



Dairy Pipeline

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Reducing the negative effects of intramammary antibiotic infusions on gut function and performance in cows

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More than 80% of all antimicrobial drug use in the dairy industry is for the treatment and prevention of mastitis and accounts for more than \$2 billion in annual losses. Infusing antibiotics directly into the mammary gland to target pathogens is the most effective treatment for mastitis. While the intended target of these intramammary antibiotic infusions is the mammary gland, many of the drugs commonly used are absorbed across the udder membrane/blood barrier and enter circulation. From here, the antibiotics interact with other tissues in the body and can be detected in urine and feces. Understanding how intramammary antibiotic infusions impact the cow's performance by altering the gut and fecal microbiome will push us to develop more effective and sustainable treatments.

The three most commonly used intramammary antibiotics for treating mastitis, Spectra-Mast, Today and Pirsue, have all been detected in circulation and other tissues of the body after intramammary infusion. Antibiotic presence in the gut and feces and its implications for animal performance will be the focus of this article. The rumen microbiome is the community of microorganisms that inhabit the rumen and is characterized by its high population density, diversity and complexity of interactions. These microorganisms provide ruminants with the unique ability to break down highly cellulolytic forages into their subcomponents for digestion and absorption of nutrients. When this rumen microbiome is disturbed, such as when populations

are stressed or killed due to antibiotics, the microbiome becomes inefficient and no longer effectively breaks down feed stuffs. This can cause secondary health and digestive issues as well as lead to lower milk production due to reduced nutrient absorption.

Recent research has demonstrated that intramammary antibiotics can be detected in the feces and alter fecal microbial composition. Pirlimycin hydrochloride (Pirsue) disrupts five specific microbial groups that have key functions in digestion. Cows with these microbiome disruptions have been found to have an impaired ability to break down cellulose, synthesize milk fat from components, produce propionate in the rumen, and increased methane production. This reduces overall digestive efficiency and lowers total milk volume and milk fat volume. When cows were treated with pirlimycin hydrochloride for eight consecutive days, the disrupted microbiome persisted for fourteen days, indicating a more sustained effect on the microbiota and a longer-term disruption of digestion and milk production. The depressed milk production observed from mastitic animals treated with intramammary antibiotics results from three factors:

1. reduced feed intake leading up to, during and recovering from mastitis,
2. destruction of mammary epithelial cells due to mastitic pathogens,
3. reduced digestion and absorption capability of the gut.

Altered gut microbiome due to the presence of intramammary antibiotics in the gut also leaves cows susceptible to secondary metabolic diseases. Two microbe groups affected by pirlimycin hydrochloride have also been linked to BHB and acetone levels, which are key indicators of ketosis. This suggests that cows with an altered microbiome due to intramammary antibiotic treatment, may also be more susceptible to ketosis.

How then can producers mitigate the unintended impacts of intramammary infusions on cow gut function? Supplemental yeast or fungus can attenuate reduced milk production in immediate mastitic cases. Research has suggested that providing a live cell yeast or *Aspergillus oryzae* fungus supplement to cows being treated with antibiotics improves feed intake and balances the gut microbiome to improve nutrient digestion and absorption. Several of these supplements are commercially available and affordable. In the future, producers may not have to supplement products by breeding for cows with more resilient gut microbiomes. With the recent discovery that members of the rumen microbiome linked with gut function, milk production and metabolic diseases are low to moderately heritable, selection emphasis could be placed on cows that have a more optimally balanced rumen microbiome that is hardier when exposed to antibiotics and less susceptible to metabolic diseases.

Understanding how intramammary antibiotic infusions interacts with the cow's gut microbiome provides important insight into establishing more effective treatments for mastitis. Improving cow performance through more effective mastitis management programs as well as genetically selecting for more efficient gut microbiome animals will contribute to a more profitable and sustainable dairy industry.

What's behind a credit score?

Authored by Cynthia Martel, Extension Agent, Franklin County; cmartel@vt.edu and Dr. Travis Mountain

The farming community has been hit hard the last couple years with volatile market prices leaving many to search for additional financial options and possibly to max out their credit cards. It is critical to remember the impact maxing out credit cards and not paying bills on time can have on your credit. When was the last time you checked your credit score and report? Not keeping up with your score and report can have lasting effects. Did you know that when you apply for credit, a financial institution will look at your credit report and this simple task can actually lower your score? Those hard inquiries, as they are called, can stay on your report for two

years and impact your score for one year. Also, if someone steals your identity and/or financial information and racks-up bills, this will show up on your credit history.

What is in a Credit Report? Equifax, TransUnion, Experian are the three major credit agencies and lenders report your credit usage to them. Financial institutions may choose to pull reporting information from any—or all—of these sources. Your report is made up of your identifying information, credit history, public record information, and inquiries. Your credit report will not display your income or amount of money in saving and checking account, length of time at a job or residence, job title, age, or credit score. The key is to remember negative information on your report stays for 7-10 years (Chapter 7 bankruptcy is 10 years). On the plus side positive information stays on your report for 10 years also, but the negative can far out wave the positive in some cases. When looking over your credit report, if you notice errors, contact the fraud department of each bureaus as soon as possible, place a fraud alert on your report for free, and ask the bureaus to investigate.

What is the difference between a credit report and credit score? Credit score is a number typically between 300-850 that reflects your credit worthiness. This score along with the report of every credit card or loan (mortgage, auto, etc.) you have ever held is what could stand between you getting that new loan for a tractor or refinance. If you are just starting out with credit, it usually will take a minimum of 6 months before you have enough of a credit history to have a credit score. The FICO score (the most common credit score) is determined by several factors. Your score is comprised of 35% payment history (are you making those payments on time?), the 30% amount owed on a bill (what percent of your credit limit are you using?), 15% length of credit history (how long have your accounts been open?), 10% new credit (don't go hog crazy and open 7 new credit cards in one day), and 10% credit mix (mix of different loans, like student loans, mortgage, credit card). If you mess up your payment history by missing payments or paying more than 30 days past due date, this can take years to fix. Also, if you have lots of credit cards or loans that that have recently been opened, this can lower credit history average age and thus lower your credit score.

Did you know you can place a freeze on your credit? Placing a freeze on your credit prevents any one from opening up a new line of credit in your name. This is added protection for you! You will want to do it with all three reporting bureaus. If you ever need to lift the freeze to allow a company to view your credit report, it is easy to temporarily remove the freeze for viewing and place it back on after. This can prevent the fraudulent opening of new credit lines. The key to remember is that your good credit depends on you. It depends on you staying on top of your bills, making payments on time, and reviewing your credit report yearly. Normally, you get one free report from each of the three main credit bureaus, so three a year, but due to COVID-19, you are allowed to check your report weekly through April 2021. Work with the credit bureaus to remove any incorrect information and tell your side of the story.

To get a copy of your credit report for free visit annualcreditreport.com, the site will walk you through the steps to pull up your credit reports from one or all three reporting bureaus.

For more information please contact your local Extension Agent to help you navigate the necessary steps and how to read your report.

Upcoming Events

September 17, 2020

Dr. Alex White, Zoom Meeting, Noon
“Management Tools that Make Your Life Easier”

September 25-26, 2020

State Fair Youth Dairy Cattle Show

Sept. 29-Oct. 1, 2020

2020 Annual Meeting and Professional Improvement Conference of the National Association of County Agricultural Agents

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.



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

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