THE DAIRY BULLETIN

A NEBRASKA DAIRY EXTENSION UPDATE

Spring 2021

What's in this Issue?

Have You Heard the I-29 Moo University Dairy Podcast?

These are some of the topics covered:

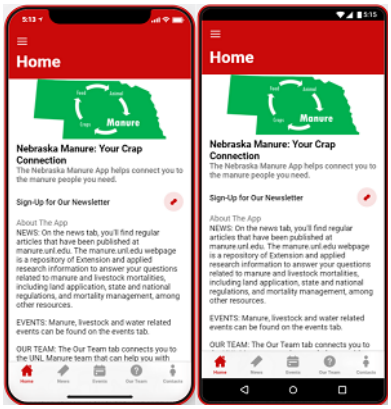
- Lord of the Flies: Controlling Flies on the Dairy
- How Should You Prepare for the Heat of the Summer?
- This Dairy Producer Needed Feed and Planted Cover Crops
- Genetics Increased Cow Longevity and Profitability
- Is Body Condition Score Too High at Calving?
- Impact of High Pregnancy Rates on Reproductive Management

A new episode is released two times a month. Subscribe today on Apple podcasts, Spotify, Google Podcasts, and anywhere you listen. Or listen online at https://feeds.captivate.fm/i-29-moo-u/

Got Manure? Need Manure? – There's an App for that!

By Leslie Johnson, Animal Manure Management Project Coordinator

The UNL Manure team has been working on building an app to connect the public to the manure people they need, and maybe learn a little bit about manure along the way. Our goal with the app is to enable folks to find a manure applicator, broker, advisor, or resource person in their area. We've been testing and updating, and we think it's ready for its full debut! The app is available for both Android and Apple devices.



Manure.unl.edu – The App is available on apple and android phones. The home screen tells about the different tabs within the app (shown above) and provides contact information for NDEE inspectors (below).

The app has 5 main tabs: Home, News, Events, Our Team, and Contacts. Access the app at https://nemanure.glideapp.io

Home

The home screen introduces you to the app, gives you a chance to sign-up for manure news in your inbox and tells you a little about each of the other tabs. Additionally, it offers a map of the area Nebraska Department of Environment and Energy (NDEE) inspectors, which also are found in the contacts tab.

News

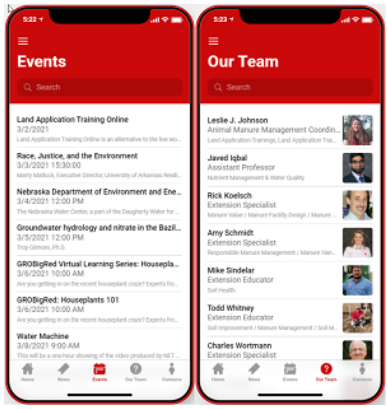
On the news tab, you'll see the recent articles that have been published at manure.unl.edu. The manure.unl.edu webpage is a repository of Extension and applied research information to answer your questions related to manure and livestock mortalities, including land application, state and national regulations, and mortality management, among other resources.

Events

Events related to manure, livestock, or water can be found in this tab. Check back frequently for educational opportunities that might interest you.

Our Team

The Our Team tab connects you to the UNL Manure team that can help you with needs relative to environmental issues associated with animal production, including planning of new and expanding operations, managing nutrients, odor, and pathogens, land application of manure for fertility and soil health benefits, and managing mortalities. You can search by name, expertise or location using the magnifying glass icon in the upper right hand corner of this tab. We welcome your questions!



The Events (left) and Our Team (right) tabs connect you to educational opportunities and actual people that can answer your manure questions.

Contacts

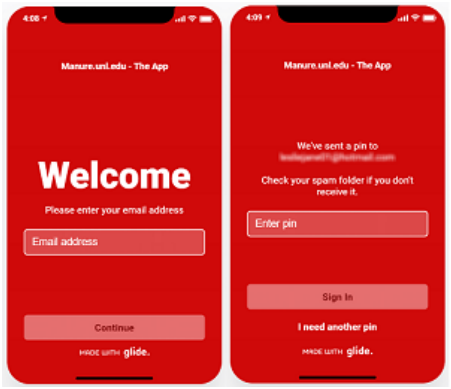
The contacts tab offers a list (left) and map (right) view to make finding the most appropriate manure contact as easy as possible.

The contacts tab is perhaps the most important part of the manure.unl.edu app. It connects you with "manure people" you need. It includes custom applicators and haulers, manure brokers and consultants, as well as representatives from the Nebraska Department of Environment and Energy and Natural Resource Conservation Service (NRCS). There are two views for this particular tab. The default view is the list view. In it, you can search and filter by name, business type or type of manure. To access the map view, click the button that looks like a folded paper in the lower right corner of the list. In this view, you can zoom in to your area and see what manure contacts are closest to you.

In an effort to keep contact information up-to-date, contacts included in the list can manage their own information. Additionally, if you wish to be added as a manure contact, you can do so using the "+" button in the upper right corner. *The listing of contacts does not imply endorsement by the University*.

Accessing the App

The app is available for both Apple and Android devices but is not currently listed on the Apple App Store or the Google Play Store. In addition, the app can be utilized right in your web browser. To access the app, visit https://nemanure.glideapp.io. You will need to enter your email address, where you will receive a pin number to verify a correct address. This makes sure only real people are adding to the contacts list. If you have problems, reach out to Leslie Johnson by email at leslie.johnson@unl.edu or phone at 402-584-3818



Manure Stockpiles: Mind Your Manners

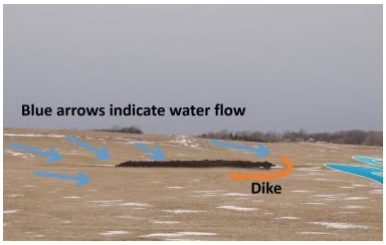
By Todd Whitney, Extension Educator Cropping Systems & Water

Manure stockpiles must be built following some regulations, but where those regulations end, manners should remain. I suspect that just about everyone reading this article has been told on more than one occasion, "Mind your manners!" Or, perhaps as a parent, it's this very simple instruction that you now give to your kids as they head out the door to spend time with someone outside the household.

