Virginia Cooperative Extension
Virginia Tech • Virginia State University

Dairy Pipeline
Department of Dairy Science

Volume 43, No. 5 June 2022

Can Efficiency be a Deficiency?

Authored by Alex White, Ph.D., Department of Dairy Science, Virginia Tech; awhite@vt.edu

It's always interesting to hear people talk about their farms and businesses. The most common topics seem to focus on production efficiency: pounds of milk/cow, milk shipped/FTE (full-time equivalent), cows/FTE, crop yields/acre, average daily gains, and so on. In theory, operating more efficiently should lead to increased profitability. However, increased profits usually come at the expense of increased risk exposure—that darned risk-return tradeoff. But, can focusing on efficiency be a deficiency to your farm? Does increased efficiency always lead to higher profits? The answer to that question depends on your time horizon.

Let's look at a few examples. Assume that your cows/FTE is well above the benchmark. You might argue that you are using your labor very efficiently. In the short term, lower labor costs can improve profits. But, you may be overworking your milking crew, leading to higher labor turnover. Maybe having fewer employees is reducing your turns/hour and increasing stress on the cows, possibly leading to decreased milk production. What happens if a milker calls in sick or quits suddenly—how will your finely-tuned milking enterprise be impacted by this unexpected hiccup? Over a longer timeframe, higher efficiency, as measured by cows/FTE, may be hurting your profitability and setting you up for operational train wrecks.

Similarly, what are the impacts of incentivizing your milking crew to increase the number of Turns/Hour? In the short term, you can finish each shift faster, potentially reducing your labor costs or freeing your labor to do other tasks around the farm. The cows are in and out of the parlor quicker, so they can get back to the barn, eat, lay down, and make more milk.

This all sounds good! But, what if the increased turns/hour are achieved by your milking crews taking shortcuts in the milking procedures that may lead to increased health issues or under-milking the cows? Maybe the hectic pace will burn out your milking crews, leading to poor morale or higher labor turnover. In the long run, higher efficiency can hurt production and profits. What is the old saying, "slow and steady wins the race?"

For example, assume that you've made moves to lower your operating expense/receipt ratio. In the short term, it takes less variable expenses to produce milk. That's good, right?! What if you reduced your operating expenses by reducing your fertilizer application, by cutting back on repairs and maintenance, by purchasing lower quality feeds, or by canceling your health insurance policy? Over a longer time horizon, these actions may significantly hurt your production and your profits. Also, your overall risk exposure may increase dramatically. Be careful of cutting costs—always consider the impact on your operation.

Consider your feeding enterprise. You've decided to implement a "just-in-time" (JIT) inventory management system in your feed station. I mean, it seems to work for manufacturing plants and retail stores—it reduces your carrying costs, frees up space for other uses, and smooths out your cash flow. In a predictable environment, this system can be highly efficient and effective. But, how are these JIT systems functioning with all of these COVID-related issues? Firms that were operating with a very slim margin for error got hammered by the supply chain disruptions. How would your farm be impacted if you ran out of feed because you didn't build in a little bit of feed reserve in your efforts to be more efficient? This is a clear example of how focusing strictly on efficiency in the short term can have adverse impacts on your profitability and risk exposure over a longer time horizon.

Don't get me wrong, efficiency is very important to your operation. However, it is important realize that bore-sighting on efficiency in the short term can have unexpected consequences over time. There is a direct relationship between efficiency and risk exposure. The more efficient you are, the more sensitive you will be to outside factors. With this in mind, I tend to put a strong value on liquidity and risk management. Taking actions such as keeping a little more money in your savings account, or having a little extra feed on hand, or having a few less cows per milker, or focusing on proper techniques instead of faster techniques can reduce your overall efficiency in the short term. However, they can pay big dividends in the future by helping you avoid major disruptions and by focusing your efforts on long-term profitability rather than short-term efficiency.

Environmental Impact on Bloat and the Bacterial Community in Ruminants

Authored by Ahmerah Thompson, M.S. Student with Associate Professor Gonzalo Ferreira, Department of Dairy Science, Virginia Tech; gonf@vt.edu

Ruminal bloat, also known as ruminal tympany, is the excessive accumulation of gas within the rumen. Usually, the gases are expelled through absorption methods, passage into other stomach compartments, or eructation. If the gas production exceeds the elimination rate of the animal, an increase in intra-ruminal pressure and distention on the left side of the animal will occur. Looking at the environmental impact on bloat and the changes in the microbial community of ruminants is essential for understanding bloat and other metabolic diseases.

