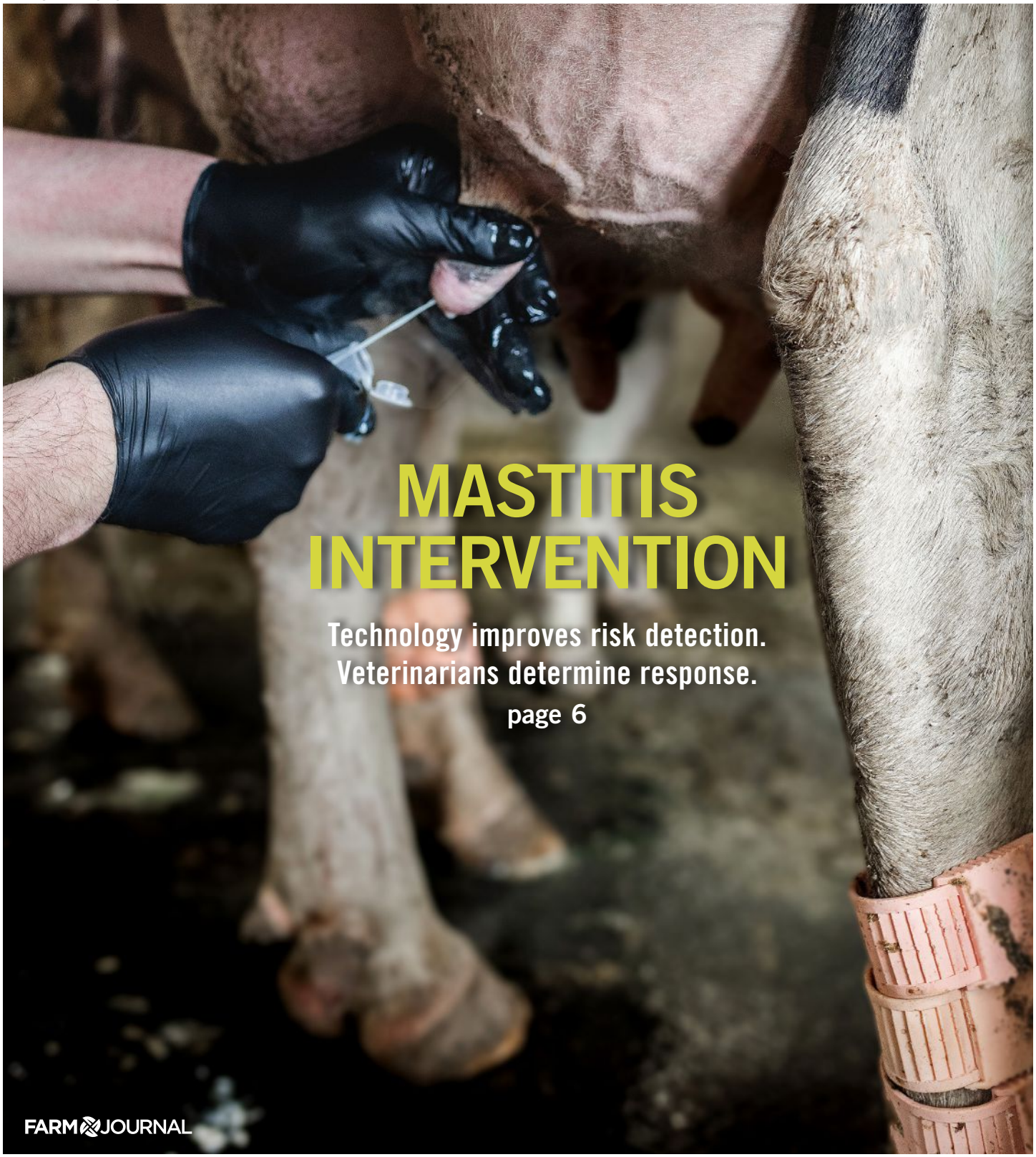
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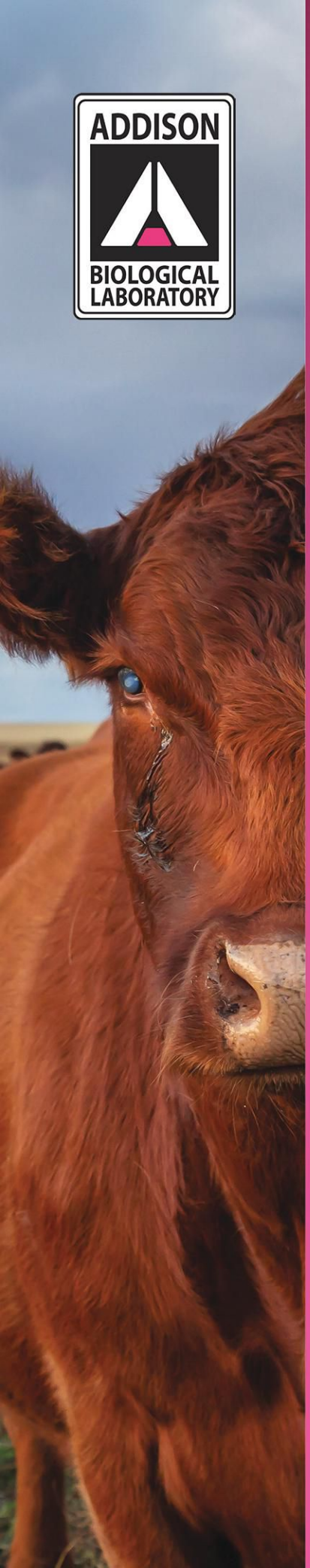


# MASTITIS INTERVENTION

Technology improves risk detection. Veterinarians determine response.

page 6

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# Introducing "The Bovine Vet Podcast"

## A new partner in making practical decisions for your clients

If it feels like cattle health technology has changed quickly in the past few years, you're not imagining it. New diagnostics, monitoring tools, data platforms and management approaches are showing up at a pace that's hard to track, let alone evaluate. Some of these ideas are going to be game-changers. Others are still finding their footing. All of them require evaluation to decide what's worth paying attention to.

That's why we began "The Bovine Vet Podcast".

### DESIGNED WITH YOU IN MIND

This podcast was created with one goal in mind: to explore what's next in cattle health in a way that's useful to practicing veterinarians. Each episode centers on a technology, technique or emerging concept and walks through the questions many of you may already be asking: What problem is this meant to solve? How is it being used in real herds today? And where does it actually fit into veterinary decision-making?

It's easy to be impressed by innovation on paper. It's much harder to make it work on farms with real people, real animals, real budgets and real biological variability. Veterinarians are often the ones asked to bridge that gap. They're expected to evaluate new tools critically, explain them clearly and help producers decide whether something is worth adopting now, later or not at all.

The conversations on this podcast are designed to support that role.

Guests will include practicing veterinarians, researchers and industry professionals who are directly involved in cattle health innovation. Some episodes will dive into digital tools and data-driven decision-making. Others will focus on diagnostics, nutrition, reproduction or disease management. The common thread is that every topic has practical implications for veterinary practice, not just theoretical appeal.

Just as importantly, this podcast leaves room for uncertainty. Not every innovation is ready for widespread use. Not every technology fits every operation. And not every new idea ultimately improves outcomes. Talking honestly about what we know, what we're still learning and where the limitations are is just as valuable as highlighting what's working well.

Veterinary medicine has always evolved through a mix of science, experience and judgment. What's different today is the pace. Staying current now requires more than keeping up with journals or sales meetings; it requires ongoing conversation and critical thinking.

### A PRACTICAL DISCUSSION

"The Bovine Vet Podcast" is meant to be part of that conversation. A place to stay curious, ask better questions and think more clearly about where cattle health is headed.

The first episode, featured in this issue's cover story, focuses on mastitis detection technology. Specifically, how new data streams are changing the way mastitis is identified, interpreted and managed at the herd level. Rather than treating mastitis as a single disease event, the conversation looks at it as a signal within a much larger system, touching on behavior, milk data and management decisions. It's a practical discussion about what these systems can realistically offer veterinarians today and where clinical judgment still matters most.

It's just the beginning of conversations to come, and I hope each episode leaves you more confident evaluating new tech and deciding what to adopt, what to question and what to leave for later. **BV**

A. Bedford

ANDREA BEDFORD, EDITOR

THE BOVINE VET PODCAST

Available on Farm Journal TV, Farm Journal NOW and all major podcast platforms.




# 5 Major Disease Risks to U.S. Food Security

Combined, these threats could have a $300-billion impact

BY ANDREA BEDFORD

Production animal disease outbreaks are not only animal health events but threats to economic stability and food security. In a recent report from The Farm Journal Foundation, The Mean Sixteen: Biosecurity Threats Facing U.S. Agriculture, Stephanie Mercier, senior policy adviser at the Farm Journal Foundation, identifies the top five diseases that have the biggest potential to disrupt U.S. livestock production, trade and response infrastructure at a large scale. The report also estimates the collective annual costs to U.S. agriculture due to outbreaks of these livestock diseases could top $300 billion if the proper precautions are not taken.

Across these diseases, the report identifies recurring gaps in U.S. animal health preparedness that extend beyond individual pathogens and suggests some key policy and infrastructure needs to help mitigate the threat:

- **Improved national biosecurity coordination, including creating guidelines for culling**
- **Training for veterinarians for outbreak identification and reporting**
- **Support for vaccine stockpiling programs as well as prioritized regulatory approvals for both prevention and treatment products**
- **Increased research support for international collaboration and domestic work on biological control techniques of pests and pathogens, and disease-resistant genetic traits** BV




### TRADE-STOPPING RISK TO U.S. LIVESTOCK

In 2015, Kansas State University found an FMD outbreak beginning in a state with high populations of vulnerable livestock could cost nearly $200 billion to the U.S. economy if no emergency vaccine program was implemented.

### PERSISTENT THREAT TO U.S. PORK PRODUCTION

It has been estimated an ASF outbreak in the U.S. would cost the economy nearly $80 billion due to loss of exports and reduced industry revenue, but it could also affect the crop sector due to decreased feed demand.

### RISK AND SURVEILLANCE DEPENDENCE

USDA estimates NWS could cost the Texas economy at least $1.8 billion. With the U.S.-Mexico border closed to cattle imports, some predict ground beef prices could reach $10 per pound by the third quarter of 2026.

### AN ONGOING MULTISPECIES CHALLENGE

The 2014 to 2015 HPAI outbreak is estimated to have cost over $1 billion in losses to the poultry and animal feed sectors, as well in land value. The outbreaks cause egg prices to spike, with March 2025 prices up 350%.

### ENDEMIC DISEASE, NATIONAL COST

Iowa State University reports PRRS caused an estimated $1.2 billion per year in lost production in the U.S. swine industry from 2016 to 2020. This marks an 80% increase over numbers reported a decade earlier.

# Mastitis Intervention

## Technology improves risk detection, veterinarians determine response





BY ANDREA BEDFORD

Clinical mastitis, including abnormal milk and visible udder inflammation, triggers immediate attention. However, it's the delay between the onset of subclinical infection and clinical symptoms — the detection gap — that leads to higher costs, reduced treatment effectiveness and chronic risk.

"There is an underlying population of subclinical cows in a herd. To some extent, every herd has them," says Dr. Justin Hess, veterinarian at Clinton Veterinary Services in Michigan.

Identifying subclinical mastitis remains the largest unresolved challenge in mastitis management and is one of the critical areas for technology-aided improvement. It is also one of the most economically damaging. Its effects accumulate quietly across large numbers of cows. Until dairies are able to reliably detect subclinical mastitis, its prevalence and impact will remain underestimated.

### TECHNOLOGY AIDS IN DETECTION

To bridge the detection gap, dairies are turning to technology, including:

- **Automatic milking systems that monitor electrical conductivity, milk color and SCC in real time.**
- **On-farm culture and rapid testing to identify bacteria in one to two days.**
- **Activity/rumination monitors to detect illness-related behavior changes, such as reduced feeding, before milk changes are noticeable.**

Sensor systems can be used to detect mastitis based on deviations from the norm at a cow level. This baseline varies for each cow, meaning you need historical data for comparison.

"The main way to detect mastitis is based on what's normal [for that animal]. Increased conductivity of a cow … or dropped lactose to a lower level than is expected. This is mainly happening with clinical mastitis," says Dr. Alon Arazi, chief veterinarian at Afimilk. "One of the problems with subclinical mastitis is the changes sometimes are very low and very hard to detect. In that case, we are looking for more sophisticated modeling algorithms that combine more things to see things just starting to change."

With the development of these algorithms, more subtle mastitis indicator shifts away from the norm may be identifiable, allowing for problem cows to be flagged and treated earlier.

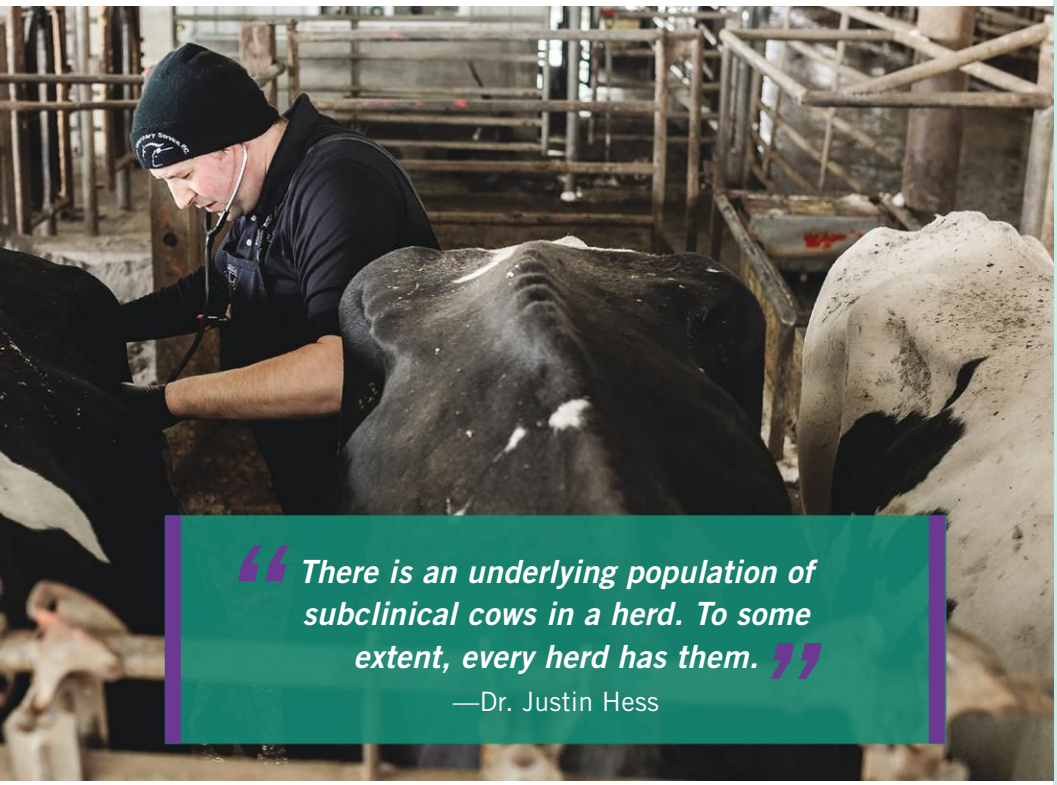
"AI or machine learning will allow you to detect things that, even for us, are hard to see right now. This, for sure, is going to improve subclinical detection," Arazi predicts.

