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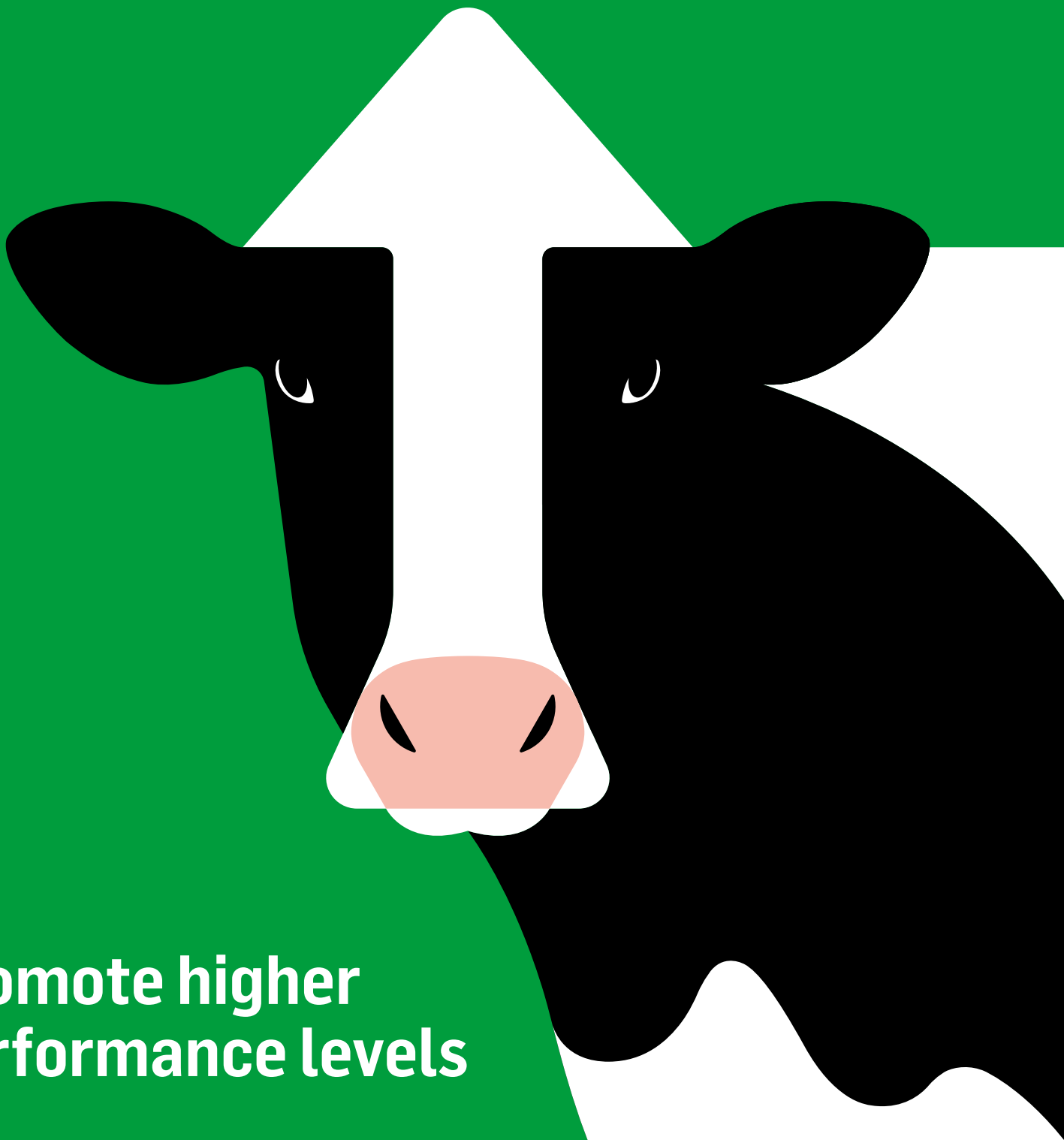
Keeping aflatoxin out of milk

What is Wrong With My Herd? Part 8: Sub-acute ruminal acidosis (SARA)



Promote higher performance levels

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Ensure Pre-Weaned Calf Health by Focusing on These 5 Key Areas

Paige Gott PhD,
Technical Sales Manager Ruminant

Raising healthy calves is crucial to the success of a dairy operation as heifers are the future of the milking herd. While calves do not directly contribute to the output of the farm, it is tempting to cut costs and lower management standards for this group of animals. However, focus on five key areas should be maintained to ensure future herd profitability.

