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Veterinarians play key role in biosecurity leadership

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The threat of foreign animal disease and bioterrorism on U.S. soil have captured livestock producers' attention. As they become aware of vulnerabilities, they question their ability to protect their herds and flocks from these threats. Responses range from denial ("it can't happen here") to hopelessness ("I can't do anything to stop it if it comes") to developing well-thought-out action plans ("I'm going to make a conscientious effort to protect my animals and livelihood"). As veterinarians, our background and training puts us in a position to help educate all three categories of people and to develop action plans to meet their objectives.

Biosecurity is a mindset. It is being proactive and thinking preventatively. It is looking out for the best interests of our clients, and finding the best way to keep each client sustainable. It is not so much being alarmist as it is stressing good management practices that will serve producers' needs, as well as meet potential future threats.

Biosecurity is looking for "breach points" in the operations we work with each day. We all see areas where producers have room for improvement. And, yes, it is hard to talk some of them into using some of the most basic management techniques. Nevertheless, lack of action on their part should not minimize the urgency. We should recommend ways to improve the biosecurity of these operations, especially those in which livelihood depends significantly upon income from livestock.

Biosecurity starts with us. Veterinarians and other ag professionals who are on-farm regularly can be an entry point for diseases previously unexperienced in an operation. We can set the standard. Disinfecting boots before getting into the practice vehicle and leaving a premise, and again when arriving at a new premise, sets a good example. The same goes for putting on clean coveralls each time we reach a new premise. It says "I believe enough in what I am recommending to follow my own advice," and "I think enough of you as a client to make sure I am not the cause of problems for your operation." It is leadership by example.

> Biosecurity is a mindset. It is being proactive and thinking preventatively.

To help develop a biosecurity plan for a client, we need to do a needs analysis and risk assessment. Starting with the producer's current management practices, we can determine his/her needs and areas of deficiency, and move toward a set of mutually agreed upon goals. The plan starts by answering many questions: What diseases reside within the herd? Is there a way to eliminate them? What common diseases do current management practices leave the herd vulnerable to? Is there a way to prevent or reduce the likelihood of encountering them? What are buying practices – are replacement animals purchased from verified disease-free herds or are they purchased in a "revolving door" fashion from a variety of sources? How are animals transported – in the same truck/trailer that is used to haul a possible persistently infected BVD calf to a sick pen for treatment, or the same one used haul a dead animal to your clinic for a necropsy? Does the producer clean and disinfect the trailer before using it to haul healthy cattle to a new pasture? Does the producer even have a sick pen – one that does not allow fenceline contact between healthy and sick animals? Are herd additions quarantined and tested for diseases the producer knows should be kept out of the herd? Is the producer aware of diseases the herd is susceptible to and at risk of being exposed to? Does the producer control access of people into the operation? Are visitor parking areas designated and access to other places restricted to all but the on-farm employees? Are feed and rendering trucks allowed to drive across open pastures? Are dead animals taken to a pre-determined spot, which is the only place the rendering truck is allowed to enter? Does the producer have a buffer zone to avoid fenceline contact between his/her herd and a neighbor's herd that has a less stringent health management program? The list of questions and observations goes on and on but is the basis for the putting together a realistic program that has a chance of working.

The ingredients that make up a basic livestock production biosecurity program not only help pay the bills through reduced production losses associated with disease, but are an essential starting point to reduce the risk of introducing foreign animal disease as well.

Also in this issue

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

Recommended responses to orange and red threat warnings

High Condition (Orange) High Risk of Terrorist Attack

Communication
Notify producers to increase biosecurity.

Contact state or federal animal health officials for updates on situations, information, or actions needed.

Provide brochures at clinics, and provide display posters.

Distribute informational brochures to producers and livestock concentration points.

Discuss the situation with employees, and report suspicious packages or telephone calls.

Physical Security
Ensure that your clinic and gates are locked when possible.

Consider hiring additional security for your veterinary facility if needed.

Lock veterinary vehicles and park them where they can be observed.

Biosecurity
Avoid livestock and poultry for at least 10 days after you leave foreign soil.

Refrain from wearing items that cannot be successfully disinfected, such as jewelry and watches.

Disinfect boots between farm calls.

Provide foot baths at your clinic.

When possible, disinfect equipment and stalls after use, especially if used for sick animals.

Before leaving a foreign country, launder or dry clean all clothing and outerwear. Remove all dirt and soil from shoes by thoroughly cleaning them prior to wiping with a cloth dampened with a bleach solution. Use a cloth dampened with a bleach solution to wipe luggage and personal items (including watches, cameras, laptops, CD players and cell phones) if they are soiled.

