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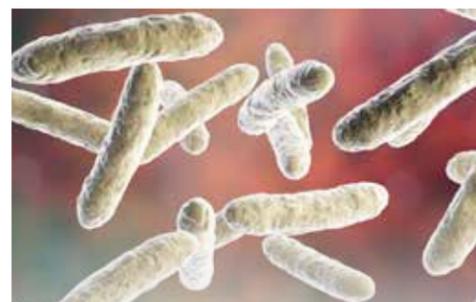


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Welcome Dakota Suko

Dakota grew up in Rockford, MN where her love of poultry began. Raising mallard ducks and pheasants were part of a spring tradition she looked forward to every year. Dakota attended North Dakota State University in Fargo, ND and graduated with an Animal Science degree with a minor in Range Science.

Recently, she spent 4 years working for Jennie-O Turkey store as a Live Production Supervisor. In that role, Dakota oversaw several conventional Tom farms. Often her days would be spent walking flocks with farm managers. Much of Dakota's focus was spent working on proper brood starts to ensure adequate growth and livability. Bird health, management and nutrition are all areas of her expertise. In her spare time, Dakota enjoys running, gardening, cooking, and traveling with her boyfriend and family. In her new position as Poultry Product Specialist at Sioux Nation Ag, don't hesitate to ask her to come out and walk your flocks or contact her with any questions regarding your birds. ◀



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About the Advocate

The Advocate is a resource of agricultural information, intended for anyone working with beef, dairy, swine, poultry and small ruminants.

Our mission is to give producers and their families the tools they need to foster healthy, profitable, informed and purposeful operations now and for generations to come.

This multi-species, quarterly magazine was created to inform and educate our customers about the latest trends, regional and national industry challenges, and human interest stories that resonate with our readers on a personal level. Our contributing writers are experts and leaders in every facet of the animal health industry. Every issue is rich with content relevant to multiple species. What you read in every issue is both important to the producer and responsive to their immediate and future needs.



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Take your operation to the next level with this unique publication filled with industry relevant, to-the-point insight for the ag leaders of today.

To subscribe to or advertise in the Advocate, email Jill Funke at jillfunke@siouxnationag.com.

Chicken & Veggie Linguine



INGREDIENTS:

- 1 8oz package of Linguine, Fettucine, or Spaghetti
- 2-3 T Olive oil
- 8 Boneless chicken thighs (skinless)
- 1 Small onion, diced
- 1 Red bell pepper, diced
- 8 oz. Portabella mushrooms
- 2 small zucchini, sliced
- 3 Cloves garlic OR 1.5 t garlic powder
- 1 C White wine OR chicken broth
- 2 15-oz. cans crushed tomatoes
- 1 t salt
- ½ t pepper
- Fresh Parsley
- Fresh Basil
- Grated Parmesan Cheese

INSTRUCTIONS:

Boil a pot of lightly salted water, add noodles and cook until al dente.

Cut the chicken thighs into smaller pieces. Heat a large skillet on medium high until very hot and add 1 T olive oil. Place half of the chicken pieces to the pan, and let them sit for a few minutes to brown. Flip pieces over to brown the other side. Remove chicken from pan and repeat process with remaining meat. When finished, set all of the chicken aside.

Add 1 T olive oil into the hot pan followed by the onions. Cook for 5 minutes while stirring and throw in the peppers. Continue cooking for 3 more minutes and stir in the garlic, mushrooms and zucchini.

Cook for 5 more minutes or until the vegetables are soft to personal preference.

Pour in the wine or broth while whisking to deglaze the pan. Reduce the heat to medium and cook until half of the liquid is left.

Add the tomatoes, salt and pepper and stir. Simmer on low heat for 15 minutes.

Add the chicken simmer another 15 minutes. Parsley and basil can be added to the sauce in the last 5 minutes.

Plate pasta topped with sauce mixture and top with grated Parmesan cheese.



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BUILDING A LIFE A RANCHER'S WAY

By Jill Funke, Communication Manager, Sioux Nation Ag Center

T There is a quote about life that reads, "Hard work spotlights the character of people: some turn up their sleeves, some turn up their noses and some don't turn up at all." South Dakota ranchers Charlie and Tanya Totton know how to roll up their sleeves and embrace hard work. The couple owns and operates Totton Angus, a black angus cow/calf breeding operation near Chamberlain, SD. Between their cows and yearlings, Totton Angus has about 650 head of cattle. They operate with the goal of raising bulls with calving ease that will produce trouble free, hard-working, and profitable females for their commercial customers.

Many ranchers learn the ins and outs of the industry on their family ranch. Charlie's father had a full-time job and raised about 40 cows on the side. It was his uncles who raised livestock for a living, and Charlie spent many of his younger years working for them as he grew up. He remembers that his uncles were particular about the care of their animals, and always made sure the work for the day was completed. During that time, Charlie says he learned a great deal about life and work, and that set the tone for his adult life as he explains, "I have always liked being outdoors, and knew that at some point I wanted to be my own boss instead of punching a clock for someone else."

In the beginning

The Tottons were married in 1983. At first, Charlie had a full-time job and was ranching on the side before he decided to work for himself. This was a difficult economic time for farmers and ranchers, as he remembers financing a small tractor at a 20% interest rate. After experiencing the economic farm/ranch crisis of the 1980's and two droughts, Charlie and Tanya realized they wouldn't be able to afford feeding larger cows. Through necessity, the Tottons started purchasing the less expensive smaller-framed, old fashioned cows as the couple projected that they could sell lower birth weight heifer bulls from those smaller cows. This change in focus has served them well, as it has been their specialty for the last twenty-five years.

During that quarter of a century, Charlie and Tanya have learned a few things about ranching and how to operate a successful business. The couple will quickly state that business owners should never stop learning and looking for better and more effective ways to run their operations. Being open to new ideas about building corals and creating low stress environments for livestock has greatly enhanced the success of their day to day task management, as Charlie explains, "Working with livestock used to be stressful for both the humans and the animals. Now, those days are really no big deal."

Arriving at that conclusion took time, however, as the Tottons began attending cattle working classes and their first reaction was to laugh at the idea of

some other cowboy showing them a better process for working their own cattle. The laughter changed to respect when Charlie and Tanya implemented the advice and found a level of success that they hadn't imagined. Some of the techniques they used included building and locating corals differently than they had in the past and taking a slower approach when handling the animals. Now, the Tottons first consider the environment from the animal's point of view, working hard to eliminate distractions for the livestock and positioning themselves better so that the cattle think they are running by the humans to get away from them and in reality, they are running to exactly the spot they need to be. Approaching livestock handling from this perspective saves time and almost eliminates the stress factor for both animals and people. This principle has taught the Tottons to evaluate their animal handling style at every stage of the operation, and they change their methods when things aren't going as planned as Charlie advises, "Often if the cattle aren't cooperating, it's because you are doing something wrong." Realizing the difference these practices have made to his operation, Charlie highly recommends a Holistic Management Class for beginning ranchers or anyone who hasn't previously attended the course.

Weaning made easier

As any rancher or farmer knows, the weaning process can be difficult for all involved. Instead of separating the offspring from their mothers and immediately placing them in a different pen or lot with new, strange feed and muddy conditions where they almost inevitably get sick, the Totton Ranch tackles weaning a little differently. They practice across the fence weaning, beginning with a slow move of the cow-calf pairs to the pasture for a few days where they become familiar with their new, comfortable surroundings. The day of cow/calf separation sees very gentle handling as the cows are sorted to one side of the pasture, with the calves sorted to another and a combination of hot and ground wires erected to separate the groups. While the calves can no longer nurse, the mothers and babies can still get close and smell each other which provides a level of comfort for them. After about five days, the cows are gently moved away and because they are used to being handled, Charlie says, "I can gather 200-300 head by myself as they are used to me." He still cannot believe the transformation this process has made as he exclaims, "The difference in the stress level between our old approach and the lowered anxiety method is unreal."

Continued on page 12



“Working with livestock used to be stressful for both the humans and the animals. Now, those days are really no big deal.”

—Charlie Totten

Continued from page 11

Another practice that the Totton Ranch has embraced is swath grazing. Instead of baling the cane/sorghum, they leave it lay in the windrows. Then, later in the dormant season, they string an electric fence to ration the feed in the windrows so that there is minimal waste. This strategy not only saves the costs associated with baling and hauling feed, it provides the added benefit of automatic manure spreading. The digestive system in cattle lacks efficiency, resulting in many of the nutrients consumed ending up in the animal’s manure. As the cattle roam the field and graze, they scatter manure much like the spreading equipment would. With this highly sustainable approach, very little leaves the land and costs are significantly lowered.

Dealing with issues immediately

Ranchers and farmers are more keenly aware of the impact that genetics has on an operation than ever before. The Totttons make it a point to cull any animal that they have identified as having an issue and move them to their commercial cow group, where they are terminal crossed. Charlie says, “I am convinced that the problems, even with fence crawlers and any other issue are genetically inherited. The more quickly you remove a problem out of your heard, the less issues you will see with the offspring.” Charlie and Tanya make it a point to communicate this management practice often so that their customers know that the animals they are purchasing will not be problem livestock as those are always culled immediately. Tanya feels this practice helps build trust, as she says, “When customers know that you cull everything with a problem, they can rest assured you aren’t passing any issues on to them.”

Even though they have spent a quarter of a century working with customers, Charlie and Tanya say that they are still learning the best ways to interact with their patrons. According to Charlie, they stick with their laid-back approach as he says, “It feels like there are many high-pressure salespeople out there, and ranchers attend a couple of livestock sales every year with a fast-talking auctioneer. We don’t have that here.” One change the Totttons made was to return to a more local customer base after spending a decade participating in a nationwide bull marketing model. They resumed their low stress exchanges with regional customers that they could build relationships with, as the only time they heard from their nationwide customers was when those customers were unhappy.

Lessons learned

One of the lessons the couple has learned is that quickly throwing money at every issue that comes up is not the best solution. Charlie advises, “Put some thought into the problem to see if you can manage your way out of it.” For example, in a scours outbreak, the Totttons first try moving the animals out of the mud and into a healthier environment. Many of the business management practices they have adopted along the way have come from the challenges they faced. One of the biggest challenges the family faces is maintaining health insurance coverage, as they say



the options available to them are very limited and extremely expensive. They are thankful that their daughter Courtney and her family were able to return to the ranch where she now works full time. She and her family are able to do this because she is also in the Nation Guard and that provides affordable health insurance coverage for her family. While she attends drill one weekend each month, Charlie says that he doesn’t mind covering her work as he feels that her absence is a small sacrifice for the family in return for affordable coverage. Wondering how others confront this challenge, Charlie says, “I don’t know how any young family can make it work without something like this arrangement that Courtney has.”

Other issues that the Totttons have tackled include the difficulty in securing the land base needed to run their cattle. Charlie says, “When we got started, land was cheap but interest was high. Now the price of land is high and interest is cheap, and it’s still hard!” Renting much of the land necessary for their operation, Charlie and Tanya live with the trials associated with finding and keeping adequate rental land, and timing those arrangements with market prices as Charlie explains, “When land is available for lease, you hate to buy cattle at the top of the market as that can get expensive.”

Family and community are everything

Owning and operating a business for 25 years often accompanies the learning of business and life lessons. As Totton Angus is a family business, Tanya says, “We must be flexible in this business and everyone in the family understands that. To work around constantly changing weather and other constraints, you need to teach yourself to get over a stressful day as it is just another day.” She says there are advantages to working with family, as she explains, “Working with family can be an advantage since they have lived the ranching lifestyle. They understand you, they know how you do things and tasks can be completed more quickly.” At the same time, working with family can have its difficulties, about which Tanya advises, “You need to be forgiving with family and employees, and you should work to make sure you are fair to everyone.”

About six years ago, the Totttons participated in the Black Hills Veterans March and Marathon, and it opened them up to

wonderful new experiences. Looking back on his initial experience, Charlie says, “The first time we went we weren’t even sure we were going to finish. After completing the half marathon several times, we decided that we needed to complete the entire march/marathon so that we could tell people we did it.” At the first marathon, the couple was served hamburgers, but ate pork sandwiches the next year. The couple is always looking for ways to promote the consumption of beef in a healthy lifestyle and saw these events as another way to accomplish that goal. To ensure that the events would feature only beef for their meals, Charlie says that he begged for, borrowed and donated meat himself. In addition to the marathons they participate in, Charlie and Tanya organize an annual beef cook off that raises money for Veterans. Those who have served are honored guests who dine for free at these gatherings.

In an effort to be good stewards of their land and environment, the Totttons are supporters of the Natural Resources Conservation Service (NRCS). For the past few years, Totton Angus has hosted educational sessions for the South Dakota Grass Lands Coalition, with as many as 60 people in attendance. The participants use the Totton Angus cattle in pens as they are learning about pasture allocation per animal, wildlife preservation and grassland productivity and protection. Charlie and Tanya feel that these classes are extremely beneficial, particularly for younger producers and he often tells others, “You can learn something at every class.” The couple also recommends that other producers know to join the South Dakota Soil Health Coalition for the resources that they can provide.

At this point in their lives, Charlie and Tanya spend any free time they can manage by spoiling their four grandchildren and are excitedly awaiting the arrival of their fifth. The couple splits the daily workload at the ranch, with Charlie doing more of the hands-on tasks and Tanya paying bills and keeping track of their financial information during the year. Currently, they are preparing for their May 9 bull sale in Chamberlain and are anticipating the arrival of spring. Considering their business, family and community involvement, the Totttons’ future plans are to continue their lifestyle, as they are the embodiment of another fitting quote, “There is not a moment in life wasted on the ranch.” ◀

By Jake Geis, DVM, Sioux Nation Ag Center

Origin and use of health papers

To help answer producer questions regarding CVI's, I turned to Dr. Dusty Oedekoven, the state veterinarian for South Dakota. Looking backwards, he detailed where the process of requiring CVIs originated.

"In the United States in the early part of the 20th century, we were combating pseudorabies, hog cholera, brucellosis and tuberculosis. When quarantine areas existed, state and federal regulators were tasked to certify animals were not coming in and out of a quarantine area. Thus, a certificate was developed to be utilized by veterinarians accredited by the government to guarantee livestock moving from place to place were not transmitting these diseases."

Though these diseases are no longer as prevalent as they were in the early 20th century, veterinary inspection is still utilized to certify that livestock are not showing visible signs of contagious infectious disease.