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Keeping Aflatoxin Out of Milk

Timothy Jenkins PhD,
Development Scientist

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What is Wrong With My Herd? Part 8: Sub-acute ruminal acidosis (SARA)

A handy diagnostic checklist of symptoms, causes and remedies.

Promote higher performance levels

The dairy industry is changing. In general terms, demand for milk and milk products around the world is on the rise. Increasing economic pressures including the rising cost of inputs and tighter margins mean that any dairy unit has to be run with precision.

Genetic improvements have given animals the ability to produce more milk than ever before, and technological improvements in milking parlour equipment are delivering a huge amounts of information to managers. Management techniques therefore have to be adapted to meet and optimize the changing needs of the dairy herd in order to keep naturally ahead.

In this issue of Science & Solutions, we explore the topic of herd management in detail, firstly focusing on pre-weaned calves. Although not directly contributing to farm outputs, calves are the future of the dairy herd so taking care of them is of utmost importance. Paige Gott draws attention to five key areas of calf management that cannot be overlooked if performance levels are to be maximized.

Aflatoxins are of major concern to dairy producers because of their ability to contaminate final milk products. Exposure to aflatoxins can be a risk to human health, hence the level of importance of eliminating aflatoxins in dairy production. Various strategies can be employed to this effect, but as Tim Jenkins highlights in our second article, the most important strategies are to ensure feed quality, and to apply an effective and selective mycotoxin binder.

Finally, we continue our series on herd health, this time focusing on sub-acute ruminal acidosis (SARA).

Enjoy reading this issue of Science & Solutions, keeping you naturally informed.

Wolfgang Markert PhD
Regional Technical & Marketing Director, Europe

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Ensure Pre-Weaned Calf Health by Focusing on These 5 Key Areas

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Raising healthy calves is crucial to the success of a dairy operation as heifers are the future of the milking herd. As calves do not directly contribute to the output of the farm, it is tempting to cut costs and lower management standards for this group of animals. However, focus on five key areas should be maintained to ensure future herd profitability.

There are several important aspects related to pre-weaned calf management as illustrated in *Figure 1*.

Timely diagnosis of disease and administration of the correct treatment is also an important component of calf rearing. Although calves are not actively contributing to milk sales, it is in the best interest of the farm to closely monitor calf health in an effort to produce high-quality replacement heifers.

