

FARM REPORT



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FROM THE PRESIDENT'S DESK: SILAGE AND VOLATILE ORGANIC COMPOUNDS

Recently, I was asked by a nutritionist about volatile organic compounds (VOC) as they relate to silages. I'm embarrassed to say that I didn't have a great answer as they were not really on my radar screen. So, I did some reading and discovered that measurement of VOC may become more common in the future. As I read, I realized that considerable research had focused on their potential negative effects on the environment, especially in areas of concentrated animal feeding, although they are not top of mind for most people.

Research on livestock operations and air quality has focused primarily on odors, ammonia, or airborne particulate material. However, emissions of VOC from silage have been identified as a significant contributor to poor air quality in regions of concentrated agriculture such as the San Joaquin Valley in central California. Concern arises because VOC emitted into the atmosphere react with oxides of nitrogen to form ground-level ozone in the presence of sun light. The two largest on-farm contributors to VOC are TMR in the feed mangers or feed lanes followed by silage storage systems.

Silages contain greater than 50 VOC that can be grouped as acids, alcohols, ketones, esters, and aldehydes. Excluding acids, ethanol constitutes more than half of the VOC from corn silage. Most VOC are likely produced

by heterofermentative lactic acid bacteria or undesirable microbes such as enterobacteria, clostridia, or yeasts.

Considerable research has focused on how to use inoculants or silage additives to promote fermentations that minimize VOC. In theory, silage additives may directly inhibit the activity of specific microbial groups or cause environmental conditions that inhibit the microbes responsible for producing VOC. However, research results to-date have been quite variable.

For corn silages, bacterial inoculants don't appear to result in consistent reductions in ethanol. Though less researched, chemical additives designed to inhibit fungi or undesirable bacteria have shown promise for reducing ethanol in silages. Propionic acid, or mixtures of potassium sorbate with other compounds may reduce ethanol, but the response appears to vary substantially with type of silage. The bottom line is that more work is needed to develop a practical and effective silage additive that predictably reduces VOC. In the future, a mixture of a homofermentative inoculant to minimize acetic acid and ethanol plus a chemical additive to suppress yeasts may be a useful approach to reduce VOC. Whatever strategies

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BRING BACK THE MILK MUSTACHE!

I, like many people in the United States, have a long family history of cardiovascular disease (CVD). My father, and both of my grandmothers all suffer from CVD. For those who are unaffected or unaware, CVD is a broad encompassment of diseases that affect that heart and blood vessels. The American Heart Association stated in 2018 that 1 out of every 3 deaths in the United States were caused by CVD.

Through the years, research has identified different risk factors associated with CVD. Cholesterol has been one of the major factors to predict CVD risk. Not all cholesterol is bad. Cholesterol has been further segmented into high density lipoproteins (good cholesterol) and low density lipoproteins (bad cholesterol). In the last few decades, low density lipoproteins have since become the primary indicator for CVD risk. In addition to cholesterol there are several conditions and behaviors that increase your risk including, but not limited to: diabetes, obesity, inactivity, and smoking.

A common recommendation by medical professionals is to cut out food from our diets that are high in fat. Included in this are dairy products (outrageous, right?). The good news? This may be changing! Recent research contradicts the idea that dietary saturated fats, specifically dairy fat, cause adverse effects on our health. I recently attended the Cornell Nutrition Conference, in October,

where J. E. Rico presented data on the positive influence of dairy dietary fat on CVD, and how this contradicts the present misconceptions.

Dietary Fat Misconceptions- Where did this start?

The diet heart hypothesis was proposed in the 1950's by a scientist, Ancel Keys. Keys produced data suggesting that there was a strong association between national death rates for middle-aged men from heart disease and the proportion of fat in their diet. From his data he concluded that dietary fat is somehow associated with CVD mortality. Acceptance of this study has been far from unanimous, and several limitations in the results have been identified by the scientific community. Nevertheless, it's become a central piece of dietary advice. This has caused a generalized "fear of fats", consequently causing an increase in milk avoidance, especially full fat dairy products. Milk has sometimes been replaced by soda and high fructose options, which are not healthy alternatives. It's well-documented that saturated fatty acids raise bad cholesterol, but dietary guidelines have ignored the fact that they also increase the amount of good cholesterol at the same time.