Health papers aid in controlling outbreaks

CVIs perform a second task in disease surveillance. If an outbreak of a reportable disease occurs, CVIs form a paper trail listing where livestock have been to trace the source of the outbreak. This limits the amount of investigation by state and federal veterinarians in determining the source of the outbreak.

For example, if disease X was detected in pigs, instead of stopping movement of all pigs in the state, the search can be narrowed to focus on only the animals that are likely to have been exposed to the disease. As a result, less producers are placed under quarantine for a disease and those who are under quarantine can move their livestock sooner because the testing is more limited.

According to Dr. Oedekoven, the end result from using CVIs is better continuity of business. "Movement both between states and internationally requires certification that livestock are free from certain diseases. Through the certification and the traceability provided by CVIs, trades of livestock can occur confidently and efficiently."

A key reason for the scrutiny involved in tracking livestock movement is the seriousness of livestock diseases. Certain diseases are a threat to human health; therefore their control is vital for the safety of all Americans. Others may not be a human health concern, but can have catastrophic economic and production effects on other livestock producers. This makes their control necessary for the financial well-being of all in animal agriculture.

Different requirements between states

For those who transport livestock to different states, confusion often occurs when the requirements for entry into one state differ from another. Michael Stepien, Public Affairs Specialist for the USDA Animal and Plant Health Inspection Service, explained that this discrepancy is due to various factors. Taking bovine tuberculosis as an example, he states, "(State testing for tuberculosis) is dependent on the intended

movement of the animals, state of destination requirements and individual herd accreditation status or disease risk." As each of these aspects change, so do the requirements for entry into various states.

Other diseases may be handled differently between states because they are not regulated by the federal government, but rather individual states. Stepien explains, "Tritrichomonas is a State only regulatory program. Many States have instituted testing of bulls prior to sale or for interstate movement. Since this is not a federal program disease, USDA does not contribute significant resources to this effort." Because states can decide to require testing or not, and if they only require testing for bulls from certain states, the end result is the testing needed to obtain a CVI changes.

What happens with the information on my health papers?

Dr. Oedekoven estimates that the state of South Dakota receives around 35,000 CVIs each year. Part of the information from these documents is entered into a database at the state level. The South Dakota Animal Industry Board has limited the availability of this information solely for the purpose of disease control. In addition, this information is not subject to public disclosure laws.

Why is this important to me?

Being as fiercely independent as we are, livestock producers may question the necessity of the CVI program. An example of how important this becomes is found in control of tuberculosis in cattle.

If the state lost its tuberculosis-free status, Dr. Oedekoven said that it could be designated as "modified accredited advanced" status by USDA. This means all cattle 18 months of age or older would be required to test negative for tuberculosis before they could leave South Dakota. An exception to the testing requirement would exist for cattle that were headed directly to slaughter.

Under this designation, all cows going out of state would be required to be run through the chute and given a tuberculin injection, then run through the chute again in 72 hours to see if there was a reaction. There likely will be some that react, as the test has a false positive rate of roughly 3%. For these cattle, a second test must be given, which can only be administered by a state or federal veterinarian. The second test utilizes a similar injection, this time given in the neck, and must also be observed again in 72 hours. The cost to the cattle industry would be significant.

By faithfully utilizing CVIs, the source of any tuberculosis cases in the state can quickly be tracked and eliminated, thereby preserving our tuberculosis-free status. Considering that tuberculosis is only one of several diseases that would be problematic for livestock producers, taking the time to obtain a health paper is one of the best insurance policies we can buy for keeping livestock moving in a timely fashion. ◀

What's the Point of these Health Papers?

If you've ever taken livestock across state lines, you should be familiar with the document known as the health paper. A health paper, officially called a "certificate of veterinary inspection" (CVI), is required for travel with livestock between states. Even within the state, these CVIs are needed for county fair or certain other livestock shows.

Inevitably while I am doing inspections for CVIs, the question will arise about the purpose of these papers and where did they start? Also, what good do they do for me as a livestock producer?



Factors Associated with Handling of Livestock

By Grant Crawford, Technical Services Manager at Merck Animal Health

Handling livestock, whether to provide routine care or for treatment of sickness, is a common and often unavoidable part of livestock production. However, there are instances where handling can be avoided, and it is important to be aware of the performance effects that livestock handling may have.

Every animal responds to stressful situations differently. Naturally calm animals, when handled in a low-stress manner, may show no negative effects in terms of growth, health, or reproduction. Animals with a more excitable temperament, however, may be unable to cope with the change in environment and may become stressed. The stress response will increase cortisol concentrations, and this can lead to reductions in growth, reproduction, and health. Any handling of livestock will also increase the risk of injury to livestock as well as any human personnel involved.

Affects of animal handling on feedlot cattle

In a 2008 study, researchers assessed the costs of processing cattle for re-implanting in 20 feedyards in the

central United States. This study included pen means for 68 pens and 8,945 head of cattle. For the ten days following processing, feed consumption was, on average, 0.44 pounds/head/day less than the ten days prior to re-implanting. Of all of the pens of cattle processed, 61% had reduced feed intakes after processing. Assuming an incremental feed conversion of four pounds of feed intake per pound of gain, the decreased feed intake would result in a loss of 1.10 pounds per head processed. At current fed cattle prices of \$1.20/pound live weight, this results in a loss of \$1.32/head processed. In addition, a survey of feedyard managers estimated one injury per 8,136 head of cattle processed for re-implant. Assuming a processing weight of 1,000 pounds and a value of \$1.30/pound for a 1,000 pound steer, this equates to an additional \$0.16/head processing loss. Feedyard managers also assumed a cost (labor, planning, and equipment) to process of \$0.62/head. In combining the lost performance, losses due to injury, and feedyard cost, the total cost of processing is approximately \$2.10/head. An earlier assessment of the cost of processing cattle for re-im-

plant estimated a reduction in average daily gain of 0.22 pounds due to processing. Over a 180-day feeding period, this results in a 40 pound reduction in live weight, or \$48/head at \$1.20/pound live weight.

Effects of animal handling on beef cows

Nutritional status has a great impact on reproduction. Therefore, decreased nutrient intake associated with stress, as well as altered nutrient partitioning and increased metabolism to support a stress response can indirectly affect reproduction. Stress hormones, particularly cortisol, can also have a direct negative effect on reproduction¹. Pregnancy rates in beef cows declined from nearly 100% to less than 40% when comparing cows with blood cortisol concentrations of less than 20 ng/mL (low stress) to cows with blood cortisol concentrations of greater than 80 ng/mL (highly stressed).

The first 60 days after breeding are particularly critical for maintaining pregnancy. Handling heifers 10-15 days after breeding reduced pregnancy rates by 6% compared with leaving heifers

in the pasture. Research assessing the effects of shipping stress on bred cows has shown pregnancy rate reductions of 6-12% when cows are shipped within 60 days after breeding. Although stress from shipping is greater than that from handling cows or heifers, it is likely that simply handling bred cows or heifers in this timeframe could result in reduced pregnancy rates as well.

Cow/calf operations vary widely in size, labor availability, condition of cattle handling facilities, and distance from pastures to cattle handling facilities. Therefore, it is difficult to make an industry-wide estimate of the monetary costs of handling cows. However, some assumptions can be made to develop a baseline for costs. For example, a 200-cow herd may require four people to prepare and clean up facilities, gather and process cattle. Assuming that this entire process takes seven hours, and each laborer is paid \$15.00/hour, the total cost of processing 200 cows is \$2.20/cow. This does not take into account equipment and maintenance costs, vehicle and/or horse costs associated with gathering cattle, potential for lameness, abortion, and other factors. When all of these factors are considered, the cost is likely more than \$4.00/cow.

Effects of animal handling on health

Added stress on livestock can lead to greater incidence of and greater severity of respiratory infections. In addition to infectious health issues that may arise due to stress associated with animal handling, non-infectious issues such as lameness may be associated with stressful animal handling. In a 2014 survey of 147 feedyard managers, consulting nutritionists, and consulting veterinarians, cattle handling after arrival was implicated as the primary cause of non-infectious lameness. In determining the lost revenue due to treatment of lameness, 40.1% of respondents estimated a loss of \$1 to \$50/head treated, 27.9% estimated a loss of \$51 to \$100/head, 8.8% estimated a loss of \$101 to \$200/head, and 5.4% estimated a loss of greater than \$200/head. A Canadian study indicated that the cost of treating an animal for lameness was approximately \$10.50/head.

Effects of animal handling on human safety

Beyond animal performance and health aspects, it is also important to recognize the human element of livestock handling. Between 2003 and 2007, there were 108 reported fatalities in the United States that involved cattle. Animal contact is generally ranked as the first or second-leading cause of injuries on agricultural operations.

Animal handling and animal welfare

Finally, our society is becoming increasingly interested in the practices involved in raising production livestock. As a part of this, animal welfare concerns have increased, and are becoming a key marketing tool for many large corporations. With this in mind, any practices that can be incorporated to reduce the risk of injury to livestock should be considered.

Whether it be through reduced stress, sickness, or injury, or a combination of all of these factors, it is clear that reducing the handling of livestock can have positive effects on animal health and production. In addition, by reducing the number of times livestock need to be handled, there is a reduced risk of injury to humans, and reduced costs associated with equipment and moving livestock. As consumer demand for improved animal welfare increases, the need for non-handling methods of treating livestock are becoming increasingly important.

Conclusion

Regardless of phase of production (cow/calf, stocker, or feedlot), cattle handling represents a cost to cattle producers. The actual cost varies greatly based on size of operation, facilities, labor availability, and several other factors. The cost of cattle handling can also be affected indirectly by lost feed intake, reduced reproduction, or increased morbidity due to stress associated with cattle handling. In addition to stress on cattle, handling poses a risk to cattle production employees. Overall, methods to reduce animal handling can improve animal productivity and reduce risk of injury to cattle as well as humans. ◀

- ▶ Handling cattle can negatively affect growth, health, and reproduction in multiple ways.
- ▶ In feedlot cattle, handling cattle costs the feedyard an estimated \$2.10/head due to labor costs, lost feed intake and growth, and risk of injury.
- ▶ Cow/calf operations likely realize a cost of more than \$4.00/head to handle cattle. This figure can vary greatly depending on the operation.
- ▶ Research has shown that stress during the first 60 days of pregnancy may reduce pregnancy rates 6-12%.
- ▶ Cattle handling after arrival is the primary cause of lameness. The cost to treat lameness is estimated at \$10.50/head.
- ▶ Animal contact is ranked as one of the two leading causes of agricultural-related injuries.
- ▶ As awareness of animal production practices becomes more widely scrutinized, non-handling methods of treating livestock are becoming increasingly important.



The Frustrating Newborn Calf

By Roy Peters, DVM, Sioux Nation Ag Center

One of the most frustrating situations at calving time is when a newborn calf is weak, acts dumb, or will not suckle after birth.

These calves can be very time consuming as producers try to get them up and going. There can be multiple causes of calves being weak, slow or not wanting to suckle after birth. We will look first at the possible causes of weakness, and then examine the causes of non-suckling.

Nutritional deficiencies in the cow have emerged as one of the most common causes of what is called "Weak Calf Syndrome". It can be a late gestation diet of the cow that is low in protein, energy, or micronutrients. In one study, cows fed diets with less than 10 percent protein hay during the last 60 days of gestation experienced an incidence of 8.5% weak calves. Cows with a body condition score of >5 also experienced less chance of weak calves. Cow diets are recommended to contain at least 2 lbs. of protein/day and TDN >56% during those last 60 days before calving.

Micronutrient deficiencies in late gestation cow diets have also resulted in weak or dead calves at birth. Lab

work on newborn mortalities revealed that the 33% of the calves were low in Selenium, 80% low in vitamin E and as high as 95% low in vitamin A. Feeding a good mineral with chelated minerals and good fresh vitamins should be standard practice, as feedstuffs stored over winter lose vitamin content.

Common diseases have also occasionally been the cause of weak or stillborn calves. BVD (bovine viral diarrhea) is one disease that has been the cause in certain herds. Lepto has also been associated with weak and stillborn calves. However, 50 years of observation does not show any consistent infectious cause of weak calves.

Suckling issues

Sometimes, calves appear normal at birth, and are not weak, but will not suckle. There are several possible causes for this. Pain due to trauma during delivery or shortly after should be considered, particularly in calves from heifers, as well as slow or assisted deliveries.

Hypothermia could be a factor in non-suckling, as the condition happens more easily than people realize, especially if calves are wet, in the wind, or do not have good quality bedding. Pro-

ducers should make a point to take the calf's temperature to determine if they have a cold calf on their hands.

Metabolic acidosis is another common under-diagnosed cause of calves not suckling. Tubing these calves with an alkalinizing electrolyte has helped in mild cases, while more severe cases may require an IV bicarbonate or a lactated ringer solution.

Another thing to consider is that the calf may not be hungry. If colostrum has been tube-fed, these calves may not be interested in suckling for up to 24 hours. Do not tube-milk the next feeding. If anything is given to these calves, it should be an alkalinizing electrolyte. Calves that have been tubed multiple times will lose their suckle reflex and it may take some coaxing with a nipple bottle to get these calves to suckle again.

Navel infection should also not be overlooked. Calves can develop a navel infection within 24 hours of birth and will feel sick with no appetite. These calves need appropriate antibiotics.

We acknowledge Dr. Bob Sager of Medicine Creek Bovine Health Services as the source of some of the information in this article. ◀



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2. G. G. Van Der Weide, University of Missouri, USA.
3. G. G. Van Der Weide, University of Missouri, USA.





BCS CALVING DIFFICULTY

By Dan Larson, Ph.D., Great Plains Livestock Consulting, Inc.

As we approach and enter the calving season, many of us should be concerned with the body condition (BCS) of our heifers and young cows. Research has demonstrated that mature cows in a BCS of 4 or less at calving require 80 days to resume cycling after calving, whereas cows in a BCS of 5 or 6 at calving require 55 days to resume cycling (Houghton, 1990). First calf heifers likely require an additional 0.5 to 1 BCS at calving to achieve the same results. One misperception preventing producers from improving BCS is that a modest increase in nutrition will increase calving difficulty. It is important to keep in mind the difference between a modest increase and an overabundance of protein and/or energy.