Monitor
Report any signs of disease that might be a foreign animal disease (FAD) immediately to state or federal animal health officials

Report any disease that might be unusual for the geographic area, time of year, or species of animal.

Monitor your clinic's chemical and drug storage areas for tampering or unauthorized entrance.

Watch for unusual packages or containers, especially those found in unlikely or sensitive areas such as air intake systems.

Verify the source of all incoming animals, feed, supplements, equipment and individuals prior to moving them into the animal area.

Scrutinize deviations from "normal operations."

Prepare
Conduct a clinic vulnerability assessment – critically evaluate your operation, determine possible areas of vulnerability, and correct them.

Review clinical signs of FAD's and discuss with all employees and clients.

Review reporting systems and phone numbers in case of a possible FAD or other emergency _ these numbers include those of your state veterinarian, federal area veterinarian in charge, local law enforcement, and state and federal 1-800 hotlines.

Post these phone numbers in your clinic and practice vehicle.

Have extra feed and water available (up to a week) for hospitalized animals in the event movement of animals is stopped.

Severe Condition (Red) High Risk of Terrorist Attack

Engage in the above activities and, in addition, the following are recommended.

Communication
Frequently check with state or federal animal health authorities for information on possible specific threats and mitigation recommendations.

Physical Security
Consider security patrols for your property if indicated.

Post signs at the entrances to your clinic indicating that the operation is under increased surveillance.

Biosecurity
Increase vigilance and report any unusual activities.

Monitor animals on calls more closely for signs of FAD's.

Disinfect boots, vehicle tires, and equipment as much as possible between farms.

Identify possible biosecurity problems to producers.

Encourage producers to minimize the local and interstate movement of animals and conveyances until the threat passes or a condition reduction is announced.

Monitor
Ask producers to call when an animal dies for unknown reasons.

Monitor the animals in your clinic more frequently.

Monitor feed, drugs, and chemicals more frequently.

Prepare
Prepare contingency plans in case of attack, quarantines, or stop movement requirements, and review these plans with employees and family.

Review reporting systems and phone numbers in case of a possible FAD or other emergency – these numbers include those of your state veterinarian, federal area veterinarian in charge, local law enforcement, and state and federal 1-800 hotlines.

Bovine Abortion Diagnostics

Casey Ramsel, D.V.M., and Jerome Nietfeld, D.V.M., Ph.D., K-State Diagnostic Laboratory

Abortions can be a significant loss of revenue for cattle producers. Finding the cause of abortions can be frustrating for the client, practitioner and diagnostician with less than 35 percent of cases submitted to diagnostic laboratories diagnosed. Of the abortions that are diagnosed, the cause is usually infectious.

The success rate for abortion diagnosis is low because often the precipitating event occurred days, weeks, or even months earlier. Usually few, if any, clinical signs are seen in the dam prior to abortion. Gross lesions are seldom found in the fetus. Fetal retention in utero results in autolysis that often obscures the fetal lesions. Toxic and genetic factors are generally not detectable. Fetal membranes, which are often affected first and most consistently, are frequently not available. Many causes of abortion are still unknown so there are no effective routine diagnostic procedures for identifying them. The fetal immune system may react differently from that of the adult. And, finally, incorrect samples may be submitted.

Examination of placenta and fetus

Examine the entire placenta and umbilical cord. Recognize normal features such as amniotic plaques and mineralization. If lesions are noticeable, try to distinguish between non-infectious and infectious causes. Non-infectious causes include the following: umbilical cord abnormalities (torsion, strangulation), deficient placentation (may result in inadequate blood supply to the fetus), premature separation, villous atrophy, and adventitial placentation (may be a response to hydrops amnii/allantois or other uterine disease).

Macroscopic lesions of the fetal membranes occur more commonly than do fetal lesions. Mycotic infection consistently produces lesions. Nonseptate fungi (*Absidia* spp., *Rhizopus* spp., and *Mucor* spp.) produce lesions that affect the entire organ. The placenta appears brown, thick and necrotic. Caruncle infarction occurs often and large parts of caruncles may adhere to cotyledons. *Aspergillus* spp., which are septate fungi, produce more localized lesions and less necrosis. The most evident necrosis is usually confined to the outer perimeter of the cotyledons. The appearance of fetal membranes affected by mycotic infection is characteristic, but severe bacterial placentitis may be mistaken for mycotic placentitis.