What does this have to do with manure management, you're wondering? With livestock manure, regulatory requirements differ whether you own the animals that are creating the manure or you receive manure from a livestock farmer to use on your crop fields. Simply put, when manure is transferred from a concentrated animal feeding operation (CAFO) to anyone not associated with that livestock farm, regulations tied to the CAFO's permit or nutrient management plan do not transfer with the manure. But does that mean the manure should be handled any differently? Where regulations end, manners should remain. Whether telling someone or being told ourselves, the message is simple: Behave politely.

"Respect for ourselves guides our morals; respect for others guides our manners."

- **Laurence Sterne, 18th century author**



A dike can be constructed between the manure pile and a stream to minimize impacts to surface water. Dikes should be constructed out of soil, not organic materials.

As responsible land stewards, farmers who follow "good neighbor practices" may save on commercial fertilizer costs while at the same time protecting groundwater from contamination due to nutrient leaching. Properly stockpiled manure stored on field edges can be a "win-win" for farmers and their rural neighbors through addressing two common concerns: runoff and odors.

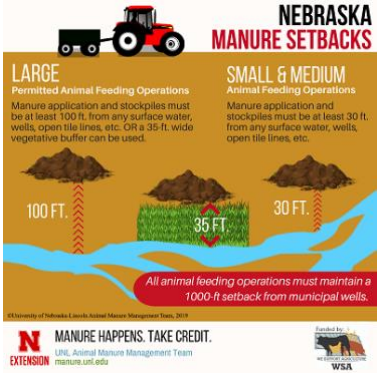
Preventing Runoff and Nutrient Loss

Diking

Manure stockpiles should be located on well-drained sites with slight slopes (less than 1-3%). If runoff risk is high, then diking around piles should be considered. Amy Schmidt, Nebraska Extension Livestock Bioengineer specialist, says that two to three feet high dikes constructed of soil (not manure or organic materials) particularly on the down-gradient side of the pile are recommended. Stockpiles should be on elevated sites to prevent contamination of water flowing to lakes, streams, ditches, and grassed waterways.

Setbacks

Ideally, manure storage piles should be placed at least 1,000 feet away from any home residences (following similar setback provisions outlined for municipal wells). Nebraska Department of Environment and Energy (NDEE) manure stockpile and in-field application standards require large animal feeding operations to keep manure applications be at least 100 feet from any surface water, well or intermittent stream flow; or at least 35 feet away from water sources with a vegetative (grass) buffer between the manure stockpile and at-risk zones. For small and medium animal feeding operations, the recommended stockpile setback and manure application minimum distance is reduced to at least 30 feet between the manure and any surface water, wells, or risk zones.



Nebraska Department of Environment and Energy (NDEE) regulations require ALL animal feeding operations to maintain setbacks when applying manure and siting stockpiles.

Site Preparation

To reduce nutrient leaching and possible environmental negative impacts, stockpiled manure should be stored on compacted, solid soil bases and sealed to reduce potential nutrient leaching into the soil profile. Clay soils are excellent bases for manure piles, whereas sandy soils are more susceptible to nutrient leaching. In some cases, manure stockpiles are placed on former truck harvest loading field edge zones, where the soil has been compacted during harvest. Land managers, however, must allow adequate room for setback distances between the field edge stockpiles and at-risk zones.

Minimizing Odors

Improving Communication

We often smell with our eyes, so selecting the proper site for your manure stockpile may mean communicating with your neighbors and receiving their input before making your final location decisions. Manure managers are encouraged to share stockpiling plans along with projections of how long the stockpiled manure may remain until spread on the field with potentially impacted homeowners, since informed neighbors may be more tolerate of short-term odors.

As with any successful communication, trust is very important. If landowners and manure applicators build strong relationships, then their neighbors will likely better know that their health and well-being are being highly valued. As livestock producers and manure

applicators continue to educate their peers and neighbors about the economic and environmental values of organic livestock manures, communities and residents become more accepting of manure stockpiles and application.

Timing

With good communication, you can avoid building a manure stockpile (and later when it is time to spread) at times that are less desirable for your neighbors. For instance, you may want to avoid building a stockpile nearby a neighbor the day before they're expecting to have a big summer barbeque in their backyard. Additionally, stockpiled manure should be spread as soon as possible onto target fields. This may mean that landowners assure that hired manure applicators arrive and spread the manure as quick as possible.

All manure managers should focus on reducing nuisance odors risks and preventing nutrient loss from stored manure piles. With a little bit of planning and some good communication, maybe manure manager and neighborhood relationships can move from "good" to "great."

Federal Livestock Insurance Market Performance and Use in Nebraska

By Elliott Dennis, Assistant Professor and Livestock Marketing Economist

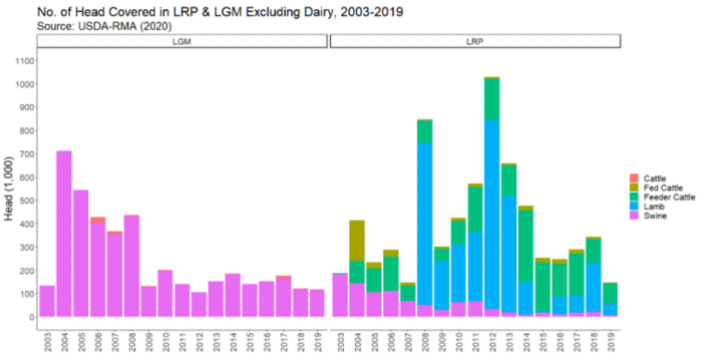
Why the US Government Provides Subsidized Livestock Insurance?

