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Tips for dealing with hot weather health problems

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Heat Stress

More than 1,100 head of feedlot cattle died in July in South Dakota because of unfavorable environmental conditions. The combination of high daytime temperatures, high humidity, low wind, minimal daytime cloud cover, and lack of nighttime cooling created the stifling situation.

A University of Nebraska publication by Dr. Terry Mader and others addresses cattle crises and possible deaths due to excessive heat and humidity. It can be found on the Web at *http://www.ianrpubs.unl.edu/epublic/pages/publicationD.jsp?publicationId=15*

I would recommend reading the entire publication, but focusing on the temperature humidity index (THI) chart at the end to help predict when cattle will get into trouble.

Heat stress in cattle is usually precipitated by a combination of environmental factors:

- Temperatures in the 80s or above
- Relative humidity above 30%
- Overnight temperatures above 70°F. with no nighttime cooling
- Wind speed below 5 mph
- Lack of cloud cover or shade — especially with dark-hided cattle

Be especially alert when the combination of above conditions occurs 2 to 3 days or more in a row

Several management factors can make the problem worse:

- Inadequate fresh, cool water
- Having to travel long distances to reach water
- Handling cattle during the heat of the day
- Fescue toxicity problems

Solutions include making sure cattle have easy access to ample water. Avoid penning or handling cattle whenever possible. If you must handle cattle, do it at sunup only. In an emergency, local fire departments may be called in to spray cattle.

While losses in South Dakota occurred primarily in heavy feedlot cattle, the same could happen in any well-conditioned cattle. This includes show cattle. In heat stress prone situations, advise livestock producers accordingly.

Blue-Green Algae

Another hot weather livestock problem that may be observed is associated with blue-green algae bloom on ponds or water tanks. This problem usually occurs in shallow, warm, slow-moving or still water that is high in nutrient content. These conditions frequently allow the growth of *Cyanobacter spp.*, which is not an algae at all, but a form of photosynthetic bacteria. When conditions are right there will be massive growth of these bacteria, resulting in what is known as a "bloom". During a bloom bacteria float to the surface and collect to form what is commonly called pond scum. Wind pushes this floating pond scum across the top of the water, concentrating the scum against downwind shores. Often there is a distinct odor associated with this bloom.

Cyanobacter spp. are capable of producing some highly potent toxins – some that affect the liver, some that affect the nervous system, and some that may cause irritation of exposed skin. The toxins produced affect humans as well as most domestic animal species. Some of these toxins are rapidly fatal, and cases of cattle dying within 30 minutes of drinking "algae bloom" water have been reported this year. Bulls and heavy milking cows may be the first to die because of their higher total consumption of contaminated water.

If blue-green algae problems are anticipated or suspected, several management options are recommended:

1. Do not wade, swim in or drink water from these water sources
2. Provide alternate sources of drinking water for livestock
3. Fence cattle away from the north half of ponds where the downwind accumulation of the bacteria might occur
4. Test pond scum to see if blue-green algae is present. The Kansas Veterinary Diagnostic Lab and other area labs can test water samples for producers.

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Thank you to the Pfizer Animal Health Group, Livestock Division, Cattle Products Group, for financial assistance in publishing this newsletter.

Emerging Infectious Zoonotic Diseases Expert Joining K-State as Regents Distinguished Professor

Juergen Richt, lead scientist with the U.S. Department of Agriculture's National Animal Disease Center and an adjunct professor at Iowa State University, will join Kansas State University as a Regents Distinguished Professor. Richt's appointment begins in April 2008. The Regents professorship, which is in the College of Veterinary Medicine, is the most prestigious of all academic appointments in the Kansas Regents' system of universities and colleges. The appointment comes with generous funding support, as well as the chance to direct the appointment of at least two additional new supporting faculty positions.