Defining a Modest Increase In Nutrition

A modest increase in energy will lead to an increase in BCS without affecting calving ease. Research conducted by L.R. Corah (1975) revealed that a 35% increase in energy in the last 100 days before calving resulted in a 4 lb increase in calf birth weight with no difference in calving difficulty. Similarly, Bellows and Short (1978) demonstrated that a 90% increase in total digestible nutrient for 100 days prior to calving only increased birth weight by 4 lb. Even this tremendous increase in energy resulted in a negligible (4%) increase in calving difficulty. However, pregnancy rates during the subsequent breeding season were improved by 15% or more in each study.

Improving the protein status of pregnant females can also improve BCS. A study by R.V. Anthony (1986) fed diets that

provided 80% or 140% of crude protein requirements (60% increase). The greater crude protein diet increased BCS from 5.4 to 6.1. Yet, calf birth weight was only increased by 2 lb and there was no difference in calving difficulty.

Benefits of Optimal Nutrition and BCS

One of the clearest representations of the effect of BCS on birth weight and calving difficulty is a series of experiments conducted by Wettemann and others in 1986. These researchers fed heifers to achieve a BCS of 4, 5 or 6 at calving. Each successive increase in BCS increased calf birth weights by a modest 2-3 lb. More importantly, calving difficulty was not affected by BCS. However, each increase in BCS resulted in at least a 10% improvement in pregnancy rate in the following breeding season. Clearly, improving pre-calving BCS is integral to rebreeding success.

Additional benefits of improving nutrition prior to calving include improved colostrum quality, increased calf survivability, increased weaning weight, improved steer calf quality grade, and an improvement in heifer calf reproductive performance. The benefits of improved nutrition are too important to ignore. Research has clearly proven a modest increase in nutrition does not increase calving difficulty. It is also important to note that virtually all research indicates mature cows are even less susceptible to nutritionally-induced calving difficulty. Consult with your nutritionist to develop a program that will improve your reproductive efficiency and cowherd performance. ◀

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Internal Parasites in Beef Cattle and Their Impact on Nutritional Status

By M.E. Corrigan, PhD

One aspect of internal parasite infections that is often overlooked is their impact on the nutritional status of the animal. Internal parasites negatively impact feed intake in cattle. While this has an obvious impact on nutritional status of the animal, the impacts of internal parasites on nutrient absorption and nutrient requirements of the animal are seldom discussed. The effects of internal parasite infections on the nutritional status of the animal are important because they impact every aspect of biology. Without a proper supply of nutrients, the ability to fight off infection, grow, and reproduce are compromised.

Internal Parasites and Feed Intake

The largest impact that internal parasites have on beef cattle production is a reduction in feed intake. Cattle with relatively low parasite burdens (324 total slaughter worm counts) have been shown to have depressions in feed intake of up to 3.2%, while cattle with high parasite burdens (11,164 total slaughter worm counts) have been shown to have depressions in feed intake of up to 7.8%. Less feed intake means that the animals are consuming less energy, protein, vitamins and minerals, all of which play a vital role in animal growth, reproduction, and immune function.

While parasites negatively impact the immune response independent of their effect on nutritional status, their impacts on feed intake, nutrient absorption, and energy status of the animal further impair its ability to respond to bacterial and viral infections. The depression in feed intake is especially detrimental to recently weaned or newly

received calves that typically have low intakes without the added stress of an internal parasite challenge. Because of the stress these cattle experience, they are susceptible to infection by a myriad of bacteria and viruses. The immune system of these stressed animals is already compromised because of the immunosuppressive effects of the hormones that are released in response to stressors. The presence of internal parasites will exacerbate that problem because the animal now must mount an immune response to the parasites, and with the concurrent depression in feed intake it has less energy, protein, vitamins and minerals to do so. Several studies have demonstrated the benefits of proper deworming on the health status of the animal. For example, Reinhardt et al. compared the effects of on-arrival feedlot deworming treatments on the health and performance of sale barn-purchased heifers.

Effects of Internal Parasites on the Gastrointestinal Tract

In addition to a reduction in feed intake, parasites also have a detrimental impact on the function and integrity of the gastrointestinal tract. These effects include an increase in the pH of the abomasum (gastric stomach) of ruminants. This increase in pH may be due to several factors, including inflammation that occurs in response to the presence of parasites. Pathological changes in the small intestine include an increase

in the density of mucus secreting goblet cells 60 days after experimental infection with *Cooperia punctata*. Other observations from that study included thickening of the intestinal wall and enlarged mesenteric lymph nodes. These changes are indicative of a severe immune response and a shift from absorptive cells (enterocytes) to mucus-secreting goblet cells and provide an explanation for the reduction in the absorptive function of the small intestine in response to parasite infections. Some parasites also inhabit the cecum and proximal large intestine, and their presence can be associated with damage and inflammation in those areas as well.

Effects of Internal Parasites on Energy Status

The biggest impact of internal parasites on the energy status of an animal is due to the depression in feed intake. The reduction in feed intake means a reduction in intake of calories (i.e. energy) for maintenance of body weight, growth, and reproduction. The metabolic costs of internal parasite infections are somewhat more difficult to measure yet are a consequence of altered protein metabolism (discussed below) and the metabolic cost of immunity. Several pro-inflammatory cytokines are up regulated in cattle following internal parasite infection, which increases the energetic needs of the animals.

Effects of Internal Parasites on Protein Status

Internal parasites impact protein status of the animal several ways, and the presence of internal parasites in ruminants such as sheep has been estimated to cost 17 g/day of metabolizable protein. This loss of protein is from increased nitrogen loss in the small intestine from endogenous sources and increased urinary nitrogen excretion. Additionally, parasites that infect the abomasum (i.e. the gastric stomach), such as *Ostertagia ostertagi* (brown stomach worm), *Haemonchus placei* (barber pole worm), and *Trichostrongylus axei* (small stomach worm)

can damage the parietal cells which produce hydrochloric acid in the stomach. This acid is necessary to reduce the pH of the abomasum in order to activate the enzyme pepsinogen which is a crucial enzyme in the breakdown of protein. The failure to activate pepsinogen will negatively impact protein digestion.

Effects of Parasites on Vitamin and Mineral Status

The specific effects of internal parasites on the vitamin and mineral status of animals are poorly understood. However, a reduction in intake would decrease the supply of both vitamins and minerals to the animal. Moreover, the damage caused by parasites to the gastrointestinal tract would limit the absorption of the nutrients that are consumed. This concept is supported by the observation that the absorption and retention of both calcium and phosphorus is compromised in the animals with internal parasite infections. Additionally, abomasal parasites impact copper absorption because its solubility is dependent on the low pH of the abomasum⁹.

Conclusion

In summary, internal parasites impact the nutritional status of the animal in three ways: they decrease feed intake, they decrease nutrient absorption, and they increase nutrient requirements of the animal. Through these mechanisms, parasites impact the energy, protein, vitamin, and mineral status of the animal, thereby impacting every aspect of biology of the animal that is relevant to production. The reduction in nutrient intake and absorption is especially detrimental in high-stress cattle because the poor nutritional status of an animal infected with parasites contributes to their inability to respond to a microbial disease challenge. However, the negative effects of internal parasites are not limited to high-stress cattle, and other classes of infected cattle will also have fewer nutrients available for growth and reproduction. ◀

- Parasites impact the nutritional status of the animal in three ways:
 - o They decrease feed intake
 - o They decrease nutrient absorption
 - o They increase the nutrient requirements of the animal
- Through these mechanisms, parasites impact the energy, protein, vitamin, and mineral status of the animal
- Reduced nutrient intake and absorption is especially detrimental in high-stress cattle
- The poor nutritional status of an animal infected with parasites contributes to their inability to respond to a microbial disease challenge
- Animals infected with parasites also have fewer nutrients available for growth and reproduction

4 Keys for Effective Probiotic Use

BEEF

Submitted by Lallemand Animal Nutrition

The benefits of probiotics keep adding up for livestock producers. Research shows that including probiotics in rations can improve producers' return-on-investment through better feed efficiency, increased production or even more robust immune responses.¹

"With benefits like these, feeding a probiotic can easily pay off — but not every probiotic is worth the investment," says Angel Aguilar Ph.D., Dipl. ACAN, Technical Service Manager, Lallemand Animal Nutrition. "In animals, there are many dynamic and robust bacterial communities that are essential for productivity and well-being. Influencing these communities in a positive way can result in better overall health and productivity. Positive responses we've seen in research trials can even lead to reduced treatment costs. Yet, you can't add just any probiotic to a ration and expect amazing results."

There are thousands of yeast and bacteria strains, and each can have a different effect — or sometimes no effect at all. To get results, Dr. Aguilar suggests using four main criteria for selecting a probiotic:

- 1) **Alive:** Choose a probiotic containing live, or viable, bacteria or yeast. These products have a minimum viability guarantee on the product label.
- 2) **From a trusted manufacturer:** Ensure production and handling preserves the probiotic activity throughout the entire production distribution process.
- 3) **Specific:** A probiotic should be specifically selected strains, and proven, for a production or a health outcome in livestock.
- 4) **Feed daily:** Include probiotics in livestock rations each day to maintain an effective level.

First, probiotics must be alive when consumed by the animal, Dr. Aguilar says. "It is well recognized that probiotic microorganisms must be alive, or viable, to have an effect on the microflora of the animal's digestive system," he says. "In fact, many governmental agencies will only authorize a claim on performance — such as improved milk production or feed efficiency — when the probiotic microorganism is viable."

Next, the probiotic should be purchased from a reputable manufacturer. Harsh environments and poor handling can harm these beneficial organisms, he says. Each strain of yeast or bacteria has its own unique growing, handling and storage preferences. Therefore, it is important for producers to ensure that their top performing probiotic is pure, consistently produced and packaged strategically to maximize product quality and performance all the way to the feed bunk.

Third, these products must be specifically selected for the intended outcome. Certain probiotics stimulate the animal's bacterial population in a specific way. For example, one strain of probiotic may stimulate the immune function while another may improve feed efficiency. *Saccharomyces cerevisiae* has been used for centuries in baking, brewing, human and livestock nutrition, and even in biofuel production. There are thousands of species of *S. cerevisiae* and not all perform in the same way.

"*Saccharomyces cerevisiae boulardii* CNCM I-1079, for example, has been proven to be more effective at positively impacting cattle and hog health status especially during times of stress," Dr. Aguilar says.

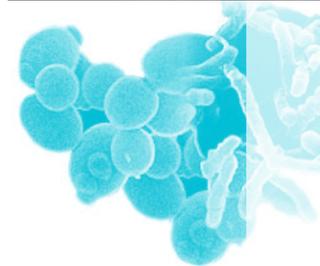
"Another strain of *S. cerevisiae* — CNCM I-1077 — has been proven to optimize rumen function by positively increasing rumen pH and fiber digestibility in cattle."

Other bacterial probiotics have been shown to have specific effects in livestock. A certain strain of *Lactobacillus acidophilus* — strain BT-1386 — has been documented to reduce the prevalence of *E. coli* O157:H7 in feedlot cattle.

Finally, producers must add probiotics on a daily basis to maintain levels high enough to see benefits in the animal. Live probiotics generally do not reproduce or colonize in the animal's digestive system, so daily consumption of a probiotic ensures the right amount of microorganisms are available to do the intended job.

"There are four keys to obtaining a positive result from probiotic use," Dr. Aguilar says. "They are simple steps that may seem very intuitive but when applied to probiotics, they release the power within these little microorganisms to improve animal well-being and productivity." ◀

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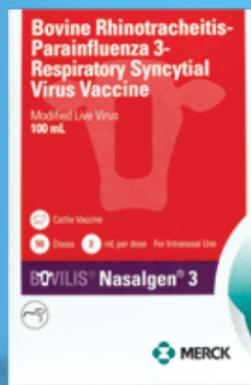
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TAKING THE GUESS WORK OUT OF CHOOSING THE BEST MINERAL

By Jill Johnson, Field Marketer, Sioux Nation Ag Center

Customers often ask why they need a mineral supplement when they feed high quality forages and feedstuffs. The short answer is that as grasses in pastures mature, vitamin and mineral content is often diminished. Another factor that affects the quality of vitamins and minerals an animal is consuming would be the soil type where the forage is grown. Extremes in precipitation can also affect mineral content of a plant from year to year.

Offering free choice mineral is one way to help your cows extract all of the possible nutrients from their feed intake. Vitamins and minerals are the foundation of an animal's overall health. Optimal growth and reproduction are directly affected by vitamin and mineral intake and absorption. An animal's protein and energy consumption directly affect how efficiently they will absorb and utilize trace minerals. The most effective operations understand this relationship and realize that by taking a proactive approach, they can greatly minimize health issues and additional expenses later.

Finding a VTM (vitamin and trace mineral) pack or free choice mineral that fits your program is important. It is essential to work with a nutritionist to determine the mineral content of your current feed. The nutritionist should send feed samples in to be tested in order to obtain a feed analysis that will help dictate what vitamins and minerals your supplement should include. In cases where this is not an option, feeding a basic mineral is better than going without a supplement. The

cost of feeding a free choice mineral or supplement outweighs the costs of not feeding supplement at all.

Animals often show signs of specific vitamin and mineral deficiencies. A deficit in selenium can result in an increase in retained placentas, whereas feeding proper levels of iodine all year can reduce the cases of foot rot and pink eye. In a cow-calf operation, if a bred cow ingests higher levels of chelated minerals, she will produce a higher quality colostrum than a bred cow who is not on a mineral program. Further down the road, the calf who received the colostrum from the cow on chelated minerals will likely be a healthier calf with a stronger immune response and reactivity to antibiotics and vaccinations. Thus, spending a few pennies up front can help prevent the outlay of dollars later. These added expenses could be an open cow, treatment for an underperforming animal in a feed lot or lowered milk production in the parlor.

Farm specific problems can be addressed with customized mineral programs that are designed with the correct formulations for your operation's unique issues. In cases where a producer questions whether their animals are either over or under consuming the supplement provided, it may be the case that the mineral is not palatable or correctly formulated. From time to time, producers will see over-consumption if the supplement is new or the animal is bored. If animals are under consuming, strategically place mineral by water sources. ◀

Making Sense of Forage Analysis Results

Submitted by Lallemand Animal Nutrition

Results from forage analysis aren't just for ration formulations. The numbers can also help producers adjust management processes to avoid future problems altogether. "The results of forage analysis can be really useful," says notes Bob Charley, Ph.D., Forage Products Management, Lallemand Animal Nutrition. "For instance, it can show if the crop was harvested correctly or if silages are prone to spoilage."