### PROTOCOLS MUST BE DOABLE

Improving mastitis outcomes depends less on detection itself and more on what happens afterward. Farms today are generating more information than ever before, but that information does not automatically translate into better decisions being made. Sound mastitis



PHOTOS: ROSE MEMORIES PHOTOGRAPHY LLC



> *"There is an underlying population of subclinical cows in a herd. To some extent, every herd has them."*
> —Dr. Justin Hess

protocols need to be in place and understood by everyone working on a dairy.

"If you try to develop a protocol, but the management team isn't on board and you don't have the right people in place, you're going to struggle and probably make things more difficult," Hess explains. "We like to keep things simple but effective."

These protocols largely include management choices surrounding animal density, mastitis detection methods and even the choice of bedding in the stalls.

"In our area, sand is frequently used as the bedding in freestalls. More of it is becoming recycled, but there's still virgin sand being used. We do have quite a few farms that use digested manure solids. Each one of those plays a different role or has an impact on mastitis," Hess says.

When it comes to mastitis detection methods and the tension between simple and complex protocols, on-farm culturing falls into that category.

"Culturing on-farm can be a struggle because of the increase in labor and the need to have a dedicated person. You need the desire to do it and the knowledge to do it correctly," Hess explains.

When farms have dedicated personnel, clear interpretation guidelines and confidence in how results will be used, culturing can reduce unnecessary antibiotic use and improve outcomes. When those conditions are absent, culturing might delay treatment without changing behavior, prompting farms to revert to broad-spectrum approaches for the sake of speed.

"Farms are big, complex systems. Mastitis is just one aspect they're trying to manage every single day," Hess says.

## AUTOMATION CAN REDUCE THE WORKLOAD

To address these complex systems, Arazi hopes consolidating data generated by monitoring animals in existing protocols could help refine management and improve animal health. →

## MASTITIS INDICATORS

Technology, such as the Afimilk system, identifies cows suspected of mastitis by simultaneously analyzing multiple milk and cow-level parameters versus relying on a single signal. Key indicators include:

### MILK-BASED

- **Milk conductivity**
  - Increased electrical conductivity associated with changes in ion flow during mastitis, one of the primary and earliest milk signals used
- **Milk yield**
  - Sudden or unexpected drops in production relative to the cow's baseline
- **Lactose concentration**
  - Decreases in lactose production when udder function is impaired
  - Possible lactose leakage from milk or utilization by bacteria
- **Milk flow / milking dynamics**
  - Changes in milk flow rate that could potentially reflect udder discomfort or inflammation

### COW BEHAVIOR AND PHYSIOLOGY

- **Rumination patterns**
  - Decreases in rumination associated with illness or discomfort
- **Eating behavior / dry matter intake**
  - Reduced intake relative to the expected performance
- **Activity and behavior changes**
  - Deviations from individual cow behavioral baselines

### COMPARATIVE AND CONTEXTUAL

- **Individual cow baseline deviation**
  - Changes evaluated relative to the cow's own historical data, not just herd averages
- **Group-level trends**
  - Patterns across pens or production groups that may signal broader risk
- **Multi-parameter pattern recognition**
  - Mastitis alerts generated by combining multiple indicators rather than a single threshold

"All this data is being gathered into one piece of software in which we do the analysis to detect mastitis," Arazi says.

The Afimilk system aims to provide directional insight that shortens the time between detection and action by reducing the workload and finding changes in cow performance before they're visible.

"You don't have to check every cow because the system has checked every cow two or three times in a day depending on the number of milkings," Arazi says. "You get the information and you get the option to catch things earlier than people can see with their eyes."

## DETECTION NEEDS INTERPRETED

Alerts without context quickly become noise. High alert frequency, poor specificity or unclear next steps can erode trust in the system. This is where veterinary intervention can help a dairy understand what it's seeing and how best to act.

Hess stresses the questions he poses to dairies implementing updated mastitis detection protocols: "When you have that information, what are you going to do with it? Are you going to actually change your protocols?"

Having more data is only useful for improving animal management if accompanied by a plan to act.

Technologies offering continuous observation and the reduced reliance on human detection could introduce risks related to accuracy, workflow fit and trust. There is also the worry of getting false alerts.

"We can still improve accuracy, reduce false alerts and get more sensitivity," says Arazi, in regard to the Afimilk system for mastitis detection.

Of course, these systems are not infallible. As with all hardware, there are uncontrollable hiccups to consider when looking at the data generated.

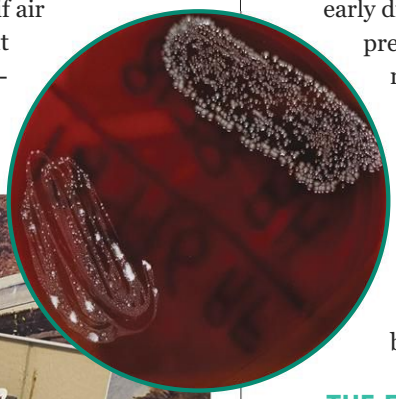
"There are some critical parts of measuring conductivity," Hess says. "If milk is moving or if air gets into the system, it can affect the sensitivity or the reading."

At the core, these tools are designed to flag abnormal patterns, not to dictate diagnoses or management decisions. Deviation alerts are only meaningful after interpretation by people who understand the cows, the parlor and the farm. Without the human layer, accurate detection runs the risk of simply turning into background noise.

"The only thing worse than having no data is having wrong or misleading data," Hess reminds.

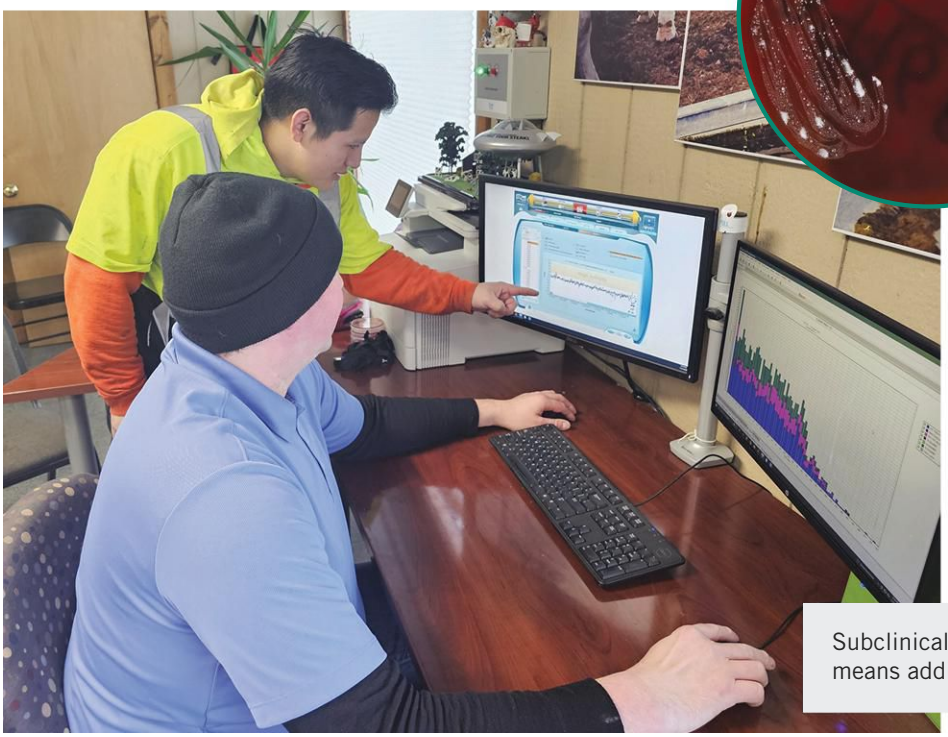
The limitation is not simply technological, but decisional. This becomes most apparent when detection systems skew too far toward sensitivity at the expense of specificity. Highly sensitive tools identify earlier or more subtle changes, but they also generate more false positives. Each unnecessary alert pulls time and attention away from other priorities.

At the other end of the spectrum, overly specific systems might miss early disease signals, limiting their preventative value. Effective mastitis detection depends on deliberate trade-offs, favoring actionable accuracy over alert volume. The goal is to deliver information that reliably supports better decisions, with people being the final filter between data and action.



## THE FUTURE OF MASTITIS

The next major shift in mastitis management will not come from faster treatment or better cure rates, but from detecting mastitis risk earlier — before mastitis becomes clinically apparent, before somatic cell counts rise and before irreversible damage to the mammary tissue occurs. This requires a shift from confirmation to prediction, and from reaction to prevention.



Subclinical mastitis requires intentional testing, which means additional labor, cost and workflow implications.

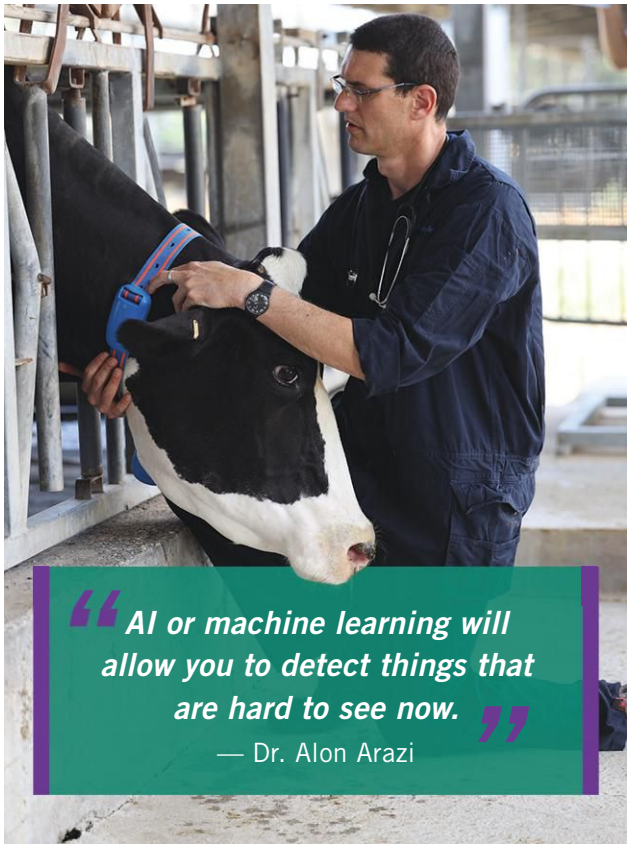


PHOTOS: AMANDA STORY, AFIMILK, ROSE MEMORIES PHOTOGRAPHY LLC

While it would be nice to have an automated system flagging mastitis at the onset of infection, Hess believes the real future is stopping it before it begins.

"Cure is a lot harder than prevention. It's always easier to keep a cow from getting mastitis than to fix it later," Hess explains. "[Even if] a system is better at detecting mastitis, you're always going to be behind the 8-ball in the first place, where the goal is to prevent it altogether."

Traditional mastitis detection has been largely retrospective. Abnormal milk, elevated conductivity, increased somatic cell count or visible inflammation signal disease is already established. The emerging goal of mastitis detection systems is to identify deviation from normal performance early enough to intervene before the disease fully develops.



> *"AI or machine learning will allow you to detect things that are hard to see now."*
> — Dr. Alon Arazi

Alongside earlier detection, there is growing interest in providing more information about the type of mastitis that is developing. Current animal-health detection systems are strong at identifying abnormality, but weak at characterization.

Looking at the future, Arazi sees two areas of opportunity:

"We are lagging in the ability to detect subclinical mastitis," he says. "The other thing is to not just diagnose mastitis, but to give information about the cause."

He hopes they will soon be able to determine the type of bacteria that are causing mastitis.

"I believe that soon we will be able to give some information on if it's Gram-positive or Gram-negative bacteria, and then help the farmer make a decision about treatment," Arazi says.

This information could potentially target and reduce unnecessary antibiotic use without having to wait for the results of a milk-culture.

The preventative impact of these systems extends beyond individual cows.

"The system is working on the cow level as well as the group level and the herd level. We try to look at all aspects of the farm," Arazi says.

When looking through a broader scope, early deviations might indicate upstream-management issues that elevate mastitis risk across multiple animals simultaneously. In that sense, future detection systems are as much about identifying system-level vulnerability as they are about flagging individual cows. When an operation has well-established characteristic norms for its herd, it's easier to notice when something is off.

"Once you have the data, you can analyze them looking backward. Not just what is happening now, but what was the situation in the past? How did things progress?" Arazi says.

As mastitis detection becomes more predictive and informative, the role of veterinarians evolves rather than diminishes. Interpretation, prioritization and integration remain essential. Technology may identify risk, but veterinarians determine response balancing biology, economics, welfare and practicality. The future of mastitis detection is not automation replacing expertise, but better information supporting earlier, smarter intervention.

Ultimately, success will be measured not by how quickly mastitis is treated, but by how often it is prevented from occurring in the first place. **BV**

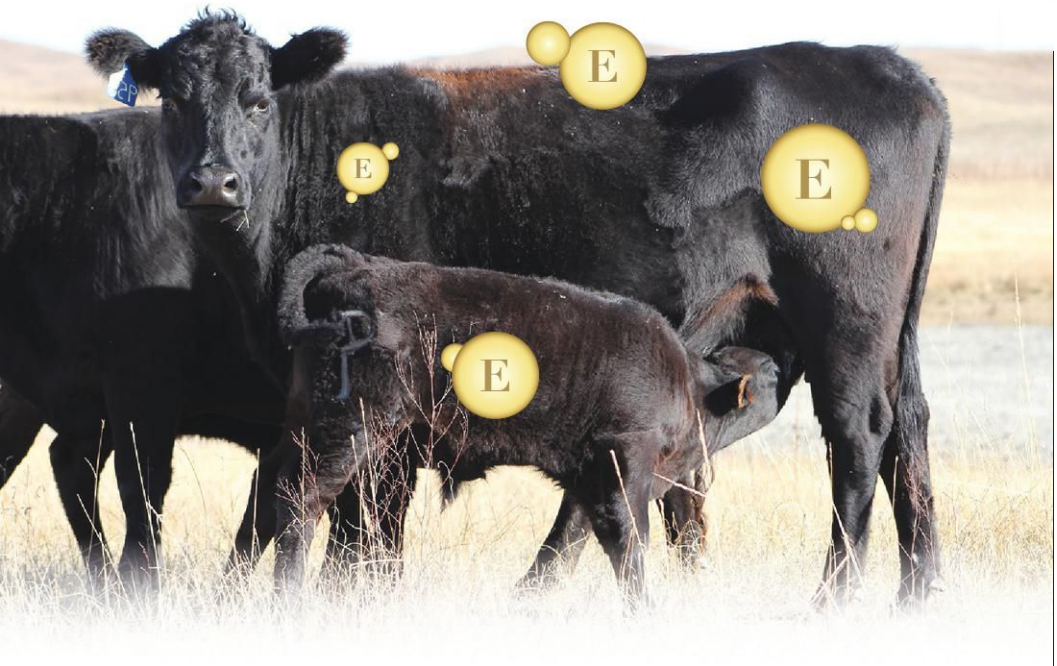



## TUNE IN TO "THE BOVINE VET PODCAST"

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SCAN TO LISTEN

# Vitamin E Deserves a Second Look



## Research shows meaningful benefits for immunity, antioxidant protection and calf performance

BY ANDREA BEDFORD

Vitamin E doesn't get a lot of attention until something goes wrong. While a small inclusion in the ration, it aids in immunity, muscle integrity, calf health and resilience.