Richt is a veterinary microbiologist who has worked with multiple agents of zoonotic potential. Zoonotic diseases can be transmitted from animals to humans. Richt has published extensively on topics including the microbiology of bovine spongiform encephalopathy, chronic wasting disease, animal flu, borna virus and other emerging zoonotic diseases. He's been widely published in more than 60 journals, including Nature Biotechnology, Journal of Experimental Medicine, Journal of Virology and Science. Richt's appointment further strengthens the nexus of expertise at K-State in the animal health and food safety and security arenas.

"Dr. Juergen Richt will be a brilliant addition not only to our faculty in the College of Veterinary Medicine, but for the entire university and the state of Kansas," said Jon Wefald, K-State president.

"Dr. Richt's experience and reputation will contribute tremendously to our university-wide commitment to animal health and food safety and security," said Ralph Richardson, dean of K-State's College of Veterinary Medicine. "His research will greatly advance K-State as a center of research excellence in infectious diseases of livestock. "In many ways, he will position us to play an important role in protecting the public from emerging infectious diseases such as avian influenza," Richardson said.

Richt received a doctorate in veterinary medicine from the University of Munich, and a doctorate in veterinary virology from the University of Giessen in Germany under the guidance of the late Dr. Rudolf Rott, considered one of the most eminent veterinary virologists of the last century. Richt's postdoctoral studies were conducted at Johns Hopkins University from 1989 to 1991. In 1991, he returned to the Institute of Virology at the University of Giessen's College of Veterinary Medicine and established an independent and well-funded research program in molecular virology. Richt moved to the U.S. in 2000 to work as a veterinary medical officer at the National Animal Diseases Center, a federally-funded laboratory with broad goals similar to those of K-State's animal health and food safety and security programs. At the federal center, Richt worked in two areas: emerging viral diseases of swine and prion diseases, such as bovine spongiform encephalopathy, also called BSE or mad cow disease. He was the first in the U.S. to describe "atypical" BSE cases. Richt has developed novel diagnostic tests to detect major swine respiratory pathogens, as well as developing novel vaccination concepts against flu viruses. He also has studied the interspecies transmission of prion agents. Because of his research expertise, he has begun rapidly moving into the field of animal influenza research and is being recognized for his understanding of avian/swine/human viral transmission.

As a Regents professor, Richt said he plans to establish a new research program at K-State's Biosecurity Research Institute. The opportunity, he said, was a major factor in his decision to come to K-State. "K-State's commitment to working on major livestock diseases is tremendously important for both the agricultural community and national security," Richt said. "I am looking forward to contributing to the scientific environment at K-State and to the education of veterinary students, especially in the interface between veterinary and human medicine."

KSVDL Leads the Way for New BVD Testing Technology

Kansas State Veterinary Diagnostic Laboratory (KSVDL) has recently completed a training course which will allow it to become the first laboratory in the United States to utilize the most sensitive BVDV test in the world. The technology was designed specifically for the detection of BVDV in both genotype 1 & 2 and all sub-genotype strains, including the difficult to detect HOBI and H138 strains. AnDiaTec manufactures the reagents used in the KSVDL.

AnDiaTec has developed a unique and proprietary lysis buffer that eliminates the need for the costly, labor-intensive and time-consuming RNA extraction step. When this lysis buffer is coupled with AnDiaTec's proprietary reagents, there is confidence in detecting a single positive ear notch in a pool of samples within a few short hours.

The technology is so sensitive that it is even possible to differentiate a Persistently Infected (PI) animal from a transiently infected animal in a pooled sample of blood, which could be particularly beneficial if someone wanted to do a complete herd evaluation.

AnDiaTec developed the reagents and a cost-effective automated instrumentation testing system in close association with the German, Austrian and Swiss BVDV eradication programs and key opinion leaders around the world. Some labs are expecting to test more than 1 million animals per year or 4,000 to 5,000 tests per day. Therefore, high quality results, smooth processes and fast turnaround are a must.