In other cases of placentitis, specifically look for:

- Cotyledon necrosis (e.g. Campylobacter, Brucella, Leptospira, Chlamydia, Coxiella)
- Hemorrhage (e.g. Listeria, Coxiella)
- Intercotyledonary edema (e.g. Brucella, Leptospira)
- Purulent Inflammation (e.g. A. pyogenes)

When determining time of death of the fetus, perform a careful necropsy examination of the carcass. Prepartum (prenatal) death is death of fetus before the initiation of parturition. Signs include hemoglobin stained tissues (red), prominent renal cortical autolysis, and no umbilical artery thrombus or hemorrhage. If the calf dies one to several days before expulsion, there is usually excessive red fluid in the body cavities. After several days to weeks, it begins to mummify.

If the calf died during parturition (intrapartal or natal death), no hemoglobin staining occurs and no umbilical artery thrombus or hemorrhage will be present. If death occurs before active expulsion, there will be variable renal cortical autolysis and no subcutaneous edema. If death occurs during active expulsion, there will be no renal cortical autolysis. There will be localized subcutaneous edema of head, forelimbs or perineum (indicates positive signs of heart or lung function).

In postpartum (neonatal) death, there is evidence of calf having been alive following birth. For example, the umbilical artery will be thrombosed and the lungs will be aerated. If death occurs soon after birth, there will be a soft to firm umbilical thrombus with hemorrhage around the stump, no milk in the digestive tract with no intestinal absorption of milk, and no wear of the hooves. If death occurs later after birth, there will be a firm umbilical thrombus or dried out umbilicus, body fat metabolism if starvation occurred, milk in the gut possibly with milk in the lacteals, and some wear of the hooves.

Lesions suggestive of dystocia include subcutaneous edema frequently involving the head and distal forelimbs, lung aeration, subdural hemorrhage, ruptured liver, staining by or aspiration of meconium, and amniotic hemorrhage.

The interval between fetal death and expulsion is fairly characteristic for many infectious causes of abortion. In *Aspergillus* spp. or *Campylobacter* fetus infection, the fetus is usually alive at the time of abortion. In infectious bovine rhinotracheitis (IBR), *Arcanobacterium (Actinomyces or Corynebacterium) pyogenes*, nonseptate fungi or *Listeria monocytogenes*, the fetus is usually dead for at least two days before abortion.

Fetal examination

Examine the fetus for signs of an infectious or noninfectious cause. Macroscopic lesions caused by environmental or genetic factors frequently occur, but it is not easy to distinguish between lesions caused by hereditary factors and those caused by environmental factors. Some non-infectious causes of abortion are congenital malformations (including nervous system and cardiac defects), lethal defects, inherited conditions (chondrodysplasia) and nutritional conditions such as hypovitaminosis A.

Significant gross lesions, such as fibrinous pleuritis, peritonitis, or pericarditis, occur infrequently in calves aborted due to bacterial infections, and the presence of these lesions does not indicate one specific bacterial infection. However, two causes of pericarditis are *Bacillus cereus* and *Campylobacter* infection. Other bacteria with significant lesions include *Arcanobacterium pyogenes* or *Corynebacterium pseudotuberculosis*, which may cause white to yellow foci as large as 1 mm in diameter in the lungs of calves aborted up to four months of gestation. Calves aborted after 4 months gestation have widespread pneumonia. Similar lesions, although smaller and less distinct, occur in calves aborted due to IBR in the first four months of gestation. *Listeria monocytogenes* can cause irregular, indistinct white foci in a shrunken, gray-brown, autolyzed liver. The most distinctive gross lesion of a bovine fetus is mycotic dermatitis. Aspergillus spp. may produce up to 8 cm diameter, raised, dry and rough lesions with a typical ringwormlike appearance. Nonseptate fungi produce flat, moist, circumscribed, white or red areas up to 8 cm in diameter. Other infectious causes may be indicated by the following:

- Degree of maturity: early (*Trichomonas*, BVD), middle (*Campylobacter*, *Neospora*, BVD) or late (*Brucella, A. pyogenes*, *Leptospira*, BVD)
- Degree of autolysis: the degree of autolysis is somewhat characteristic, but not diagnostic, for the various infectious agents. Fetal death with typically prolonged retention in utero resulting in moderate to severe autolysis include IBR, *Leptospira,A.*

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pyogenes, B. abortus, Listeria, Salmonella. Premature fetal expulsion with minimal autolysis include *Aspergillus, Chlamydophila* (formerly *Chlamydia*), *Bacillus sp., Campylobacter spp*.