IN BRIEF

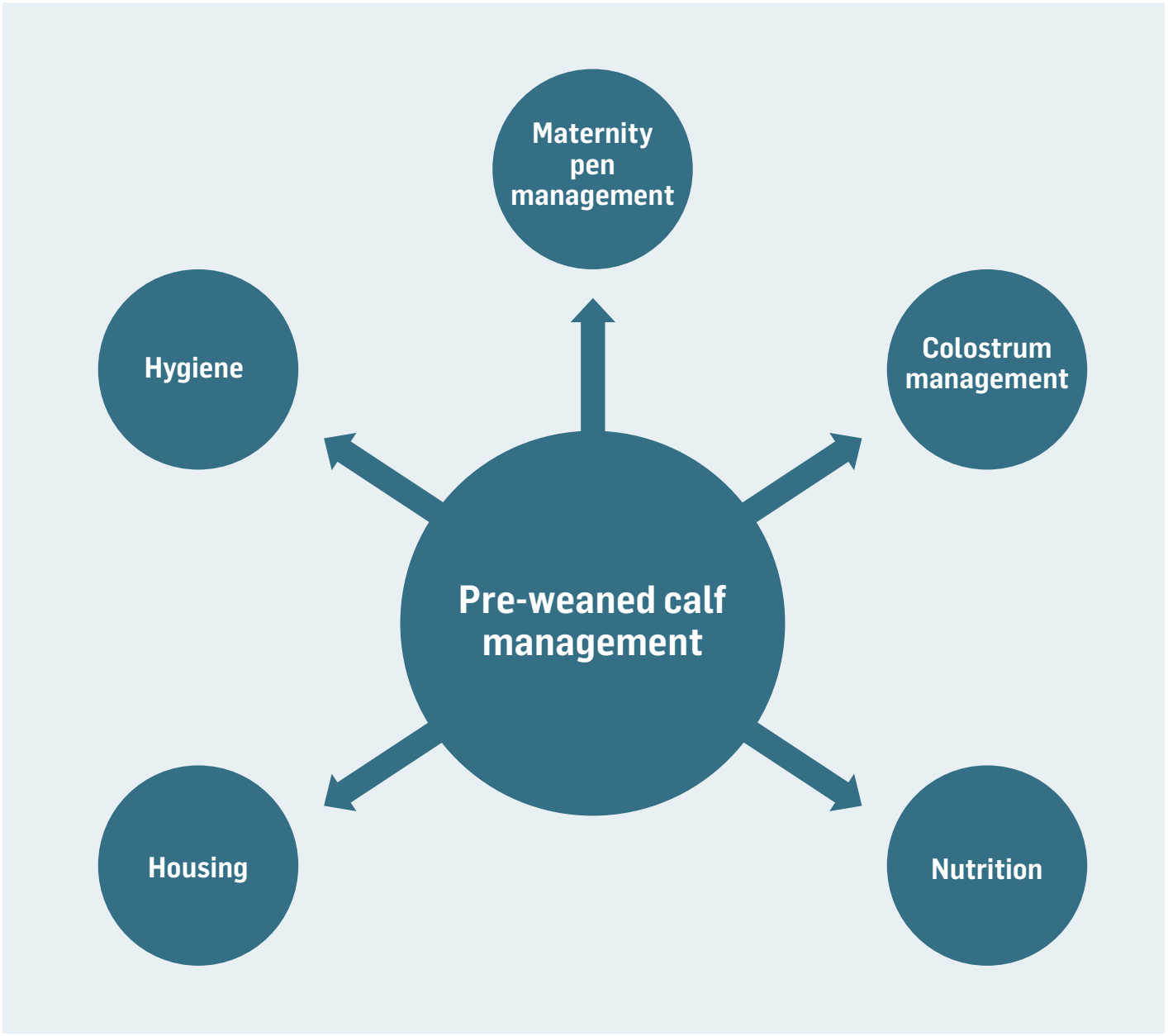
- Raising healthy calves is essential to optimizing the future performance of the dairy herd.
- Critical factors to consider include maternity pen management, hygiene, colostrum intake, housing and nutrition.
- Supporting the calf from birth will minimize animal losses and promote higher future performance levels when the animal joins the milking herd.

Reasons for calf illness

Despite advances in management and technology on farms, the National Animal Health Monitoring System (NAHMS) 2007 dairy report estimated the average mortality rate at 7.8% during the pre-weaning phase on North American dairy farms (USDA, 2007). Diarrhea or digestive problems accounted for 56.5% of the deaths in pre-weaned calves, and respiratory problems accounted for another 22.5% of the deaths.

Death due to diarrhea is mainly related to dehydration and septicemia (infection of the blood). When looking at pre-weaned calf morbidity, 23.9% had diarrhea (74.5% of calves with diarrhea or digestive problems were treated with antimicrobials) and 12.4% of calves had respiratory diseases (93.4% of calves with respiratory issues were treated with antimicrobials). Additionally, 1.6% of pre-weaned heifer calves suffered navel infections (92.3% of calves with navel infections were treated with antimicrobials). Regular monitoring and good record keeping may hasten the diagnosis of sick calves. Supportive therapy during the early stages of illness may help reduce calf loss.

Figure 1.
Five important aspects related to pre-weaned calf management



Source: BIOMIN

Hygiene and maternity pen management

Proper hygiene is necessary in all aspects of calf management. This begins in the maternity pen. Maternity pens should be well bedded with clean, dry bedding, ideally separated from pens housing sick animals. Bedding should be changed regularly and pens disinfected between uses in order to reduce pathogen loads.

Calves are born with little to no immunity so reducing exposure to pathogens is important. Additionally, calves have very little fat reserves at birth, so the maternity pen should be draft-free, especially in colder climates and seasons.

Maternity pens should be well supervised so that calves can be removed from the dam in a timely manner. This will help reduce pathogen exposure as well as reducing the potential for injury, which may occur especially in group pens. Cleanliness of the maternity pen is essential, as poor hygiene can contribute to navel infections.

The use of a 7% tincture of iodine dip shortly after calving can help reduce navel infections.

Colostrum

There are many important aspects of pre-weaned calf management, but the quality, amount, and timing of colostrum fed to calves is the main focus on most farms. Feeding four liters of high-quality colostrum (> avoid breaking off of immunoglobulins) within 6 to 12 hours of birth is commonly recommended. Absorption of immunoglobulins in the intestinal tract decreases over time; therefore, it is important to deliver these nutrients to the calf in a timely manner. Immunoglobulins help provide protection during the first two weeks of life while the calf develops its own active immunity.