New Focus in Favor of Fat

A reevaluation of the literature and emerging evidence contradicts the idea that dietary saturated fatty acids, specifically milk-derived fatty acids,

are bad for health. Recent research has shown that the historic focus on saturated fat may not only be unnecessary, but detrimental to health. Some findings suggest that dairy products, including full fat options, exert protective effects on metabolic health and reduce the instance of conditions including obesity, type 2 diabetes, and CVD. Other studies report a significant association between milk-derived fatty acids and a more favorable low-density lipoprotein particle size distribution, so less of the bad fat. Some work even goes as far to infer that CVD risk may be amplified by a low fat diet.

While the mode of action for this protective effect on CVD by dairy products is likely extremely complex and will require investigation by the scientific community, let's agree that piece of the puzzle is to be continued. For now, things look good for dairy fat, but more research on human health is necessary to update the current guidelines for dairy consumption. I think this is great news for the dairy industry, especially in a time where milk sales are at the lowest they've been in 30 years. Hopefully, with an increase in awareness of these protective benefits, more people will make milk their beverage of choice. But for now, let's raise a glass of milk and toast to a healthier you!

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DIFFERENT STROKES FOR DIFFERENT...FARMERS

When making crop recommendations to farmers I try to tailor them to what I think is the ability of the farmer. For instance, with excellent seedbed preparation and good soil pH and fertility, it's possible to get a great seeding from a lot less than the normally-recommended seeding rate. I've seen farmers who made a mistake in drill calibration and wound up with about half the intended alfalfa-grass seeding rate. One farmer asked me if he should go back a second time at the same half rate; I looked at his seedbed and it was so good I told him to keep his grain drill in the shed. He later said that he couldn't imagine a better seeding. (Whew, got that one right!) Then there was the farmer who for some reason seeded alfalfa-grass with sudan-sorghum, a practice that should horrify any responsible agronomist. The sudan-sorghum grew to over six feet, but by some combination of great weather, high fertility (the field was next to the cow barn) and good luck he managed to get a decent seeding after green chopping the sudan-sorghum. However, there's no alfalfa-grass seeding rate that's "right" for that situation, and I told the fellow that he was lucky that time but never, never try that again.

Matching crop recommendations to the ability of the farmer isn't unique among those of us advising farmers. Many years ago, Dr. W. Shaw Reid, a soil fertility professor at Cornell University, told me that top farmers could exceed Cornell's recommended N fertilizer rate for corn by about 25%. Their excellent crop management would make

good use of the added N. But you'd never see that recommendation in print because so many farmers, like the children at Garrison Keillor's fictitious Lake Wobegon, consider themselves to be "above average". (I used to try to console my mother, as she looked with alarm at yet another less-than-stellar report card, by telling her that it was students like me who made the top half possible.)

An essay by Donald Darnell is purported to be the translation of an ancient manuscript attributed to Noah. (Yup, that Noah.) "The Art of Herding" discusses the handling of various animals, and concludes:

"Man, having been created on the last day, seems to possess every quirk of every other beast. And in any crowd of any number some will be found which follow the rule of another beast that came before. There are those which are prone to fright and suffocation; those which are prone to define for themselves and each go his own way; those who are tall enough to see the herders dance for what it is; those for which the means of sustenance is of a nature that it is exceedingly difficult for the herder to provide; those which much be driven but only at great risk to the herder; and those which are best left to do as they please."

I recognize farmers I've known in several of these descriptions, including "those which are best left to do as they please".

— *Ev Thomas*
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VOC, Continued from Page 1

are developed, they must be consistent with well-accepted practices that minimize silage storage losses.

A model for predicting VOC emissions has been developed recently (2017. Atmos. Env. 152:85-97) and incorporated into the Integrated Farm System Model (ver. 4.3) which was developed by USDA scientists as a whole farm model that evaluates the long-term performance, economics, and environmental impacts of production systems over many years of weather conditions. The model performance was evaluated using measures of ethanol and methanol emissions from conventional silage piles, silage bags, TMR, and loose corn silage. The model simulations showed that the greatest silage VOC emissions came from TMR lying in feed mangers or feed lanes and not from exposed silage faces. Based on this model, mitigation efforts should focus on VOC emissions associated with feeding of silage-based rations.

