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**From the Editor** - Fall is the time of meetings for me and many producers and veterinarians. Going to meetings, putting on meetings, and presenting at meetings keeps us pretty busy! *A large list of meetings you could attend are listed at the end of this newsletter.*

In this issue of *ag animal health*, I have summarized some of what I heard at some recent meetings. Did you know that dairy cows with low blood calcium - but not low enough for milk fever - are at risk for many other postpartum diseases? Did you know that the Wisconsin Veterinary Medical Association put together a whole program on drug residue avoidance for the dairy industry?

Although we can learn a lot from the Internet, sometimes going to a meeting gives us even more current, as well as in-depth, information we can use. Add to that the fellowship of like-minded folks and you have real value!

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## What are we up to?

**Veterinary Medicine Extension** worked with Animal Science Extension to deliver a program for dairy producers: *Dairy Production Mini-Symposium* in Sunnyside, Washington, in early October. The **Population Health Research** group was just awarded a large USDA grant to evaluate alternatives to antibiotics and mitigating antibiotic resistance. Several **WSU Ag Animal veterinary students** deserve some congratulations! Todd Winzer (Class of 2016) won the Amstutz Scholarship from the American Association of Bovine Practitioners. Benjamin Baird (Class of 2016) won a Merck Scholarship and Alex Beck (Class of 2016) won 2<sup>nd</sup> place in the Student Research competition at the same meeting. Way to go!

## WSU Ag Animal Health Research Abstracts

**(1) Calm temperament improves reproductive performance of beef cows. R. Kasimanickam, M. Asay, S. Schroeder, V. Kasimanickam, J.M. Gay, J.P. Kastelic, J.B. Hall, W.D. Whittier.**

Profitability of a beef operation is determined by the proportion of cows attaining pregnancy early in the breeding season and those that are pregnant at the end of breeding season. Many factors, including temperament, contribute to these reproductive parameters. The objective of this study was to evaluate the effect of temperament on reproductive performances of beef cows. In experiment 1, Angus and Angus cross beef cows (n=1546) from 8 locations received body condition score (BCS; 1-emaciated; 9-obese) and chute-exit and gait score (1 = slow exit, walk; calm temperament; 2 = jump, trot or run; excitable temperament). Cows were grouped with bulls (1:25 to 1:30; with satisfactory breeding potential and free of venereal disease) for an 85-day breeding season. Pregnancy status and gestation length of cows was determined (transrectal palpation) 35 days after the end of the breeding season. Controlling for BCS ( $P<0.01$ ) and handling facility ( $P<0.0001$ ) and handling facility by temperament score interaction ( $P<0.001$ ), breeding season pregnancy rate was lower in excited versus calm cows [88.6% (798/901) vs 94.1% (607/645);  $P<0.001$ ]. Cows with an excitable temperament took 24 more days to become pregnant compared to calm cows (median days to pregnancy, 35 vs 59 days;  $P<0.0001$ ). In experiment 2, Angus and Angus-cross beef cows (n=1407) from 8 locations were assigned scores for body condition and chute-exit and gait (as described in Experiment 1) and assigned to bulls (breeding sound and free of venereal disease; 1:25 to 1:30) for 85 days. Pregnancy status was determined by transrectal palpation at 2 and 6 months after the breeding season. Controlling for BCS ( $P<0.05$ ), pregnancy loss was higher in excited versus calm cows [5.5 (36/651) vs 3.2 (20/623), ( $P<0.05$ )]. In conclusion, **beef cows with an excitable temperament had significantly lower reproductive performance than calmer cows. Furthermore, the modified 2-point chute exit-gait scoring method was repeatable and identified cattle with an excitable temperament.** (Accepted for publication by: *Reproduction in Domestic Animals*)

**(2) Fertility following two doses of PGF $2\alpha$  concurrently or at 6-hour interval on the day of CIDR removal in 5-day CO-Synch progesterone-based synchronization protocols in beef heifers. S. Schroeder, R. Kasimanickam.**