Colostrum quality is also key. The quality of the colostrum can be estimated easily on-farm with the use of a colostrometer or hydrometer. This tool is reliably used to distinguish good-quality colostrum from poor-quality colostrum. A Brix refractometer is another tool which can be used on-farm to determine colostrum quality. Regardless of which tool is used, it is best to measure colostrum quality at room temperature (23°C) as samples at lower or higher temperatures can provide false readings.

Another indicator of colostrum quality is bacterial content. Bacterial counts can be limited with sanitary collection and handling. Colostrum should be fed to the calf, or refrigerated or frozen within one to two hours after collection to prevent excessive bacterial growth. Additionally, colostrum (or milk) can be pasteurized to reduce bacterial loads.

Studies have shown that batch pasteurization for 60 minutes at 60°C significantly reduces bacterial counts with minimal destruction of immunoglobulins. Pasteurizers require proper cleaning and regular maintenance to ensure they are effectively reducing bacterial counts. One good way to monitor pasteurizer efficiency is to test the bacterial

Many factors influence pre-weaned calf health and can have carry-over effects later in life.

Photo: iStockphoto, Dobtreasures

Table 1.
Feed additives and their benefits

Category of feed additive	Benefit
Prebiotics and probiotics	Help establish beneficial gut flora, improving resistance to gastrointestinal disease
Phytogenic feed additives	Increase feed intake
	Antimicrobial effects improving gut health
	Anti-inflammatory effects improving gut health
	Antioxidative effects improving gut health
Yeast and yeast cell wall	Bind Gram-negative bacteria to support digestive health
Acidifiers	Improve feed hygiene Improve digestibility of feed

counts of milk samples both before and after pasteurization to ensure that bacterial content is being reduced. Again, hygienic handling of the pasteurized milk is important to prevent re-contamination prior to feeding.

Nutrition

Dairy calves have traditionally been limit-fed with liquid feed (at approximately 10% of body weight, which is estimated to be half the normal consumption) in an effort to accelerate weaning and reduce input costs. Multiple studies have investigated the potential benefits of increasing the amount of milk or milk replacer offered to calves. Data suggest that more intensive feeding programs promote growth, improve feed efficiency, improve health and animal welfare, and potentially improve future milk production. These improvements may be due to increased availability of nutrients for growth, improved immune function, and improved ability to deal with climate-induced stress.

Limit-feeding may only provide enough nutrients and energy for maintenance requirements. During cold weather (and also hot weather), more energy is required to maintain body temperature. Additionally, energy requirements are increased when a calf is ill in order to mount an immune response, but dietary intakes typically decline during this period of increased need, putting the calf at an even greater disadvantage. Calves that received greater amounts of milk or milk replacer experienced lower mortality and morbidity than those with restricted intakes, most likely due to their improved ability to cope with challenges.

In addition to reconsidering the sheer volume of milk or milk replacer fed, the formulation of traditional milk replacers has also been investigated. A 20% protein, 20% fat powder is commonly fed. Higher nutrient density

During times when milk prices are low it may be tempting to cut costs, but poor calf rearing will eventually affect profits.

formulations have been created with nutrient profiles closer to whole milk. These are especially beneficial during cold weather and for small breeds such as Jerseys, which are at a greater risk of heat loss.

Feed additives are available for use in milk replacers and also calf starters. *Table 1* lists some of the categories of feed additive and their benefits in calf production.

Many products on the market are beneficial in calf production, but none of them can overcome excessively poor hygiene or extremely poor-quality feeds.

Housing

Housing is also important to raising healthy calves. Proper hygiene is key and calves should be provided with plenty of

clean, dry bedding. Ventilation is also important to maintain good air quality and reduce respiratory issues. Most calves are housed individually prior to weaning, but recent research has seen benefits in performance parameters and social interactions for calves housed in pairs. Cross-suckling is a concern when calves are housed together, but non-nutritive suckling can also be detrimental to the health of individually housed calves due to potential pathogen ingestion. Further research is needed into group housing and the reduction of all types of suckling.