"It really is such an exciting nutrient because not only does it impact the animal from an immune response perspective, but we have the opportunity to make real incremental improvements on the productivity of that animal," says Zeno Hubbert, ruminant technical expert at DSM-Firmenich.

When vitamin E levels are low, tissues are more vulnerable to damage and immune responses don't fire as cleanly. But the real story isn't about preventing dramatic deficiencies; it's about making sure cattle have enough vitamin E to stay healthy throughout high-stress stages, which looks different depending on the type of operation.

### FEEDLOT CATTLE

Vitamin E is well-known for how it affects meat quality, but its impact on health shouldn't be overlooked.

"We're not aiming to just keep that animal out of a state of deficiency," Hubbert explains. "We're aiming for optimization of productivity."

Research shows vitamin E supplementation to beef steers before or after transit can lower their stress response, and it can increase antibody titers of newly received steers after vaccination for bovine viral diarrhea virus.

When vitamin E is supplemented for meat quality, it takes at least 100 days to see results. This is the time period needed to equilibrate the liver and tissue soluble levels with the intake amount.

### COW-CALF OPERATIONS

Vitamin E can pay off meaningfully in the cow-calf world, especially during the late-gestation period.

"If we look at the vitamin E level in milk, it's only supplying about 16% of the requirement of that newborn calf," Hubbert explains. "We can affect the calf's health by supplementation of the late-gestation cow."

Calves that are born to vitamin E-supplemented heifers have been shown to have increased antibody titers at birth, pasture turn out and weaning in response to routine vaccines.

### HOW TO DECIDE

Whether or not it is worth increasing vitamin E in the ration of a herd comes down to the cattle's stress load, forage quality and production stage.

"It's dependent on the range conditions, whether we have drought conditions, how much access to forage those cows have," Hubbert says.

Cow-calf herds often see the biggest return, but feedlot cattle under heavy stress during receiving or diet changes can also benefit.

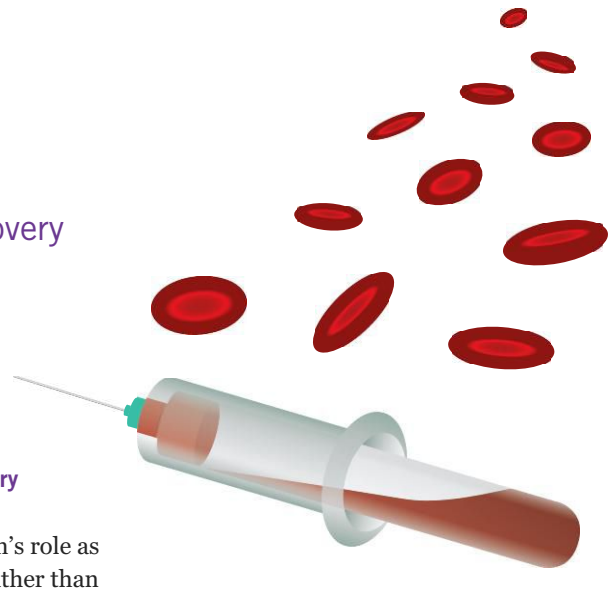
"It is such a small addition to the overall ration from a cost perspective, it's almost as if it's an investment in the health and productivity of that animal," Hubbert says. **BV**



PHOTO: TROY WALZ

# Can Haptoglobin Levels Track BRD?

## This signal could aid vets in assessing the disease and recovery



BY ANDREA BEDFORD

Bovine Respiratory Disease (BRD) continues to be a persistent challenge in feedlot systems because early detection and objective assessment of recovery remain difficult. Visual appraisal and clinical scoring are valuable tools, yet they can be inconsistent across observers and environments.

A recent collaborative study between researchers at the USDA-ARS U.S. Meat Animal Research Center and the College of Veterinary Medicine at Kansas State University explores whether or not inflammatory biomarkers track BRD in ways that could meaningfully support veterinary decision-making.

To accomplish this, researchers followed the inflammatory response of BRD cattle over time. Blood samples were collected from feedlot cattle on the day of purchase, the time of diagnosis and five days after treatment. Several clear patterns emerged that are relevant to clinical practice.

### WHAT THE DATA SHOWED

Haptoglobin, a glycoprotein that plays a critical role in tissue protection and the prevention of oxidative damage, tracked both disease onset and recovery. It showed the most consistent and biologically meaningful response to BRD. Concentrations of haptoglobin rose significantly from the time of arrival to the time of clinical diagnosis. They then declined within the five days that followed treatment.

- **Haptoglobin levels increased at diagnosis compared with baseline**
- **Levels declined after treatment**
- **The rise and fall pattern mirrored disease presence and early recovery**

This response supports haptoglobin's role as a true acute-phase protein in BRD, rather than a nonspecific indicator of arrival stress alone.

### IL-6 MIRRORED ACUTE-PHASE ACTIVATION

Interleukin-6 (IL-6) followed a similar temporal pattern, increasing at diagnosis and decreasing after treatment.

- **IL-6 concentrations rose significantly with active BRD**
- **Levels declined posttreatment as inflammation resolved**
- **This aligns with IL-6's known role in driving acute-phase protein production**

While IL-6 is not likely to be a practical field biomarker due to its short, variable half-life and higher sensitivity to non-disease stressors, it reinforces the relevance of haptoglobin as a downstream indicator of inflammatory activity.

### OTHER CYTOKINES SHOWED LIMITED OR INCONSISTENT SHIFTS

Not all inflammatory markers changed meaningfully across disease stages.

- **TNF-∝ differed between baseline and disease time points but showed less consistent normalization after treatment**
- **IL-1∝ and IFN-γ did not change significantly through BRD**
- **These cytokines could reflect background immune signaling rather than actionable disease markers**

Correlations were observed among some of these cytokines, particularly IL-1β and TNF-∝, however, haptoglobin remained the clearest marker.

### WHAT THIS MEANS FOR BRD DIAGNOSIS

The pattern of haptoglobin indicates systemic inflammation is measurably active in the disease course, and haptoglobin tracks early resolution of that response during therapy. This work provides biological justification for further exploration of acute-phase proteins, particularly haptoglobin, as decision support tools.

In BRD management, these inflammatory signals could help veterinarians assess disease and recovery before performance data catches up. **BV**

ILLUSTRATION: LINDSEY POUND

# Shaping Better Calves Before Birth



*IVF embryo culture conditions can greatly impact the future calf.*

## Understanding subtle biological signals can influence the health, growth and future productivity of a calf

BY ANDREA BEDFORD

What if the most powerful determinant of a calf's lifetime performance isn't the genetics or the ration, but the environment that calf experienced as a one-cell embryo? As research accelerates, developmental programming is becoming one of the most promising frontiers in cattle reproduction.

For two decades, the beef and dairy industries have focused relentlessly on improving fertility — and it worked. Conception rates rose, days open stabilized and the long slide in reproductive performance reversed. With conventional reproductive efficiency nearing a functional ceiling, scientists are shifting attention upstream, where the environment itself may program the future trajectory of the calf.

It's well known a resulting phenotype represents the genotype and environmental interactions. The performance of an animal depends on the genes they inherited, how much feed they get, whether they get sick, whether it's hot or cold and a plethora of other factors.

"We've made tremendous progress in optimizing the environment that those animals are raised in by providing the best nutrition, the best housing, the optimal photo period and treating disease with pharmaceuticals to optimize phenotype," says Peter Hansen of the University of Florida. "But we usually do that after the animals are born. We don't really think too much about what is happening to those animals when they're embryos or when they're fetuses or even when the germ cells are being produced."

### DEVELOPMENTAL PROGRAMMING

Recent work has shown the environment of the mother and the early embryo can affect the postnatal phenotype of that embryo. The environment of the fetus can affect what kind of calf it becomes.

When embryos are produced in vitro, they are put in an artificial medium.



PHOTOS: FARM JOURNAL AND UNIVERSITY OF ILLINOIS

Under normal protocols, this culture medium is choline-free. Choline is a methyl donor that may factor into the one-carbon metabolism of bovine embryos. In the uterus, choline is present at millimolar concentrations.

Work led by Eliab Estrada-Cortes in Hansen's lab investigated the effect of culturing bovine embryos with or without choline. They found choline-cultured embryos resulted in calves that were heavier at weaning with altered muscle DNA methylation.

"We've done this experiment three times, and each time the choline calves weigh more than the calves without choline. That goes all the way through to slaughter," Hansen says.

A nutrient present (or absent) in the culture dish during critical development time can make a big difference.

The condition of the fertilizing bull can also affect embryonic development and quality. Arslan Tariq from the University of Florida investigated the effect of bull overnutrition on fertility, finding heavier bulls produced semen that delayed embryonic development and decreased embryo quality, without changes to sperm motility or fertilization rate.

Historically, seminal plasma is removed from sperm for artificial insemination as it contains elements that can be detrimental during storage. That being said, seminal plasma modulates the maternal environment in a significant way, impacting the establishment and maintenance of pregnancy. Gabriela Macay at the University of Florida evaluated the reproductive, health and production performance of female offspring conceived in the presence of seminal plasma. These animals had increased birth weights, increased milk yield and had greater persistence in the herd compared to controls.

"What we now know is the environment of the mother that the early embryo is in can affect the postnatal phenotype of that embryo. The environment of the fetus can affect what kind of calf it becomes," Hansen says. "And the environment of the bull."

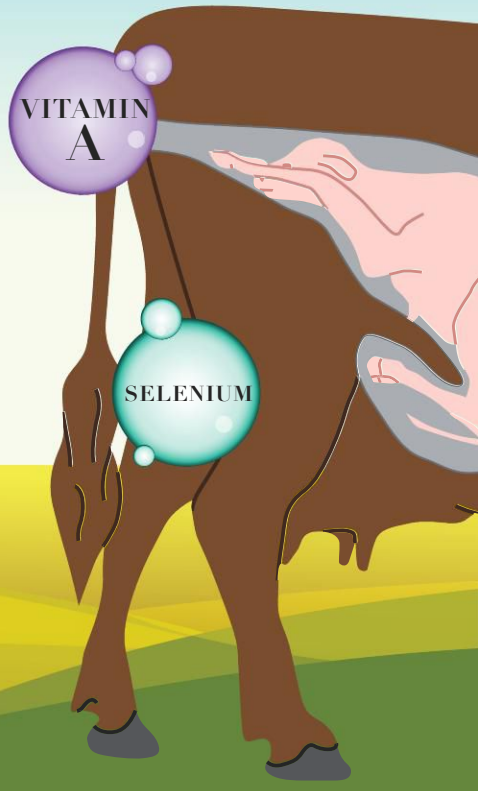
## REPRODUCTIVE MANAGEMENT

This approach shifts reproductive management from a focus on achieving conception to how early-life conditions shape an animal's long-term health, productivity and resilience. It expands the veterinary role from problem solver to long-term system designer who helps producers shape herd-level outcomes.

The next revolution in cattle reproduction may come from understanding the earliest biological environment that determines how a calf learns to grow, metabolize and perform. **BV**



# Feeding the Fetus: A Closer Look at Gestational Nutrition




Careful management of maternal vitamins and minerals can potentially increase the chance of a calf's survival

BY ANDREA BEDFORD

Stillbirths and weak newborn calves are among the most frustrating outcomes in both beef and dairy systems, and many cases ultimately end with no clear explanation.

What often goes unnoticed is the gestational environment that shaped the fetus long before calving began. Nutritional decisions made months earlier, particularly around vitamins and trace minerals, can quietly determine whether a calf is born resilient, compromised or nonviable. Rather than being isolated calving failures, some stillbirths might represent the final outcome of inadequate fetal preparation.

"If we don't do what we need to do nutritionally for that pregnant animal, we could have very long-term effects not only on the reproductive success of the female, but also on the offspring," explains Dr. Bob Van Saun, professor and Extension veterinarian at Penn State University, on an episode of AABP's "Have You Herd?" podcast.

## NUTRITIONALLY LIMITED

Newborn calves, whether beef or dairy, arrive with a biological disadvantage: milk alone cannot meet their trace mineral and vitamin needs.

"Particularly iron, copper, selenium and even some of the vitamins aren't in high quantities within the milk," Van Saun says.

A calf's ability to survive early life depends heavily on what accumulated before birth, particularly in the fetal liver.

"With some of the work that's been done, we're starting to recognize that the mineral status of that newborn calf is very dependent upon how we feed mom," Van Saun says.

In addition to gestational nutrient transfer, colostrum is an important way to get calves off on the right foot, especially with fat soluble vitamins, so long as the mother has been appropriately supplemented.