Synchronization protocols for timed artificial insemination in beef cattle are designed to result in highly synchronized estrus while simultaneously achieving high pregnancy rates and a concise calving season. Protocols achieving such goals reduce time and labor associated with estrus detection, and make advanced reproductive technologies implementable for beef producers. We hypothesized two doses of PGF $2\alpha$  (PGF) administered at a six hour interval would attain the highest pregnancy rate as the corpus luteum requires additional prostaglandin to achieve complete luteolysis at day 5 of development in 5-day CO-Synch progesterone-based synchronization protocols. The objective of the study was to determine the effect of three different PGF dosage schemes on Artificial Insemination (AI) pregnancy rates in beef cattle. 875 Angus heifers were randomly allocated to one of three protocol groups, including: 1PGF (n=291) received 25 mg IM of Dinoprost (Lutalyse®, 5 mL, Zoetis Animal Health, New York, NY, USA); 2 CO-PGF (n=291) received 50 mg IM of Dinoprost at CIDR removal, and 2 PGF (n=293) received 25 mg IM of Dinoprost at CIDR removal and an additional 25 mg IM of Dinoprost 6 hours later. Results showed that the 2PGF group yielded a greater AI pregnancy rate of 63.6% (185/291), compared to the 2CO-PGF group at 51.9% (151/291) and 1PGF group at 54.9% (161/293) ( $P<0.001$ ). In conclusion, **heifers synchronized for fixed time AI with 5-d CO-Synch progesterone based protocols require two administrations of PGF $2\alpha$  at 6 h interval for optimal AI pregnancy rates.**

**(3) Detection of genes encoding multidrug resistance and biofilm virulence factor in uterine pathogenic bacteria in postpartum dairy cows. V. R. Kasimanickam, K. Owen, R. K. Kasimanickam.**

Reckless use of antibiotics and/or development of biofilm are the rationale for the development of multidrug resistance (MDR) of pathogenic bacteria. The objective was to detect MDR genes in *Trueperella pyogenes* and to detect biofilm virulence factor (VF) genes in *Escherichia coli* isolated from the uterus of postpartum dairy cows. Uterine secretions from different parity postpartum Holstein cows (N=40) were collected using cytobrush technique following a sterile procedure from cows with varying grade of uterine inflammatory conditions. The cytobrush was stored in a specimen collector, placed in a cooler with ice and transported to the laboratory within 2 h. The pathogens were isolated and were identified initially by their colony morphology and biochemical characteristics. To further identify and classify the single species, and to determine the presence of MDR and VF genes, the genes fragments were amplified using the respective primers by either singleplex or multiplex PCR protocol and amplicons were detected by electrophoresis method. *T. pyogenes* was isolated in 17 out of 40 cows in the study population as recognized by the 16S rRNA gene. Of the positive *T. pyogenes* samples, 6 were positive for amplicons aadA5 and aadA 24-ORF1. Presence of addA5 indicated resistant to sulfadiazine, bacitracin, florfenicol and ceftiofur. Presence of addA24-ORF1 indicated resistant to sulfadiazine, bacitracin, penicillin, clindamycin and erythromycin. *E. coli* was isolated in 18 of the 40 cows in the study population. The genes for VF, Agn43a and Agn43b, associated with biofilm production, were found in 6 out of the 18 positive isolates. Both *T. pyogenes* MDR gene and *E. coli* biofilm virulence factor existed in cows with metritis and clinical endometritis compared to cows with subclinical endometritis. **In conclusion, 35% of *T. pyogenes* isolates found were positive for a gene cassette associated with antibiotic resistance and 33% of the *E. coli* isolates contained genes for the virulence factor associated with biofilm production, which plausibly explains antibiotic treatment failure in cows suffering from uterine infections.**

**(4) Safety and Immunogenicity of a *Mycoplasma ovipneumoniae* bacterin for domestic sheep (*Ovis aries*). Ziegler JC, Lahmers KK, Barrington GM, Parish SM, Kilzer K, Baker K, Besser TE. PLoS One. 2014 Apr 21;9(4):e95698. doi: 10.1371**