Dr. Charley advises producers to review these parameters:

- **Dry matter (DM):** Lower DM levels, especially in alfalfa or other high protein silages, can compound issues like the presence of clostridia from the soil. Lower DM levels also require more acid production and a lower pH for stability.
- **pH:** Lower pH levels do not necessarily make better quality silage. Forage analysis should show pH stabilization, even if it's achieved at a higher level.
- **Ash:** Normal levels in the plant should be around six to eight percent, depending on the crop. Higher numbers can

indicate slurry contamination.

- **Acid detergent fiber (ADF), neutral detergent fiber (NDF) and lignin:** These values should be within average ranges for the type of material harvested. If levels are higher than normal for the crop, it may be a sign the material was more mature than ideal. This can also lead to yeast and mold challenges.
- **Crude protein (CP):** The higher the protein level, the higher the buffering in the material and the more acid is required to bring the pH down. This can facilitate complications from clostridia.
- **Acid Detergent Insoluble Crude Protein (ADICP):** High levels of bound protein (ADICP, greater than 10 percent of the CP) show there has been heating in the silage.
- **Soluble protein:** High levels of soluble protein indicate there has been protein breakdown, also called proteolysis. This can occur due to prolonged wilting in the field or inefficient silage fermentation.
- **Lactic acid:** This is the main driver for pH drop and should be at a rea-

sonably high level for the silage pH to rapidly stabilize. This number can vary with the crop ensiled and DM level.

Lactic acid levels will be lower in silages treated with inoculants containing *Lactobacillus buchneri*. It also typically has higher concentrations of acetic acid and lower levels of lactic acid than untreated silage. Acetic acid helps inhibit the growth of spoilage yeasts that are responsible for silage heating.

This process is one of the reasons Biotal® forage inoculants containing the specific strain *Lactobacillus buchneri* 40788 have been uniquely reviewed by the FDA for improved aerobic stability when applied at 400,000 CFU per gram of forage or 600,000 CFU per gram of high-moisture corn (HMC).

"There is no single number that indicates 'good' silage," Dr. Charley notes. "Silage is a very complex biological system with inherent variability. Still, forage analysis results can help producers understand what happened during the harvest and ensiling process — and how to improve feedstuff quantity and quality the next time." ◀

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1. J. Dairy Science 92:343-351 2. J. Dairy Science 98:1-12 3. J. Animal Physiology and Nutrition 19:4 411-419 4. Translational Animal Science 1:1 60-68

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Balancing Fly Control & Insecticide Resistance



By Cassie Krejci, Ph.D., Animal Health Technical Field Specialist, MGK

As temperatures rise and the sun shines a little longer each day, not much more indicates that summer is upon us like seeing flies on your cattle. House flies, *Musca domestica*, are a common problem to almost everyone in our industry. House flies are included in a grouping called filth flies, which also includes horn flies, stable flies, and face flies. The name of the group originates from the reproduction process; each of these flies breeds or develops in organic filth of some sort, making dairies a prime location. Often, insecticides used to treat house flies will also control other filth flies.

Controlling flies in a dairy facility can be daunting, but nothing will cause you more frustration than insecticide resistance. Insecticide resistance is the result of gradual changes to the insect population over generations that lead to a tolerance, making some insecticides less effective, or not effective at all. Because they are quick to reproduce, insects are able to adapt quickly over generations to adverse conditions like insecticides. However, not all resistance is the same. To an entomologist, cuticular resistance, target-site resistance, metabolic resistance, and behavioral resistance are each characteristically unique, but to anyone else, the results are the same: the flies are not dying.

Finding balance

Integrated pest management (IPM) is the key to finding balance when controlling insects and is demonstrated with the use of all available control techniques in a unified program.

Chemical control, or the use of insecticides, is often our first line of action as it delivers relief to cattle quickly. Insecticides are structured into classes that share common chemical structures and modes of action, or the way they kill an insect, and it's important to rotate the class over time. Organophosphates, spinosyns, and pyrethroids are examples of insecticide classes. Continual use of the same insecticide class to control flies can quickly lead to resistance, or the inability of that insecticide to kill insects. Rotating the insecticide class you use to control an insect is imperative to continued control. It is important to remember that even if active ingredients are different, the mode of action could be the same. For example, use a pyrethrin or pyrethroid product then an organophosphate, rather than permethrin then cyfluthrin, which are both in the pyrethroid class. The time between class rotations is dependent on how severe the insect problem is and how much insecticide has been applied.

The use of insect growth regulators (IGR) is another important step to gaining control of a filth fly problem. Insect growth regulators work by preventing immature flies from reaching adulthood by interrupting their growth hormones or their ability to form an exoskeleton, both of which are fatal. An added benefit of using IGRs is that soft-bodied larvae are easier to kill

with a premise application of an adulticide; that is, if the IGR doesn't get them first. Fly control products containing IGRs are available in bait, premise spray, or feed-thru formulations. Other considerations for your IPM program include the implementation of effective manure management practices, adding a synergist to your insecticide formulation, installation of physical controls, such as screens, and biological controls, like parasitic wasps. Use of non-chemical methods can reduce the frequency of insecticide applications and slow the development of insecticide resistance.

Successful control

of a fly problem requires a multidimensional approach that includes premise applications, over-animal treatments, fly baits, and IGRs. Continuously monitor your fly population with the use of traps. This is an inexpensive way to keep an eye on the insecticide's efficacy. Seeing an increase in the number of flies on the traps may be an indication that it is time to switch insecticide classes. Finally, create a plan for your fly control program at the beginning of the season by scheduling IGR applications and product use based on insecticide class to avoid getting too comfortable with a single approach to fly control.

To learn more about your insecticide options for fly control on dairy cattle, visit www.MGK.com.



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Wrapped Bales Make Cents



By Dan Funke, Owner of Funke Hay and Forage

To wrap, or not to wrap, that is the question asked by many forage producers and dairy farmers looking to maximize forage value. The wrapping process became popular in Europe thirty to forty years ago, as the climate in that part of the world rarely allowed producers the opportunity for dry hay production. In the last decade, the wrapping process has gained popularity in the U.S. also as a result of difficult harvest conditions. Long term storage requires either low moisture or no oxygen. When it's nearly impossible to eliminate enough moisture, sealing the bale to keep air out becomes an attractive solution. Many hay and forage producers have found that their failure rate when attempting to make dry hay is high. The wrapping process brings the failure rate down to almost zero, thus all but eliminating the risk of ruined feed. Producers have also found that their efficiency skyrocketed as they could get much more work done instead of spending days waiting for the perfect moisture conditions. This resulted in the capacity to remove hay from the field much faster, thus reducing the damage caused by driving on regrowth. Putting pencil to paper, hay and forage producers realized an increase in both quantity and quality of feed off every acre.

Dairy benefits

Dairy farmers also realize advantages to utilizing wrapped bales for feed. The wrapping option allows feed to be baled at higher moistures, which in turn contributes to greater leaf retention and overall greater feed quality when compared to dry hay. In addition, the plastic used in to wrap the bales also protects them from moisture and environmental elements, thus negating the need for the bales to occupy space in storage structures.

Dry matter loss, also known as shrink, is a large concern for dairy farmers. As each wrapped bale is a fresh package that can be opened as needed, the necessity to manage an open face on a pile or bunker is eliminated, as is the money lost to spoiled feed. Thanks to custom baling and wrapping operations, both small and large dairies can take advantage of the wrapping process if they grow their own hay and forage.

In summary, the cost of wrapping bales is more than offset by the increase in quality and quantity of feed. Having a storage solution, widening the harvest window, and getting feed off the field more quickly are secondary benefits to also be realized. ◀



China Dominates Global Vitamin Production

By Yulin Ma PhD, MBA, President of Hanley International LLC

In terms of Vitamin supply, the world is heavily depending on Chinese production. Anything that happens in China will have a global impact sooner or later.

China Coronavirus outbreak

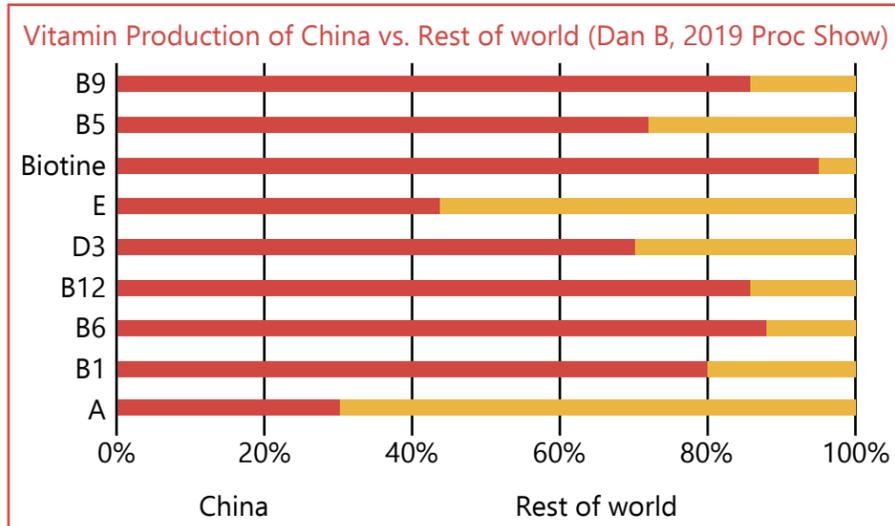
As of March, 2020, in mainland China there are over 80,000 confirmed cases with the death toll reaching over 3,000. However, the Chinese government has implemented some extreme measures into virus control. Based on expert opinion, the cases might have reached the highest points.

Current situation on Vitamin availability and Challenge

In anticipation of China's long spring festival, major Vitamin manufactures halted production for at least two or three weeks. This cease has resulted in higher inventory in the US prior to the Chinese New Year in order to counteract the anticipated shortage. Unfortunately, this year the product resumption will take a little longer than normal because of the coronavirus outbreak.

Raw material supply shortages and domestic freight are large concerns at this moment. Very few manufacturing plants are operating. As a result, everyone is depending on the inventory that was amassed prior to the holiday.

The combination of the Chinese New Year, geographical quarantines, and travel bans have left several produc-



tion areas idle from mid-January until potentially into March. One example is Hubei Huazhong Pharma (B1 and B6 manufacture), which is located in Hubei epidemic area. In terms of Biotin, a raw material production plant producing potassium thioacetate is located in Wuhan. In terms of VE, the shortage of m-cresol combined with the delay in the resumption of domestic work of NHU and ZMC has resulted in the continuous tightening of VE supply. Hanley has ordered some products from China; the manufacturer has the product in their warehouse but they face a bag shortage as the bagging company has not yet resumed production.

Due to the travel restrictions and the fear of contacting the Coronavi-

rus, Chinese domestic freight is slowly resuming. As a result, the initial freight rates have been doubled from what they were in December. The domestic trucking industry has been at a standstill. The lack of trucks moving results in not enough raw material reaching the factories to continue production. Many companies have been moving as many products by rail as possible to limit supply chain issues.

With typical ocean vessel transit times at around 4 weeks, the impact is that the current lack of shipping could lead to future. Major Chinese ports are operating but are experiencing delays. Container shipments are reportedly at normal levels for product that was already in port. ◀



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Oofda Omphalitis

POULTRY

By Evan VanBeusekom, DVM, Sioux Nation Ag Center

This poult mortality cause is one of the most frustrating to me because it has a lasting effect on the entire flock's performance and in my experience, there is nothing you can do to change the outcome.

Omphalitis is the infection of the yolk and related tissues, it can be due to a multitude of bacterias and stem from a plethora of sources. I often attribute it to egg sanitation issues, hatchery sanitation issues, or brood barn sanitation issues. The frustrating part is that you can rarely be sure of where the problem originates, yet some indicators such as bacterial type can help narrow the list of usual suspects. For instance, staph usually seems to be more correlated to barn issues, and pseudomonas are more related to hatchery issues.

Expectations and poor outcomes

When experiencing yolk sac infection, mortality in young turkeys can last as long as up to 4 weeks of age. They wall off the yolk with fibrin but often the seal is imperfect and there is bacterial leakage into the body, which causes septicemia much longer than many producers expect. As long as the seal is good, turkeys can have a walled-off yolk sac all the way to processing. When the seal isn't working, it's a sad day for that bird.

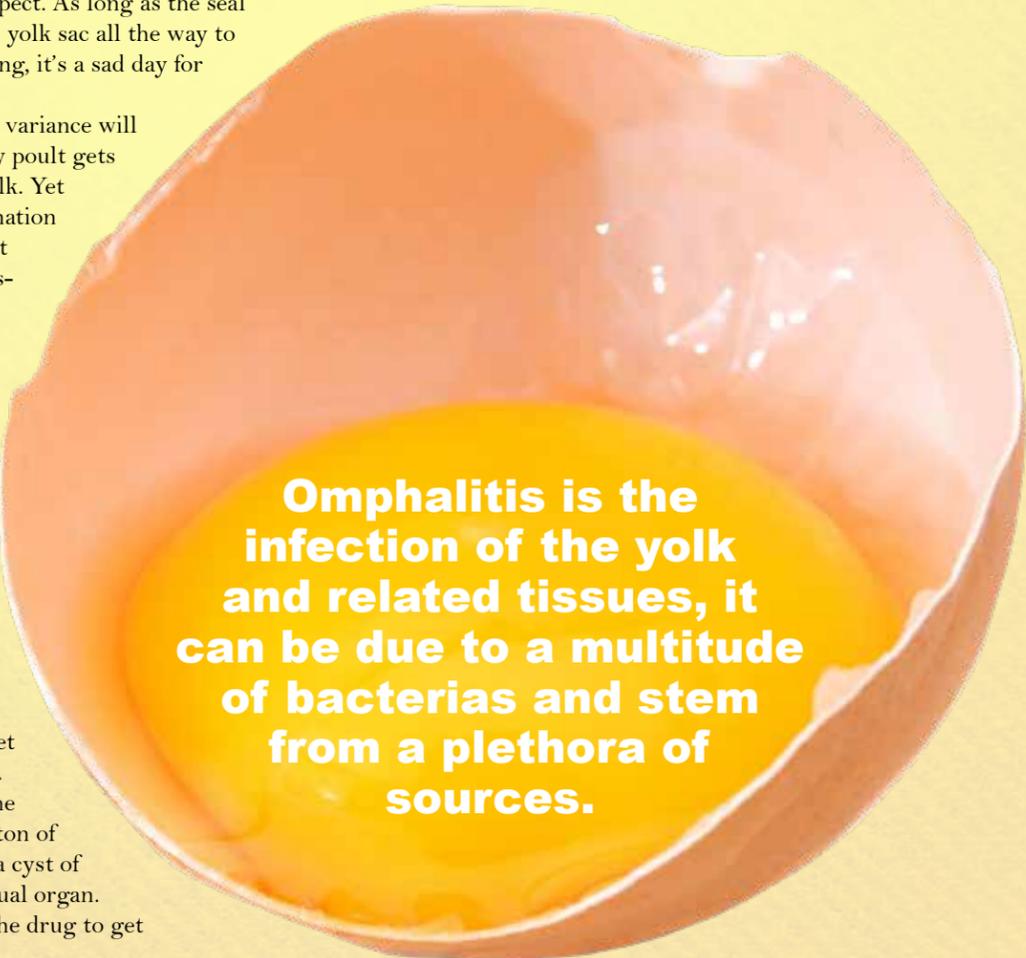
One can also expect that the flock variance will be quite high, as we assume that every poult gets to consume the nutrients from one yolk. Yet any birds that have bacterial contamination wall off that yolk and therefore do not get those nutrients, putting them drastically behind their peers in terms of development, and making it difficult for them to catch up. Think of yolk sac infection like getting half your poult one day, a quarter next day, and a quarter two days or more after hatch. This is a similar flock dynamic to that mixing and starve out situation.