Federally supported livestock insurance is managed by the Federal Crop Insurance Corporation (FCIC) and USDA's Risk Management Agency (RMA) as part of the federal crop insurance program. Since 2003, several products are offered for cattle (fed and feeder), swine, dairy, and lamb. Three products developed for cattle producers include livestock risk protection (LRP) for feeder and fed cattle and livestock gross margin (LGM) for fed cattle. LRP seeks to cover the decrease in margin between input prices (feeder + corn) and output prices (fed cattle).

Adoption/Use of Livestock Insurance Nationally and in Nebraska

Nationally the use of either LRP or LGM for cattle has been limited (see Figure 1). LGM use is heavily dominated by swine producers. Comparatively the use of federal insurance by cattle is minimal. LRP use is heavily dominated by dairy and lamb. The share of LRP use for swine was relatively large when first introduced in 2003 but has since decreased significantly. LRP fed cattle use is small but stable through time and LRP feeder cattle is larger and stable through time. The overall use of federally provided livestock insurance is still relatively low compared to the total US inventory. Between 2003-2019, 0.13% of total cattle inventory was covered using LGM or LRP. The average of other commodities, except for lamb, are all likewise very low.

Figure 1:



Nebraska is the largest user of LRP. Since 2003 approximately 30% of all LRP policies sold were to Nebraska producers. Kansas, South Dakota, and North Dakota are other states that have a historically large share of LRP use. Combined these four states account for 75% of all LRP policies sold in the US. So, while LRP is offered in every US state, the usage of it varies dramatically by region. There are significantly fewer LGM policies sold each year. For example, in 2019 there were 16 policies sold nationwide. Most policies are sold to cattle producers in the Northern Plains. Since 2003 approximately 30% of all LRP policies sold were to Nebraska producers. Iowa, Nebraska, Wisconsin, and North Dakota account for 85% of all LGM policies sold in the US.

Significant Changes to the Livestock Risk Protection (LRP) Insurance Product

The adoption/use of these products is not widespread, one of the primary barriers to use is policy premiums. The government provides subsidies to help producers offset these costs. These subsidy levels have changed dramatically in the last 2 years to make products more affordable compared to other traditional public risk management tools. For example, for LRP, subsidy levels were 13% of premium costs from 2003-2018, 20-35% from 2018 to May 2020, and since September 2020 are 35-55%. The subsidy level varies given the percent of ending price one wishes to cover, commonly referred to as the coverage price. Coverage levels vary from 70-100% of the ending price.

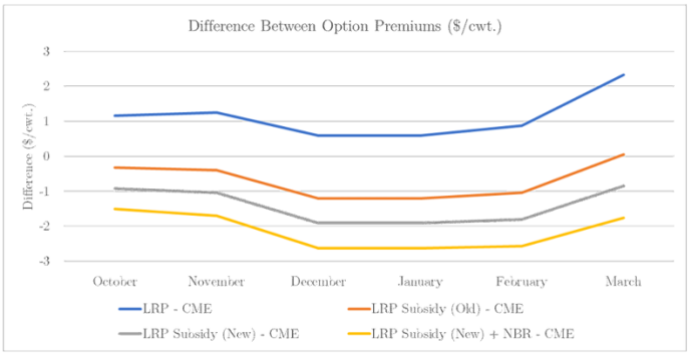
In addition to the changes in subsidy levels, there have been several other changes that should significantly increase the use of LRP. These include increasing head limits to 6,000 head per endorsement/12,000 head annually for fed and feeder cattle, modifying the livestock ownership requirement to 60 days and allowing the purchase of insurance before physical ownership (i.e. calving), removing the A&O cap of $20 million, and allowing producers to pay the premium after the endorsement period has ended. All of these remove barriers that have historically prohibited the use of LRP. One barrier that remains in place, and unlikely to ever be removed, is that LRP must be purchased after CME trading hours (i.e. 4 pm – 10 am EDT). To find crop insurance agents in your area that are currently qualified to sell LRP can be found at https://prodwebnlb.rma.usda.gov/apps/AgentLocator/#/.

Differences and Similarities of LRP and CME Options

One of the primary objectives of LRP is to provide a cost-effective risk management product to the producer. The contract size is a significant barrier to producer CME futures and options use. One benefit of the LRP insurance product is that it allows a flexible amount of coverage based on total production weight.

LRP premiums being too expensive is a common comment made by cattle producers. Comparing premium cost to CME options is one way to measure how expensive, it at all, LRP premiums are. If LRP insurance premiums are cheaper relative to CME options, then a profit-maximizing producer would shift risk management from FME options to LRP. The opposite is also true. Figure 2 plots the premium cost differential between LRP insurance and CME options both with and without subsidy levels. Positive numbers imply that for a given endorsement length, LRP is relatively more expensive than a CME option. Negative values imply LRP is relatively cheaper than a CME option. Further, it shows that the newly established subsidy levels, make LRP considerably cheaper than CME options. Given current and potential future market disruptions, using LRP is one tool that can be affordable for producers to manage output price risk.

Figure 2:



Fitting Annual Forages in a Crop Rotation

By Jay Parsons – Professor and Farm and Ranch Management Specialist, John Hewlett, and Jeff Tranel

According to the National Agricultural Statistics Service (NASS), approximately 60 million acres of forage are harvested annually in the U.S. Lower commodity grain and oilseed prices coupled with high pasture rental rates and/or difficulty finding range and pasture to rent, have led some crop producers to consider ways to incorporate more annual forages into their crop rotations.

The benefits of adding annual forages to a traditional grain and/or oilseed crop rotation include better ground cover – reducing wind erosion during fallow periods, increases in soil organic matter, better weed control and better soil infiltration rates, which reduce water erosion. In addition, there is the potential to increase income from a given land base by adding forage sales revenue that more than compensates for any increase in costs or decrease in grain and/or oilseed revenues.

If the producer also owns cattle or other ruminant livestock, flexibility emerges on how and when to best utilize the annual forage as feedstuff in order to capitalize on its full value to the agricultural business. The forage can be grazed and/or harvested to be stored and fed to livestock at a later time. Grazing will limit the forage value converted directly to livestock production but provides benefits from nutrient cycling, more ground cover and more organic matter being incorporated into the soil profile.