BACKGROUND: Mortality from epizootic pneumonia is hindering re-establishment of bighorn sheep populations in western North America. *Mycoplasma ovipneumoniae*, a primary agent of this disease, is frequently carried asymptotically by the domestic sheep and goats that constitute the reservoir of this agent for transmission to bighorn sheep. Our long-term objective is to reduce the risk of *M. ovipneumoniae* infection of bighorn sheep; one approach to this objective is to control the pathogen in its reservoir hosts. METHODS: The safety and immunogenicity of *M. ovipneumoniae* for domestic sheep was evaluated in three experimental immunization protocols: 1) live *M. ovipneumoniae* (50 ug protein); 2) killed *M. ovipneumoniae* (50 ug whole cell protein) in oil adjuvant; and 3) killed *M. ovipneumoniae* (250 ug whole cell protein) in oil adjuvant. Immunogenicity was assessed by two serum antibody measures: competitive enzyme-linked immunosorbent assay (cELISA) (experiments 1-3) and serum growth inhibition (Experiment 3). Passive immunogenicity was also assessed in the third experiment using the same assays applied to blood samples obtained from the lambs of immunized ewes. RESULTS AND CONCLUSIONS: Adverse reactions to immunization were generally minor, but local reactions were regularly observed at immunization sites with bacterins in oil adjuvants. No evidence of *M. ovipneumoniae* specific antibody responses were observed in the first or second experiments and no resistance to colonization was observed in the first experiment. However, the ewes in the third experiment developed strong cELISA serum antibody responses and significant serum *M. ovipneumoniae* inhibition activity, and these responses were passively transferred to their lambs. **The results of these trials indicate that immunization with relatively large antigenic mass combined with an adjuvant is capable of inducing strong active antibody responses in ewes and passively immunizing lambs.**

**(5) Estimated prevalence of lameness in 53 northwest dairy herds. AC Hoffman, JR Wenz, J Vanegas, DA Moore.**

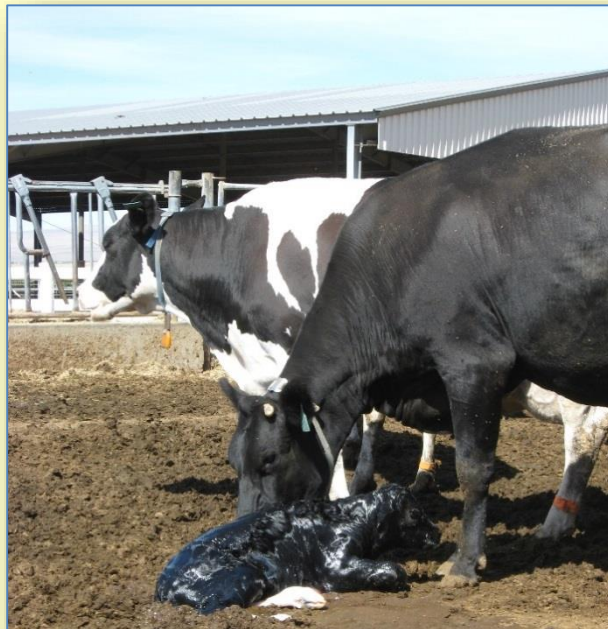
Lameness is an important disease that can be quantified subjectively by locomotion scoring. The prevalence of lameness in dairy cattle has been measured in some areas of North America but has not previously been measured in the northwest United States. In this study, 53 dairy farms in Washington and Oregon were visited, and herd lameness prevalence was estimated by locomotion scoring (using a 5-point system) a systematically obtained sample of the lactating herd, distributed across the lactating cow pens. Over all the herds, the prevalence of any gait abnormality was 21% and was just over 4% for cows that limped or refused to bear weight. Jersey herds had lower prevalence than Holstein herds, and the eastern part of the region had lower prevalence than the western part of the region. Estimating lameness prevalence on dairy farms can serve as a point of comparison or starting point for making herd and regional progress. (*Accepted for publication in the Bovine Practitioner*)

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## **What's New at WADDL?**

### **WADDL Client Survey**

In an effort to keep the lab moving ahead and meeting the needs of the veterinarians and clients in the region, WADDL is conducting a client survey. If you received a mailed survey or a link to an online survey, please take a little time to complete it! Your suggestions are taken seriously and can only help to improve the functions and usefulness of the lab. Thanks!