For the farm simulation, VOC emissions were reduced by approximately 30% when cows were housed indoors versus an open lot, and by 23% if feed was delivered four times versus once daily. Even though this model indicates that feeding represents the greatest concern for VOC emissions, reducing the exposed face of silage during storage is also important. For example, use of silage bags reduced emissions from the silage face by 90% compared with silage piles.

In the end, I'm glad I took the time to learn about silages and VOC – they are not presently front and center – though that could change going forward.

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ARE YOUR FIBER FRACTIONS ADDING UP? FORMULATING FOR OPTIMAL MEAL BEHAVIORS

Cattle are ruminants, designed to utilize fiber to produce meat and milk. Fiber is the total cell wall quantified by neutral detergent fiber (NDF) and is related to intake and chewing activity. The indigestible portion of fiber is called undigested NDF (uNDF240) and quantified by in vitro fermentation for 240 hours. uNDF240 is related to physical effectiveness and gut fill. The potentially digestible NDF (pdNDF) is fiber that has the opportunity to be digested and is calculated by subtracting uNDF240 from NDF. These measures affect intake and meal behaviors, so understanding them can allow us to formulate diets to meet nutritional requirements, but also match management styles.

To understand the relationships between fiber measures (NDF, pdNDF, and uNDF240), intake, and meal behaviors (meal duration and bouts), we combined three studies conducted at Miner Institute with various diets focusing on particle size and digestibility (table above). Intake was most related to uNDF240 with a strong negative relationship meaning as intake increases uNDF240 decreased and vice versa. This relationship being stronger than NDF is not surprising as uNDF240 cannot be digested in the rumen, it can only be passed. The higher the uNDF240 is in the diet, the more of the rumen is filled

Pearson correlations among dry matter intake (DMI), meal behaviors, and fiber fractions in lactating Holstein cow's diets.

Trait	DMI, kg/d	Meal duration, min/d	Meal bouts, bouts/d
NDF ¹ , % of DM	-0.57	0.23	0.66
pdNDF ² , % of DM	-0.09	-0.25	0.86
uNDF240 ³ , % of DM	-0.84	0.66	0.13

¹NDF = neutral detergent fiber.

²pdNDF = potentially digestible NDF.

³uNDF240 = undigested NDF at 240 h.

with indigestible fiber that takes longer to turn over and limits intake. Meal duration is also positively related to uNDF240 which means as uNDF240 increases the meals become longer. This is important as cows that are limited by time such as being over-stocked or being away from the pen for long periods of time should have diets lower in uNDF240 to allow for shorter meals. Meal bouts are strongly and positively related to pdNDF, so as pdNDF increases in the diet the number of meals increases. So as a cow comes to the feed bunk for the first meal she will fill up, lay down and ruminate. The cow will come back for another meal when she has emptied part of her rumen. The portion of fiber that will influence this the most is the pdNDF which can be digested and passed whereas uNDF240 can only be passed. Just by formulating diets with lower uNDF240 and higher pdNDF we can decrease meal

duration and increase meals which could allow the cow to reach her optimal intake for production and efficiency.

As our knowledge of how fiber fractions influence intake and meal behaviors, it will allow us to formulate diets that match management styles. Undigested NDF at 240 hours seems to be a good indicator of intake and influences how long meals will last. The number of meals is influenced positively by potentially digestible NDF. For cows who are limited on time, a diet with lower uNDF240 and higher pdNDF will decrease meal length and increase meal bouts. This can be done using high-quality forages and a variety of by-products and allows us to optimize the diet so the cow can reach her optimal intake.

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DESK-CLEANING TIME

Occasionally I find a pearl in what seems to be a vast ocean of stuff crossing my desk — the old roll-top that's been in the family for generations, as well as my virtual desktop. It's getting to be time for "Out with the old, in with the new", so in this spirit following are a few items I found interesting:

- A pig in the pot, and vice-versa: No research data yet, but there's a fair chance that "pot-bellied pig" might have a different connotation.