How best to incorporate annual forage crops into an existing crop rotation will depend upon location, local climate, primary crops, and management objectives.

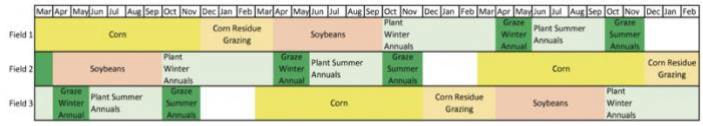
Annual forages can be broken down into three main types: (1) cool-season, winter-hardy (winter types), (2) cool-season, winter-sensitive (spring types) and (3) warm-season, summer annuals.

Winter-hardy forages can be planted in the fall and grazed in winter or early spring. Winter wheat, cereal rye and triticale are three common winter-hardy forages. Winter wheat is often used a s a dual-purpose crop with grazing livestock removed early enough in spring to allow for production of a grain crop. Oats, peas and barley are some common spring-type forages. Sorghum, sorghum-sudangrass and millet are common warm-season, summer annuals.

Rotation Alternatives

How well annual forages fit into an existing crop rotation will vary. In areas of the country with adequate moisture, it is much easier to intensify a crop rotation by inserting the annual forages into one or more fallow periods. In dryer areas of the country, producers must account for soil moisture conditions and exercise caution in how annual forages are introduced into the rotation.

Figure 1 offers a scenario where a typical two-year corn-soybean rotation is expanded to a three-year rotation, including a double crop of annual forage in the third year.

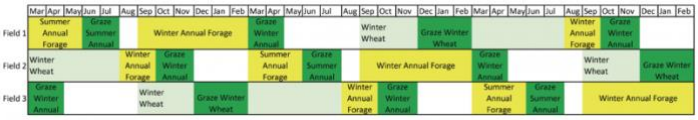


Bridging the gap for cattle between corn residue grazing in winter and summer pasture is one of the primary objectives. This rotation provides annual forage grazing resources for the critical April-May period in the spring and for the October-November period in the fall. Of course, these forages could alternatively be mechanically harvested and fed throughout the year as needed.

Economically, the producer moving from a two-year corn-soybean rotation to the three-year rotation depicted in **Figure 1** would be trading off one-third of

the net returns for corn and soybeans for the net benefits of growing two forage crops in one year on a third of their acres. Most people considering this rotation live in the Corn Belt with adequate moisture to support the cropping intensity and possess a desire to improve soil physical properties by growing something other than just corn and soybeans.

Figure 2 depicts a scenario where a typical two-year wheat-fallow rotation is expanded to a three-year crop rotation with up to three annual forages added to the winter wheat rotation.



All of the annual forages in this rotation would be considered “options,” depending upon the prevailing soil moisture conditions, as would grazing of the winter wheat crop during the dormant season.

From a livestock production standpoint, the rotation in **Figure 2** potentially provides annual forage-grazing resources year-round. The two grazing gaps that occur in May and the two-month period of August through September could be closed by extending the grazing season of winter-hardy annual forages into may and by using a mix of cool-season and warm-season forages to extend the June-July grazing season into August and September.

In the rotation depicted in **Figure 2**, each acre would produce a winter wheat crop and one to three annual forage crops every three years. Economically, the producer moving from a two-year wheat-fallow rotation to the three-year rotation depicted in **Figure 2** would be trading off one-third of the net returns of growing wheat for the net benefits of growing one to three annual forage crops.

Of course, the intensification of the crop rotation could have a negative impact on wheat yields in low-moisture conditions. However, the rotation is designed to provide flexibility for the producer to adjust the manner in which annual forages are utilized in a given year to match production conditions and, hopefully, mitigate the risk of negatively impacting wheat yields.

Insurance for Annual Forages

Soil moisture and precipitation present some of the biggest risks when planting annual forages, especially in dryland production situations. The Annual Forage Insurance Plan (AFIP) from the USDA Risk Management Agency (RMA) is a tool that may help mitigate this risk. However, it is currently only available in Colorado, Kansas, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota and Texas. AFIP insures annual forages, planted for uses as livestock feed or fodder, against low precipitation based on precipitation index data provided by the National Oceanic and Atmospheric Administration (NOAA) – Climate Prediction Center.

The annual signup deadline is July 15, with coverage available for four different planting periods that include the entire year. More details on AFIP coverage are available at the RMA website or from a local crop insurance agent.

Nebraska Land Link Provides Opportunities to Connect Land Seekers with Retiring Landowners

By Allan Vyhnalek, Extension Educator, Farm and Ranch Succession and Transition

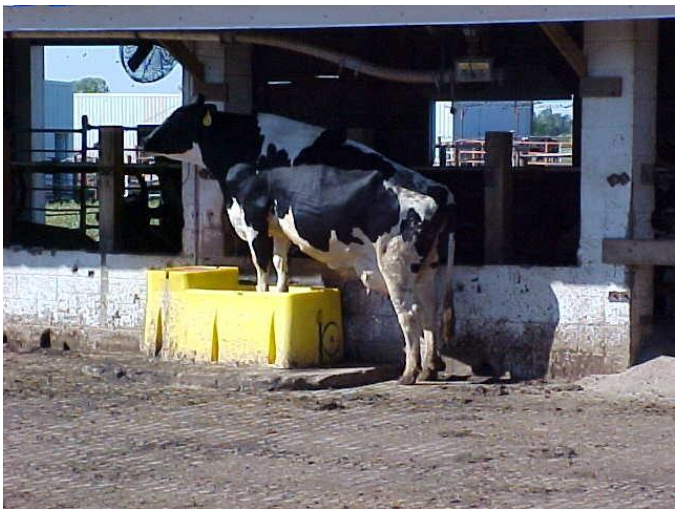
Land access is one of the biggest challenges facing aspiring and beginning farmers. For some landowners, they simply do not have the next generation available to take over their operation.