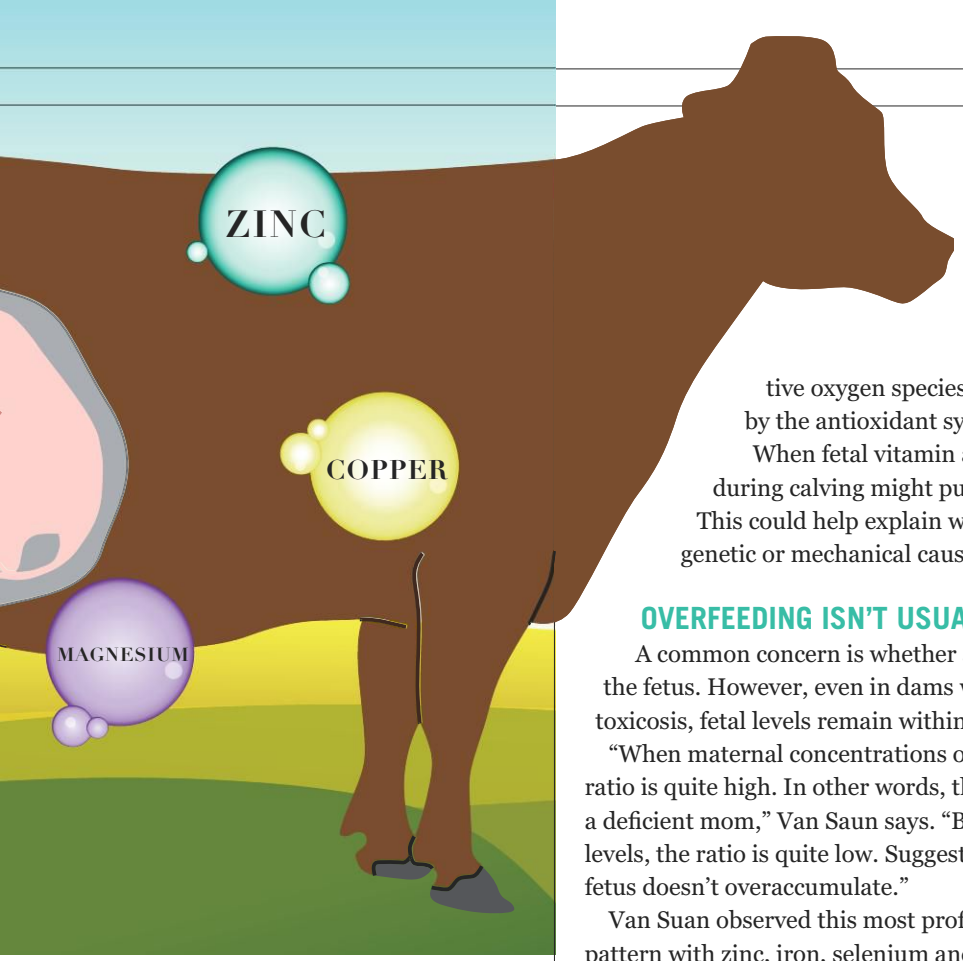
## PLACENTAL TRANSFER

Vitamins and minerals reach the fetus through the placenta, but not all nutrients behave the same way. Trace minerals appear to move primarily by facilitated diffusion, rather than active transport. Van Saun explains that as a result, fetal blood concentrations are typically much lower than maternal blood concentrations.

Once those nutrients enter fetal circulation, the liver becomes the key storage site. However, the complete mechanism by which these nutrients are stored in the liver is not well understood.

"If you remember the anatomy, the umbilical vein goes directly to the liver. It's my thinking that the fetal liver somehow captures these minerals and stores them," Van Saun says. "The fetal liver can concentrate these trace elements to a level that's nearly twice what we typically see in the dam. We need to find out what influences this."

Fat-soluble vitamins cross the placenta inefficiently, leaving newborn calves relatively depleted at birth and heavily reliant on colostrum for antioxidant protection.




## OXIDATIVE STRESS AT BIRTH

As umbilical blood flow is compromised during delivery, the fetus experiences hypoxia. "That's going to produce large quantities of reactive oxygen species," Van Saun explains. "And if those aren't squelched by the antioxidant system, that could cause the demise of the animal."

When fetal vitamin and mineral reserves are marginal, oxidative stress during calving might push a compromised fetus past a survivable threshold. This could help explain why some stillborn calves show no obvious infectious, genetic or mechanical cause at necropsy.

## OVERFEEDING ISN'T USUALLY THE PROBLEM

A common concern is whether aggressive mineral supplementation could harm the fetus. However, even in dams with liver mineral levels that would be considered toxicosis, fetal levels remain within a narrow range.

"When maternal concentrations of liver minerals are very low, the fetal-maternal ratio is quite high. In other words, the fetus is capable of extracting more minerals from a deficient mom," Van Saun says. "But as mom's mineral status increases to very high levels, the ratio is quite low. Suggesting that there is some mechanism in place where the fetus doesn't overaccumulate."

Van Suan observed this most profoundly with copper, but has also seen the same pattern with zinc, iron, selenium and manganese.

## CONNECTION TO FETAL LOSS?

At the Penn State diagnostics lab, mineral and vitamin analyses of fetal and stillborn calf livers found a surprising number of incidences of deficiency. Despite expectations of a linear relationship between maternal mineral status and fetal mineral status, there appears to be little direct relationship.

"When I plot maternal versus fetal concentrations, I generally see a shotgun scattergram," Van Saun explains. "That makes me think there's got to be some other regulatory process there."

Several nutrients appear repeatedly in association with fetal loss and stillbirth:

- **Copper:** Essential for enzyme systems and antioxidant defense
- **Selenium:** Critical for glutathione peroxidase activity
- **Zinc:** Involved in cellular and immune development
- **Magnesium:** Supports energy metabolism and neuromuscular stability
- **Vitamin A:** Needed for epithelial development and antioxidant defense

## STILLBORN CALVES AS NUTRITIONAL SENTINELS

Stillborn calves represent an underused opportunity to evaluate herd nutrition. Liver mineral and vitamin analysis from stillborn calves can uncover deficiencies that were not clinically apparent in the dam.

"We really need to emphasize how to make a good situation out of a bad situation," Van Saun says. "I think if you're having a string of stillborns, I would be wanting to take a liver sample."

Repeated measures of low selenium, copper or vitamin A in stillborn calves, especially in the absence of other pathology, can point back to gestational nutrition.

## GET AHEAD OF THE PROBLEM

Effective investigation of stillbirths and weak calves should begin with diet evaluation, but meaningful assessment of gestational nutrition requires a broader, more deliberate strategy. A clearer understanding can be gained by using multiple diagnostic entry points across the herd and across time.

Van Saun highlights several practical diagnostic opportunities:

- **Submit liver samples from stillborn calves when infectious and congenital causes are not identified**
- **Use cull cow or abattoir liver samples to establish baseline mineral status**
- **Sample healthy animals within defined physiologic groups, rather than sick cows in inflammatory states**
- **Build longitudinal data rather than interpreting isolated results**

Taken together, these approaches allow the shift from reactive troubleshooting to proactive risk management.

Stillbirths and weak calves are often the final expression of biological constraints established months earlier, not failures limited to the calving event. **BV**

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# The Critical First 24 Hours

## Tips to recognize when calves need immediate intervention

BY ANDREA BEDFORD



The first 24 hours of life represent the most vulnerable period a calf will ever experience, where oxygen deprivation, metabolic acidosis, trauma and pain can overwhelm a compromised neonate.

Many distressed calves arrive compromised. Prolonged calving, excessive traction or repeated premature intervention increase the likelihood of hypoxia, trauma and delayed physiologic recovery. A live calf is not necessarily a stable calf. Distress is often subtle in the first minutes and can be missed if assessment relies solely on heart rate or movement.

Ryan Breuer of the University of Wisconsin School of Veterinary Medicine outlined the following early indicators of neonatal distress:

- **Delayed head lifting or failure to achieve sternal recumbency**
- **Irregular, shallow respiration**
- **Blue or pale mucous membranes**
- **Meconium staining**
- **Swollen head or tongue**

"If calves are not trying to get up or won't stay in sternal recumbency after 15 minutes, these calves have a very poor prognosis," Breuer says.

These calves need immediate veterinary care and often have combined hypoxia and metabolic acidosis.

"Acid is toxic to the brain and can cause scarring and neurologic death to the brain tissue," Breuer adds, listing blindness as a neurologic sign to watch for. "These animals can't see, or they'll start tipping their nose to the sky."

### THE PRIMARY EMERGENCY

Respiratory compromise is the most immediate threat of neonatal distress. Newborn lungs have never expanded; even mild impairment can prevent adequate oxygen exchange.

"Open mouth and flaring nostrils are signs of respiratory distress," Breuer explains, adding that blue-tinged or cyanotic mucous membranes are also indicators the calf is not getting enough oxygen. "If the heart rate is less than 50 beats per minute and falling, intervention is going to be needed to save them."

Calves in respiratory distress should be placed in sternal recumbency to maximize lung expansion. Physical stimulation including vigorous rubbing, nasal septum stimulation or pressure on the nasal philtrum can help initiate more effective breathing.

### OTHER DISTRESS INDICATORS

Meconium staining is a visible indicator the calf experienced distress before delivery. Passage of the meconium into the uterus typically reflects prolonged time in the birth canal or delayed delivery.

"Now that the amniotic sac has ruptured, there's mixing of the waste and what the calf is submerged in," Breuer says. "This can cause issues down the road because it can cause difficulties in cleaning that airway."

Calves born with meconium staining are more likely to experience respiratory compromise, difficulty clearing airways and delayed stabilization after birth.

Trauma from dystocia can contribute to pain, reduced movement, impaired breathing mechanics and delayed recovery. Swelling of the head, tongue and soft tissues can further compromise airways and oxygen delivery.

### ONGOING MONITORING

Calves that survive an initial distress event have a higher risk through the first 24 hours of life. Ongoing monitoring for declining vigor, abnormal respiration or changes in responsiveness is essential as early compromise often evolves rather than resolves.

Many calves that survive neonatal distress reappear later as poor performers, respiratory cases or unexplained losses. Effective neonatal distress management is not about saving every calf but about recognizing when intervention can still alter the outcome. The first 24 hours determine which calves stabilize and which never fully catch up. **BV**

PHOTO: KAREN BOHNERT

# Strategic Colostrum Strategies

When it comes to calf immunity, more volume isn't always better

BY ANDREA BEDFORD

For decades, dairy producers have fed newborn calves based on standard protocols for first-milking colostrum, but as Dr. Donald Sockett and Dr. Ryan Breuer from the University of Wisconsin noted on a "Raising Your Best Dairy Heifer" webinar, the underlying assumptions might be due for revision.

"The current colostrum feeding guidelines that are considered best practices today were developed a little more than two decades ago," Breuer says.

Sockett explains the conventional gold standard of 50 grams of immunoglobulin G (IgG) per liter was reasonable back then, but times have changed.

"The average here is 75 grams to 95 grams per liter," he says. "Why would we build a program around fair colostrum?"

Because calves are receiving colostrum of higher quality than the older guidelines are built around, feeding volumes and methods may need adjustment.

In a recent case report, Sockett and Breuer described a Holstein heifer that received colostrum based on 10% body weight: 4 liters of first-milking colostrum 30 minutes after birth and an additional 2 liters six hours after the first feeding. Shortly after the second feeding, the calf developed colic and was in apparent pain. It was humanely euthanized within 24 hours after a lack of response to care.

Breuer says the attending veterinarian had seen similar situations at other dairies where, after the recommended colostrum, calves had distress or colic.

Upon necropsy, it was concluded aspiration pneumonia killed the calf after some colostrum was regurgitated due to a distended abomasum from the volume.

## TAILOR THE RECOMMENDATION TO THE FARM

Cornell University published a study on the effects feeding colostrum at 6%, 8%, 10% or 12% of a calf's weight had on IgG absorption, gastric emptying and postfeeding behavior.

Gastric emptying is an important factor as no colostrum absorption occurs in the abomasum. Passage to the small intestine in a timely manner before absorption efficiency goes down is key. Calves fed at 10% and 15% of their body weight had significantly lower apparent efficiency of absorption of IgG rates and showed significantly more behavioral signs of discomfort (abdomen kicks) than those fed 6% and 8%.

A study of 818 calves across 61 Holstein dairy farms at the University of Montreal looked into how colostrum management practices impacted transfer of passive immunity (TPI). They found the top factor affecting apparent IgG absorption was the concentration of IgG in the colostrum, or colostrum quality. Calves fed colostrum with a Brix value over 24.5% were almost three times more likely to have received adequate TPI. Additionally, calves fed equal to or greater than 2.5 liters of colostrum at their first meal (notably less than 10% of the calves' body weight) within three hours of birth had the highest odds of receiving adequate TPI.

"We have to start thinking about the quality of the colostrum and the mass of colostrum being delivered," Sockett says.

If you're creating a colostrum feeding program for a dairy operation, Sockett and Breuer recommend collecting a database of information of what's going on in the herd. Tailor the program to the farm based on:

- **The average birth weight of the calves — what are typically the lightest and the heaviest animals?**
- **Pooled or individual colostrum**
- **The normal weight of colostrum**
- **Mean and standard deviation of the Brix scores**
- **Timing of first colostrum delivery**
- **TPI goals**



The idea is not to abandon colostrum best practices, but to update them strategically. By refining colostrum feeding protocols, verifying colostrum quality, aligning volume with body weight and monitoring outcomes, dairy operations can create their own evidence-based practice. The result? Healthier calves, fewer complications and better use of that liquid gold. **BV**

PHOTO: LINDSEY POUND

# Manage Your Risk

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Don't gamble with BRD treatment. Bet on gold. **Watch Resflor Gold go to work against BRD.**

[1]Merck Animal Health. 2025. Comparison of RESFLOR GOLD® to Norfenicol for Treatment of Bovine Respiratory Disease in Holstein Steers Following Me

**IMPORTANT SAFETY INFORMATION:** Not for use in humans. Keep out of reach of children. Do not use in animals that have shown hypersensitivity to flo skin, eyes and clothing as product contains materials that can be irritating. Animals intended for human consumption must not be slaughtered within 38 for use in female dairy cattle 20 months of age or older, including dry dairy cows. Use in these cattle may cause drug residues in milk and/or in calves born established in pre-ruminating calves. Do not use in calves to be processed for veal. Not for use in animals intended for breeding purposes. See package in

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etaphylaxis with Tulathromycin. Final Study Report.

rfenicol or flunixin. Avoid direct contact with
days of treatment. This product is not approved
to these cows. A withdrawal period has not been
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## ODUCT INFORMATION

roved by FDA under NADA # 141-299
·fenicol and Flunixin Meglumine)
microbial/Non-Steroidal Anti-Inflammatory Drug

**mg/16.5 mg/mL | Sterile**

**ubcutaneous use in beef and non-lactating dairy cattle only. Not for use in female dairy cattle onths of age or older or in calves to be processed for veal.**

**TION:** Federal law restricts this drug to use by or on the order of a licensed veterinarian.

**CRIPTION:** RESFLOR GOLD® is an injectable solution of the synthetic antibiotic florfenicol and the non-steroidal nflammatory drug (NSAID) flunixin. Each milliliter of sterile RESFLOR GOLD® contains 300 mg florfenicol, 16.5 mg in as flunixin meglumine, 300 mg 2-pyrrolidone, 35 mg malic acid, and triacetings.

**CATION:** RESFLOR GOLD® is indicated for treatment of bovine respiratory disease (BRD) associated with *·heimia haemolytica, Pasteurella multocida, Histophilus somni,* and *Mycoplasma bovis,* and control of BRD-ciated pyrexia in beef and non-lactating dairy cattle.

**AGE AND ADMINISTRATION:** RESFLOR GOLD® should be administered once by subcutaneous injection at a rate of 40 mg florfenicol/kg body weight and 2.2 mg flunixin/kg body weight (6 mL/100 lb). Do not administer more 10 mL at each site. The injection should be given only in the neck. Injection sites other than the neck have not been ated. For the 500 mL vial, do not puncture the stopper more than 20 times.

