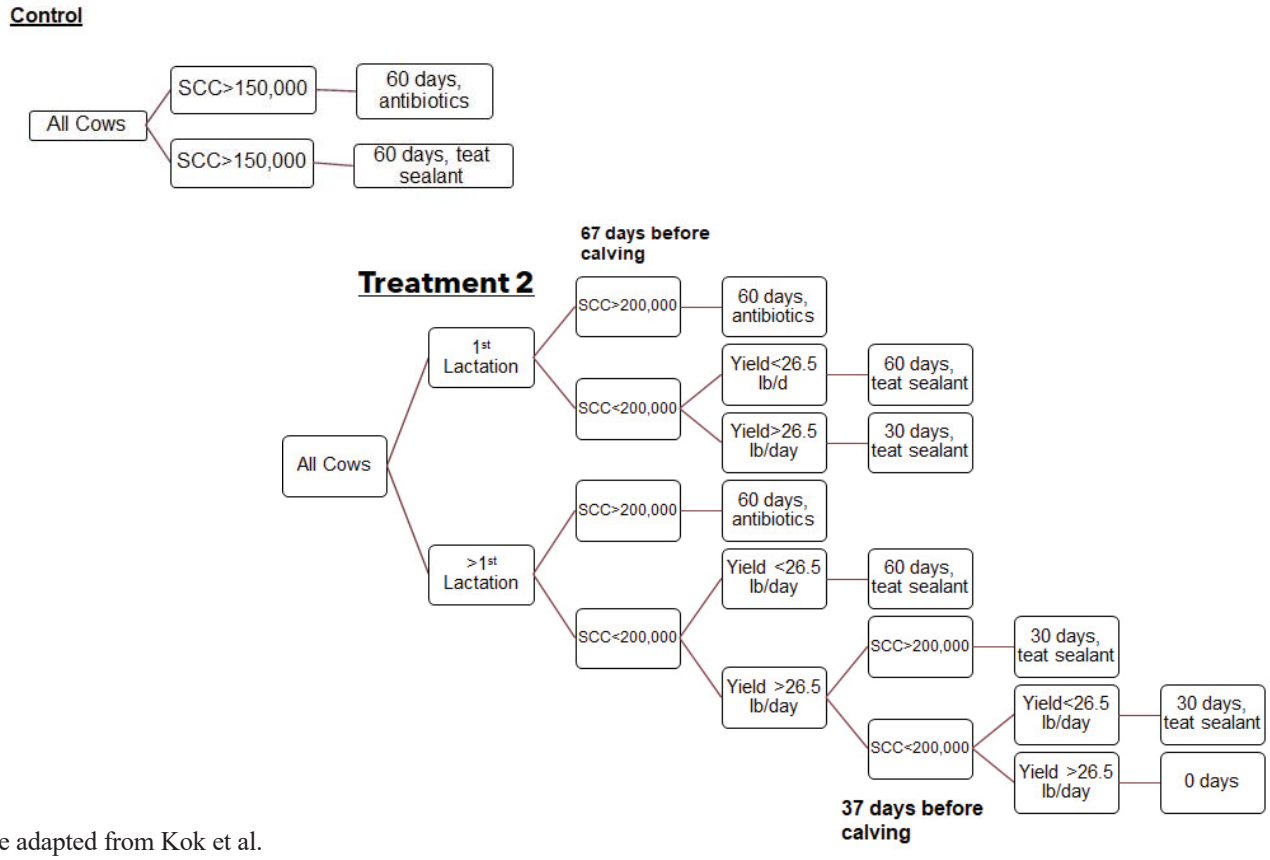

Figure adapted from Kok et al.

THE GIFT THAT KEEPS ON GIVING

A reminder to our male readers: Valentine's Day is Sunday, February 14th, and it's customary to celebrate the day by giving "that special person" (if you're married this better be your wife) something nice. A box of chocolates is a traditional Valentine's Day gift, but since the pandemic has resulted in much less physical activity (and somewhat higher consumption of adult beverages), your special person might have put on a few pounds below the equator. Therefore chocolates, which are actually little calorie bombs, may not be a wise choice -- even though you usually wind up eating most of them anyway.

Choose your gift carefully since your decision may have lasting consequences. This suggestion is based on a Valentine's Day gift I bought for The Bride almost 50 years ago. I wanted to buy her a pair of diamond earrings but discovered that the size of the diamond in what I could afford would fit through the hole in her pierced ear. (Diamonds may be a girl's best friend but they weren't mine.) So diamond earrings were out but I still had to find something she either wanted or needed. I went with need and bought her a Crock Pot, and had enough money left to buy our kids an Atari. (Millennials may need to Google this item.)

I can hear Katie Ballard snickering all the way from Vermont to Virginia. And in retrospect, I probably shouldn't have mentioned to T.B. that my original idea involved diamonds. But in my defense, a crock pot was something that not only was useful, but a gift she's used many, many times. (How many gifts do you have that you're still using half a century later? However, with almost every use of the crock pot she reminds me (and anyone else within earshot) that it was a Valentine's Day present. When I gave her the crock pot I probably shouldn't have suggested that whenever she used it she should think diamond earrings. When she bought a fancier model a few years ago I thought I was finally off the hook but nope, she keeps the new one at Oak Point and brought the old one down here to Virginia. She used it just the other day, once again reminding me (and my granddaughter as well) of its provenance. So that crock pot is "The gift that keeps on giving." For better or for worse.

— *E.T.*

The William H. Miner Agricultural Research Institute
1034 Miner Farm Road
P.O. Box 90
Chazy, NY 12921

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