Treatment

There are many different drugs available for treatment, and from tetracycline, neomycin, streptomycin, to penicillin, I have tried them myself. Yet I have never seen any tangible results. The difficulty is drug availability at the source of the problem. There's not a ton of blood flow to the yolk, it is more like a cyst of bacterial buffet material versus an actual organ. This makes it incredibly difficult for the drug to get

to the source and wipe out the culprit, all the while assuming that it is sensitive. The bottom line is that the drug cannot reach the source. The antibiotic can help against the leaking septicemia inducing bacterial challenge, yet it fails to get to the root of the issue. As a result, once they are off the antibiotic after 3-7 days producers end up losing birds with 3-7 days more feed into them.

The hard part of yolk sac infection is getting through the dead and remembering to make the changes needed to avoid the problem in the future. If you have an issue, it's best to work with your veterinarian, as well as the poult source to let them know there is an issue so they can investigate. Many times I hear about how bad a set of poults is for one problem or another but no one contacted the breeder sourcing the birds because the issue wasn't enough for compensation. Even if the loss isn't dramatic, remember that the feedback you give the hatchery is useful, including the cases when the poults are doing great. ◀



Omphalitis is the infection of the yolk and related tissues, it can be due to a multitude of bacterias and stem from a plethora of sources.



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Pre-Brood Placement Checklist

Flock #: _____

Barn #: _____

ENTRYWAY

- Entryway is swept and disinfected
- Foot pan is clean and by entry to barn
- Barn specific boots are cleaned of debris and disinfected
- Rat bait stations in entry are cleaned and re-baited
- Room heater is clean and operating properly

LP STORAGE

- Tanks are at least 50% full for starting
- Vaporizers are properly functioning

ELECTRICAL

- Wiring throughout barn is free of damage
- All switches on controller to barn function properly (fans, feed lines, water, etc.)
- All light sockets are fitted with a light bulb and are clean
- Power and Temperature alarms are tested and operational

BUILDING INTERIOR

- Barn is free of wild birds and vermin
- Doors, vents, and curtains are working properly
- Drafty areas, doors, and unused exhaust fans are sealed with plastic

POULT PREPARATION

- Shavings are spread evenly and leveled with ring
- Rings have well rounded corners
- Ring outer edge is no cooler than 88 degrees
- Building temperature is between 90-95 for first day
- Water space is 15-20 poult per cup
- One supplemental water per 600 poults
- Early Poults (less than 3 week of lay) need one supplemental water per 300 poults
- Water lines are 1-2 inches high off of shavings and poults can see water
- 1 inch of feed space per poult
- 1 feed flat per 100 poults and spaced evenly in ring
- Colored paper under water lines and sprinkled with feed
- Feed lines and buckets are fully flooded
- Hospital pen setup away from direct heat and have supplemental waters close to ground level

What Else Do Your Poults Need?

By Dakota Suko, Production Consultant, Sioux Nation Ag Center

I've been told many times that it's the little things that make the biggest difference. Attention to detail, especially in raising poults is not the place to cut corners. From feed line height to bedding temperature, there are many details that will dictate the how well your poults start. I often think of management as the first line of defense towards keeping poults healthy and happy. What better way to get these details organized and completed than with a list?

At Sioux Nation Ag Center, our Poultry Team has a wealth of knowledge that we'd love to share with you. We're here to help you provide the best care for your flocks, from the small details to the overall big picture. Please reach out to us with any questions you have or to schedule a farm visit. ◀



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Managing Your Litter For Success

By Evan VanBeusekom, DVM, Sioux Nation Ag Center

With the changing of the seasons, the struggle to keep birds comfortable continues to change as well. This is especially true during unseasonal weather patterns. The fall of 2019 was the most volatile and wet one that I can remember in the last decade.

Producers want to keep the birds warm and dry, but at the same time conserve fuel and electricity. We also want to avoid getting the barns overly dry because that can increase the dust, which in turn can cause colic and airsac issues.

It is truly managing the whole barn when you look at managing litter, because the ventilation is how we remove moisture.

The first step is to seal up the barn as much as possible, especially when the birds are younger in the grow barns. You can use spray foam or plastic to help seal up problem areas. I would also recommend using sand on the outside at the end of the barn by the big doors to cut off a major draft option. Sand is better than shavings or straw because it is more insulating and the turkeys are less likely to pull it from the doors.

Many producers will also half the barn and keep the birds in part of it to keep them warmer and heat less square footage in the earliest stages in finishing. This can work very well, as long as there is enough feed and water space for the birds. If

there isn't, the result can be more variation from a lack of feed and water availability in the flock.

If the birds are comfortable they will use all the square footage of the barn, yet if they are too cold they will be in the inside of the feet lines and also will be a couple bays in from the ends of the barn. This can create more disease because they are crowded and uncomfortable.

When the moisture is spread evenly through the barn because the birds are evenly spaced through the barn, not only are the birds doing better because they are more comfortable, the barn is easier to manage to stay dry because you are utilizing all of your litter.

If the barn gets too dry, you can add moisture by cooling the barn down a bit and allow the humidity to increase. This can knock down the dust and then you can go back if so desired to a more ideal temperature.

You can also use misters, but that is a pretty fickle and touchy way to do it because it can easily get very wet.

When your flock is comfortable in a low stress environment, they will grow better and be more successful at withstanding disease. ◀

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Brushing off your Biosecurity

By Evan VanBeusekom, DVM, Sioux Nation Ag Center

Biosecurity is the first line of defense against disease in your flocks. Producers are likely well-aware that it is something that should be done every day, yet they may not recognize that there are definite benefits to revisiting current practices and making sure that corners haven't been cut since the last time decisions were made. I like to use Avian Influenza Eve, or late winter to early spring, when I tune everything up so that it is fresh for the at-risk season.

History of travel is important and should be recorded, as well as ensuring that whenever we go to the farm we need to be in freshly laundered clothing and clean footwear. If the clothing is barn or site specific, then it need not be freshly laundered.

Shower in/shower out facilities, Danish entry systems, as well as using footbaths or barn specific footwear are all good options to decrease the number of pathogens entering the barn space. Footbaths and barn specific boots are a great start to a program. Footbaths should either be a dry powder or should be

changed after every use to ensure that they remain effective. It is of the utmost importance to ensure that whatever method that is implemented is followed.

I always recommend the Danish Entry procedure, which involves utilizing barn specific boots/coveralls/gloves/etc. The whole idea of this protocol is to keep the outside out and the inside in. Limiting the items allowed into the barn greatly reduces the risk that something from another farm can get in and contaminate the flock. It is the most cost-effective way to keep the birds safe.

Considering downtime, it is best to have as much time as possible between visits. At the same time, over-night is likely sufficient, provided that the next person to enter the barn shows up freshly showered, in freshly laundered clothing, and has blown their nose to remove inhaled contaminants.

There are many different aspects of a biosecurity program, including the barn entry and downtime components listed in this article. If you have any questions, feel free to ask your veterinarian or give the Sioux Nation Ag Center team a call. ◀

Limiting the items allowed into the barn greatly reduces the risk that something from another farm can get in and contaminate the flock.

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OXIDATIVE STRESS & Animal Health

By TJ Gaydos, DVM, MAM, DACPV, with Gaydos Technical Services, LLC

All animals are subjected to oxidative stress. Oxidative stress has many sources. The animal itself generates reactive oxygen molecules through the metabolic and immune systems and consumes pro-oxidants in feed. Oxygen is an essential part of metabolism for all known life. All animals require oxygen through respiration for their survival and have different mechanisms to limit or repair the damage caused by excess oxygen or oxidative compounds. Some organisms are not able to process or tolerate elemental oxygen, anaerobic bacteria for example, because they do not have the enzymes necessary to protect themselves against oxidative damage.

The process of converting the energy stored in the chemical bonds of glucose, or other energy sources in the mitochondria, results in the production of hydrogen peroxide and other reactive molecules. Hydrogen peroxide is a strong oxidant that is toxic to the cell. This is one of the reasons it makes a good disinfectant. The hydrogen peroxide is neutralized by enzymes in the antioxidant system present in the cell, the cell membrane, and in the mitochondria. Phagocytic or white blood cells in the immune system produce reactive oxygen species to destroy the pathogens they consume, in the same

way hydrogen peroxide bubbles and kills bacteria on a cut. The multicellular nature of animals allows the animal to use oxidation to destroy more simple pathogens at the expense of some cells in the animal. This creation and release of oxidizers creates a level of oxidative stress. When an animal is battling an infection, the level of oxidative stress is extremely high.

Controlling and neutralizing oxidative stress

Oxidized or rancid feeds can reduce consumption, destroy fat soluble vitamins, and reduce the nutrient density of the feed. Additionally, the ingestion of oxidized fats and oils is a source of oxidative stress on the animal. This source of oxidation is controlled by the proper storage and antioxidant protection of feed and ingredients. The nature of the oxidation process of fats and oils creates a chain reaction where the resultant fatty acid radical can then react with another non-oxidized lipid molecule, much like a runaway nuclear reaction. This reaction is only terminated when the fatty acid radical oxidizes a purpose-added antioxidant molecule or an antioxidant like vitamin E. The reaction in an animal can be stopped by vitamin E or neutralized by one of many antioxidant enzymes.

These sources of oxidative stress converge on the intestine. The intestinal tract contains a significant portion of the immune system and a large amount

of metabolism occurs as a part of digestion. Oxidized feed stuffs impact the whole animal but start to have an impact in the first place they encounter, which is the gut. The impact of oxidative stress on the intestinal mucosa, antibodies, immune cells, and performance is well documented across species.

Ethoxyquin is a commonly recognized antioxidant used in animal feed, fats, and oils. However, there are other antioxidants that are valuable for maintaining the oxidative stability of feed and different feed ingredients. Butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), tert-butylhydroquinone (TBHQ), are highly efficient, specialized compounds for the protection of oxidizable feed and feed ingredients. Some plant extracts have antioxidant properties: grapes, hops, green tea, rosemary, and others contain compounds that can improve stability of fats and oils. The most effective antioxidant program involves the blend of multiple different active ingredients to protect a broad range of lipids.

Preventing the oxidation of high-risk ingredients and finished feed is critical to achieve optimal performance and animal health. Regularly checking the oxidative status of fats and oils with a reputable lab and adjusting the antioxidant inclusion can reduce the level of oxidative stress on the animals in our care. ◀



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Patent pending

By Austin Langemeier, Nutritionist, Sioux Nation Ag Center

Industry averages suggest that the replacement rate in a sow herd is near 50%. With that in mind, it is essential to source replacement gilts that are built to last.

Whether you are purchasing replacements or raising your own, there are a few key factors that help identify which females should be kept and finding those that should be culled.

Reproductive soundness

The primary factor to evaluate is underline correctness. Replacement females must have at least 7 functional teats on each side.

The main issues to consider are proper spacing and proper size. Teats that are bunched up or are spaced too far apart cause difficulty for young pigs to find ample space while nursing. Having a consistent size is key as well, as small, "pin" teats are often non-functional, while large, blunt teats are difficult for young piglets to latch-on to while nursing. Additionally, evaluating the proper size and set to a gilt's vulva is important. The main concern in considering to cull females is small, tipped or upward pointing vulvas.

Structural soundness

Evaluating the structural build of a replacement gilt definitely requires some practice or experience to perform quickly. However, a well-built female will prove to be durable and offer longevity in your sow herd. An easy exercise is to simply evaluate each gilt walking across the pen. The freedom in her movement tells a story about her structural build. It is important to watch her topline, as a gilt that is well-built will often be consistently level topped. Gilts that break behind their shoulder or roach in their topline usually have structural issues. Evaluating a gilt's structural correctness piece by piece starts at the ground. A good replacement female will offer big, evenly-sized toes, has a comfortable set to their pasterns, and proper set to their knee and hock. Gilts that should be culled are simply the opposite. Producers can quickly spot small or uneven

toe size, soft/weak pastern set, being upright or stiff in the set to their knee, straight and stiff in the set to her hock, or there is too much set to the hock. An additional indicator is a gilt's base width. A gilt's foot placement should be as wide as the width of her shoulders or hips. Gilts that offer excessive base width or stand too narrow at the ground will tend to breakdown over time. As you study a gilt from the ground up, these tell-tale signs often indicate if she is built to last. Although a gilt's structural build does not dictate how many pigs she will wean for you, it is clear that a gilt that is sound from the ground-up should last for a longer period in your sow herd.

Additional factors

There are a few other factors to consider when evaluating your replacement gilts. It is important to consider her overall growth or rate of gain, body conformation, if she has an adequate amount of muscling, and the presence of any abnormalities. Although we do not prefer to grow our replacement gilts like finishing pigs, a gilt that shows adequate and consistent growth is very appealing as you would expect her offspring to do the same. Also, a gilt's body confirmation is important. Ideally, a replacement gilt offers a robust rib cage and a productive look. Gilts that are smaller framed or are more quick to mature are often carrying extra fat and can be a challenge to manage her condition later in life. The same is true at the opposite end of the spectrum with an extraordinarily long, narrow gilt that never shows much flesh or fill through her center body, and become sows that wither away. We still want our gilts to offer some muscling over their top and from behind, since they do pass half of the genetic potential to their market hog offspring. The final factor to consider is usually the easiest to spot. A gilt that has experienced a belly rupture, a wound or permanent damage to their vulva or underline, or has any other abnormality that deems her unacceptable should be culled.