**RESFLOR GOLD® Dosage Guide***

| Animal Weight (lbs) | Dosage (mL) |
|---|---|
| 100 | 6.0 |
| 200 | 12.0 |
| 300 | 18.0 |
| 400 | 24.0 |
| 500 | 30.0 |
| 600 | 36.0 |
| 700 | 42.0 |
| 800 | 48.0 |
| 900 | 54.0 |
| 1000 | 60.0 |

Recommended Injection Location



ot administer more than 10 mL at each site.

**TRAINDICATIONS:** Do not use in animals that have shown hypersensitivity to florfenicol or flunixin.

**INGS: NOT FOR HUMAN USE. KEEP OUT OF REACH OF CHILDREN.** This product contains material can be irritating to skin and eyes. Avoid direct contact with skin, eyes, and clothing. In case of accidental eye sure, flush with water for 15 minutes. In case of accidental skin exposure, wash with soap and water. Remove minated clothing. Consult a physician if irritation persists. Accidental injection of this product may cause local ion. Consult a physician immediately. The Safety Data Sheet (SDS) contains more detailed occupational safety mation. For customer service, adverse effects reporting, and/or a copy of the SDS, call 1-800-211-3573. For ional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDAVETS, p://www.fda.gov/reportanimalae.

**CAUTIONS:** As a class, cyclo-oxygenase inhibitory NSAIDs may be associated with gastrointestinal, renal, and tic toxicity. Sensitivity to drug-associated adverse events varies with the individual patient. Patients at greatest r adverse events are those that are dehydrated, on diuretic therapy, or those with existing renal, cardiovascular, r hepatic dysfunction. Concurrent administration of potentially nephrotoxic drugs should be carefully monitored. Ds may inhibit the prostaglandins that maintain normal homeostatic function. Such anti-prostaglandin effects result in clinically significant disease in patients with underlying or pre-existing disease that have not been ously diagnosed. Since many NSAIDs possess the potential to produce gastrointestinal ulceration, concomitant f RESFLOR GOLD® with other anti-inflammatory drugs, such as NSAIDs or corticosteroids, should be avoided sely monitored.

in is a cyclo-oxygenase inhibitory NSAID, and as with others in this class, adverse effects may occur with its The most frequently reported adverse effects have been gastrointestinal signs. Events involving suspected , hematologic, neurologic, dermatologic, and hepatic effects have also been reported for other drugs in this class. or use in animals intended for breeding purposes. The effects of RESFLOR GOLD® on bovine reproductive rmance, pregnancy, and lactation have not been determined. Toxicity studies in dogs, rats, and mice have ciated the use of florfenicol with testicular degeneration and atrophy. NSAIDs are known to have potential effects th parturition and the estrous cycle. There may be a delay in the onset of estrus if flunixin is administered during the glandin phase of the estrous cycle. Studies have associated the use of flunixin in cattle with a delay in parturition rolonged labor (which may increase the risk of stillbirth), and interference with involution and expulsion of fetal branes (which may increase the risk for placental retention and metritis).

LOR GOLD®, when administered as directed, may induce a transient reaction at the site of injection and underlying ss that may result in trim loss of edible tissue at slaughter.

**RESIDUE WARNINGS:** Animals intended for human consumption must not be slaughtered within 38 days of treatment. This product is not approved for use in female dairy cattle 20 months of age or older, including dry dairy cows. Use in these cattle may cause drug residues in milk and/or in calves born to these cows. A withdrawal period has not been established in pre-ruminating calves. Do not use in calves to be processed for veal.

**ERSE REACTIONS:** Transient inappetence, diarrhea, decreased water consumption, and injection site swelling been associated with the use of florfenicol in cattle. In addition, anaphylaxis and collapse have been reported approval with the use of another formulation of florfenicol in cattle. In cattle, rare instances of anaphylactic-like ions, some of which have been fatal, have been reported, primarily following intravenous use of flunixin meglumine.

**ICAL PHARMACOLOGY:** The pharmacokinetics (PK) of florfenicol (Table 1) and flunixin (Table 2) after taneous injection of RESFLOR GOLD® is described below:

**e 1. Mean (n=28) pharmacokinetic parameters for florfenicol in cattle after a single subcutaneous nistration of RESFLOR GOLD® (florfenicol dose of 40 mg/kg BW).**

| Mean Florfenicol PK parameters in Cattle | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | $AUC_{0-t}$[1] (ng*hr/mL) | $AUC_{0-\infty}$[2] (ng*hr/mL) | $C_{max}$[3] (ng/mL) | $T_{max}$[4] (hr) | $T_{½}$[5] (hr) | $MRT_{0-\infty}$[6] (hr) |
| Mean | 242527 | 247577 | 11151 | 6.25 | 28.5 | 27.3 |
| SD[7] | 42741 | 41391 | 4194 | 3.87 | 9.91 | 11.6 |

**e 2. Mean (n=28) pharmacokinetic parameters for flunixin in cattle after a single subcutaneous nistration of RESFLOR GOLD® (flunixin dose of 2.2 mg/kg BW).**

| Mean Flunixin PK parameters in Cattle | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | $AUC_{0-t}$[1] (ng*hr/mL) | $AUC_{0-\infty}$[2] (ng*hr/mL) | $C_{max}$[3] (ng/mL) | $T_{max}$[4] (hr) | $T_{½}$[5] (hr) | $MRT_{0-\infty}$[6] (hr) |
| Mean | 13370 | 14448** | 1913 | 1.14 | 9.5** | 11.4 |
| SD[7] | 4964 | 5116 | 791 | 0.97 | 3.27 | 4.41 |

$_{0-t}$ = Area under the plasma-concentration-time curve
C) from time zero to the last quantifiable concentrations
$_{0-\infty}$ = AUC from time zero to infinity
= Maximum plasma concentration
= Time at which $C_{max}$ was observed
[5] $T_{½}$ = Terminal elimination half-life
[6] $MRT_{0-\infty}$ = Mean residence time from time zero to infinity
[7] SD = Standard deviation
** n=27

**ROBIOLOGY:** Florfenicol is a synthetic, broad-spectrum antibiotic active against many Gram-negative and -positive bacteria isolated from domestic animals. It acts by binding to the 50S ribosomal subunit and inhibiting rial protein synthesis. Florfenicol is generally considered a bacteriostatic drug, but exhibits bactericidal activity st certain bacterial species.

ro studies demonstrate that florfenicol is active against the BRD pathogens *M. haemolytica, P. multocida,* and *mni,* and *M. bovis* that florfenicol exhibits bactericidal activity against strains of *M. haemolytica* and *H. somni.*

inimum inhibitory concentrations (MICs) of florfenicol were determined for non-mycoplasmal BRD isolates ned from calves enrolled in BRD field studies in the U.S. in 2006 using methods recommended by the Clinical aboratory Standards Institute (M31-A2). MICs for *M. bovis* isolates were determined by an accepted method Hayflick Broth with Alamar Blue (HBAN) medium under appropriate control. Isolates were obtained from pre-ment nasal swabs from all calves enrolled at all four sites, post-treatment nasal swabs from treatment failures in ESFLOR GOLD® and saline control treatment groups at three sites, and lung tissue from one calf that died in the control treatment group. The results are shown in below Table 3.

**e 3. Florfenicol MIC values- of indicated pathogens isolated from cattle with naturally-ocurring BRD.**

| Indicated pathogens | Year of isolation | Number of isolates | $MIC_{50}$** (µg/mL) | $MIC_{90}$** (µg/mL) | MIC range (µg/mL) |
|---|---|---|---|---|---|
| *Mannheimia haemolytica* | 2006 | 183 | 1.0 | 1.0 | 0.5 to 32 |
| *Pasteurella multocida* | 2006 | 139 | 0.5 | 0.5 | ≤0.125 to 16 |
| *ophilus somni* | 2006 | 84 | ≤0.125 | ≤0.125 | ≤0.125 to 0.25 |
| *oplasma bovis* | 2006 | 60 | 1.0 | 1.0 | 0.5 to 1.0 |

e correlation between *in vitro* susceptibility data and clinical effectiveness is unknown.
e lowest MIC to encompass 50% and 90% of the most susceptible isolates, respectively.

**CTIVENESS:** In a multi-site field study, calves with naturally-occurring BRD were treated with RESFLOR GOLD®, r Gold (NADA 141-265), or saline. A treatment success was defined as a calf with normal respiration to mild atory distress, normal attitude to mildly depressed, and a rectal temperature < 104.0°F on Day 11.

reatment success rate for BRD for the RESFLOR GOLD® treatment group (68.4%) was statistically significantly er (p = 0.0255) compared to the saline control treatment group (42.9%). RESFLOR GOLD® was non-inferior to r Gold® for the treatment of BRD, with a one-sided 95% lower confidence bound for the difference between wo treatments equal to -13.2%.

same study, the change in rectal temperature from pre-treatment to six hours post-treatment was evaluated to mine the effectiveness of RESFLOR GOLD® for the control of BRD-associated pyrexia. The proportion of calves e rectal temperatures decreased by ≥2.0°F from pretreatment to six hours post-treatment was statistically icantly greater (p = 0.0019) in the RESFLOR GOLD® treatment group compared to the saline control treatment . The mean decrease in rectal temperature from pre-treatment to six hours post-treatment was statistically icantly greater in the RESFLOR GOLD® treatment group compared to the Nuflor Gold® and saline control treatment ps (p = 0.0031 and 0.0002, respectively).

ffectiveness of RESFLOR GOLD® for the treatment of BRD associated with *Mycoplasma bovis* was demonstrated amining the *M. bovis* data from cattle enrolled in the BRD treatment study described above. There were ically more treatment successes (6 of 8 calves, 75%) than treatment failures (2 of 8 calves, 25%) in RESFLOR D®-treated calves that cultured positive for *M. bovis* pre-treatment.

**MAL SAFETY:** A target animal safety study was conducted to evaluate the effects of RESFLOR GOLD® when nistered to cattle subcutaneously at 1X, 3X, or 5X the labeled dose for three consecutive days (3X the labeled duration). eased feed and water consumption, and decreased body weights (secondary to decreased feed consumption) were ved in the 1X, 3X, and 5X groups. Injection site swellings were noted in the 1X, 3X, and 5X groups.

parate injection site study was conducted in cattle. The study demonstrated that RESFLOR GOLD®, when nistered according to the label directions, may induce a transient local reaction in the subcutaneous and lying muscle tissue.

**RAGE INFORMATION:** Do not store above 30°C (86°F). Use within 28 days of first use.

**/ SUPPLIED:** RESFLOR GOLD® is available in 100, 250, and 500 mL sterile, multiple-dose, glass vials.

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# Diagnostic Gray Zone

## Why subacute rumen acidosis in calves can often go unrecognized

BY ANDREA BEDFORD

Subacute rumen acidosis (SARA) is well defined in adult cattle, but often goes undiagnosed in calves.

"In adult cattle, we have established thresholds for acidosis to detect and define it: 5.8, 5.6, some people even say 6.0 if you're using the reticulorumen bolus," says Gustavo Mazon, nutritionist at Axiota Animal Health. "But in calves, we still don't have that magic number because the rumen of the calf is more acidic than the rumen of a cow."

A calf's rumen function is still developing, immune function is being shaped and fermentation patterns differ from mature cattle — blurring the line between normal adaptation and acid stress.

### IT'S HARD TO DEFINE

Calves routinely operate at rumen pH values that would be considered acidotic in adult cattle. Work by Anne Laarman from the University of Alberta shows calves fed varying starters consistently had a rumen pH value dropping to 5.0 to 5.2, levels that would make adult cattle clinically sick fairly quickly.

"These calves had no clinical symptoms. pH just recovered every day," Laarman said on a Heifer Academy webinar.

The consequence is a diagnostic gray zone where the tolerance for a low rumen pH masks fermentative stress.

### INTENSE WEANING TRANSITION

Weaning represents a compressed and intense transition from a milk-based diet to reliance on solid feed.

"In the natural environment, you're going to have a calf that's going to nurse for eight, nine months and develop the rumen very slowly. We're trying to develop that rumen in the dairy within less than two months," Mazon says.

Starter feed drives volatile fatty acid production, which is necessary for rumen papillae development. But research has demonstrated fermentation frequently accelerates faster than the rumen's buffering and absorptive capacity.

Highly fermentable starter diets have been associated with altered rumen morphology, epithelial gene expression and fermentation profiles consistent with acid stress. Early and sustained acid exposure may compromise epithelial integrity or absorptive efficiency, challenging the assumption that faster rumen development is always better and also raising questions about whether some calves are adapting to, rather than thriving under, acidic conditions.

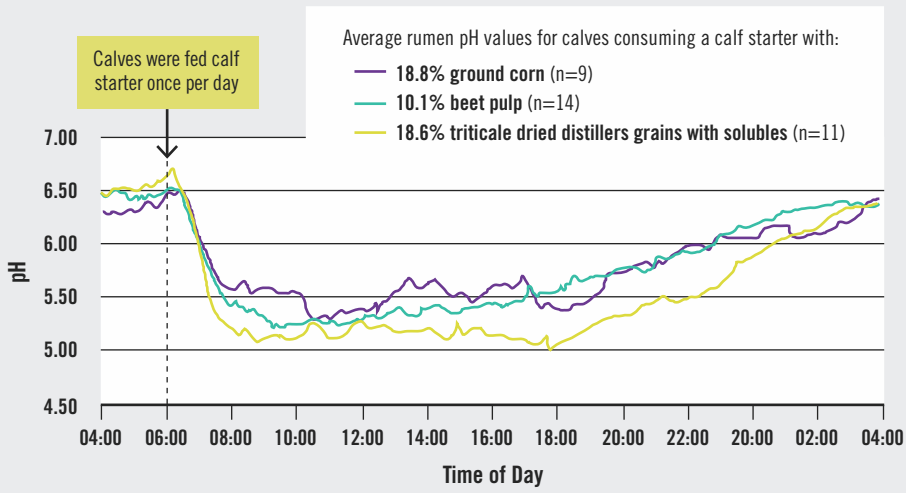
### BEHAVIORAL CHANGES

With SARA, calves may show subtle behavioral changes, such as altered feeding patterns and non-nutritive oral behaviors like bar biting. The presence of bubbles in loose feces and the occurrence of ruminal bloats during the weaning and postweaning periods are other common indicators as well.

### REDEFINED RUMEN ACIDOSIS

The resilience of the neonatal rumen is remarkable, but the long-term biological cost of adaptive stress on gut integrity and immune maturation remains a critical area for study. Bridging the gap between adult SARA definitions and calf-specific physiology will be essential for developing the next generation of precision weaning strategies that support the developing ruminant. BV

**Effects the Starch Content of Calf Starter Has on Growth and Rumen pH in Holstein Calves During the Weaning Transition**




SOURCE: JOURNAL OF DAIRY SCIENCE (2012)

# Tips for Keeping Calves Healthy

Two North Dakota veterinarians discuss everything from colostrum timing to bedding strategies

BY SHAYE KOESTER-WANNER

Health issues during calving season are high on the list of nightmares for ranchers. Veterinarians Troy Dutton and Joe Hochhalter from the Steele Vet Clinic in Steele, N.D., share how they help their clients stay ahead of it.