- Fetal anomalies: mainly viral such as cerebellar hypoplasia (BVD) and skeletal abnormalities (BVD)
- Anemia, icterus (*Babesia, Leptospira*)
- Hepatic lesions + interstitial pneumonia (septicemia)
- Fibrin on serosal surfaces (septicemia)
- Omphalophlebitis
- Pale streaky muscles (skeletal and myocardium; Neospora)

Submission of specimens

The quality of specimens received by the diagnostic lab directly affects the results of the laboratory examination. Because submission requirements vary between labs, call the lab you are sending specimens to prior to shipment to find out what it requires. Every effort must be made to prevent leakage of blood, fluids or water from the package.

Two options are available:

1) Submit the entire fetus and part of the placenta (cotyledon + intercotyledonary areas) to a lab (preferred method) with a detailed history. Keep cool, not frozen.

2) Perform a detailed necropsy examination on the aborted fetus and send specimens on ice, but not frozen, to a lab with a detailed history and gross findings

Which specimens are required?

Bacterial Culture - Fresh tissues - Abomasal content, lung, liver, and any affected organs for bacterial culture. Abomasal content is probably the single best specimen for bacterial culture. Ship the specimens on ice in separate, sterile containers. Do NOT freeze.

Virus Isolation - Pooled lung, kidney, heart and spleen. Placenta in a separate bag. Many labs also like stomach contents. If you wish to special request ureaplasma, please submit lung and placenta.

Histopathology - Formalin-fixed tissues - brain, lung, heart, liver, spleen, kidney, skeletal muscle, thyroid and placenta. Other tissues as indicated, e.g. lymph nodes or thymus.

Fluorescent Antibody Testing - Lung and kidney for IBR and BVD; lung, kidney and placenta for Leptospirosis.

Mycology - Affected placenta and abomasal contents.

Toxicology - Entire eye (so the lab may withdraw ocular fluid) or thoracic fluid for nitrate testing done on third trimester abortions or stillborn calves.

Fetal serology - Precolostral blood from the heart or fetal thoracic fluid for BVD, bluetongue and possibly Leptospirosis. Fetal serology is generally of limited value because of low sensitivity. The fetus may be immunologically incompetent or die too quickly to develop a titer.

Chlamydophila - special request - Cotyledon impression smear (unstained) and liver.

Using the Diagnostic Results

Diagnostic success is generally good in cases of epidemic abortion due to a common cause. However, epizootics of abortion in a herd may occur due to a series of unrelated factors sometimes associated with a common predisposing event. Such epidemics present diagnostic difficulties because frequently no pattern of lesions or agents exists.

Only rarely can effective action be taken to stop an abortion epizootic. Listerial abortion may be controlled by eliminating the feed or water suspected of being the source of infection or by treating all the pregnant cows with antibiotics. However, if a fetus or its placental membranes were infected prior to antibiotic treatment, the course of infection might not be altered. Also, the problem of antibiotic residues in meat and milk must be considered.

Vaccination can stop an abortion epidemic only if it is done in time to produce effective immunity before infection occurs. Vaccination may be effective in diseases such as leptospirosis where the spread of disease through the herd is slow. Vaccination is ineffective in diseases such as IBR and BVD because infection is present at least 3 weeks before the first abortion and transmission is often rapid. Abortions often continue for two to three months after vaccinating a herd during an IBR abortion epidemic. Other than good nutrition and husbandry, there are few specific steps of value in controlling sporadic infectious abortion. Abortion diagnosis is of greatest value in designing programs to prevent future epidemics of abortion.

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Abortion Specimens

In Separate Whirl Packs	Bacteriology	Lung, liver, and any affected organs
	Fluorescent Antibody	Lung, kidney and placenta
	Virus Isolation	Pooled lung, kidney, heart & spleen. Placenta in separate bag
In Separate Red Top Tubes	Bacteriology	Abomasal contents
	Serology	Fetal blood from heart or thoracic fluid
In Formalin	Histopathology	Brain, heart, lung, liver, spleen, kidney, skeletal muscle, thyroid, placenta and any affected organs

Antimicrobial sensitivity patterns from BRD, BED cases

Tanya Purvis, B.S., and George Kennedy, D.V.M., Ph.D., K-State Diagnostic Laboratory

The Diagnostic Lab compiles the results of antimicrobial sensitivity testing of various pathogens in various species of animals. While this collection of sensitivity patterns may give some indication as to the general usefulness of individual antibacterial agents, readers are reminded that many of the samples submitted came from treatment failures and, as such, do not necessarily represent the true effectiveness of a given antibacterial agent in the general population of a given species.