Some Oregon hog producers are feeding cannabis (marijuana) waste to hogs and claim that it's resulting in improved pork texture and taste. We've heard of grass-fed beef, but...

- One-hit wonders: Margaret Mitchell wrote "Gone with the Wind", and never wrote another book. Harper Lee wrote "To Kill a Mockingbird", and never wrote another book. Same with Anna Sewell ("Black Beauty") and Emily Bronte ("Wuthering Heights").

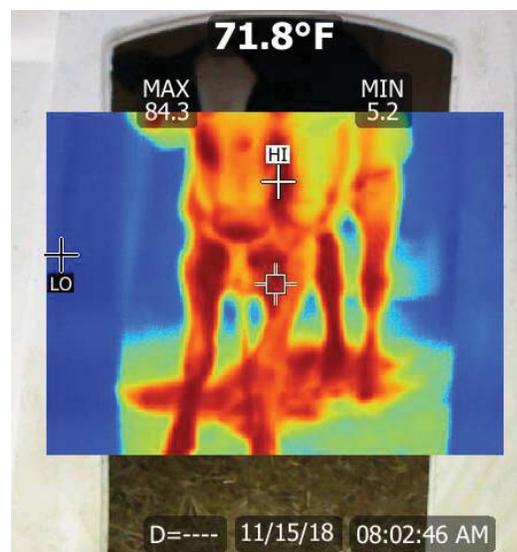
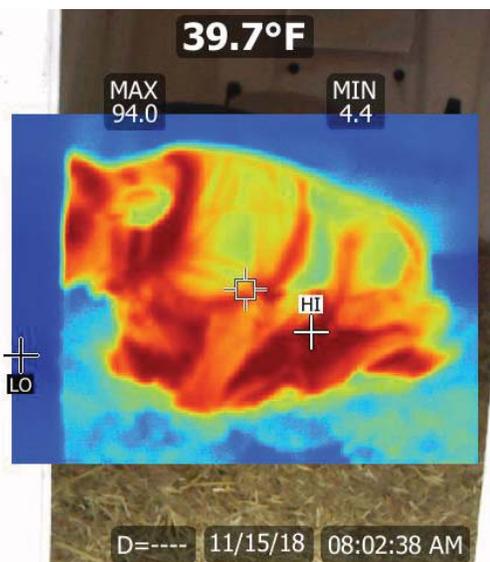
That all four of these authors were women is perhaps a coincidence. With the exception of Lee, all died within a year of writing their single (and singular) novel.

- What's in a name? In 1994 an online shopping service called "Cadabra" began without making much of an impact. After one of its lawyers misheard the name as "cadaver" the name was changed. To Amazon.

— E.T.

LOOKING AT CALVES WITH A DIFFERENT LENS

At Miner Institute we have the opportunity to work with many tools. Thermal cameras have been used under a wide range of applications; in agriculture these include identification of mastitis and lameness, correlation of eye temperature to stress or health, and thermal cameras are also used extensively in crop and field applications. I found out that we have a thermal image camera so thought I'd take it out to the calf hill to look at things through a different lens.



As I made my way past the different calves on the hill I came across the calf in the two pictures above. In the first picture the calf was lying down. The thermal image camera shows a relative scale of temperature through the different colors, with the warmest being the darkest red and the coldest shown in blue. In the first picture you can see one of the warmest parts identified was where the calf was all tucked up underneath her calf jacket. In the second photo the calf stood up and I was amazed at what was left behind. On the bedding where she had been lying down a section of red (warmth) remained, highlighted by the thermal image. There was quite a large area where the calf had been laying that had retained some of the calf's heat for

several minutes after she got up.