"It's a lot easier and more rewarding to help prevent problems than help work through problems like scours and pneumonia in baby calves," Dutton says.

## PREVENTION IS KEY

Calves might get an official ID in the spring, but other factors, such as nutrition, throughout gestation impact their health before they hit the ground.

"We start all the way back prebreeding to make sure nutrition-wise they're set up properly," Dutton says. "Work with a nutritionist to make sure your herd's energy and protein needs are being met as well as provide minerals year-round."

Body condition scores should also be monitored throughout the year.

"Cows in good body condition at calving are more likely to birth a healthier calf, have better-quality colostrum for that calf and be in a better condition to breed back," Hochhalter adds.

## START STRONG

Once calves hit the ground, getting them off to a good start sets them up for the rest of their lives.

Hochhalter explains: "Calves that have some kind of calfhood disease never do catch up to their herdmates that have been healthy their whole lives."

Colostrum is a key component to this.

"Calves need colostrum within six to 12 hours of birth to get the most out of the antibodies it provides," Dutton says. "Calves with adequate colostrum have a better rate of gain and feed efficiency all the way through to the end."

It's also important to make sure producers know the difference between colostrum replacement and colostrum supplement if necessary. Colostrum replacement products have more than 150 immunoglobulins.

## SANITATION AND CALVING BARNS

Sanitation and calving areas look different based on the time of year, herd size and geography. Regardless, keeping cattle clean and dry is non-negotiable.

For those using calving barns, know when to change out the bedding.

"In a perfect world, we'd like to see each new pair get fresh bedding, but that's not realistic," Hochhalter says. "The next best option is to change that bedding once it becomes damp and spoiled to reduce the exposure of pathogens to calves."

An often-overlooked method to reduce disease spread is proper ventilation.

"Ventilation issues present a real challenge even in the beef industry — especially for early calvers," Dutton says.

Sanitary equipment also can't be forgotten in the calving frenzy.

Dutton says: "Equipment sanitation is also important — especially if you're running around giving a bolus to a calf or using needles and syringes."

For producers not using a barn, be aware of how mud impacts calf health.

"If those calves are really muddy, it increases the risk for navel infection or scours," Hochhalter says.

Try to change bedding around shelters and find dry areas. Spreading cattle out also helps reduce disease transmission.

"We have some clients who sort pairs by age or keep pairs separate from cows left to calve, and we know reducing that calving density reduces the spread of illness," Dutton explains. "However, this can be challenging depending on labor and resource availability." BV



PHOTO: SARA BROWN



# BRD Risk Through Different Lenses

New survey results highlight differences in how veterinarians and producers assess the disease

BY ANDREA BEDFORD

The hardest cattle health decisions often live in the gray zone. Nowhere is that truer than with bovine respiratory disease (BRD) in cattle that aren't clearly high risk, but also aren't looking entirely safe either. A new survey suggests when cattle fall into this medium-risk category, veterinarians and feedlot managers are working from different playbooks.

The study, published in Translational Animal Science, examined how veterinarians and feedlot managers assess BRD risk and decide whether to use metaphylaxis when risk is uncertain. While both groups rely heavily on experience, the results show notable differences in how risk is perceived, what outcomes are expected and which factors ultimately tip the decision toward treatment.

## CONTRASTING EXPECTATIONS

In the survey, respondents were asked to consider hypothetical groups of medium-risk cattle and estimate the expected morbidity and mortality if metaphylaxis was not used. Veterinarians consistently anticipated worse outcomes than feedlot managers. On average, the vets expected to see higher percentages of sick cattle and greater death loss overall, while managers' expectations were lower and more variable.

That difference is important to take note of. Expected disease burden strongly influences whether or not metaphylaxis is justified. If one party is anticipating substantial losses while another is expecting a manageable disease, alignment becomes difficult from the beginning.

## KEY FACTORS USED TO DECIDE

The survey showed clear differences in which risk signals each group emphasizes most when cattle are medium risk.

Veterinarians tended to emphasize:

- **Health history of the cattle, particularly prior illness, vaccination status and consistency of backgrounding**
- **Degree of commingling, with mixed-source cattle seen as higher risk**
- **Body weight and age, with lighter, younger cattle seen as less resilient**
- **Transportation stress, including hauling distance and time in transit**
- **Weather conditions, such as temperature swings and adverse conditions**
- **Expected morbidity and mortality, with vets more likely to predict higher disease impact without metaphylaxis**



PHOTO: WYATT BECHTEL

Veterinarians also placed weight on how these factors interact, rather than viewing a signal in isolation. In the gray zone, multiple moderate risks stacking together often justified treatment.

In contrast, feedlot managers and producers placed greater emphasis on:

- **Cattle source and origin, particularly if cattle came from known suppliers**
- **Market channel, such as sale barn versus direct-from-ranch purchases**
- **Similar cattle's historical performance**
- **Visible condition at arrival, including fill, alertness and signs of stress**
- **Variability within the load, with uneven cattle raising more concern than uniformly moderate-risk groups**
- **Cost-benefit considerations**

There were decision areas where the groups aligned, however. Before cattle arrived, both consistently identified the market channel and where the cattle originated as the most influential pre-arrival indicators of BRD risk. After arrival, the overall condition of the cattle turned into the dominant real-time signal for both the veterinarians and producers — often serving as the final checkpoint before a decision was made.

## EXPERIENCE GUIDES DECISIONS

One of the study's most striking findings is how heavily metaphylaxis decisions still depend on professional judgment rather than formalized thresholds. Respondents frequently described relying on gut feel, prior outcomes with similar cattle and local norms.

That reliance on experience isn't necessarily a flaw, but it does introduce variability. Two operations receiving similar cattle under similar conditions might make different decisions.

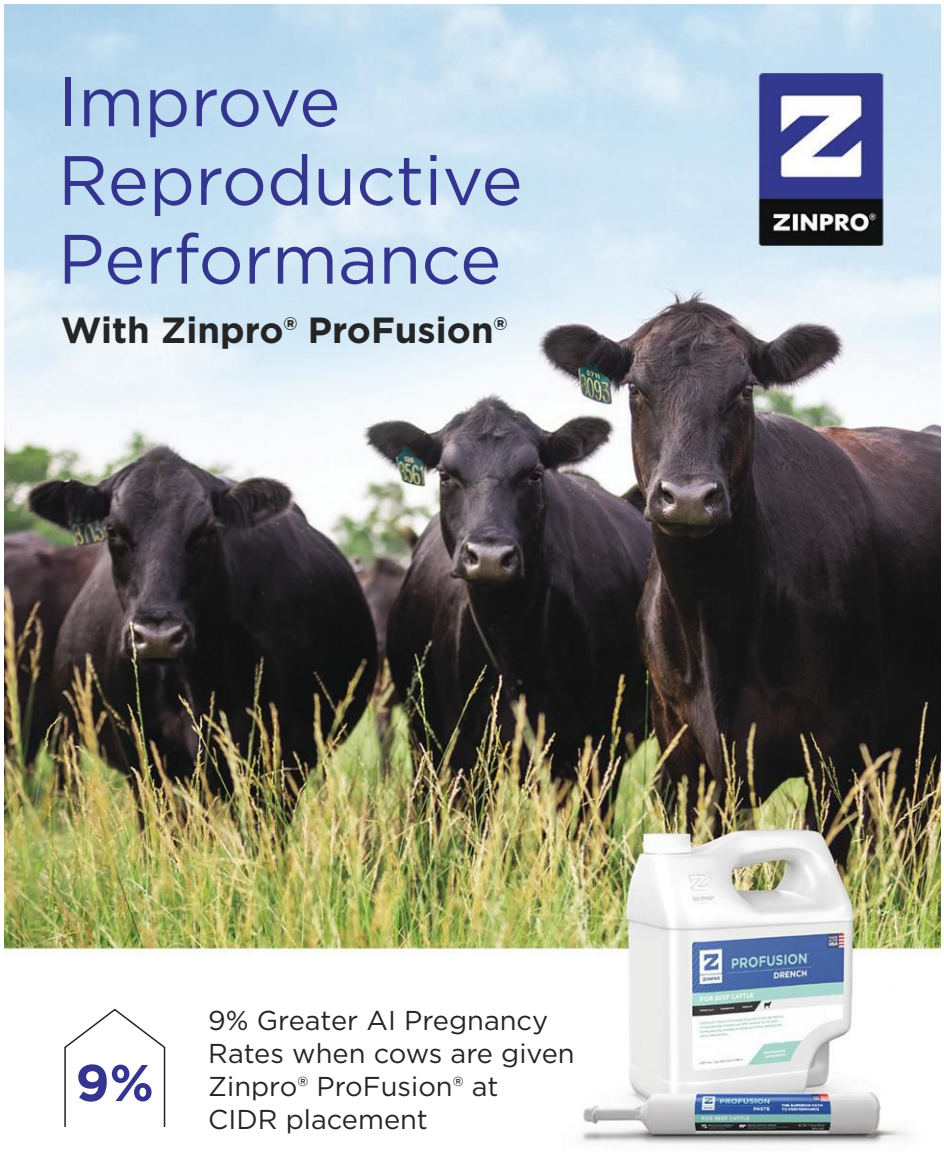
From an antimicrobial stewardship standpoint, that variability is significant. Medium-risk cattle represent the largest opportunity and challenge for reducing unnecessary antibiotic use without increasing disease loss.

## OPPORTUNITIES TO BETTER ALIGN

Rather than framing these differences as conflict, the authors point to an opportunity for better alignment. Clearer conversations around expected morbidity, acceptable loss thresholds and what success looks like for a given group of cattle could narrow the gap.

As scrutiny for antibiotic use in food animals continues to intensify, metaphylaxis decisions will only draw more attention. This study highlights that improving consistency doesn't necessarily require new drugs, but better alignment between who's making the call.

When risk is uncertain, clarity between veterinarian and producer might be one of the most powerful tools available. **BV**

# What Your Clients Will Value Most

## Producers share the qualities of a vet they'll keep calling

BY ANDREA BEDFORD

The veterinarian's role is shifting. No longer seen solely as an emergency responder, many producers view their veterinarians as partners who help shape the long-term success of their operations.

Based on a small survey of her peers, beef producer Lydia Grant shares what they value most in veterinary partners.

### COMMUNICATION FOUNDATION

Producers want veterinarians who are approachable, respond quickly and show genuine empathy for both cattle and the people who care for them.

"What does effective communication look like to your producer? Approachability," Grant says. "We as producers want to feel comfortable asking questions — even the silly ones."

A vet who listens carefully, adjusts their communication to match the producer's preferences and follows up signals respect and builds confidence.

### BEYOND EMERGENCIES

Trust develops when veterinarians are present not only during crises, but also during the farm's long-term planning. Producers want their vets to know their operation so advice is realistic.

"In the survey, one producer mentioned the best thing their veterinarian ever did was take a tour of their operation to better understand their values and goals," Grant says.

Grant also emphasizes some producers may not know the extent to which their veterinarian can help.

"I remember the first time my vet reached out and asked to put together a yearly vaccine plan. I didn't know that was an option," she recalls. "Do your clients know you're willing to do that?"

When vets are seen as partners, producers are more likely to bring them into conversations early.

### TEACHING AS A PART OF SERVICE

While producers value veterinary expertise, they also want to develop their own skills so they can handle smaller health concerns and recognize problems.

"Simple tasks, such as treating pinkeye and treating an abscess, are basic cattleman-type care," Grant says.

Education doesn't always require formal training; short conversations during herd checks, on-farm demonstrations or simple printed guides all strengthen the knowledge base of the operations.

Grant proposes these questions: "Are you the reactive veterinarian or the proactive? Planning, prevention and long-term herd health are priorities. Are you building relationships? Are you the emergency call or a vital part of the team contributing to the overall success and sustainability of the herd?"

Successful collaboration helps to strengthen the resilience of the entire beef and dairy industries. **BV**



PHOTO: LACEY FAHRMEIER

### BE A PRODUCER'S FIRST CALL

Grant highlights several concrete steps veterinarians could take to strengthen these relationships:

- **Know the operation and the people.** Learn each farm's goals, challenges and decision-making processes. Make your advice personal.
- **Be available when it matters.** Producers need reliability, not just in emergencies, but also for routine questions and decisions.
- **Discuss economics openly.** Frame recommendations in terms of cost, alternatives and return on investment.
- **Offer preventative strategies.** Help producers establish proactive herd health plans, including vaccination, nutrition and biosecurity.
- **Listen first.** Producers know their cattle. Respect their observations and incorporate them into veterinary decision-making.




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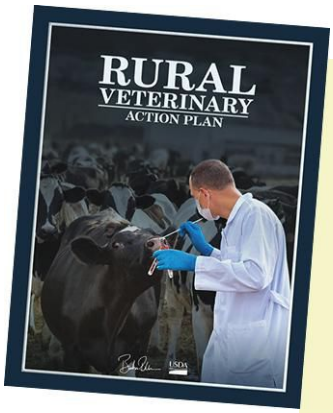
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# Rebuilding the Rural Animal Health Pipeline

From virtual reality training to state investments, new programs tackle the veterinarian shortage

BY ANDREA BEDFORD




Since U.S. Secretary of Agriculture Brook Rollins' formal elevation of the rural veterinary shortage to a national priority, a wave of federal initiatives, state investments and veterinary school-led programs has begun reshaping how the profession approaches rural workforce development, moving beyond loan repayment alone toward structural, pipeline-based solutions.

The announcement, introducing USDA's Rural Veterinary Action Plan, acknowledges what producers and veterinarians have long warned: Insufficient access to food-animal and rural veterinary care poses risks to animal health, biosecurity and food system stability. USDA committed to expanding incentives, streamlining grant programs and actively engaging veterinary schools as workforce partners rather than passive beneficiaries.

USDA NIFA (National Institute of Food and Agriculture) has since announced an investment of $3.8 million in the Veterinary Services Grant Program (VSGP) to mitigate food animal veterinary shortages. This investment was divided into 22 VSGP awards, including eight Education, Extension and Training (EET) grants and 14 Rural Practice Enhancement (RPT) grants.

## RECRUITMENT TO LONG-TERM RETENTION

Months after the initial announcement, the response to the rural veterinary shortage looks less fragmented and more intentional. Federal incentives, state investments and veterinary school-led training pipelines are beginning to align around a shared goal: making rural practice viable, visible and sustainable. The challenge is now execution; ensuring these programs translate into long-term retention, not just short-term recruitment.

## SCHOOLS WORK TO CLOSE THE GAP

The EET-awarded schools have not hesitated in taking action.