We are extremely pleased to be the first U.S. laboratory to provide the AnDiaTec reagents to our clients. In the

VIPs of the Feedlot Industry

Bovine Veterinarian sent a survey through the AVC-L listserve and asked members which veterinarians have had or are having a significant impact on feedlot medicine. The individuals featured were identified by their peers as: "Having exhibited high levels of leadership, passion and dedication for many years as well as being excellent thinkers, challenging paradigms and developing new, progressive strategies for feedlot medicine."

Mike Apley, D.V.M., Ph.D.
Kansas State University

"A leader in evidence-based medicine discussions." "Has brought pharmacology education and its issues to the forefront of feedlot medicine."

A 1987 veterinary school graduate of Kansas State University, Mike Apley, DVM, PhD, gravitated toward feedlot medicine because he liked cattle, production systems and good people. Apley believes data collection capabilities in the feedlot industry initially advanced well before our ability to interpret the data.

"I think the industry as a whole is getting more of an understanding of how to structure and analyze the numbers we collect from the feedlots," he says. "There is a huge difference between seeing if monthly numbers meet our arbitrary benchmarks and letting the numbers tell us what is truly going on in the system followed by trying to refine the system."

Apley believes organic production will continue to be a truly niche market, but that more consumers are responding to that market and are more aware of welfare and food safety issues. "I don't think we have yet found the ultimate mix of consumer interest (and willingness to pay), product quality, environmental impact, animal husbandry, and production cost."

In the next decade Apley hopes to see advances in animal diagnostics and more individual case management. "When a universal response to a lame animal is restricted to needles, we still have a long way to go." Apley also believes the beef industry has completely ignored selecting for disease resistance along with performance. "We accept that carcass quality and performance have huge genetic components, but then turn around and ignore health in our selection process."

An AVC member since 1991, Apley says beef cattle veterinarians range from those completely dedicated to the industry all the way to a very small population of shameless con artists. "Fortunately, our profession is very, very heavily weighted to the former rather than the latter," he notes. "I continue to be amazed by the insight and observational skills of the veterinary practitioner. The strength of the beef practitioner is still in observing what is going on around him or her. The most successful among us are those who use the word 'why' the most."

Apley recalls mentorship from others such as his father who practiced in central Kansas from 1964 through 2001 and demonstrated the realities of life in veterinary medicine and approached those realities with integrity. Veterinary pharmacologist Dan Upson sparked an interest in the application of drugs in food animals and demonstrated respect for the veterinary practitioner. Feedlot consultant Del Miles embodies intensity, dedication to an industry, the ability to read people and digging for answers.

"If you want to talk about heroes, then those are the quiet professionals that serve the small communities in which many of us live," adds Apley. "Foremost among those are the general-practice veterinarians serving rural communities, like my father did, and the professionals that teach our children."

Apley encourages students to first figure out their personal goals for professional fulfillment, income and lifestyle. "If working with cattle on feed is a goal, you can do that in many different ways. If feedlot medicine rises to the top of your interests, grow in that direction."

Used with permission, *Bovine Veterinarian*, August 2007

What is FAMACHA?

A clinical on-farm system, called FAMACHA©, was developed in South Africa for classifying animals into categories based upon level of anemia. Because anemia is the primary pathologic effect from infection with *H. contortus*, this system can be an effective tool for identifying those animals that require treatment (but only for *H. contortus*).

To use FAMACHA©, the color of ocular mucus membranes are observed and compared to a laminated card which has colored illustrations of eyes from sheep at different levels of anemia. All animals are examined at regular intervals and only animals scored as being anemic are treated. In evaluation trials in South Africa, use of FAMACHA© reduced the number of dewormer treatments given by up to 90% as compared to previous years. This system has been validated in the United States by the Southern Consortium for Small Ruminant Parasite Control (SCSRPC).

FAMACHA© is distributed under the auspices of the South African Veterinary Association. Professor G.F. Bath (project coordinator for FAMACHA© in South Africa) has requested that distribution in the United States be made only through the SCSRPC via the laboratory of Dr. Kaplan (University of Georgia) and that FAMACHA© cards are only to be sold directly to veterinarians or other trained animal health professionals. These individuals are expected to provide training in the proper use of the FAMACHA© system prior to re-selling the cards. The exception to this will be when sheep or goat producers attend a formal FAMACHA© training workshop. This restriction in distribution is required by the agreement with Professor Bath in South Africa. Failure to understand the limitations and potential problems with the system combined with the problem of drug resistance may lead to improper implementation.