When you apply to Nebraska Land Link, either as a land seeker or a landowner, Nebraska Extension personnel will work to match your application with the most compatible counterpart. Using the answers you submit and offer in a potential interview, Nebraska Land Link matches are based on the shared values, interests, and skills of both parties, so that a mutually beneficial and satisfying partnership can be forged over the course of the transition plan.

Before and throughout the process, we work to provide important educational information regarding transfers, communication, negotiations, goal setting and more. And we are here to answer any questions you might have. Nebraska Land Link is a project of Nebraska Extension's Farm and ranch succession and Transition program and Nebraska Women in Agriculture.

Ramping-Up to Lower Heat Stress

By Rick Stowell, Extension Specialist – Animal Environment



If the early-June dose of sweltering tropical heat did not hasten your plans to get cooling systems in good operating condition, maybe this photograph of one of the highly trained Holsteins at the former UNL Dairy Research Facility will nudge along those efforts.

- First off, 'Beatrice' clearly appreciates the easy access to water, though her using it to cool her feet may have made her think twice about drinking it. Is access to drinking water a challenge for some of your cows?
- Then again, Beatrice appeared more interested in finding shade under the eave of this older building's roof. Consider ways to manage exposed drive-by bunks so feed stays fresh and cows can eat during cooler times of day.
- While Beatrice may not have been in position to benefit from airflow from the fan in the background, the fact that it is not operating on a hot day should remind you to check controller settings and perform basic fan maintenance (e.g. tighten belts) and repairs.
- I'm sure Beatrice was a mature, production-oriented gal, but I think she would have also splashed some water on herself if she could have done that while in this position. Are your sprinkler systems or evaporative cooling pads ready to go? Nozzles should create large droplets that quickly soak cows to the skin and dribblers should be cleaned or replaced.

While Beatrice's milking days have long passed, your herd stands to benefit in the weeks ahead from preparations made now, before the dog days of summer arrive. Sustained milk yield and more pregnant cows are the target rewards returned to you.

3 Goals to Achieve for Greater Cow Comfort

By Kim Clark, Nebraska Dairy Extension Educator

Dairy cows spend 12 to 14 hours a day lying down. Ensuring they have adequate space and comfort for lying leads to healthier, cleaner cows producing higher quality milk. Dairy farmers can achieve this by focusing on goals related to cows, management, and comfort:

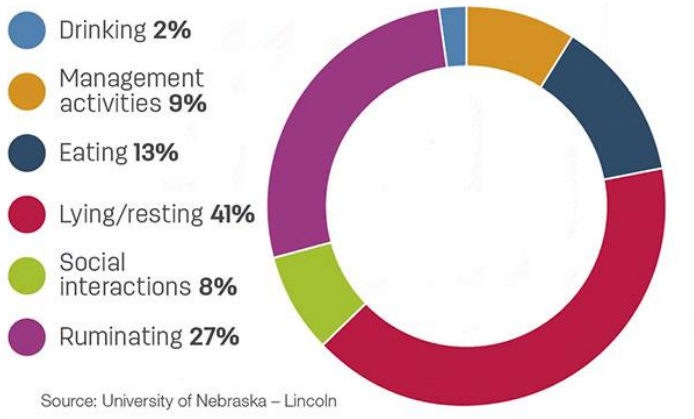
1. **Our goal for cows** is to provide clean, dry bedding, which improves comfort and lying times while controlling bacterial counts and udder health while not interrupting natural movements of rising and lying behaviors.

   To ensure optimal cow comfort, ask yourself these questions:

   - Are cows and stalls clean and dry?
   - Do cows easily and readily use the stalls?
   - Are there injuries, punctures, abrasions, swelling of hocks, legs, hips, etc.?
   - Do cows have to push, bang or bump against stall components to recline, rise or change positions?
   - Do cows have traction to easily recline and rise?

The cow is the final inspector; if cows are not using stalls or are dirty and show signs of injury, change is necessary.

FIGURE 1 Daily time budget for lactating dairy cow (hours)



2. **Our management goal** is to reduce or eliminate injuries and swelling to hocks, necks, legs and hips of cows in the herd, while making the most efficient use of farm labor by reducing the amount of time required to clean manure from the stall and replace bedding.
3. **Our comfort goal** is to reduce the occurrences of any or all of the comfort issue red flags. The first way to reach this goal is to identify why cows show signs of comfort issues. One reason may be the stalls are too small for the size of the cow. Another reason could be inadequate bedding material (not enough is being used; it is too wet; bedding is not managed effectively; stalls are not cleaned often enough; etc.)

   Watch for these red flags of cow comfort issues:

   - Hock lesions – May be the result of small stalls and space restrictions, or short chains in tiestalls
   - Abrasions on the back of the neck – Oftentimes caused by the heigh or location of the neck rail
   - Broken tails – These are signs of poor animal handling
   - Lameness – Indicators include overgrown claws, poor stall cushioning, short stalls
   - Dirty cows – Not directly a cow comfort issue, but dirty cows are linked to higher somatic cell counts (milk quality issue)

By honing in on these goals, asking these questions and looking for the red flags, dairy farmers can identify the concerns holding their herds back from optimal cow comfort and the production and performance benefits that come with it.

Assessing *Listeria* Cross-Contamination Transmission from Personnel's PPE to Food and Plant Surfaces

By Andréia Bianchini - PhD, Jayne Stratton - PhD, and
Karen Nieto - PhD Student working in cross-contamination studies

Historically, raw milk and soft cheeses have been associated with *Listeria monocytogenes* contamination; however, recent outbreak investigations have shown its presence in heat-treated products such as ice cream and pasteurized milk. *Listeria's* presence in processed dairy products can occur due to post-pasteurization contamination from the plant environment. The pathogen can be introduced at any point in the dairy chain and can rapidly establish in the facility. *Listeria* is a hardy pathogen and can easily attach to equipment and surfaces and be carried by personnel and improper workflows.