- **Texas Tech University's School of Veterinary Medicine** is creating the school's first food animal residency program, planned to launch in 2026. This program will recruit early-career veterinarians to provide them with advanced clinical and research training to help them become future educators in food animal medicine. It is the hope veterinarians trained through this residency will work to influence more students to pursue careers in food animal, large animal or mixed animal practice. A capstone professional achievement for the residents in this program is attainment of diplomate status in the American Board of Veterinary Practitioners.
- **Colorado State University** will be amping up its existing virtual reality (VR) offerings, implementing livestock-focused VR education into the curricula. The project will design and evaluate game-like VR modules where students can practice biosecurity, infection prevention and farm management.
- **The University of Alaska** plans to enhance local access to scientific resources that support livestock production through updated veterinary instruction to increase student comfort with livestock medicine and increased Extension resources supporting livestock producers of Alaska, which will uniquely focus on supporting care for the local reindeer industry.
- **The Veterinary Diagnostic Laboratory of the College of Veterinary Medicine at Iowa State University** has opened a new anatomical pathology residency program addressing the national shortage of veterinary pathologists.
- **The University of Kentucky and the Auburn College of Veterinary Medicine** is collaborating to address the Alabama-Kentucky-specific shortage of rural veterinarians. Together, they aim to recruit students from USDA-identified shortage counties and rural leadership and mentorship opportunities for upper-year veterinary students.

## STATE-LED INITIATIVES AND REGIONAL PARTNERSHIPS



› **Outside of these grants, The Ohio State University's College of Veterinary Medicine** has launched the Protect One Health in Ohio initiative (Protect OHIO). This initiative, supported by a $30 million investment from the state, centers around enrolling more students from Ohio's rural communities, mentoring large animal and rural veterinarians and expanding risk assessment and surveillance programs for the state.

"Feeding people is a shared responsibility, and it starts with healthy animals, resilient communities and a strong veterinary workforce," describes Leah Dorman, director of Protect OHIO.

› **Meanwhile, Wisconsin lawmakers** have proposed a student loan relief bill granting veterinarians who have graduated within the past seven years $25,000 in student loan repayment for each year that they practice in a rural county (up to four years). Applicants would need to spend 25% of their time working with farm animals.

› **New Mexico** has also offered loan relief. The Veterinary Medicine Loan Repayment Program, signed into law this year by Gov. Michelle Lujan Grisham, offers up to $80,000 in debt relief to veterinarians who commit to working in underserved areas for at least four years.

› **The University of Nebraska-Lincoln**, in partnership with Gov. Jim Pillen, has launched the Elite 11 Production Animal Health Scholarship Program, which provides 20 incoming freshman students pursuing veterinary practice in rural Nebraska with production animals with scholarships covering 50% of tuition. Eleven students in their junior and senior years will get full tuition scholarships. **BV**





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FARM JOURNAL

# SUCCESSFUL BRD VACCINATION IS FUELED BY THE RIGHT ADJUVANT

When selecting a respiratory vaccine for calves, evaluating antigen coverage is just one part of the equation. The adjuvant—though often overlooked—is equally essential. It's the adjuvant that can determine whether a calf develops a robust, lasting immune response or remains vulnerable to disease pressure.

## A SMARTER START TO IMMUNITY

"An ideal adjuvant would really have three different functions: to stimulate the immune system, help traffic antigens within the immune system and protect antigens against preexisting immunity," said Chris Chase, DVM, Professor, Department of Veterinary and Biomedical Sciences, South Dakota State University.

Biologically, adjuvants work by attracting immune cells to the injection site and improving antigen uptake. They enhance how antigens are processed and presented to the immune system, and can slow antigen release to prolong exposure — boosting both immune activation and memory.

This boost can be especially important in young calves, where maternal antibodies can interfere with vaccine performance. "When you give a modified-live vaccine, the antigen has to replicate, but preexisting immunity can neutralize the antigen before that replication happens," explained Dr. Chase. "That's where the adjuvant makes a huge difference."

## FINDING THE RIGHT ADJUVANT

In the past, we believed maternal antibodies got in the way of parenteral vaccination in calves, especially with modified-live virus (MLV) vaccines. But over the last few decades, peer-reviewed studies and field work have shown that PYRAMID® vaccines can succeed even in the face of maternal immunity, all thanks to its unique adjuvant, METASTIM®.

The METASTIM adjuvant is specifically designed to address the challenges of early calfhood vaccination. Found only in PYRAMID and PRESPONSE® SQ vaccines, its dual-phase adjuvant system can stimulate a balanced, robust immune response. Research performed using PYRAMID shows that this can be achieved in calves as young as 30 days of age.[1] "Historically, it was accepted as fact that maternal antibodies would block the parenteral vaccine," said Curt Vlietstra, DVM, Boehringer Ingelheim. "Now we know METASTIM works alongside the preexisting antibodies, not against them."

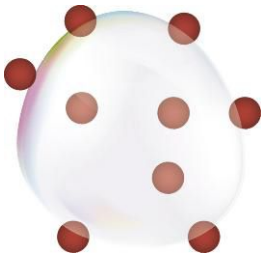
Composed of lipid droplets in an aqueous solution and surfactant, METASTIM offers a strategic advantage. In this structure, the antigen is suspended within two aqueous phases separated by an oil phase. This slows antigen release, increases lymphatic uptake and promotes antigen presentation over time. The oil-based middle layer acts as a depot, while the surrounding aqueous layers allow for early immune activation.

This dual-phase design helps the immune system respond more effectively by doing two things: It gives immune cells more time to recognize the antigen, which strengthens immune memory, and it protects the vaccine components from being quickly neutralized by circulating antibodies.

"Having a dual-phase adjuvant like METASTIM gives the vaccine multiple opportunities to present itself to the immune system," shared Dr. Vlietstra. "Even in a calf with crazy high maternal antibody levels, PYRAMID has worked."

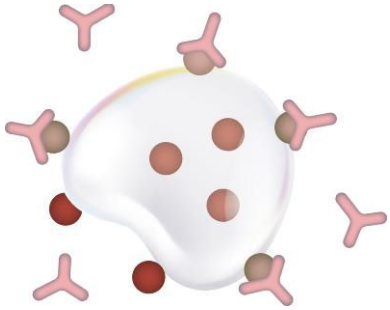
## THE STRATEGIC ANTIGEN DELIVERY OF METASTIM®

1.



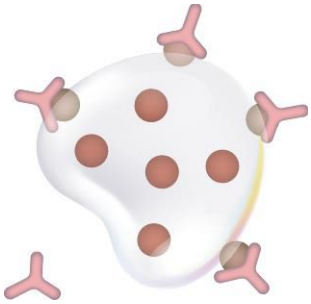
Vaccine antigens on adjuvant lipid droplets stimulate the immune system.

2.



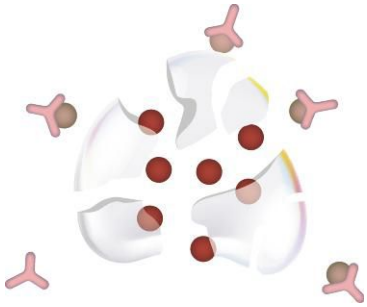
Maternal antibodies can neutralize exposed antigens.

3.



Some antigens are “hidden” inside lipid droplets to escape maternal antibodies.

4.



Immune cells metabolize lipid droplets, releasing “hidden” antigens to stimulate an immune response.

**To learn more about METASTIM and PYRAMID® vaccines, contact your Boehringer Ingelheim representative or visit PYRAMIDVACCINES.COM**

[1] Perkins-Oines S, Dias N, Krafsur G, et al. The effect of neonatal vaccination for bovine respiratory disease in the face of a dual challenge with bovine viral diarrhea virus and *Mannheimia haemolytica*. *Vaccine* 2023;41(19):3080–3091.

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# Monitoring Tools Can Strengthen Herd Health

Modern herds generate more information than ever, and veterinarians are key to interpreting it and guiding data-driven management decisions

BY ANDREA BEDFORD

Early identification of health challenges is one of the most effective ways to reduce disease severity, minimize treatment costs and support long-term herd productivity. While experienced caretakers have always relied on stockmanship and close observation, today's operations can benefit from data beyond what we can consistently monitor with our own eyes. Monitoring tools provide an additional layer of insight, helping recognize subtle changes in behavior, intake or environment before clinical signs are obvious.

Dr. Tiago Tomazi, dairy technical services veterinarian with Merck Animal Health, shares his advice on how the dairy landscape has progressed, allowing us to use monitoring technologies and management practices for improved animal health.

"If we go back to the '80s, we can say that dairy farming was still dominated by small and medium-sized family farms, right? We used to call cows by name," Tomazi says. "Then the '90s and 2000s came, and there was a marked acceleration in the growth of large-scale operations. There was an explosion of studies, of investigations and scientific investigation that helped a lot to bring us to the point we're at nowadays as far as reproduction and production in dairy cows and cattle health."

Following this growth in knowledge came the development of monitoring technologies to assist producers and veterinarians identify potential animal issues earlier.

That being said, data-driven decision-making does not necessarily require advanced technology. In many herds, structured record keeping, routine scoring (such as body condition scoring, lameness scoring or feed bunk assessments) and consistent visual checks are foundational monitoring practices. The goal is to identify patterns and changes over time, not just within isolated events.

## TECHNOLOGY COMBINED WITH STRONG MANAGEMENT

When technology is added on top of strong stockmanship, the combination can be especially powerful.

"Point No. 1 is that monitoring systems are not a diagnostic tool," Tomazi reminds. "But they help in identifying a cow that's not having a good day."

These activity monitoring technologies are not meant to tell you what ailment the cow has, but rather to alert you that a cow may be worth checking up on.

"Biology is not math," Tomazi says. "While math uses formulas, numbers and calculations to get you the exact result, biology [has to] take into consideration a set of factors associated with the biology of the cow and the environment."

While a variety of wearable tools exist for the earlier recognition of health changes, the interpretation of the data remains critical. Similar patterns can have multiple causes. For example, a decrease in rumination may reflect heat stress, early illness, social stress or rumen upset. Likewise, changes in activity could indicate estrus, discomfort or pain. Connecting these data points to clinical reasoning and management is key.



PHOTO: NEDAP

## APPLICATION EVIDENCE FROM RESEARCH

Research shows the data that is collected from these monitoring tools can also be applied to make health predictions in a number of scenarios.

Chabel and colleagues from the University of Florida evaluated over 4,500 dairy cattle across three commercial dairy herds wearing automated monitoring devices designed for estrous detection. They found early postpartum estrous characteristics were valuable indicators of reproductive potential; they were able to identify cows at risk for suboptimal fertility. By combining these characteristics with other health, genetic and environmental data, they were able to improve the prediction of fertility outcomes and provide targeted reproductive management for the cattle.

A series of three studies by Stangaferro and colleagues at Cornell University investigated the use of automated monitoring devices for the identification of health issues in dairy cattle. They found health index scores (calculated using an algorithm using rumination and activity data) provided sensitive detection for cattle with metabolic and digestive disorders, reducing time to clinical diagnosis by approximately two days. However, this system was less sensitive for the detection of mastitis and metritis, being most effective for cattle with severe cases.

While these monitoring devices may not perfectly identify all health issues in a herd, they can certainly help identify some disease signs earlier than human observation alone. It's also important to note that the implementation of these monitoring devices will be different from farm to farm.

"We have to take into consideration the level of disease protection you want at your farm as well as the feasibility and labor capabilities," Tomazi says. "You can be very intensive, but if you don't have the people to provide you with that intensity, then it makes everything harder. On the other hand, you can be less intensive and find that balance where you're not going to compromise the reproduction or production during the lactation of those cows."

## DATA INTERPRETATION IS JUST AS IMPORTANT

Training caretakers to recognize when and how to respond to monitoring data is going to be just as important as selecting the technology. A monitoring system is only as good as the team who is interpreting it.

While the benefits can be significant, monitoring tools can also introduce challenges. The amount of data generated has the potential to be overwhelming. Time and training are required to get the most out of an investment and use the data effectively. This provides a great opportunity for veterinarians and producers to work together in prioritizing the metrics that are the most actionable and will make the most impact on the operation's herd health goals.

> *"Monitoring systems are not a diagnostic tool. But they help in identifying a cow that's not having a good day."*
> —Dr. Tiago Tomazi

## THE FUTURE WITH MONITORING TOOLS

Looking ahead, predictive models and machine-learning-based alerts will play an increasing role in herd health programs. With these systems will come the need for increased expertise on interpretation, contextual decision-making and ongoing evaluation of how the tools fit into preventative care strategies.

"I think integration is what we are walking toward," Tomazi says. "The integration of these technologies with biological factors and management factors all together will help us make decisions considering the specific scenario at each dairy farm."

Ultimately, monitoring tools are most effective when combined with strong stockmanship and veterinary oversight. When data and observation inform each other, disease can be detected earlier, interventions become more targeted and herds can become healthier overall. **BV**



# Mooving Cows

## A game is helping veterinarians and dairy teams improve animal welfare, safety and efficiency

BY ANDREA BEDFORD




Van Os and colleagues consulted with farm owners and veterinarians on the game prototype.

Veterinarians have long been advocates for animal welfare, yet one of the most significant welfare determinants on dairy farms often lies outside the treatment pen: how cows are moved and handled. Cow handling directly affects stress physiology, lameness risk, udder health, milk letdown and handler safety. Veterinarians are uniquely positioned to influence these routines.

When Jennifer Van Os from the University of Wisconsin-Madison spoke with producers, the need for education on animal handling became clear.

"I met with a bunch of Wisconsin dairy farm owners and managers to ask them about some of the challenges they face with animal care and animal welfare," Van Os says. "One of the most popular requests that I got was: Can you please come to my farm and train my staff on proper handling?"

Unfortunately, this wasn't feasible, but she took the message to heart and considered how she could address it.

### A CLEVER TRAINING TWIST

Enter the serious game "Mooving Cows". Developed by Van Os and the animal welfare team at the University of Wisconsin, this digital touchscreen game enables farm s taff (and anyone interested) to practice moving cws in a simulated dairy farm environment.

Rather than simply reading a manual, trainees play through a series of scenarios: moving cows from pasture to barn, guiding them into the milking parlor and navigating when a cow is reluctant. The game rewards patience, calm movements and minimal startling gestures, while it penalizes rushing, shouting or forcing cows into motion. In effect, it applies the principles of low-stress livestock handling in a safe, virtual form: pressure and release, staying on the edge of an animal's flight zone, moving at a walk and staying in the cow's line of sight.

One of the key aspects of the application is the opportunity for failure.

"There is this principle in educational video games that it is able to provide users this safe environment where they can deliberately mess up," Van Os explains. "It provides an opportunity for them to learn by making mistakes or learn by failure, and that's something you can't necessarily do in training. If it's hands-on and active and interactive, there are real-life stakes where you don't want to get injured and you don't want the animals getting stressed or injured."

The research performed by Van Os' group shows users found the application to be an easy-to-use training tool and their knowledge of best cow-handling practices improved after playing through the game.