Coxiella burnetii causes Q fever in humans, abortion in goats

Mary Wight Carter, D.V.M.
Diagnostic Medicine/Pathobiology

Twin fetuses and the placenta from a crossbred goat were submitted to the Kansas State University Veterinary Diagnostic Laboratory in July 2007. The fetuses were from a herd of 200 nannies, and this was the second nanny out of the herd to abort. The submitted fetuses had a 34cm and 37cm crown to rump length and were fully to partially haired with unerupted incisors. These findings are consistent with a third trimester abortion.

For third trimester abortions in goats, the first two possibilities to rule out were *Chlamydophila (Chlamydia) abortus* and *Coxiella burnetii*, however a full abortion work-up was performed to rule out less common causes of infectious abortion. The abortion work-up included bacterial culture of fetal tissues for aerobic bacteria, *Campylobacter sp.* and *Brucella sp.* Fetal thoracic fluid was tested for *Toxoplasma gondii* by a latex agglutination test. Abomasal contents were examined microscopically for motile bacteria characteristic of *Campylobacter sp*. Impression smears of cotyledons were examined by fluorescent antibody for *Chlamydia*. Placental and fetal tissues were also collected in formalin to check for histologic evidence of infectious disease.

There were no gross or histologic lesions found in the fetuses, but the placenta was diffusely thickened and edematous with tan friable material between the cotyledons. (Figure 1) Microscopically, there was a necrotizing placentitis and numerous chorionic epithelial cells were distended by basophilic granular colonies of bacteria. (Figure 2) This is characteristic of placentitis caused by *C. burnetii*. The placenta was negative for *Chlamydia sp.* by fluorescent antibody; however *C. burnetii* was detected by immunohistochemical analyses. Tests for other infectious agents were negative.

Coxiella burnetii is a zoonotic rickettsia that causes Q (Query) fever in humans and abortion in sheep, goats and, less frequently, cattle. Human exposure most commonly occurs at parturition by inhalation, ingestion or direct contact with the fetal fluids and placenta which commonly have very large numbers of organisms. The organism is also shed in the urine, feces and milk and can be transmitted to humans by drinking unpasteurized milk. Q fever in humans can vary from asymptomatic (60%) to mild illness (38%) to severe disease (2%). The incubation period in humans averages 2 to 3 weeks but can be as long as 6 weeks and signs of illness include fever, chills, myalgia, fatigue and chest pains.

Figure 1. Diffusely edematous and thickened placenta. Intercotyledonary areas are covered with tan friable material.

Goats are subclinical carriers of *C. burnetii* with late-term abortions being the most common clinical sign in affected goats. In a study from California of causes of goat abortions, *C. burnetii* was the second most commonly identified agent. *Chlamydophilia abortus* was the most common cause. There are rarely any fetal lesions associated with *Coxiella* or *Chlamydophilia* abortion but placentitis is consistently present and diagnosis of both is relatively easy with a placenta. Without a placenta, diagnosis of both diseases is much more difficult. Presumptive diagnosis of *C. burnetii* is made by observing the characteristic gross and histologic lesions in the placenta. Definitive diagnosis can be made with immunohistochemical analyses of fixed placental tissue.

"There has been a steadily growing interest in raising goats in the state of Kansas over the last few years. It is important to educate clients about this zoonotic agent. . ."

There has been a steadily growing interest in raising goats in the state of Kansas over the last few years. It is important to educate clients that are new to goat production about this zoonotic agent and about *Chlamydophilia abortus*, which on rare occasion causes life threatening illness and abortion in pregnant women, to prevent inadvertent infection during the kidding season. In addition, the client needs to be aware of the importance of submitting the placenta along with the fetuses to facilitate the diagnosis of both these diseases.