Foamy or frothy bloat is the predominant type of bloat in grazing cattle. Under normal conditions, the rumen contents are layered based on the density of the digesta, or feed contents. With the digesta being continuously fermented at the bottom and the produced gas at the top. A thick proteinaceous foam is produced as a result of the ruminal bacteria producing a slimy-like substance during the fermentation process. The digesta of the animal, along with saliva production, would normally be able to decrease the viscosity of the foamy slime, but when the ruminal digesta is no longer able to keep the foamy stabilized, the animal reaches this point of bloat. As this foam is produced in excess, it builds up in the rumen and essentially blocks the point of eructation; thereby, limiting the animal from eliminating the gas that is steadily being produced. Another form of bloat is free-gas bloat. Free-gas bloat would be similar to a human choking or having a gas "bubble" that feels stuck in the chest, which could be from a physical obstruction. This concept can be related to ruminants as well. When a physical obstruction is blocking the eructation site or animals lying time drastically increases due to other diseases, gas is blocked in the rumen. Both cases of bloat can result in death in a matter of days and cause the animal extreme pain as it progresses. When looking at ways to decrease the occurrence of bloat, we typically focus on foamy bloat because that can be directly correlated to nutritional changes and management efforts. Changes in the microbiome that could alter the rumen to the point of bloat could come from environmental factors like location, nutrition, or stress.

The nutritional impact of bloat has been associated with ruminants who consume highly digestible legumes or wheat pastures. Legumes like red, white, Persian clover and alfalfa are the main concerns for their high protein and low fiber content. These feed components can shift the microbiome of the gut having a direct impact on the production of this foamy substance. The rumen is composed of 95% of bacteria, archaea, fungi, and protozoa that are involved in energy production and other functions. Microorganisms in the rumen have the job of decomposing cellulose and hemicellulose. Fermentation is an important function of the microbes in the rumen to convert feedstuff into energy. As a result of this fermentation, by-products generated are CO2, methane, and volatile fatty acids. With bacteria being the most abundant microbiome, looking at the location and housing factors and their effect on the bacterial community will give insight into the change in the microbiome community of dairy cattle on pasture.

The location of dairy cattle on pasture plays a role in bloat because 20% of grazing dairy cattle die every year from this disease. While on pasture, the antimicrobial compounds in plants and environmental temperature would be critical factors in the change in the microorganisms. Research shows a relationship

between very low temperatures with high pressure and a decrease in bacterial growth. Also, individual housing vs group housing increases the cellulolytic bacteria level and higher protein content in the rumen. Pasture-based ruminants have an increase in the number of bacteria present in the rumen. Heat stress has been known to alter animal performance, increase metabolic disorders, and shift the rumen microbiome. When cows are in a state of heat stress, the lactate-producing bacteria, which utilize soluble carbohydrates, increase, while the acetate producers decrease. Fermentation in the rumen is also affected due to the physiological responses of the animal during heat stress. All of these variables have a relationship with bloat.

In conclusion, nutrition, location, and stress are environmental factors that play a role in bloat and the microbial community. Nutritionally, highly digestible legumes could directly affect fermentation through the introduction of components in the feed. Consuming a pasture-based diet, and having a temperature and pressure effect, alters the microbiome to the point of unfavorable diseases. Heat stress increases metabolism, thereby increasing the activity of microorganisms and the production of byproducts at an excessive rate. Farmers should consider their pasture management if they are having a rise in bloat. Choosing a less digestible legume, releasing animals onto dry pastures, and monitoring the intake of the animals should reduce the gas build-up!

Upcoming Events

Franklin County Youth Livestock Show with Dairy
June 18, 2022

Franklin County DHIA
June 23, 2022

Virginia Dairy Expo
July 8, 2022

Youth Fitting and Showing Workshop - Rockingham County Fairgrounds
July 16, 2022

Virginia Colored Breed Show, Rockingham County Fairgrounds
August 4, 2022

Youth State Dairy Judging Contest
August 5, 2022

Virginia Holstein Show, Rockingham County Fairgrounds
August 6, 2022

Rockingham County Fair
August 15-20, 2022

Cattle WISE/Equipment WISE-Women in Ag
Date TBD (Fall)

If you are a person with a disability and require any auxiliary aids, services or other accommodations for any Extension event, please discuss your accommodation needs with the Extension staff at your local Extension office at least 1 week prior to the event.

For more information on Dairy Extension or to learn about current programs, visit us at VTDairy—Home of the Dairy Extension Program online at www.vtdairy.dasc.vt.edu.

Dr. Christina Petersson-Wolfe,
Dairy Extension Coordinator &
Extension Dairy Scientist,
Milk Quality & Milking Management

Visit Virginia Cooperative Extension: ext.vt.edu

2022 DASC-150NP