Plant personnel are among the most significant vectors of microbial transmission in a food facility. Personnel and their Personal Protective Equipment (PPE) (i.e., aprons, gloves) are often in contact with food and food contact surfaces (FCS), and accidental transfer may take place by inappropriate food handling practices. Under-trained staff could potentially spread *Listeria* from one surface to another if they work with soiled garments, fail to wash their hands, and do not change their gloves after touching non-food contact surfaces (NFCS). *Listeria* is also associated with soiled and moist conditions and can frequently be present on drains and floors. If personnel walk over contaminated floors, a possible transfer can occur to footwear, leading to *Listeria* movement from one product area to another by foot traffic.

To help dairy manufacturers prevent post-processing contamination, research at The Food Science and Technology Department at UNL[1] was conducted to understand and quantify *Listeria* transmission patterns from PPE to surfaces. Five contamination pathways were identified to mimic real scenarios. The first two evaluated transmission from *Listeria innocua* contaminated gloves to cheeses. Two types of cheeses were selected to be part of this research: Queso fresco and cheddar cheese. The third pathway of transmission evaluated was associated with packaging and handling, as product contamination could happen from gloves to plastic cutting boards. The last two pathways included *Listeria* transference from aprons to stainless steel (i.e. equipment surfaces) and from boots to dairy brick floors (Figure 1).

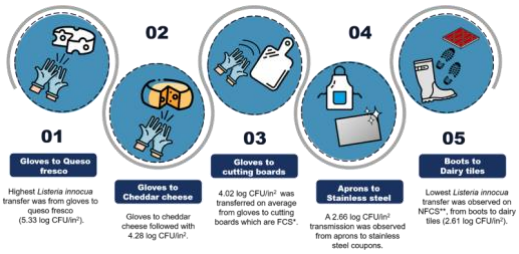


Figure 1. Average *L. innocua* transfer quantification (log CFU/in^2) in different PPE to surface combinations. FCS*: Food Contact Surfaces. NFCS**: Non-Food Contact

Data from consecutive transfers was averaged and results showed that transmission quantification was different depending upon the PPE and the surface of interest. As observed in **Figure 1**, higher *L. innocua* transmission was observed in glove mediated transfer to finished product (cheeses). This PPE to surface combination was classified as a high-risk activity for cross-contamination in a dairy environment. The risk associated justifies the dairy industry's need for more stringent food handling practices and monitoring when producing high-moisture cheeses. *Listeria* transfer to cutting boards was also worrisome, since it is a food contact surface (FCS), and its contamination could lead to finished product adulteration. Lower transmission values were observed from aprons to stainless steel and boots to dairy tiles, as a result these PPE to surface contamination patterns were classified as medium to low risk, since it involved transference to non-food contact surfaces (NFCS).

Nevertheless, dairy manufacturers should always be in the lookout for this type of situations and prevent further spread. A key consideration is to continually train employees in proper hygiene practices, monitor so improper practices are not overlooked and keep food safety training as a priority. To prevent the spread of *Listeria* throughout the plant, traffic patterns should be controlled, and personnel's hygiene practices and proper PPE guidelines must be implemented. In addition, effective sanitation procedures (cleaning and sanitizing steps) are crucial to reduce the risk of *Listeria* contamination to the finished product.

MUNCH

A Smartphone Application for Effective Fiber for Dairy Cows

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Providing adequate effective fiber to lactating cows is essential to maintain rumen health and function. MUNCH, a free mobile phone app, can help dairy producers determine adequate fiber.

Introduction

Dairy cows must consume adequate amounts of effective fiber. Effective fiber are long fibrous particles that are important constituents of the rumen mat formation, which retains smaller feed particles and promotes rumen digestion. Effective fiber is important in maintaining rumen pH because it stimulates rumination and salivary buffer production. The particle size of fiber consumed by a dairy cow is known to affect feed intake, chewing activities, rumen fermentation, and milk fat production. Several systems have been developed to quantify the "effectiveness of fiber." Feeding recommendations for carbohydrates from the National Research Council (2001, Table 4–3, Page 37) provide recommended minimum forage NDF (fNDF), NDF, and ADF and maximum non-fiber carbohydrates dietary content. Although this table has proven to be useful, it does not account for the effect on the rumen environment of other factors such as dietary starch, dry matter intake, or particle size of a TMR. Recently, a new effective fiber system that includes the effect of dietary factors on particle size recommendations was developed and published in a mobile phone application called MUNCH (https://dairy.unl.edu/munch-effective-fiber-app; see the section Further Detailed Information on MUNCH for more detailed information). The program uses TMR particle size measures of the Penn State Particle Separator (Kononoff et al., 2003).

MUNCH is available free of charge on Google Play and App Store.

MUNCH, an Effective Fiber Calculator for Dairy Cows

A flow chart for a step-by-step process to use MUNCH to supply adequate fiber is illustrated in *Figure 1.* Prior to using MUNCH, determine dietary inputs using commercial feed analysis or a computer software program.

Steps to using MUNCH:

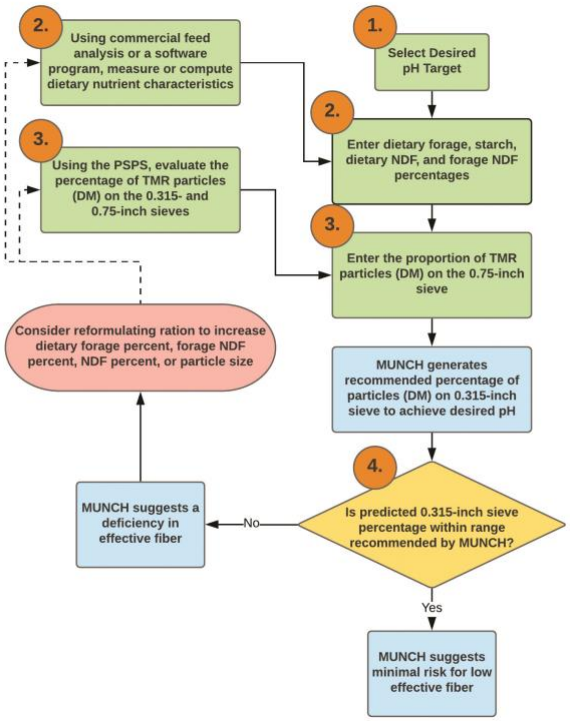

Figure 1. Steps to use MUNCH to supply adequate effective fiber to lactating dairy cows.