Occasionally veterinarians may be asked to evaluate goat herds that are associated with people that have been diagnosed with Q fever by their physician. In this case practitioners should be knowl-

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edgeable of the prepatent period and the typical gross findings that are associated with *C. burnetii*.

Coxiella burnetii is now considered a bioterrorism agent. The Kansas state health department requests that known infections with this agent be reported to the state epidemiologist at 877-427-7317, but this is not mandatory.

References

Moeller RB. Causes of Caprine Abortion: Diagnostic Assessment in 211 Cases (1991-1998). J Veterinary Diagnostic Investigation 2001; 13(3): 265-270

Spickler AR and Roth JA. Q Fever. In: Emerging and Exotic Diseases of Animals, 3rd edition, 2006, Iowa State University, Ames, IA, pp. 216-217

Foster R. Female Reproductive System. In: Pathologic Basis of Veterinary Disease, 4th edition. St. Louis, MO: Mosby Elsevier: 2007: 1295-1296

Communication with Gail Hansen, D.V.M., M.P.H., State of Kansas Epidemiologist

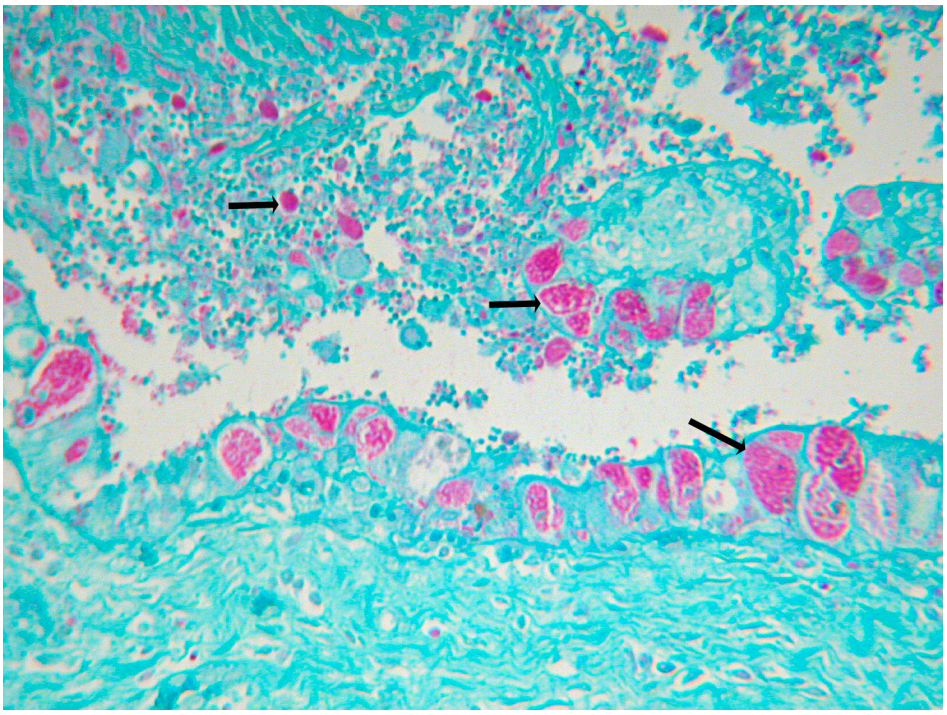

Figure 2. Placenta epithelial cells with intracytoplasmic Coxiella burnetii organisms (arrows). PVK Stain.

What is in the bites of flies and mosquitoes?

Alberto B. Broce, Ph.D.
Livestock Entomologist

When we learn of the battle going on at the host's skin between blood-sucking insects and vertebrate hosts, we are surprised at the complexity of the battle tactics and weaponry utilized, and must conclude that robbing a full blood meal from the host is no easy task.