Many factors influence pre-weaned calf health and can have carry-over effects later in life. During times when milk prices are low it may be tempting to cut input costs, especially at a stage of production where earnings are not apparent. However, poor calf rearing will eventually affect profits when those heifers enter the milking herd. Spending time and money to raise healthy calves will pay off in the future.

This article originally appeared in Progressive Dairyman

Reference

USDA. (2007). Dairy 2007 Heifer Calf Health and Management Practices on U.S. Dairy Operations, 2007. https://www.aphis.usda.gov/animal_health/nahms/dairy/downloads/dairy07/Dairy07_ir_CalfHealth.pdf

Keeping Aflatoxin Out of Milk

Tim Jenkins PhD
Development Scientist

Aflatoxin contamination is one of the biggest concerns dairy producers all over the world face. But the risk of contamination can be reduced by close management of the feed, ensuring it is of the highest quality, and by applying an effective and selective mycotoxin binder.

The carryover of aflatoxin M_1 into milk is a major concern in dairy production worldwide. Although the dairy cow rumen detoxifies a proportion of aflatoxin B_1 in the diet, much is converted into aflatoxin M_1. Aflatoxin M_1 is the main contaminant in milk and poses the same threat to human health as food-borne aflatoxin B_1.

Management of the aflatoxin risk should begin with being selective regarding the source and storage of feed that the cows receive.

Feed source

If there is a problem with aflatoxin contamination on a dairy farm, a fundamental step is to identify the main source or sources of the toxin. Aflatoxin can contaminate many types of feed but is of particular concern in many oil-rich, high-risk crops such as peanuts, cottonseed and soybean.
Cereals including corn and wheat can be affected, particularly if insect pests or drought stress damage the kernels. Certain regions carry a higher risk of aflatoxin contamination, especially those with warm, wet, tropical or subtropical climates.

The complete feed should be tested for the presence of aflatoxin B_1 and individual ingredients should be inspected for condition and obvious mold growth. Individual feed materials can be tested but a representative sample must be analyzed, achieved by combining several subsamples. Aflatoxins are usually very unevenly spread throughout a batch, being present at high levels in specific spots that may be missed in casual sampling.

Selecting the right mycotoxin binder is important because not all binders are effective or selective.

Tip 1: Regularly analyze feed ensuring that samples are representative of the whole batch.

IN BRIEF

- Aflatoxin B_1 is of great concern to dairy producers due to the carryover risk (as aflatoxin M_1) in milk
- Mycotoxin management strategies should be employed to reduce the risk of contamination.
- An effective and selective mycotoxin-binding product should be added to the feed as part of the mycotoxin mitigation program.

Aflatoxin M_1 is the main contaminant in milk and poses the same threat to human health as food-borne aflatoxin B_1.

Photo: iStockphoto_emesilva

Storage of feed

Because the *Aspergillus* species (such as *A. flavus*) that produce aflatoxin B_1 are often storage fungi, an aflatoxin issue may commonly be related to sub-optimal storage conditions. Feed material should be as free from damage as possible, low in moisture content and without localized areas of moisture. Pockets of moisture may occur when feed comes into contact with concrete bases or when warm feed is added to metal vats, resulting in condensation around the edges.

Forages such as hay or silage should be stored well with clean feed-out management to avoid loose material being exposed to the air for prolonged periods. Even the best-preserved silage can succumb to *Aspergillus* molds after days of exposure to air.

Slight exposure to moisture or a warm, humid climate is sufficient for the aflatoxin species to invade forage. And although compact moist silage is too anaerobic for those molds, exposure to air provides the oxygen required for growth and aflatoxin production.

Tip 2: Avoid feeding noticeably moldy material and check that feed troughs and feed-out areas are regularly cleared.

Choice of mycotoxin binder

Mycotoxin binders are an effective tool against aflatoxin contamination. Selecting the right mycotoxin binder is important because not all binders are effective or selective.

Effectiveness involves fast and strong binding. An effective binder is one that has been shown to bind a high proportion of aflatoxin B_1 when there are high aflatoxin B_1 levels and a low relative concentration of the binder in difficult pH conditions, for example pH 5.0. These are exactly the conditions used to assess the effectiveness of a binder under EU authorization.

Specificity is important because some binders will reduce the availability of vitamins, veterinary medicines and antibiotics. Under high aflatoxin pressure, it may be necessary to increase the level of binder included at which point specificity becomes even more important.