Below are results from samples submitted for diagnostic testing from field cases of bovine respiratory disease (BRD) or bovine enteric disease (BED) from October 2002 through November 2003.

We hope these results will assist you in your antimicrobial treatment decisions during the Spring 2004 calving season and beyond.

BOVINE: Mannheimia haemolytica
TESTED: 122

	Interpretations (as%)		
	Suscept.	Interm.	Resist.
Ampicillin	49	2	50
Ceftiofur	97	2	2
Chlortetracycline	17	2	4
Clindamycin	2	1	98
Enrofloxacin	80	7	14
Erythromycin	1	85	14
Florfenicol	51	30	20
Neomycin	26		74
Oxytetracycline	27	21	51
Penicillin			89
Spectinomycin	3	35	62
Sulphachloropyridazine	3		87
Sulphadimethoxime	5		95
Sulphathiazole		4	96
Tilmicosin	58	24	18
Trimethoprim / Sulphamethoxazole	90		10
Tylosin		1	99

BOVINE: Haemophilus somnus
TESTED: 39

	Interpretations (as%)		
	Suscept.	Interm.	Resist.
Ampicillin	97		3
Ceftiofur	95		5
Chlortetracycline	18		
Clindamycin	23	62	15
Enrofloxacin	97		3
Erythromycin	69	23	8
Florfenicol	79	8	13
Neomycin	82		18
Oxytetracycline	85	3	13
Penicillin			18
Spectinomycin	69	10	21
Sulphachloropyridazine	41		51
Sulphadimethoxime	44		54
Sulphathiazole		33	67
Tilmicosin	87	5	8
Trimethoprim / Sulphamethoxazole	97	3	
Tylosin	64	18	18

BOVINE: Pasteurella multocida
TESTED: 147

	Interpretations (as%)		
	Suscept.	Interm.	Res.
Ampicillin	84	1	16
Ceftiofur	89	5	6
Chlortetracycline	22	5	1
Clindamycin		1	99
Enrofloxacin	78	13	9
Erythromycin	1	53	46
Florfenicol	54	8	38
Neomycin	23		77
Oxytetracycline	32	8	60
Penicillin			83
Spectinomycin	14	20	66
Sulphachloropyridazine	3		96
Sulphadimethoxime	3		95
Sulphathiazole		5	95
Tilmicosin	45	3	53
Trimethoprim / Sulphamethoxazole	51		49
Tylosin	2	11	87

BOVINE: Salmonella sp.
TESTED: 37

	Interpretations (as%)		
	Suscept.	Interm.	Res.
Ampicillin	32		68
Ceftiofur	51		49
Chlortetracycline	14		27
Clindamycin			100
Erythromycin			100
Florfenicol		3	97
Gentamicin	95	3	3
Neomycin	73		27
Oxytetracycline	27		73
Penicillin			100
Spectinomycin	5	30	65
Sulphachloropyridazine	11		89
Sulphadimethoxime	3		95
Sulphathiazole		11	89
Tilmicosin	5	5	89
Trimethoprim / Sulphamethoxazole	97		3
Tylosin			100

Continued, page 6

ANTIMICROBIAL SENSITIVITY PATTERNS from page 5

BOVINE: E. coli, non-hemolytic
TESTED: 7

	Interpretations (as%)		
	Suscept.	Interm.	Resist.
Ampicillin	57		43
Ceftiofur	71		29
Chlortetracycline			29
Clindamycin			100
Erythromycin			100
Florfenicol			100
Gentamicin	86		14
Neomycin	43		57
Oxytetracycline	29		71
Penicillin			100
Spectinomycin	14	57	29
Sulphachloropyridazine	29		71
Sulphadimethoxime	29		71
Sulphathiazole		29	71
Tilmicosin			100
Trimethoprim / Sulphamethoxazole	71		29
Tylosin			100

Continuing Education

January 5 – February 5
Selected dates VetBytes Continuing Education Audio Conference Series
January 30
Equine Reproductive Ultrasound Wet Lab for the Veterinary Practitioner
February 1
Equine Reproduction Seminar for Horse Owners
February 7
Small Animal Conference on Wound Management
February 28
Second Annual Update in Large Animal Medicine and Surgery
March 6
Veterinary Technician's Conference
Opthamology Conference and Wet Lab on Preserving Animal Visual Health
March 7
Small Animal Medicine Lecture Series – You asked for It!
April 18
Frank W. Jordan Seminar – Legal Implica-

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*

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