1. Check desired rumen conditions and set “Min TMR Particle Size.” To do so select “Advanced Settings” – Default is Target. Changing to “- Target (↓paNDF)” or “- - Target (↓paNDF)” will reduce effective fiber and decrease 0.315- inch sieve (second sieve) recommendations. Making these dietary changes should be based on personal observations and informed professional opinion and may increase risk of unfavorable rumen conditions. Enter dietary percentages of forage, starch, NDF, and forage NDF.

2. Mix the diet and using a Penn State Particle Separator determine particle size on a DM basis. Enter the proportion of TMR particles retained on the 0.75-inch sieve (DM basis).

3. Compare the MUNCH recommended 0.315-inch sieve percentage with that of the actual 0.315-inch sieve—Is the actual 0.315-inch percentage within the range recommended by MUNCH? If yes, the system suggests a minimal risk for low effective fiber. If no, the system suggests a deficiency in effective fiber; consider reformulating the diet. See the section “Effect of Dietary Manipulation on 0.315-inch recommendations” for recommended changes and repeating the evaluation process.

Example diet in MUNCH. An example diet is illustrated in *Figure 2.* After putting all inputs into MUNCH, the recommended amount of the TMR on the 0.315-inch sieve is 43.2 ± 10% (DM basis). It is extremely important to note that the recommended value is not an absolute number but rather the mean of the range of recommendations indicated by the ± value. For this example, a 0.315-inch sieve value between 33 and 53% is reasonable. Values on the lower end are more likely to be deficient in effective fiber, whereas values on the upper end might limit intake. Additionally, MUNCH predicts minutes of rumination, which is calculated under the assumption that actual percentage of feed particles on the 0.315-inch sieve is equal to the recommendation. This value is primarily for descriptive purposes; low rumination time suggests an increased risk for effective fiber deficiency.

Figure 2. An example recommendation from MUNCH for the % of TMR (DM basis) on the 0.315-inch sieve to achieve the programs TMR particle size "Target" for a diet containing (DM basis) 8% 0.75-inch particles, 23% ADF, 34% NDF, 17% CP, 25% starch, 24% forage NDF, 55% forage, 45% of TMR as wet forage, and 0% cottonseed, assuming a body weight of 1,391 lb.

Effect of dietary manipulation on 0.315-inch sieve recommendations

Because of the complex nature of dietary manipulation on the rumen environment and the correlation between dietary variables, the effects of dietary manipulation of particle size recommendations are complex. Even so, by understanding the effect of changes in each input variable on the biology of the cow, one can manipulate dietary characteristics to generate attainable particle size recommendations. The effects of changes in dietary variables on particle size recommendations and predicted time ruminating are outlined in *Table 1*.

Table 1. Using the example diet above, effect of changes in MUNCH input variables on recommended % of DM on 0.315-inch sieve of a Penn State Particle Separator and predicted minutes ruminatin

Input	Change	0.315-inch sieve recommendation	Minutes ruminating
0.75-inch ("top") sieve	8% to 12%	43.2±10 to 39.6±9%	346 to 351
Diet NDF	Diet NDF: 34 to 35% Starch: 25 to 24%	43.2±10 to 42.7±10%	346 to 339
Starch	Diet NDF: 34 to 33% Starch: 25 to 26%	43.2±10 to 47.2±9%	346 to 352
Forage NDF	24 to 26%	43.2±10 to 33.2±8%	346 to 307
Forage percentage	55 to 60%	43.2±10 to 49.0±11%	346 to 345
Wet forage	45 to 50%	43.2±10 to 42.6±10%	346 to 339
Whole cottonseed	0 to 5%	43.2±10 to 43.3±10%	346 to 354
Body weight	1,391 to 1,350 lb.	43.2±10 to 40.1±9%	346 to 350
Crude protein	17 to 17.5%	43.2±10 to 51.4±12%	346 to 376
Advanced settings	- Target (↓paNDF)	43.2±10 to 21.8±5%	346 to 256
Advanced settings	- - Target (↓paNDF)	43.2±10 to 8.8±2%	346 to 204

0.75-inch ("top") sieve. Increasing 0.75-inch sieve measurements will increase rumination time, which will increase rumen pH or decrease 0.315-inch sieve recommendations. Increasing 0.75-inch particles can be achieved by increasing the chop length of straw or hay. However, excess long particles (>15% DM basis) concentration of the TMR on the 0.75-inch sieve) can decrease dry matter intake and/or increase TMR sorting, and MUNCH does not account for these effects.

NDF. In general, increasing NDF will increase rumination time that via an increase in rumen buffer potential will decrease 0.315-inch sieve recommendations. Although NDF per se is not directly correlated with rumination time, it is positively associated with forage NDF inclusion and 0.75-inch sieve measurements, both of which stimulate rumination. Also, when more NDF is included in the diet, something has to be replaced, which is often starch.

Starch. Increasing starch will via an increase in acidotic load in the rumen increase 0.315-inch particle size recommendations. As described for NDF, dietary starch is negatively correlated with dietary NDF.

Forage NDF. Increasing forage NDF will increase rumen pH or decrease 0.315-inch sieve recommendations. This occurs because forage NDF will stimulate rumination and chewing activity and is typically digested at a slower rate than non-forage NDF

Forage percentage. The effect of changes in forage inclusion on particle size recommendations is difficult to interpret because it is highly dependent on the source of forage that is changed and what concentrate ingredients are concurrently manipulated. However, forage inclusion has a strong positive correlation with 0.315-inch particle size. Therefore, if diets are deficient in 0.315-inch particles and forages are appropriately processed, increasing forage inclusion will increase the supply of 0.315-inch particles.