Mycofix® Secure, a component of the Mycofix® product line, is the only product to have gone through the full EU process of assessment for efficacy, specificity and low reversibility as well as being assessed for safety (heavy metals and dioxins can be a concern with some binders).

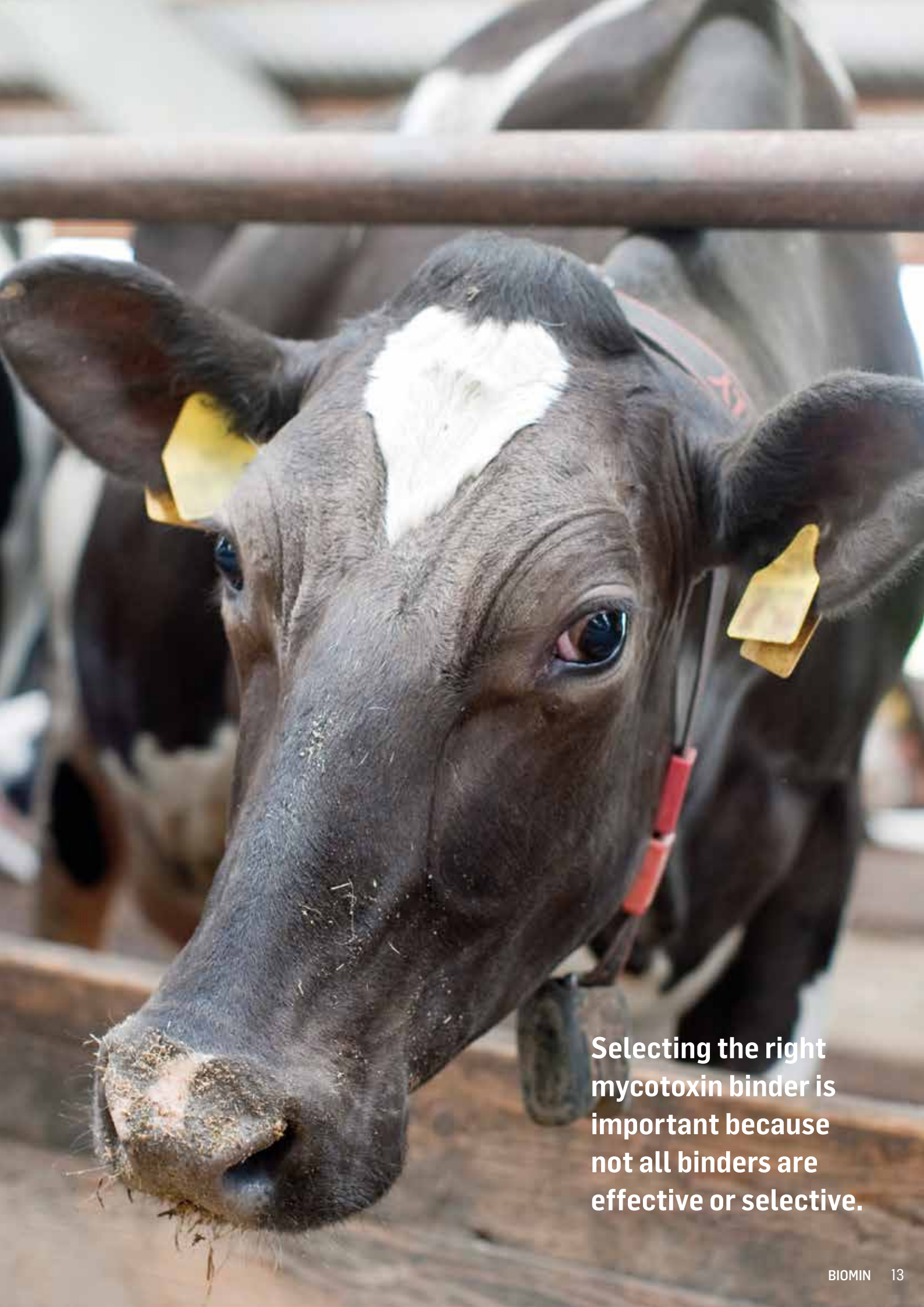
Tip 3: Choose a mycotoxin binder that is both effective and selective.

Other mycotoxins

Aflatoxins are not the only mycotoxin that can impact dairy cow performance or milk quality. Deoxynivalenol, for instance, can affect milk production by compromising the intestinal barrier and the condition of the microbial community in the rumen. In turn, compromised microbial fermentation may reduce aflatoxin detoxification and a compromised barrier can allow a greater level of aflatoxin uptake.