Conclusion

Raising and producing replacement gilts is a challenging task. Investing money into every female and then being asked to cull some of them can be even tougher. In order to replace aging sows, maintain your production standards and to continue moving forward, replacement gilts are a key piece in the effort. However, all replacement females are not created equal. Staying grounded in your approach and taking your time to study each and every gilt will allow you to identify those gilts that are built to provide longevity in the sow herd.

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HOUSEFLIES A POTENTIAL VECTOR FOR THE TRANSMISSION OF VIRAL DISEASES TO PIGS



By Grant Allison, DVM; Phil Gauger, DVM, MS, PhD; Jianqiang Zhang, MD, MS, PhD; DVM; Gene Spellman, BS

Insects have long been associated with the transmission of infectious disease in various species. Unlike many species, the role of the common housefly (*Musca domestica*) in the transmission of swine disease(s) is less well known. Flies can carry and transmit important swine viruses that cause clinical disease such as Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) 1. Less is known about the risk posed by flies for the transmission of both Porcine Epidemic Diarrhea Virus (PEDV) and Senecavirus A (SVA). Test results from virus isolation (SVA) and bioassay (PED) will illustrate their true potential as vectors in the transmission of viral disease in pigs.

Materials and methods

Oral fluid samples were collected from a 2,400 head finisher in Eastern Iowa that was PCR positive for PEDV 30 days post diagnosis. This site served as the initial investigation into the interaction of flies and PEDV. Oral fluid (PRRS) and oral swab (SVA) samples were collected from a 4,800 head finisher in Southern Minnesota 24 days post exposure. Flies were collected with jug liquid traps to reduce any cross-contamination from the environment that may occur during sample collection. A negative control trap was hung that prevented flies from entering the device but allowed room air to circulate into the trap. Sterile

water testing PEDV real-time reverse transcription polymerase chain reaction (rRT-PCR) negative was used to solubilize trap attractant and flies were allowed to enter the trap by their own volition. Flies were removed from the trap by net, frozen and shipped to the Iowa State University Veterinary Diagnostic Lab (ISUVDL). Both flies (minimum of 100 flies) and trap liquid was collected for PCR testing. Flies were processed as a 10% homogenate solution using phosphate buffered saline. Homogenates were clarified by centrifugation and the supernatants analyzed at ISUVDL. Isolation of Senecavirus A (SVA) was conducted in H1299 cells (ATCC CRL-5803) per routine procedures at ISUVDL.

The source of PEDV for the bioassay was a 2,400 head finisher in Eastern Iowa confirmed PEDV positive on rectal swab PCR (Ct 16.5 pool of 5 samples). Using traps, flies that were rRT-PCR positive for PEDV (average Ct 24.5) and liquid attractant samples

rRT-PCR positive for PEDV (average Ct 26.5) were collected for bioassay. The bioassay was conducted at Iowa State University under strict environmental conditions and research protocols. Four experimental groups of three-10 day old pigs, negative for PEDV antibody and virus were used: Group 1: negative control liquid attractant; Group 2: PEDV positive control virus isolate of a Non-S-INDEL (prototype) reference strain obtained by Iowa State known to infect pigs; Group 3: PEDV rRT-PCR positive flies in a 10% homogenate; Group 4: PEDV rRT-PCR positive liquid attractant. Each pig in these groups received one 10ml orogastric dose of the inoculum. The experiment ran 11 days long from piglet arrival to end with 8 actual days post-challenge. Animal monitoring is daily. Reported rectal swabs were collected on 0, 3, 5, and 7 days post inoculation (DPI).

Results and discussion

Flies at the initial investigation

VIRUS	DATE	SAMPLE TYPE	LABORATORY RESULTS	COMMENTS
PEDV	5/15/17	Rectal swabs	PCR positive (Ct 18.9)	Pool of 5; confirm site status
PEDV	6/15/17	Oral fluids	PCR positive (Ct 29.6 – 32.8)	4 of 6 OF samples positive
PEDV	6/15/17	Flies	PCR positive (Ct 34.9)	30 days positive PI site
PRRS	8/04/17	Oral fluid	PCR positive	
PRRS	8/28/17	Flies	PCR positive (Ct 31.6)	Trap (1 of 6 positive)
PRRS	8/28/17	Liquid	PCR negative	Liquid attractant in traps
SVA	8/04/17	Oral swab	PCR positive	
SVA	8/28/17	Flies	PCR positive (30.5 & 30.4)	Trap (2 of 6 positive)
SVA	8/28/17	Liquid	PCR negative	Liquid attractant in traps
SVA	8/28/17	Flies (Ct 30.5)	VI positive (Ct 20.0)	Virus isolation passage “0”
SVA	8/28/17	Flies	VI positive (Ct 17.0)	Virus isolation passage “1”

Table 1: PEDV, PRRS, and SVA rRT-PCR (PCR) and virus isolation results from various sample types including flies collected in the jug liquid traps and liquid attractant.

site in Iowa were PCR positive for PEDV (Ct 34.9). At the Minnesota PRRSV/SVA herd: one of six traps of flies was rRT-PCR positive for PRRSV (Ct 31.6). Two of six traps of flies were rRT-PCR positive for SVA (Ct 30.5 and Ct 30.4). All fly attractant liquid samples (without flies) were rRT-PCR negative. Virus isolation (VI) attempts were made on the two SVA positive samples. The first sample (Ct 30.5) was VI positive and confirmed by rRT-PCR on cell culture supernatant. The initial passage of cell culture material (P0) had a Ct of 20.0 and the subsequent passage (P1) had a Ct of 17.0. The initial Iowa farm showed that flies can be found rRT-PCR positive for PEDV. This confirms the presence of the virus but not viability or the potential to transmit PEDV to pigs. Likewise, the Minnesota herd showed that flies can be rRT-PCR positive for PRRSV. Again, this result by itself does not prove viability or potential to transmit PRRSV to pigs. PEDV is difficult to grow in cell culture and requires a bioassay to confirm viability and/or transmission. Depending on the virus, PRRS can be difficult to grow in cell culture, which is also highly influenced by the amount of virus in the sample. However, H1299 cells are highly permissible to SVA and virus isolation results from the Minnesota herd suggest that the fly sample contained viable SVA (Table 1).

The bioassay site in Iowa revealed that Group 1 (negative control) pigs did not become infected with PEDV during the trial. Group 2 (positive control group) pigs were confirmed infected with PEDV as expected. Group 3 (PEDV positive flies) pigs did not become infected with the PEDV detected in the fly homogenate. However, pigs in Group 4 were confirmed infected with PEDV detected in the liquid attractant based on PEDV rRT-PCR positive fecal swabs collected on day 3, 5 and 7 DPI (Table 2). It should be noted that rRT-PCR results differ in the liquid fly attractant for PRRS/SVA when compared to PEDV. The former being PCR negative in liquid attractant but positive flies and the latter being PCR positive in attractant and flies for their respective virus. This may suggest flies contained PRRSV and SVA internally versus PEDV where the virus may be present both internal and external. Flies are seemingly ubiquitous in barns housing swine and can fly up to 4 miles. Flies will lay eggs in almost any warm, moist material (including manure) that will provide nutrients for their larvae (maggot). Once grown, larvae seek out dry, dark places to pupate into adults. It can be speculated that PED outbreaks may occur (or re-occur) when fly eggs are deposited on the

GROUP	DAYS POST-INOCULATION	COMMENT
	0 3 5 7	
1	Ct > 36 Ct > 36 Ct > 36 Ct > 36	Negative control liquid
2	Ct > 36 Ct 22.4 Ct 26.4 Ct 32.3	PED positive reference strain
3	Ct > 36 Ct > 36 Ct > 36 Ct > 36	PEDV positive fly
4	Ct > 36 Ct 23.9 Ct 15.6 Ct 23.3	PEDV positive liquid fly attractant

Table 2: Piglet bioassay rRT-PCR results on rectal swabs collected on day 0, 3, 5, and 7 days post inoculation with PEDV negative control liquid fly attractant, PEDV positive control, PEDV positive fly homogenate, and PEDV positive liquid fly attractant

crust in a manure pit that has been contaminated with PEDV and complete their life cycle above the pit. Studies have found manure pits can harbor infectious PEDV from four months to nine months in duration. Flies should be considered a potential vector of viable SVA and PEDV that is capable of infecting susceptible pigs. It should be noted that the relationship between flies and African Swine Fever has been investigated and may pose the biggest risk to the US swine industry. ◀

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Microclimates Key To Wean-Finish Success

SWINE



By Scott Bauck, Hog Slat, INC.

Weaning young pigs in a building designed to meet the needs of market hogs requires creating small areas or “microclimates” that more closely imitate temperatures found in traditional nurseries.

Provide a solid laying area of 0.3 to 0.34 square feet per pig to increase comfort and eliminate drafts. The most common of these temporary mats is a reinforced rubber mat with a raised feed lip around the perimeter. Because these heavy mats weigh over two pounds per square foot, producers may choose to use two mats per pen for easier handling or a lighter polyethylene mat weighing in at just over a half pound per square foot.

There is also a disposable mat available manufactured from cornstalks and wood fibers. This four by eight foot biodegradable mat weighs only ten pounds and eliminates the need for cleaning and disinfecting as it is simply composted after use.



Heating

Radiant heat is the perfect application for creating the microclimate needed for weaned pigs. By directing the heat at the pigs, we can increase the localized environment for the pigs without having to raise the temperature in the entire room. Forced air heaters regulate the room temperature to between 75 and 80 degrees Fahrenheit, while the radiant heat maintains a microclimate of 90 degrees at pig level. Gradually reduce the radiant temperature over 28 days until it meets the target room temperature, at which time the brooders are removed and stored.

Types of radiant heat

Electric heat lamps are the least expensive type of radiant to install and regulate in a building. Installation amounts to placing several lamps with 250-watt bulbs over the laying area



in each pen and adjusting the height until reaching the desired floor temperature. A simple thermostat with a remote sensor regulates the lamp output. Disadvantages to heat lamps include higher energy costs and bulb replacement.

Individual infrared gas brooders are the most popular form of radiant heat in wean-finish applications. Though higher in initial cost, these small 10,000 to 17,000 BTU brooders are powerful enough to heat a floor area suitable for 100 to 150 weaned pigs. A sensor mounted under one of the brooders transmits a signal to a control panel regulating the gas flow. Both on/off and modulating control panels are available depending on producer preference. Gas-fired brooders will typically have lower operating costs than electric systems.



Air from poorly managed inlets can cause pig-chilling drafts to occur in the weaning microclimate. Leaks around curtains, doors and fans can reduce airspeed, allowing cold incoming air to fall to the floor without proper mixing. Good barn management includes tightening up the building envelope so the incoming airspeeds reach 800 to 1,000 feet per minute and mix with warmer ceiling air before tumbling to the floor. ◀

By Robert Fischer, PhD, Sioux Nation Ag Center

Heat stress affects the pig in tropical climates as well as in temperate regions like the United States. It has been estimated that economic losses due to the effects of heat stress on the US swine industry are over \$300 million annually. These losses are a result of an increase in non-reproductive days in gestation, decrease in lactation performance, and losses in growth in both late-nursery and finishing pigs. Pigs are much more sensitive to hot weather than other livestock animals, as pigs sweat very little and their lungs are relatively small compared to their body size. Also, modern pig genotypes produce considerably more heat than their predecessors. It has been estimated that current genetic lines of pigs produce nearly 25% more heat than their counterparts in the early 1980s.

Pigs don't sweat (the small stuff)

Most animals can transfer heat to the outside of the body by sweating and panting, as these are the two most important tools for maintenance of body temperature. As mentioned above, pigs do not sweat and have relatively small lungs. Due to these physical limitations and a layer of subcutaneous fat, pigs are prone to heat stress. When pigs are exposed to heat stress, their respiration rate increases, pulse rate falls, they

start heavily panting and they have a loss of appetite and stop eating to halt further heat production.

Hot on the inside

Along with the externally observed effects of heat stress, there are also many effects happening internally to the visceral tissue. When an animal experiences heat stress, its core body temperature increases. This causes blood flow to be diverted away from the visceral tissue (stomach, small and large intestine, and other internal organs) and directs it to the skin surface to increase the dissipation of heat from the body. As blood flow is decreased to the internal organs, the amount of oxygen and energy available to the enterocytes (cells lining the intestinal tract) is significantly decreased. This reduction in energy and oxygen to the enterocytes results in a weakening of the "tight junctions" that hold the enterocytes together, allowing pathogens and their toxins to transfer from the lumen (inside) of the intestine through the tight junctions and into the bloodstream, leading to a condition called "leaky gut". Thus, severe heat stress can lead to morphological changes in the intestine, such as a decrease in the gut villi height and greater villi width, thus reducing the absorptive capacity of the

intestine. These changes in the in the intestinal barrier result in more pathogens and endotoxins entering the blood stream. To counter this, the body activates the immune system, which in turn results in less energy available for growth. Therefore, while a majority of the decrease in animal performance during heat stress is a result of a decrease in feed intake to reduce metabolic heat, the increase in immune system activation, increase in gut pH, reduction in protein digestibility, inflammation of the intestinal lining all due to leaky gut syndrome also play a big part in the loss of production during heat stress.

Managing the heat

Heat stress is widespread issue that swine producers need to manage. It's critical to have a plan in place prior to the onset of hot weather conditions to prevent the long-term effects heat stress can have on animal performance. Some things to consider when implementing management and nutritional tactics to reduce the symptoms of heat stress are the following:

1. Increase ventilation and airflow and regularly check that cooling system is in good working condition
2. Reduce stocking density if flow will allow

3. Check feeders regularly to minimize the potential for out of feed events overnight as that is when pigs are most likely to consume the majority of the daily feed intake
4. Make sure you have an adequate amount of drinker spaces and water supply
5. For sows in lactation, feed smaller meals more frequently, avoid feeding during the hottest part of the day, and wet the feed with water to stimulate feed intake
6. Reduce the crude protein concentration of the diet
7. Increase the energy density of the diet with a supplemental fat source
8. Reduce the amount of fiber in the diet, as fiber results in an increase in metabolic heat
9. Supplement electrolytes and/or antioxidants through the water supply or feed
10. Supplement feed ingredients into the diet such as chromium and/or plant-based compounds which have shown to increase feed intake during periods of heat stress.