While our calf feeders do a great job of bedding and keeping the calves dry, these images got me thinking about what would most influence the amount of heat lost in this way. These pictures highlight how a calf could lose a lot of heat if not properly bedded. First, the contact calves have with the ground when laying down is quite large and includes part of their belly and their legs. If that area is wet or drafty they will lose substantially more heat compared to an area that is dry and draft-free. Second, bedding and calf jackets are really important. Dry and insulative bedding such as straw will minimize the amount of heat lost from the calf by retaining that heat directly

around the calf. Additionally, all our young calves have jackets, so they have that extra layer to help minimize heat loss. The pictures also highlight the effectiveness of the calf jackets. The outside of the calf jackets in the images are cooler relative to the edges where you can see some of the warmest spots on the calf (underneath the blanket), indicating that the calf jackets are doing their job quite nicely.

I hope you find these pictures as interesting as I did! It's always enlightening to look at things through a new lens. Bundle up your calves and stay warm this winter!

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GRASS SEEDING RATES

For years I recommended about 5 lbs./acre of cool-season grasses when grass was seeded with alfalfa. Then we seeded a field at Miner Institute to alfalfa-orchardgrass, even though I wasn't at all fond of this grass species. Farmers might have been able to detect this fact because for years I'd stand up in front of farmer audiences and say "I HATE orchardgrass!", then list the reasons. My negative attitude on orchardgrass hasn't changed, but I was amazed at how much grass we got from our seeding rate of 1 lb. of orchardgrass with 14 lbs. of alfalfa. When we started using tall fescue in our alfalfa-grass mixtures we used 5 lbs. of grass but soon were second-guessing this decision after looking at some of our early stands. I backed off — both on the Institute farm and in farmer recommendations — to 4 lbs./acre and occasionally as low as 3. We still occasionally saw more grass than I was happy with in our seedings, but rarely less.

Now, another change: Depending

on the situation, I'm starting to recommend 2 lbs./acre of tall fescue and meadow fescue when these species are seeded with alfalfa. This is generally consistent with the recommendation by Cornell University's Jerry Cherney, who has actual data instead of just field observations. Jerry recommends 1-2 lbs./acre of meadow fescue with 12-14 lbs. alfalfa. Of course, 2 lbs. is 100% more than 1 lb. (I always was a math whiz), so which is correct? Either or neither, depending on seedbed preparation and weather conditions shortly after seeding. With a fine, firm seedbed and cool, moist weather following seeding, 2 lbs./acre should be plenty of seed, and 1 lb. might be enough for an adequate percentage of grass in the stand. (Can you bounce a basketball on your seedbed just before the drill rolls in? That's acceptably firm.) If, on the other hand, you decide to moldboard plow a clay loam next spring while the soil is still wet, making large brick-hard clods that repeated disking simply turns into smaller brick-hard clods, 2 lbs./acre may not

be nearly enough grass seed. Which is the reason for the "depending on the situation" phrase in the first sentence of this paragraph. (We agronomists are a clever lot.)

In a Farm Report article just last month I suggested a tall or meadow fescue seeding rate of 3 lbs./acre when seeding with alfalfa (assuming a good seedbed) and now it's 2 lbs. You may be understandably frustrated with what seem to be ever-changing recommendations (and no, it's not because it's harder to hit a moving target). However, we try to base our recommendations on the latest information, especially when it's supported by both research data and farmer experience. We now know that a lower grass seeding rate results in better overall performance — milk production per acre and per ton of forage — so that's what I'm recommending.

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COTTONSEED

Scientists have genetically modified cotton to produce seeds that are edible by humans. A comment in a Bloomberg news article on this topic states that this will also "help farmers, who will be able to sell the seeds, currently considered a nearly useless byproduct".

"Nearly useless? Try telling this to dairy farmers who are paying \$250 to \$300 per ton for whole cottonseed (AKA "fuzzy" cottonseed) and cottonseed meal. It's an excellent protein source, and farmers certainly aren't looking forward to alternative uses for cottonseed driving the price out of reach. Annual U.S. production of cottonseed is over 600 million tons, and almost every ton of this is used, mostly as animal feed but also exported or crushed for oil. Does this sound like a useless byproduct?"