Effective management of aflatoxins and other common mycotoxins should therefore be broad, with effective and selective binding of aflatoxin and proven biotransformation of mycotoxins like deoxynivalenol that are not reliably bound.

Tip 4: Consider the presence of other mycotoxins in the feed and implement the necessary mycotoxin mitigation strategies to ensure animal performance is not compromised.



Selecting the right mycotoxin binder is important because not all binders are effective or selective.

What's Wrong With My Herd?
Part 8 – Sub-acute ruminal acidosis (SARA)

Though not easily detected, sub-acute ruminal acidosis (SARA) can have a serious impact on milk production, general health and longevity. It is caused by an imbalance between the production of volatile fatty acids, their absorption by the rumen wall, and the buffering mechanisms of the rumen.

Technically, a bout of SARA occurs when rumen pH drops below 5.8 for at least three hours (or pH 5.6, or even 6.0, according to other authors). Fiber digestion is reduced and noticeably affects production. It can also result in lower feed intake, lower feed efficiency, and hoof problems (laminitis).

Rumen effects

SARA will affect feed efficiency, therefore increasing feeding costs due mainly to the decrease of fiber digestibility.

When pH drops below 6.0, the populations and growth of cellulolytic bacteria and ruminal fungi decline, impairing fiber digestibility. According to several sources, every 0.1 decrease in pH reduces fiber digestibility by 3.6%. Poor fiber digestibility and lower feed efficiency resulting from SARA translate into increased feeding costs for producers.

One study showed that short bouts of SARA (less than 30 minutes) did not reduce neutral detergent fiber (NDF) digestibility, while repeated bouts of four hours did. These findings support the use of total mixed ration (TMR) and free, 24-hour access to the feed bunker as key management tools to control SARA.

Main causes of SARA

- Poor adaptation of rumen microflora to diet changes. Common at calving, paired with other metabolic diseases such as ketosis and related conditions.
- Improper feeding patterns and cows selectively choosing their feed.
- Inappropriate forage particle size.
- Formulation mistakes.

Feed intake effects

SARA commonly causes erratic eating patterns and reduces feed intake. When the pH drops, the cow reduces its feed intake, decreasing the production of acids and driving the pH back to normal levels. The cow will then resume eating, resulting in another bout of SARA and repeating the cycle. This variation will not only decrease production due to the lower feed intake, but will also reduce the efficiency of the rumen fermentations due to the variation of the nutrient supply, causing further economic losses.

Feces assessment and SARA detection

TIP: SARA can cause a heterogeneity of feces in a group of cows in the same lactation stage. In this situation, some feces will be normal and some too loose. You can use the 1 to 5 scoring system to assess them. *Figures 1* and *2* are shown as examples.

Figure 1.
Feces with a score of 3 (out of 5)

Figure 2.
Feces with a score of 1 (out of 5)

Lameness

Lameness is a major concern in modern dairy and beef production due to implications for welfare and profitability.

There is a clear link between acidosis and the inflammation of the lamellar tissue of the hoof, a condition known as laminitis. Laminitis not only causes problems in itself, but is also a predisposing factor for other conditions such as sole ulcers and white line hemorrhages.

Although this mechanism for lamnitis is not yet completely clear, it is thought that the condition is due to lower systemic pH during acidosis, and substances such as histamine (involved in the immune response) and endotoxins entering the bloodstream.

Lameness, in turn, can exacerbate SARA as cows suffering from this condition will change their feeding patterns to lower the number of meals consumed due to the pain suffered when moving to the feeding bunker.

Two detection tips

- Check feeding patterns of the TMR. If cows are selectively choosing their feed, evidenced by lots of holes in the TMR (Figures 3 and 4), then the ingested fiber and concentrates can differ considerably from the theoretical ration.
- Routinely assess and document indicators of possible SARA such as butterfat content (reduced during SARA), manure assessment (too loose in affected individuals) and individual feed intake patterns.

Figure 3 and 4.
Examples of cows selecting their feed creating holes in the TMR.