"Mooving Cows" is completely free and is available for both Apple and Android devices. The application has been approved by the Farmers Assuring Responsible Management (FARM) Animal Care program for continuing education on stockmanship; completion of the game provides users with a certificate.

Van Os and her team hope to continue developing interactive, gamified cow-handling applications with their sights set on training for maternity pens, the parlor and down cows. **BV**

# Does a 6-Day CIDR-Synch Work?

Refinements to current strategies may boost conception rates and reduce rearing costs

BY ANDREA BEDFORD

Over the last two decades, conception rates in lactating cows have reached heights that once seemed impossible.

While milking cows have been in the spotlight, nonlactating heifers quietly carry enormous economic weight.

Paul Fricke, professor and Extension specialist at the University of Wisconsin-Madison, says better heifer reproduction means decreasing total days on feed.

"Raising heifers is all about days on feed. And what controls days on feed? When they calve. And what determines when they calve? When they get pregnant," he says.

## THE GOLD STANDARD HAS GAPS

The 5-day CIDR-Synch protocol, involving two timed gonadotropin-releasing-hormone (GnRH) injections and two timed prostaglandin (PGF) injections along with a progesterone-releasing insert, has been standard for years. But even the best protocol won't work for all cattle. With heifers, two issues stand out:

- **About 30% of heifers come into estrus a day early.**
- **Only 25% to 40% ovulate following the first GnRH injection (G1).**

These issues can be attributed to how heifers differ from lactating cows:

- **They have more follicular waves, so they're at more varied cycle stages when synchronization protocols begin.**
- **Their progesterone levels can be higher, which dampens the LH surge needed to trigger ovulation.**

Researchers decided to ask: With what we know, can we do better with heifers?

## SMALL CHANGE, BIG RESULTS

Fricke had the idea of a 6-day CIDR-Synch protocol to suppress the early estrus and force the heifers to a timed AI.

None of the 6-day protocol heifers showed early estrus, while 28% of 5-day protocol heifers did.

This extra day of progesterone pushed out ovulation. However, while the CIDR was left in for an extra day, the timing of insemination remained the same, resulting in the heifers being bred too early.

When AI was delayed by just eight hours for animals on a 6-day CIDR protocol, conception rates went back up.

"The timing of insemination is important for fertility, especially with sexed semen," Fricke says. "[The 6-day CIDR] may be a little bit of a pain with that eight-hour interval, but I think it could be eight to 12 hours."

## PRACTICAL TAKEAWAYS

Key considerations for this method are:

- **Reduced early estrus events, making grouped AI more manageable.**
- **Ovulation occurs later, so timed AI must be adjusted accordingly.**
- **Heifers respond more uniformly to the longer progesterone exposure.**

## WHERE WE GO FROM HERE

Reproduction has evolved from managing the herd to managing physiology. This 6-day CIDR-Synch is a great example of this shift as a smarter application of the biology we already understand.

For heifers, whose reproductive rhythms differ from cows in subtle but important ways, this one-day adjustment offers a meaningful opportunity to boost performance without creating too much of a management burden. **BV**

### 6-day CIDR-Synch Protocol for Heifers with Delayed Timed AI

*(Adapted from Paul Fricke)*

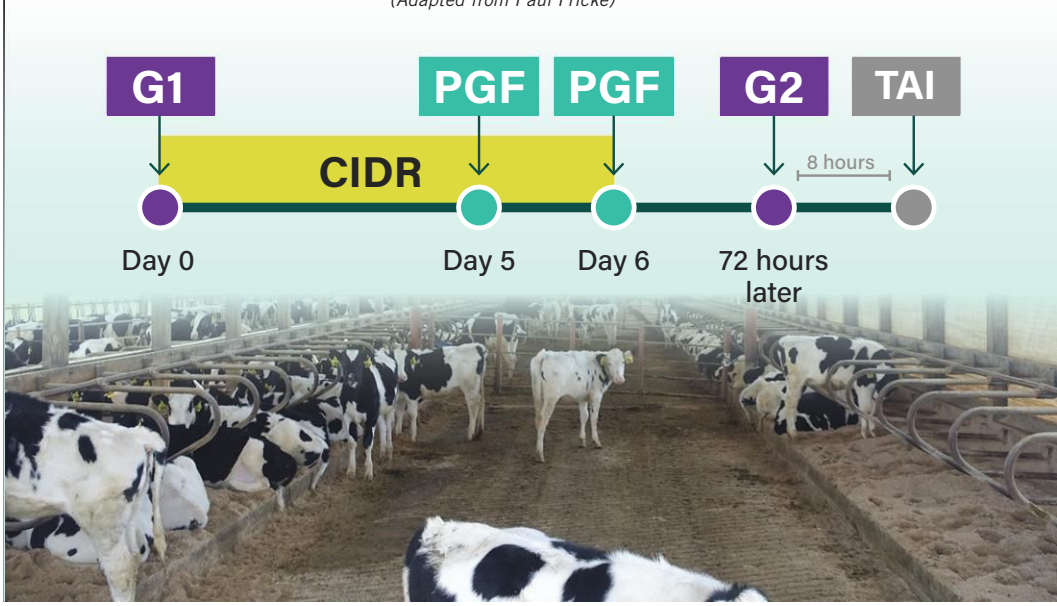
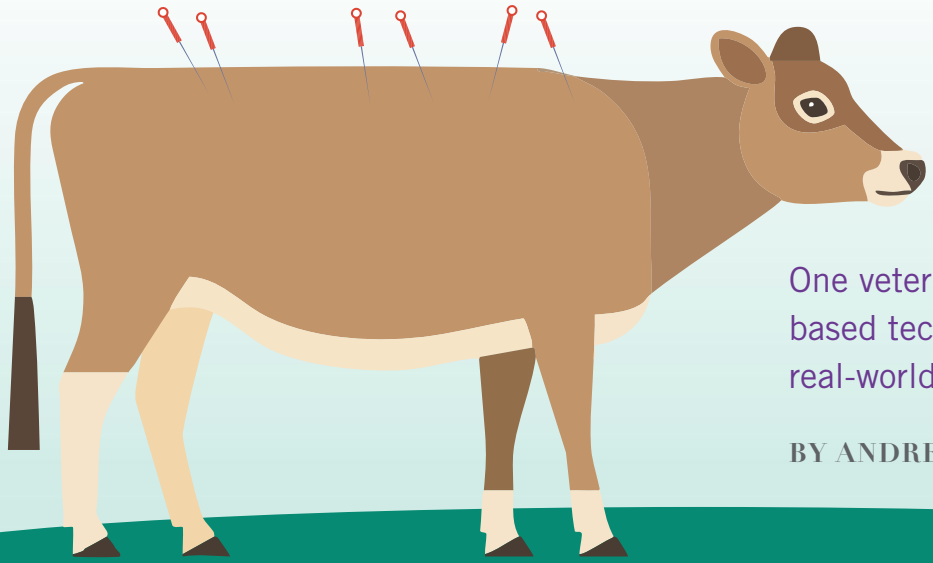



PHOTO: MAUREEN HANSON

# Have You Considered Acupuncture for Cows?



One veterinarian shares how point-based techniques could improve real-world food-animal care

BY ANDREA BEDFORD

With limited tools available for pain and restoring function in food animals, acupuncture, long viewed by many as alternative or fringe, may deserve a second look as a practical, low-risk adjunct for cattle veterinarians.

"It's another option, but there's no reason to throw all the Western [medicine] out," says Dr. Anne Murphy, speaking on Traditional Chinese Veterinary Medicine (TCVM). "You don't use it instead of Western veterinary medicine, you use it in addition to."

One argument for acupuncture in food animals is practicality. It requires no DEA license, carries no residue concerns and does not introduce withdrawal times. Getting trained in acupuncture could arm you with an additional tool to offer your clients for cattle health care.

## HOW IT WORKS

Although acupuncture originates from TCVM, Murphy points out that it is directly related to physiology. Acupuncture points are associated with:

- High densities of free nerve endings
- Blood vessels
- Lymphatics
- Mast cells

These sites, located along energy pathways termed "meridians" in TCVM, typically demonstrate altered electrical conductivity. Acupuncture procedures along these pathways have had measurable neurological and analgesic responses.

"Stimulation of acupuncture points can result in pain relief due to the release of beta-endorphins," Murphy says. "Also, stimulating these points can increase endogenous opioids in the cerebrospinal fluid."

Beyond this, stimulating acupuncture points can influence both immune and reproductive system regulation.

## PRACTICAL ENTRY POINT

Murphy advises taking a simplified approach based on determining the clinical problem then finding the acupuncture back-shu points associated with that problem, rather than a full TCVM diagnosis. These points can be manually palpated using the ribs as guidance.

This approach is particularly well suited to cattle practice where ease of access is important. Points along the topline and hindquarters are reachable and generally well tolerated.

"On dairy cows, it's great because they're skinny," Murphy says. "There's usually a depression, sometimes a prominence, and you use the anatomical landmarks to figure it out."



ILLUSTRATION: LORI HAYS

> *"It's another option, but there's no reason to throw all the Western [medicine] out. You don't use it instead of Western veterinary medicine, you use it in addition to."* —Dr. Anne Murphy

## TECHNIQUES AND SAFETY

There are a variety of acupuncture techniques to consider depending on the situation:

- **Dry needling:** Likely the most commonly thought of acupuncture technique. It involves simply inserting a needle.
- **Electroacupuncture:** This method couples needle insertion with the use of a TENS unit to pass an electric current between pairs of needles.
- **Aquapuncture:** This technique involves injecting a liquid, commonly vitamin B12, into acupuncture points to create a longer-lasting stimulation.
- **Hemoacupuncture:** This involves releasing blood or injecting the patient's own blood into acupuncture points.

Murphy also points out a number of cautions to be aware of if you are considering learning and offering acupuncture as part of your practice.

"[Acupuncture point] bladder 60 is between the lateral malleolus of the tibia and the calcaneian tuber," Murphy describes. "It's known as the aspirin point, but it also promotes parturition. So, you shouldn't use it in pregnant cows unless you want to induce parturition."

She also cautioned against needling near tumors due to increased blood flow and being conscious of animal tolerance to avoid needle breakage or loss.

## WHY IT MAY BE WORTH CONSIDERING

Murphy acknowledges that acupuncture might not always be the answer.

"Sometimes, acupuncture can be like magic, which is super exciting. It's not always like magic, and sometimes it doesn't work at all, but it's definitely worth trying in certain situations," Murphy says.

However, the same could also be said for many common Western medicine practices.

When analgesic tools are scarce and animal comfort matters, acupuncture may offer a meaningful benefit at relatively low risk.

"Acupuncture is a great tool for pain management and treatment of nerve damage in food animals," Murphy says in closing. "But hopefully, success with a few acupuncture points will inspire you to investigate TCVM further." BV


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## NIXIFLOR APPROVED BY THE FDA FOR BRD

The FDA has approved nixiFLOR injectable solution by Parnell Technologies, marking the first FDA-approved generic version of Resflor GOLD by Merck Animal Health. This product is indicated for the treatment of bovine respiratory disease (BRD) associated with Mannheimia haemolytica, Pasteurella multocida, Histophilus somni and Mycoplasma bovis, and for control of BRD-associated fever in beef and nonlactating dairy cattle.

NixiFLOR has the same actives as Resflor GOLD:

- Florfenicol, a broad-spectrum antibiotic
- Flunixin meglumine, a nonsteroidal anti-inflammatory drug (NSAID) that helps reduce fever and inflammation

Administered via subcutaneous injection in the neck, it is prescribed at 40 mg florfenicol/kg body weight and 2.2 mg flunixin/kg body weight (approximately 6 mL per 100lb.), with no more than 10 mL per injection site. A withdrawal phase of 38 days must be observed before cattle treated with nixiFLOR enter the food supply.

## NEW ERA IN VETERINARY EDUCATION AT UC DAVIS



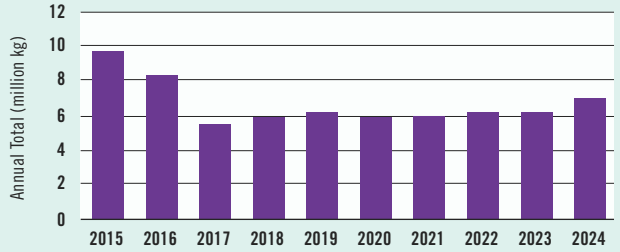

The University of California, Davis announced a historic $120 million philanthropic commitment to its veterinary program from Joan and Sanford I. Weill, through the Weill Family Foundation.

In response, the university has renamed the school the UC Davis Weill School of Veterinary Medicine.

The gift will center an $80 million investment toward the construction of a new small-animal teaching hospital, enabling care for up to 20,000 more patients annually.

The remaining $40 million will be directed toward fundamental and clinical research to give faculty greater flexibility to pursue high-impact ideas.

**U.S. Sales & Distribution of Medically Important Antimoicrobial Drugs Approved for Use in Food-Prodcuing Animals**




## LIVESTOCK ANTIMICROBIAL SALES JUMP

According to the FDA's 2024 Summary Report on Antimicrobials Sold or Distributed for Use in Food-Producing Animals, sales of medically important antibiotics increased 16% compared with 2023, marking a notable reversal after nearly a decade of plateauing or declining volumes. While overall volumes remain approximately 27% below peak 2015 levels, the size and rebound stands out against nearly a decade of gradual reduction. Specific class data show:

- **Tetracyclines:** About a 20% increase
- **Aminoglycosides:** About a 37% increase
- **Lincosamides:** About a 11% increase

In contrast, penicillins declined by about 14%, despite being among the most commonly sold classes overall.

The concurrent rise across these classes likely reflects increased disease pressure and production challenges. While FDA sales data cannot identify clinical drivers, the pattern points toward greater reliance on core therapeutic drugs during a challenging production year.

Looking across species, 41% of medically important antimicrobial sales in 2024 were intended for cattle, 43% for swine and 16% for poultry.

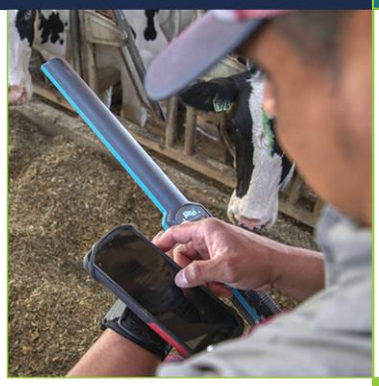
For cattle, tetracycline sales increased about 19%, aminoglycosides increased about 38%, sulfonamides increased about 24% and cephalosporins increased about 26%.

In swine, aminoglycoside sales increased about 25%, fluoroquinolones increased about 49%, sulfonamides increased about 15%, tetracyclines increased about 15% and lincosamides increased about 13%.

A critical point emphasized by FDA is sales and distribution data do not directly measure the actual use of antimicrobial drugs on farms. These drugs can be held in inventory in anticipation of future needs.

FARM JOURNAL

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