Wet forage and cottonseed. The effects of wet forage or cottonseed inclusion on 0.315-inch particle size recommendations are small.

Body weight and crude protein. Body weight and dietary crude protein can have a large influence on particle size computations. However, these changes are not biologically based, but are primarily a function of the data used in model development. The data used was collected almost exclusively from Holstein cows that were approximately 1,400 lb and were consuming diets with around 17% crude protein. Therefore, using the body weight of a Jersey cow is likely to result in erroneous recommendations for % of TMR on a 0.315-inch sieve. For example, changing body weight from 1,391 lb to 1,000 lb results in a 0.315-inch sieve recommendation of 17.8% (DM basis). Feeding a diet with this particle size is likely to result in acidosis. Changes in dietary crude protein will result in similar recommendations. **Therefore, we recommend only minor changes in body weight (1,300 to 1,500 lb.) and dietary crudeprotein content (16.8 to 19.0%) even if actual parameter values fall outside these ranges.**

Target (↓paNDF) or – Target (↓↓paNDF) If the user feels that the target proportion of particles is high and based on professional judgment, effective fiber can be reduced the user can choosing the “Advances Settings” button and then choose “Min TMR Particle Size” button. From here the user can reduce the target by one-step or two steps by selecting either - Target (↓paNDF) or - - Target (↓↓paNDF). When doing do the user is reducing the rumen pH target by 0.05 at each step.

Further Detailed Information on MUNCH

The aim of a recent meta-analysis by White et al. (2017a) was to quantify the effect of physical and chemical characteristics of dairy cow diets on rumen pH. Because rumen pH is an indicator of normal rumen function it can serve as a proxy for the effective fiber. However, rumen pH is affected by a number of factors. Specifically, rumen pH decreases with increased dietary inclusion of starch and increased dry matter intake, whereas rumen pH typically increases with increased particle size, increased dietary content of forage NDF, and replacement of dietary starch with nonforage NDF.

From the work of White et al. (2017a), a new physically adjusted neutral detergent fiber (paNDF) system was created that has recently been implemented in the MUNCH smartphone app. This application uses a modeling approach from White et al. (2017b). Models from a range of dietary scenarios, such as high-or low-starch diets, are identified and used to predict the amount of the TMR that should be on the 0.315-inch sieve (DM basis), commonly known as the “second screen” of a Penn State Particle Separator, to maintain a user-defined rumen pH. Additionally, a confidence range for 0.315-inch sieve recommendations is produced from the minimum and maximum predictions of the model. MUNCH allows users to input dietary characteristics, and the application will generate recommendations for the amount of the TMR that should be on the 0.315-inch sieve (DM basis) of a Penn State Particle Separator for lactating dairy cows.

Particle size inputs for MUNCH should be on a dry matter basis. This is because these measures were most useful in the statistical solutions for effective fiber. We recognize that it isn’t always practical to determine particle size measures on a dry matter basis. When using particle size measures on an as-fed basis users may be interested in knowing that based upon our data the proportion of DM retained on the 0.75-inch “top screen” averaged over 1% less and almost 2% less on the 0.315-inch “second screen” than portions of as-fed material. Additionally, the proportion of DM retained on the bottom pan (< 0.315-inches) averaged almost 3 % greater than portions of as-fed material.

Summary

Providing adequate effective fiber to lactating cows is essential to maintain rumen health and function. Recently, models have been developed to determine the effective fiber requirements of lactating cows, measured as particle size, when accounting for dietary composition. These models have been converted into a mobile phone application, MUNCH. This NebGuide outlines how MUNCH can be used as an aid to provide adequate effective fiber to dairy cows and how manipulation of dietary composition affects MUNCH's recommendations for % of TMR on the 0.315-inch sieve of a Penn State Particle Separator.

WE NEED YOUR INPUT

I-29 MOO UNIVERSITY IS CONDUCTING A SURVEY TO PLAN FOR FUTURE PROGRAMS

We want to ensure we are meeting the needs of dairy producers and industry and are requesting your input on this survey. We are gathering data to determine the needs of dairy producers and the dairy industry in Iowa, Minnesota, Nebraska, North Dakota, and South Dakota. This survey is anonymous and should not take more than 30 minutes to complete.

Who should participate?

Dairy farmer, owners, managers in Iowa, Minnesota, Nebraska, North Dakota, and South Dakota, and current or previous dairy industry representatives working with I-29 Moo University.

Participants must be at least 19 years of age.

How to participate

To participate in this survey visit:

go.unl.edu/i-29dairysurvey

After completing the survey, you can enter to win one of the prizes.

Compensation

Participants are eligible to receive one $100 gift card or one of five I-29 Moo University cheese boards with utensils.

Awardees will be randomly selected from eligible participants that choose to participate in the award program.

The deadline to complete the survey is June 1, 2021.

SDSU Extension and Nebraska Extension Present:

FARM Animal Care Resource Guide

What is it?

A resource binder for dairy producers to prepare for the National Dairy FARM Animal Care Program Version 4

What does it include?

- Resources, tools, and standard operating procedure templates
- Summary sheets to meet specific standards

Where do I get one?

Resource binders can be purchased for $45 (+ shipping) at http://bit.ly/animalcarebinder

Farms are encouraged to reach out to their cooperative or FARM evaluator to ensure a copy has not already been purchased for them

For questions about this resource binder, contact Heidi Carroll at Heidi.Carroll@sdstate.edu or Kim Clark at kimclark@unl.edu

For more information about the National Dairy FARM Animal Care Program, visit https://nationaldairyfarm.com/

Meet the Nebraska Dairy Team!

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Thank you to the Nebraska State Dairy Association for their support!