Steps to address SARA

SARA control aims at improving adaptation of rumen papillae and microflora and optimizing effective fiber intake. Here is a list of management practices to mitigate the risk of SARA:

- Ensure proper rumen adaptation especially at calving when shifting cows from the dry group to the lactation group.
- Control the palatability of ingredients.
- Ensure homogeneity of the TMR and proper forage cut length. Keep records of mixer maintenance (balances, knives).
- Ensure proper access to feed bunks and an adequate supply of water.
- Avoid stressful situations such as moving animals too much between production groups.
- Keep first-calving heifers separated from older cows when possible.
- Ensure good layout, maintenance and bedding in resting areas. Insufficient lying time will cause cows to change their feeding pattern.
- When formulas or forages are changed, a smooth transition is highly advisable.

SARA can have a serious impact on milk production, general health and longevity.

For more information, visit www.mycotoxins.info

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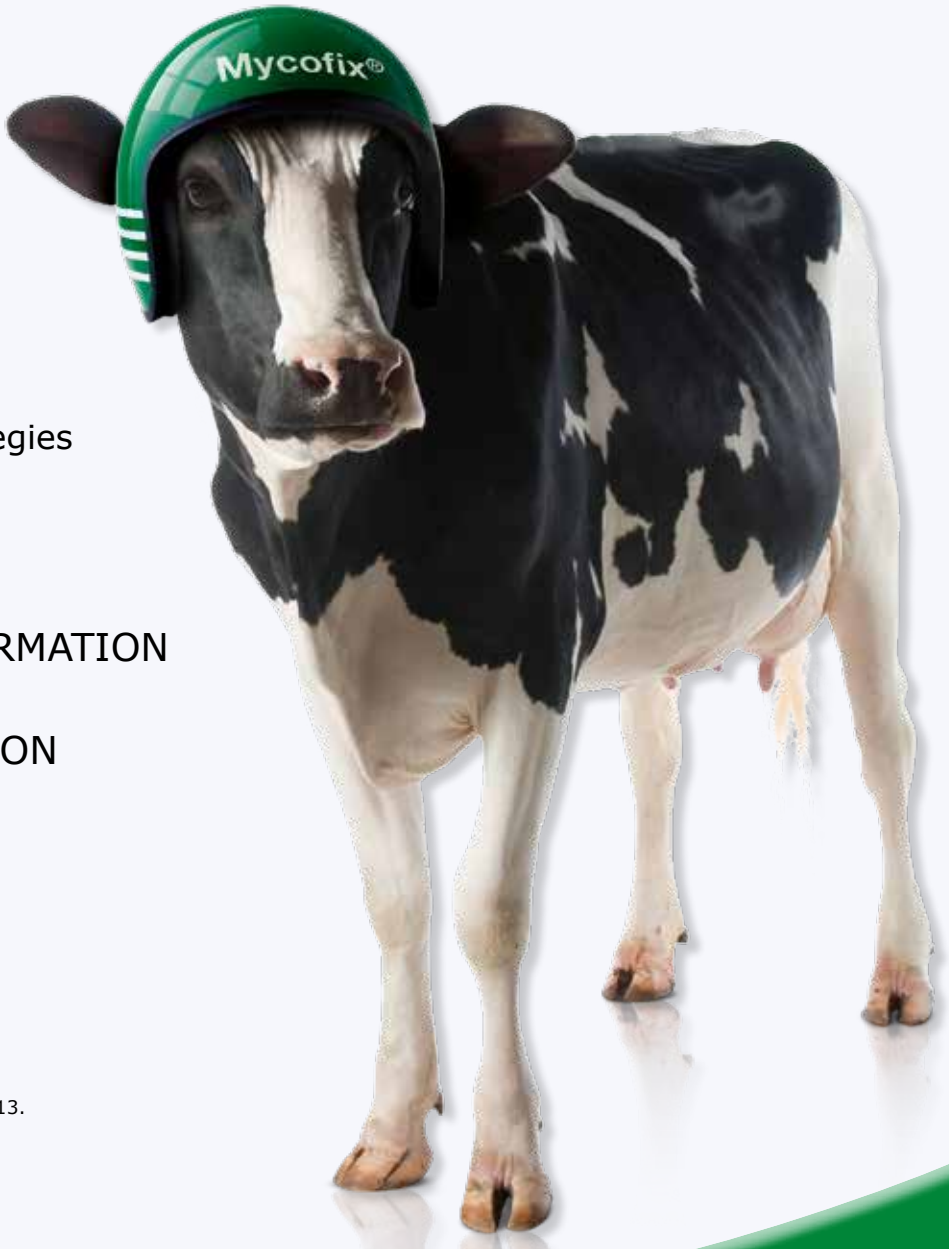

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