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Growth Promoting Alternatives

By Austin Langemeier, Nutritionist, Sioux Nation Ag Center

Antimicrobial agents as growth promotants have played a vital role within the swine industry over the last half century. With new regulations that restrict the use of antibiotics for growth promotion, the trend within the industry is to source antimicrobial alternatives to compensate for production losses. Pig care and pig health have always been a major priority to producers, however, the path to achieve optimal health and proper care has shifted away from depending on antibiotics. Even though producers are still able to use antibiotics for treatment, prevention and control of health issues, antibiotics have been known to not only ensure healthy pigs but to also aid in growth performance, especially in the nursery phase. With this lag of performance, there has been a major push to source other feed additives that would assist in pig health and potentially reduce losses in production pertaining to growth within the early stages during post-weaning. Producers have consistently used antibiotics since the mid-1950s, thus making this transition significant to everyone involved in the swine nutrition industry. Consumers, retailers, and packers have shown considerable interest in raising pigs with little to no antibiotic. Consequently, the needs of pork

producers are acute and time-sensitive to seek alternatives that will enable them to recapture the pig performance lost in the absence of sub-therapeutic antibiotics. There are numerous antibiotic alternatives available for use. Examples include acidifiers, copper, phytogenic feed additives or essential oils, probiotics, yeast products, and zinc.

Piglet Growth

Transitioning piglets into the nursery while maintaining an appropriate rate of gain is of absolute importance. Research suggests weaning is one of the most stressful events in the pig's life and can contribute to intestinal and immune system dysfunctions that result in reduced pig health, growth, and feed intake, particularly during the first week after weaning. A newborn piglet's intestinal immune system undergoes a rapid period of expansion and specialization that is not achieved before early weaning. Consequently, pigs are highly susceptible to pathogenic enteric conditions such as post-weaning diarrhea. Therefore, an immense amount of focus is placed upon formulating diets that provide weaning pigs with a defense toward enteric pathogens. Ultimately, these diets should be formulated

to enhance immune response, reduce the pathogen load within a piglet's gut, aid in establishing beneficial gut microbes, and stimulate digestive function. A weaned pig with developing immune function may ultimately compromise digestibility efficiency and response to enteric diseases. As antibiotics typically play a role in the transition post-weaning, formulating diets that provide health-promoting aspects is an ongoing necessity. Within the first 48 hours post-weaning, piglets experience a high incidence of intestinal disturbances with diarrhea and depression of growth performance. As weaned pigs transition from milk to a plant based diet, feed intake levels often reduce. Anti-nutritional factors within starter diets play a major role, in this, as does the dietary protein source and level. Common nursery diets include formulation of leguminous plant proteins (soybean meal), that are known to have negative impacts on growth and health immediately following weaning. The use of specialty proteins, such as animal protein sources and milk powder, are commonly supplemented to bridge the gap and avoid production losses. Furthermore, increased levels of dietary protein have been met with concern regarding increased levels of undigested protein undergoing microbial fermentation

by nitrogen utilizing bacteria, and ultimately increasing the occurrence of post-weaning diarrhea episodes. At the same time, weaned piglets fed lower dietary crude protein levels still show a reduction in growth performance.

More Studies Needed

Consequently, the anti-nutritional factors that coexist within a common nursery diet immediately after weaning results in a dire need for growth promoting alternatives to reduce post-weaning growth lag and diarrheal episodes following the stress of weaning. With sub-therapeutic antibiotic use for growth promotion no longer a viable option, the primary focus of considering feed additives may need to cover a few criteria including reduced content of protein that is fermented in the pigs gut, minimal buffering capacity, minimal anti-nutritional factors, and a supply of beneficial compounds. With a primary focus on identifying feed additives to achieve this criteria, ongoing research continues in order to better understand their effectiveness and potential interactions with other dietary components. ◀



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Raising Replacements

By Mandy Thomas, Nutritionist for Sioux Nation Ag Center
and JoHannah Klinghagen, Field Marketer for Sioux Nation Ag Center

One of the most critical parts of managing a flock is how replacement ewe lambs are developed. Too often we see the ewe lambs left with the market weathers for an extended time. Many might question why this is an issue. What we need to know is that ewe lambs that are left on the feeder lamb diet for too long develop too much fat. This fat settles around their organs, including the uterus and the mammary tissue. Research has shown that too much fat deposition in the udders of ewe lambs and subsequent inferior mammary development can negatively impact their lifetime milk production, which ultimately effects the bottom line. Other issues that may occur if there is too much fat around organs include decreased space for the uterus and rumen, as well as an increase of the animal's internal temperature of

that animal that can decrease fertility. Giving birth to small, weak lambs or excessively large lambs are also possible outcomes if ewe lambs are allowed to get too fat.

Producers often wonder when they should pull the ewe lambs and what should they be fed. These answers will be determined by breed, farm management and location, farm goals, etc. However, a good rule of thumb for an average-size sheep would be to pull the ewe lambs from the market pens no later than 90 pounds. This target weight could be lower for smaller framed sheep or hair breeds that can get excessively fat. Ultimately, the ewe lamb should reach 70% of her adult body weight by breeding, and ideally up to 75% of her adult body weight by lambing around 12 months of age. When selecting replacements, opt for multiple birth,

born early in the season (means the ewe settled quickly), high performance, and sound conformation animals.

When to breed

The one thing that most sheep producers agree on is to breed ewe lambs to deliver around 12 months of age as they believe it increases the animal's lifetime productivity. Interestingly, the Lamb Resource Center advises that the importance of breeding lambs as yearlings is early puberty. According to research data, early puberty ewes have a greater instance of twinning over their lifetime. Where we see a breakdown in longevity of these ewe lambs that deliver as yearlings is when they are managed like the rest of the ewe flock. Yearling ewes are expected to mature and grow lambs at the same time, which will require a bit more attention than the older ewes.

In many cases where ewes are managed as part of a large, multigenerational group, the youngsters will fall out of the flock before their 2nd breeding season. In a range flock, management styles will likely differ based on region. Producers should understand that recommendations for the Midwest may not apply everywhere, and it is important to match management to individual and unique farm goals.

When determining nutrition needs for ewe lambs, one formula does not fit all farms. Not all ewes will thrive on free choice or limit-fed grass hay and a ½-1 pound of corn. The Nutritional value of the feeds on hand, the genetic potential of the flock, and the operation's manage-

ment style should all be considered when ascertaining the best feed formulation for the flock.

Research has shown that ewe lambs don't need to be pushed as hard as market weathers. Lower and slower might be more appropriate, providing the pace isn't too low and slow as the younger animals might not reach puberty and their proper weight before breeding. The general recommendation is that animals should be gaining a minimum of .4 lbs/day before and throughout breeding. This recommendation varies slightly from the .5lb/day suggestion by Dr. Thomas from the University of Wisconsin. Research has also shown in the first 5 months of life, replacements should be fed at no more than 65-75% of their maximum gain potential, with some experts recommending 50%. As stated earlier, breed, weight and age at weaning and production environment, all influence how well ewe lambs will grow.

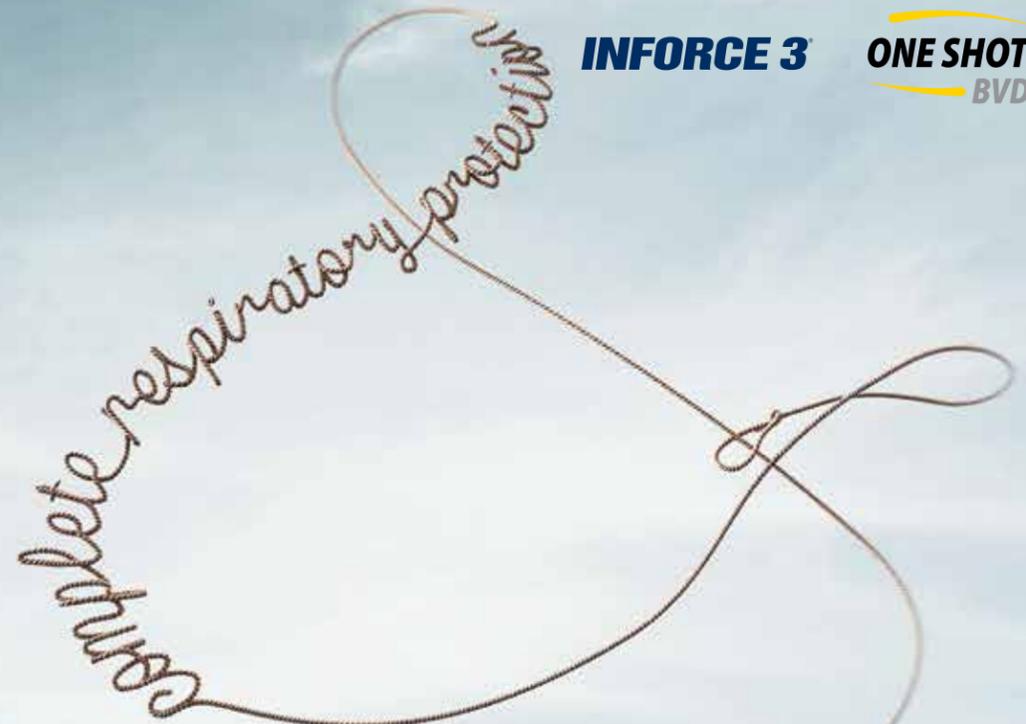
Baselines, goals and development

It's important to establish a baseline or current status of the flock, and the goal for the flock before determining how to best develop ewe lambs. At the same time, when raising replacement rams, it should be noted that overconditioning them can be detrimental to their breeding potential, just like overconditioning ewe lambs can affect their lifetime milk production.

While there is far less consolidated research on developing replacement does, some general information to note is that by the time overconditioning is evident on a goat, they are exceedingly fat, as goats tend to lay fat down internally first as opposed to sheep, who tend to lay down external fat first. Considering this difference, goat nutritional needs are higher than sheep nutritional needs, which means if they will be kidding as yearlings, they should be on a higher plane of nutrition than a replacement ewe lamb, especially in harsher winter climates. For this reason, a little overconditioning on a doeling that is expected to kid as a yearling is not the end of the world. They tend to lose that condition quickly post-kidding. Contrary to popular belief, goats are much more susceptible to health issues than sheep. Because the goat industry is so varied, plans most definitely should be determined based on the farm goals and current conditions. ◀

When determining nutrition needs for ewe lambs, one formula does not fit all farms.





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MALES?

WHO NEEDS THEM?

By Mandy Thomas, Nutritionist for Sioux Nation Ag Center
and JoHannah Klinghagen, Field Marketer for Sioux Nation Ag Center

While it might seem like it is a little early to be preparing for breeding season, it is never too early to prepare for breeding season! We spend most of the year worrying about the females in our flocks/herds, and rightfully so, but how often do we look at the males on the property? I've also been guilty of rushing through my buck chores a time or two, but the truth is that we should be looking at our males long before their working season. We need to remember that even one infertile male can ruin an entire year in a hurry.

So why should we be so concerned about what's happening with the males? The female does most of the work, doesn't she? The problem is that it takes 49 days for rams to produce functional sperm capable of impregnating females. If a ram is experiencing stress from extended exposure to humid or hot temperatures above 90 degrees, illness, or not nutritionally sound, that means a minimum of 7 weeks of recovery time before he can breed well. By the time this magazine hits your desk, it may already be too late to impact this year's breeding, but there's still time for next year.

We still have so much to learn with regards to the effects of nutrition on livestock beyond "the better you feed them, the better they will do" mindset. While this is true, there is still a fine balance of too much and not enough. In some cases, we tend to treat our animals too well. Research shows that only improving nutrition in the 2 months before breeding could increase testicle size and sperm production. At the same time, too much protein and energy in a ration can make a ram very fat. He may look nice, but he could prove to be lazy when it comes to breeding. Also, being overweight could be causing a decrease in testosterone (even while increasing scrotal circumference). It might be wise to consider the quantity of Vitamin A in his diet, as that has also been shown to be important in sperm production.

It's breeding time

We expect our rams to work very hard for at least 45 days and in that time, they can lose up to 20% of their body weight. Older studies from Virginia Tech have stressed that it may take over 50 days and 2.5 pounds of corn in addition to the normal diet to help a 250-pound ram regain the 30 pounds of weight lost during breeding season. It's especially important to take good care of the guys in the Midwest region, as so often post-breeding is immediately followed by the cold and snowy months of winter, and the stress of that environment is not an optimal time for the animal to be regaining weight.

Back to the girls

The intention of this article is not to marginalize the females on the farm, yet a quick Google search shows a much larger focus on the females than the males. With so much emphasis on the girls, resist the temptation to ignore the big dumb boys as they are important too! At the same time, don't forget to ask yourself these questions regularly while checking out your girls:

- What is their body condition?
- Were they pulled down by lambs/kids?
- Have your retained replacements reached their minimal breeding size?
- Do we need to flush them to try and increase our multiples? Research shows that BCS of 3 or better generally won't benefit from flushing but the marginal scores will benefit from the extra feed.
- What does their coat condition look like, how are their feet, etc.?
- Parasite load?

And if you have any questions, feel free to reach out and use Sioux Nation Ag Center animal health experts as a sounding board. That's what we are here for! ◀



**WELCOME
PARASITES**

PARASITE MANAGEMENT

Stop Rolling Out the Welcome Mat for Freeloaders

By Mandy Thomas, Nutritionist for Sioux Nation Ag Center and JoHannah Klinghagen, Field Marketer for Sioux Nation Ag Center

Parasites are one of the largest management headaches in the small ruminant industry, and arguably one of the most complicated issues faced by producers. The complex nature of parasite management is daunting, yet understanding best management practices is essential to your success in raising small ruminants. This is particularly important if they are being pasture-raised and managed. The American Consortium for Small Ruminant Parasite Control (<https://www.wormx.info/>) is an exceptional resource to consult periodically for best practice information.

While I am not a veterinarian, I am a small ruminant producer. Quite often when I am at farms doing nutrition consultation, I also end up assisting customers with parasite issues. It is a major problem in our industry. Because 2019 was an exceptionally wet year in our region, parasites hit numerous flocks/herds hard. At the same time, too much moisture lowered grass quality, and hay quality was decreased when the excessive number of rainy days meant hay producers lacked enough dry

days to cut, dry and bale hay. The challenges faced as a result of these issues led to important discussions with producers.