Over the eons of evolutionary time, blood-sucking insects have developed as stealth warriors by modifying their mouthparts into slender weapons to minimize the pain associated with puncturing the skin tissues. However, this evolutionary selecting force can't go to an extreme because other forces act against it; namely, the smaller the mouthparts diameter, the longer it takes to fill up, thus the longer the parasite is dangerously exposed to the defensive behaviors of the host.

The initiation of tissue penetration by the parasite's mouthparts signals to the host the beginning of battle. The host rushes defenses to the battle site to prevent loss of blood, using the same protective mechanisms used in dealing with any other type of wound bleeding: platelet aggregation, blood clotting, and vasoconstriction, the three factors working in unison in hemostasis. Inflammation and immunity, two other processes involved in the biting event, are time-delayed and of greater consequence to parasites that remain attached while feeding for long periods of time, such as ticks.

Hemostasis is of significant importance to blood-sucking insects. Consequently, they have acquired a series of weapons to counteract this three-pronged host defense. Biting insects inject a complex chemical mixture into the forming wound that lubricates mouthparts and helps evade host defenses. Thus, almost every blood-sucking insect studied has been found to carry anti-platelet, anti-coagulant, and vasodilator compounds in their saliva; sometimes bearing multiple forms of any of these classes of compounds. In addition to these compounds, blood-feeding insect saliva may carry pain-killing substances.

Some of these compounds are potent chemicals intensively studied today for their potential application in human and animal health. For instance, saliva of a tropical sandfly carries maxadilan, the most potent vasodilator known yet. Thus, in the long run we may derive some benefits from the constant battle between vertebrate hosts and their blood-sucking insect parasites.

Information summarized from various sources, especially from:

Lehane, M. 2005. The biology of blood-sucking in insects. Cambridge Univ. Press. 321p.

Ribeiro, J.M.C. & M.B. Francischetti. 2003. Role of arthropod saliva in blood feeding. Ann. Rev. Entomol. 48: 73-88

from page 2

past, PCR technology was viewed as too difficult, unreliable or too costly to run in a high throughput environment. However, now KSVDL staff are able to effectively and efficiently use the simplified AnDiaTec reagents and automation to provide superior results and service for our clients.

Additional Information

Samples to Collect: ear notches (dry) or blood (unclotted)

Shipping: On ice within 2 days of collection – overnight recommended, please freeze the ear notches if shipment cannot occur within 2 days

Results: via fax, webAccess, or phone

Turn-around time: 24 hours after receipt of sample

Pricing: $4.20/head, $3.60/head for 1000+ annually, and $3.30/head for 10,000+ annually. Call KSVDL to set account and pricing 866-512-5650.

Continuing Education

September 8-11
21st Meeting of the American Society for Rickettsiology

September 22
17th Annual Equine Fall Conference on Winning ways: keeping them healthy from young colt to old salt.

September 22
Progressive Practice Management Conference: Surpassing the benchmarks for success in both practice and animal care

November 2-3
Veterinary Career Opportunities Workshop

January 26, 2008
Canine Care Workshop

June 1-4, 2008
70th Annual Conference for Veterinarians and KVMA Veterinary Trade Show

For the most complete, up-to-date conference information visit our Web site at: *www.vet.ksu.edu* and click on Continuing Education, or contact: Linda M. Johnson, Ph.D., at 785-532-5696 or *johnson@vet.ksu.edu*

Upcoming Events

August 25, 2007
Famacha Workshop

August 28, 2007
Feedyard Negotiation Skills Conference, Garden City

September 11-12, 2007
Applied Reproductive Strategies in Beef Cattle, Billings, MT

September 27, 2007
KSU Beef Stocker Conference, Manhattan

October 10-12, 2007
HACCP Plan for Meat, Poultry and Food Processors, Overland Park, KS

October 11-12, 2007
Employment Management for Production Agriculture Conference, Kansas City

November 2-3, 2007
Oklahoma Meat Goat Conference, Ada, OK

November 15, 2007
KSU Swine Day, Manhattan

December 15, 2007
Junior Beef Producer Day, Manhattan

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