SOUTHERN EXPOSURE

Odds are that it's warmer here in Virginia today than wherever you are, and particularly in Northern NY. The Bride and I don't mind a bit of cold weather but not several months of it, so we winter just south of Richmond, VA next to our #1 son and his family. By the time we leave Oak Point we've raked up the leaves in our yard, arriving here just as the oak trees are turning colors, so we get to enjoy the beauty of fall (and leaf raking) twice each year. When we arrived in mid-November this year the oaks were still green. By the time we leave the "midsouth" in late March the magnolia blossoms are starting to drop, so we get to experience spring twice each year as well. We arrive late enough to avoid the heat and humidity of summer, also the early fall hurricanes including Michael this year, which while it was "merely" a tropical storm by the time it reached the Richmond area dumped a foot of rain and caused considerable wind and flood damage. We're happy to avoid most of a North Country winter, but by the time March rolls around we're counting the days before we return to Oak Point. For anyone with crop-related questions, my phone number is 518-570-7408.

— Ev Thomas

WHAT'S HAPPENING ON THE FARM

It's the last month of 2018, and if our late November snowstorm is any indication, we're gearing up for what could possibly be a long, snowy North Country winter (and the fourth one I'll experience here)! This fall we decided that I'd remain on the farm in an assistant herdsman-type position as well as working with our calves. This arrangement will last until the summer, when (fingers crossed) I'll be heading out on a new adventure to veterinary school. I've already interviewed at one

vet school in Arizona a couple of weeks ago, trading in my Carhartt bibs for a polished black suit and 80-degree weather. I'm honored and so fortunate to still be here, continuing to work hard taking care of our ladies at a time when we're short on labor. I'm delighted that Steve and the Miner Institute crew wanted me to stay and that my commitment to the farm was recognized as I strive to do my best work every day.

It's been quite the year on the farm, and looking back it's amazing to see all our work laid out in numbers. Since January 1st we've had 451 cows freshen. August was our busiest month with 69 fresh cows, and February our least busy month with only 29 fresh cows. We had a total of 187 heifer calves born this year. We also reached a record number of cows milking at one time – 430. We are still milking 3x and so far this year we've shipped 12,345,528 lbs. of milk, averaging 4.1% butterfat and 3.1% protein (December's production not included). Our SCC has continued to stay under 100,000. We've achieved another production record: Our test day average for the month of November was a whopping 101.1 lbs



with 4.1% fat and 3.1% protein. The cows have been averaging 100 lbs./day for the past week, and we could not be prouder of how hard our cows are working and of the dedicated team of employees that care for them and run the farm.

This year we were busy with many research projects and didn't go more than a couple weeks without at least one study (and sometimes three!) being conducted in the dairy barn. Our farm team not only cares for the cows but also pays attention to detail as they help collect data for projects. We gained a new herdsman intern at the end of the summer, Alexandra Banks, who has done a great job here. We educated five Advanced Dairy Management students and four Summer Experience students, and are awaiting the arrival of our next ADM class. Although challenging at times because it really "takes a village" to teach an inexperienced person the ropes of farm work, it's a rewarding experience to see the students come away with more knowledge than they arrived with.

Some highlights of 2018 include an update to our parlor – replacing our

old turn reel with a vertical lift exit system, new energy efficient lights in the parlor, and the replacement of stall mattresses in one of our pens. We sold three trailer loads of springing heifers in an attempt to reduce overcrowding – we have more heifers than we need right now. We also worked on employee education this year, with a meeting about mastitis for our milkers and a meeting about proper calving assistance, both with our herd veterinarian, Dr. Nate Theobald, as the speaker. Towards the end of the year we had to stop using Imrestor after it was pulled from the market for further labeling. After using this fresh cow immune-booster for the past two years we'll see how our herd is affected, if at all, in the coming year. Our vaccination program has also been changed with the addition of a Klebsiella vaccine for mastitis.

At the end of each year it's always nice to reflect back on how we're doing and see the results of all of our hard work, as well as think of ways we could improve next year. Although the low milk prices are disheartening, I encourage every one of our producers reading this to look at your achievements. See where you can make improvements (these don't have to cost money – just making different management decisions can make a huge difference in your bottom line) but also realize that what you do every day is important! We hope to make 2019 an even more successful year than 2018, and wish the same for you and your farms. Merry Christmas and Happy Holidays.

— Victoria Vendetta
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