For many years, the recommendation was to deworm several times a year as a routine part of management, and to rotate dewormers periodically. The more we learn about parasites, the more we realize how much of a headache we have caused ourselves in the emergence of dewormer resistance. There are a few key components to a parasite management plan, yet producers should consult the many fact sheets and studies available to be better equipped to tackle this tricky challenge.

Nutrition

Nutrition is an important factor in the health and productivity of your flock/herd. Research suggests that high protein diets can help combat parasitism or susceptibility to parasitism. However, protein is generally overfed in most systems now, making it important to understand your nutrition program completely before deciding to simply add more protein. Nu-

merous vitamins and minerals are important in immune function, including copper, zinc, selenium, manganese, iron, iodine, and Vitamin A. It's essential to your operation to closely monitor the nutrition of your animals year-round. Animals that are stressed due to factors including the weather, lambing/kidding, freshly weaned, moved, poor body condition, etc. are going to be more susceptible to health concerns.

Genetic selection

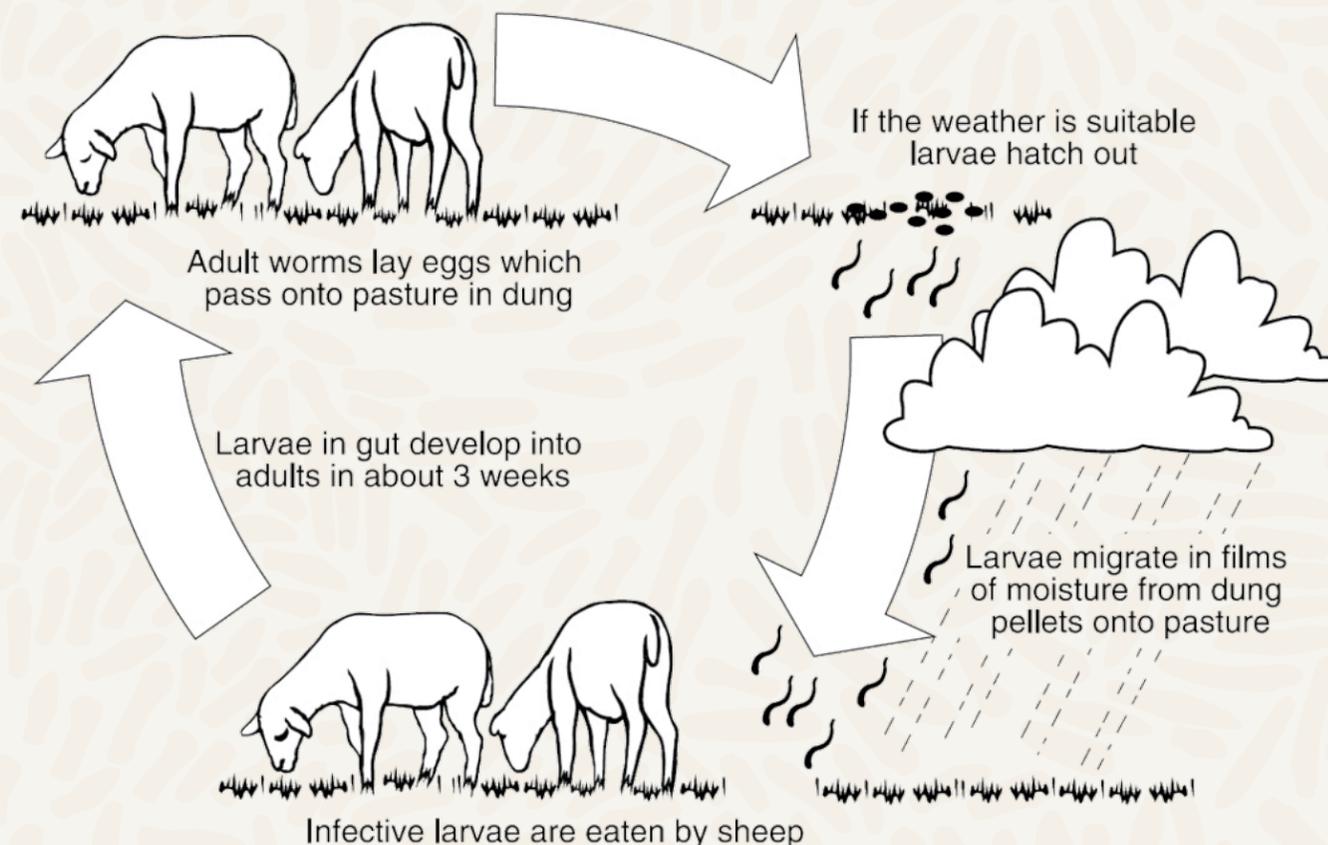
Producers should remember that there are animals within the flock that will be more "resistant" to parasites than others. There are also going to be animals that appear to be more "resilient" as they may carry a high parasite burden but don't show the effects. For a true understanding of which animals in your flock are resistant versus resilient, FEC's (fecal egg counts) are an important tool. Genetic resistance to parasites is moderately heritable so it can be an important tool to select for animals that carry a lower parasite burden and require less deworming. An important rule of thumb is that 70-80% of worms shed on your property often come from 20-30% of the herd. Producers who work towards having fewer "problem" animals may have less of a parasite concern later.

Pasture management

Rotational grazing is an important part of managing parasites in small ruminants. Allowing animals to constantly graze the same area impacts nutrition, and the practice allows them to continually infect themselves with infective larvae. Multi-species grazing can also be a helpful tool, as cattle and horses can "clean up" small ruminant parasites. There are several other factors to consider regarding pasture management, however, they are not as easily applied in the Upper Plains and under most Midwestern conditions including using forages like sericea lespedeza. Dry lotting animals can be another important tool in the toolbox, especially if rest time for pastures is necessary. Do not graze pastures to the ground, as generally no lower than 3-4 inches of grass height remaining in the pasture is important.

Under an ideal temperature of around 85 degrees and high moisture levels, parasite eggs will hatch, experience 2 molts and can develop into the infective stage within 3-4 days. If the temperature is higher than 85 degrees, there could be a greater hatch rate with a lower hatch percentage. In an ideal world, animals would be able to graze a pasture until the infective larvae appear, and then would be moved. However, these decisions are determined by temperature and moisture, which explains why the summer of 2019 was such a perfect storm for parasites. ◀

Life cycle of sheep worms



AN UPDATE Cultivating Resiliency for Women in Agriculture

By Doris Mold, Sunrise Agricultural Associates, LLC

It is cold, it is cloudy, the crops are still in the field, the snow is on the ground and the mud season will soon be here...yet there is a ray of hope. In an earlier Sioux Nation Ag Center publication, we reported that a new project to combat farm stress would soon be available online. That project Cultivating Resiliency for Women in Agriculture has been very successful in providing free stress relief for thousands of women and men farmers, ranchers and other agriculturalists in 47 states and five provinces in Canada. Nearly every type and size of farm and ranch has been reached through these sessions. While raising awareness of farm stress is important, offering tools to help weather the stress is critical. The interactive online series helps cultivate resiliency by focusing on what people can control in these challenging times and connects them with resources and information that can help them weather stress. This project was developed by farmers and agriculturalists and other professionals for farmers. It has been a collaboration of American Agri-Women, District 11 Agri-Women, University of Minnesota Extension- Women in Ag Network and the Upper Midwest Agricultural Safety and Health Center (UMASH).

Online Sessions

The sessions to date have been led by professionals in their fields who have a connection to agriculture and connect well with the farmers, ranchers and agriculturalists who have participated. Sessions range from 60-90 minutes in length depending on the topic. Participants may remain anonymous and can register for the webinars using the links below. During the webinar

session, participants are muted so that no one can hear them. Participants may listen and view the session simultaneously, or listen only (if they call in via phone and are in their tractor or vehicle). If participants have questions during a live session, they may type them into the system for the presenter to respond to. All sessions are recorded so that anyone may access them if they happen to miss the live session, if they wish to view/listen to the session again, or would like to share the session with someone else. Sessions may be accessed on two of the collaborator's websites. The sessions that are currently available either as a recording or live are listed at the end of this article.

<http://umash.umn.edu/cultivating-resiliency-webinars/>
<https://americanagriwomen.org/webinars/>

Coffee Chats

In addition to online sessions there is an opportunity for people to join the online Coffee Chats. The "Chats" are an informal, safe opportunity for people to share what is on their minds related to agricultural stress. They are meant as a small discussion group. These sessions are led by trained counselors with farm backgrounds. Participants remain anonymous. In these sessions, participants may talk if they wish, type in their questions, or just listen. These sessions are limited to 20 registrants and last for one hour and are not recorded. Schedules for these sessions are shared on <http://umash.umn.edu/cultivating-resiliency-webinars/>

Additional resources are in the works including podcasts, worksheets and more. Check the listed weblinks or contact doris.mold@americanagriwomen.org for more information. ◀



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We perhaps cannot stop the storms from coming, but these sessions can help you weather them. Online free webinar sessions that are available either live or as a recording, please see below for a list of sessions to date:

December 14, 2018	Impact of Farming and Ranching Stress for Women 101
January 11, 2019	Self-Care Tips to help reduce stress
January 25, 2019	You can't pour from an empty cup, how do you fill it up to support yourself and others?
February 8, 2019	Building and Maintaining Relationships in Stressful times
March 8, 2019	Increasing your joy and happiness while living a farm life
April 12, 2019	Putting it all together
May 10, 2019	Suicide and the Agriculture Way of Life: What you need to know
June 14, 2019	Anxiety, Depression and Coping Skills
July 12, 2019	Who Am I if I am not a Farmer anymore?
August 9, 2019	Navigating Tough Discussions
September 13, 2019	Navigating Conflict
October 11, 2019	Navigating Conflict and Tough Discussions: Now What?
October 25, 2019	Grief and Mourning: What you need to know
November 22, 2019	An Introduction to Suicide Prevention
December 6, 2019	Effective Communication: A Strategy to Reduce Farm Stress
December 13, 2019	Holiday Self Care, Strategies and Tips
January 10, 2020	New Year, New Farm Goals!
January 24, 2020	Supporting Farm Youth through Understanding and Intervention
February 7, 2020	Planting Courage and Authenticity in a Farming Life
February 26, 2020	Blah! It is Still WINTER!
March 13, 2020	I Can't Do This Anymore: When Chronic Stress Takes Its Toll
March 17, 2020	Tough Times in Agriculture – panel discussion
April 10, 2020	When is it more than a Bad Mood? Depression and anxiety related to pregnancy & childbirth

KIDS IN AG



Trevor and Tate Johnson

Get to Know the Next Generation of Farmers and Ranchers

By Jill Funke, Communications Manager, Sioux Nation Ag Center

Midwestern kids and young adults are finding many ways to learn about and enrich the agricultural industry. At home, they can be found feeding, watering and cleaning up after livestock, as well as helping with planting and harvesting seasons. Many of these dedicated future farmers and ranchers balance their school activities, homework and community involvement with working alongside their family members on the farm.

Trevor Johnson, age 17, and younger brother Tate Johnson, age 16, can trace their time in agriculture to their toddler years. As each of them turned a mere three years old, they began showing pigs at the South Dakota State Fair. By the time they turned 8 and were old enough to join the Clover Kids 4-H club



in Turner County, they had years of showing livestock under their small belts. The Johnson boys have shown mostly calves and pigs, yet have used their skills to also show sheep and goats. In 2016, their Yorkshire Barrow won the South Dakota State 4-H show. Trevor and Tate are currently members of the Beresford FFA, and enjoy that program as well as being involved with 4-H and Junior Livestock groups because those activities afford them the opportunity to travel to events across the country, meet new friends, and learn more about the livestock industry. Going to these events and shows is the reward for the challenging daily work the young men put into their animals and projects.



Thankful for Mentors

While the Trevor and Tate say that being involved in youth livestock projects has been a great experience, they are quick to point out that they do more than show animals. The Johnson boys have helped their parents and uncle in all aspects of the family cow/calf, feedlot and crop operations. The young men appreciate the help that the older generations have been to them, and they are grateful for what they have learned about managing a successful farming operation. Watching their own herds grow from just a few head to a considerable number that they manage with the help of their parents has been a highlight of their young lives. The farming lifestyle is attractive to the Johnson boys, and they hope someday to be part of it on a full-time basis.

Getting Involved

Trevor is currently a senior at Beresford High School, with plans to attend Butler Community College in El Dorado, KS in the fall as part of their Livestock Judging Team. Tate is a sophomore at Beresford High School and plans to continue with FFA and working with his family until he graduates. The Johnson boys agree that kids who are interested in agriculture should strongly consider becoming involved with Livestock Judging. While Trevor and Tate know the activity can be fun and competitive, they feel it also helps teach how to improve your own livestock. They are grateful that these contests helped them meet people who have since become some of their best friends. In addition to the friendships they have made, the Johnson boys will never forget that their Turner County Livestock Judging group won the South Dakota State contest in 2018, paving the way for them to have the opportunity to judge in the national contest in Louisville, KY. To the young men, it was a trip of a lifetime. Involvement in livestock judging has paid off in other ways, as Trevor is receiving a scholarship to compete on the team at Butler Community College.

Considering their bright futures in agriculture, Trevor and Tate are thankful to their parents Mark and Jeanne Johnson, their 4-H leaders in Turner County, as well as their FFA advisor Bridget Twedt. They also feel gratitude toward Dr. Greg and Dr. Doug from Sioux Nation Ag Center who the boys say have been great help to them over the years. ◀

Pork Carnitas

INGREDIENTS:

- 2 pounds (approximately) pork roast
- 1 onion, chopped
- 1 green bell pepper, chopped
- 1 red bell pepper, chopped
- SPICE RUB
 - 3 cloves garlic
 - 1 T lime juice
 - 2 t sea salt
 - 2 t cumin
 - 2 t chili powder
 - 1 t dried oregano
 - 1 t onion powder
 - ½ t black pepper
- Flour or corn tortillas

DIRECTIONS:

Mix all spices together in a bowl. Rub 1/3 of spice rub into all sides of roast. Place roast at the bottom of a crock pot. Cover the meat with onions and peppers. Add garlic, lime juice, and ¼ cup water to the bottom of the pot and cook on LOW for 8 hours.

Shred the roast and transfer to a large skillet. Add the remaining 2/3 of the spice rub to the meat, along with a few T of water. Stir and heat until spices are thoroughly mixed and fragrant.

Spoon meat into tortillas or bowls, garnish with salsa, avocado, fresh cilantro or rice.

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