**Will this cow have a transition problem?**

# Heard at the AABP: Subclinical Hypocalcemia: III Effects Beyond Milk Fever

By Dr. D.A. Moore

Yours truly attended a day-long seminar on transition cow physiology and nutrition from Drs. Jesse Goff and Jon Townsend. Some really new information I heard was on subclinical hypocalcemia. Although I have, in the past, implemented programs on dairies to reduce clinical milk fever through the use of DCAD diets and monitoring urine pH, and had some idea of the importance of calcium in early lactation, I learned some new things about the consequences of the subclinical form of this disease. The title of the presentation I heard was: *Hypocalcemia - it's not just milk fever anymore!*

Normal blood calcium is around 8.5 to 10 mg/dl in adult cows. About 5% of cows in the US will develop clinical milk fever (Calcium less than about 6 mg/dl). The lowest point of calcium is usually about 12 to 24 hours after calving. Cows are in negative calcium balance for up to 4 weeks into lactation. This does not necessarily mean that they are in trouble, just that they have to replenish the body reserves (about 12% bone loss) that they have depleted early in lactation. In a USDA NAHMS study, cows were bled and tested for serum calcium levels. About 25% of heifers and 54% of cows on US dairies were found to have subclinical hypocalcemia (defined as serum calcium 5.5 to 8.0 mg/dl, with no clinical signs).

The most interesting discussion was that cows with subclinical hypocalcemia mobilize more body fat and have higher non-esterified fatty acid levels (NEFAs), increasing the risk for ketosis and DAs. Because hypocalcemia affects rumen and abomasum motility, the risk for DA increases. In addition, because of the need for calcium to work on the teat sphincter muscle for closure of the teat end, the risk for mastitis goes up with hypocalcemia. Finally, calcium is needed for proper immune system function, increasing the risk for mastitis as well as retained placenta. **So, many of the post-partum diseases that we see are likely associated with low calcium after calving.**

We can manage calcium after calving by nutrition before calving. The following were suggested by the speakers for close-up diets:

- Phosphorus at 0.30 - 0.37 %
- Mg at 0.4 %
- S between 0.22 and 0.4 %
- Ca at 0.85 - 1.0 % ??
- Na at 0.1 - 0.15 %
- K as close to 1 % as possible
- Enough Chloride to decrease urine pH

Add chloride to bring the urine pH in the close-up cows to 6.2 to 6.8 the week before calving for Holsteins. For Jersey cows, the target urine pH is 5.8 to 6.2. Levels too low will result in a reduction in Dry Matter Intake and an uncompensated metabolic acidosis. A Thumbrule given was: the % Chloride needed is equal to the % K minus 0.5.

# Highlights from the WSVMA Meeting: Residue Avoidance on Dairy Farms

By Dr. D.A. Moore

Veterinarians from around the state met at the WSVMA Conference in Yakima to learn about drug residue reduction. The focus was on dairy cattle because this class of cattle along with bob veal, top the list for the number of violations seen at slaughter or harvest.

On Friday, September 26, 2014, Drs. Dave Rhoda and Katie Mrdutt brought the details of the Wisconsin Veterinary Medical Association and Professional Dairy Producers of Wisconsin program on FoodArmor™. This program is an industry-wide one that works to reduce violative levels of drugs in market dairy animals. Wisconsin topped the list of tissue residue violations in 2009, prompting the veterinarians and industry to take action.

Take home points from the meeting for me were:

- MEAT MATTERS
- Reasons for residues: (1) Lack of adequate records on treated animals, (2) Extra-label drug use without proper withdrawal times, and (3) Lack of animal identification.



To reduce the risk of residues, the Wisconsin group adapted the use of a Hazard Analysis Critical Control Point system in 6 steps:

1. VCPR - Veterinary Client Patient Relationship that involves the people at cow side, owner, veterinarian. Relationships on dairy farms are complicated, including a number of consultants, employees and others that might have a role in residue reduction. Do we know who everyone is? Do we regularly communicate with each other?
2. Everybody knows the Drug list
3. Everybody knows the Protocols
4. There are SOPs (Standard Operating Procedures) for all things
5. There are Records of treatment
6. There is Veterinary Oversight of drug use on the farm

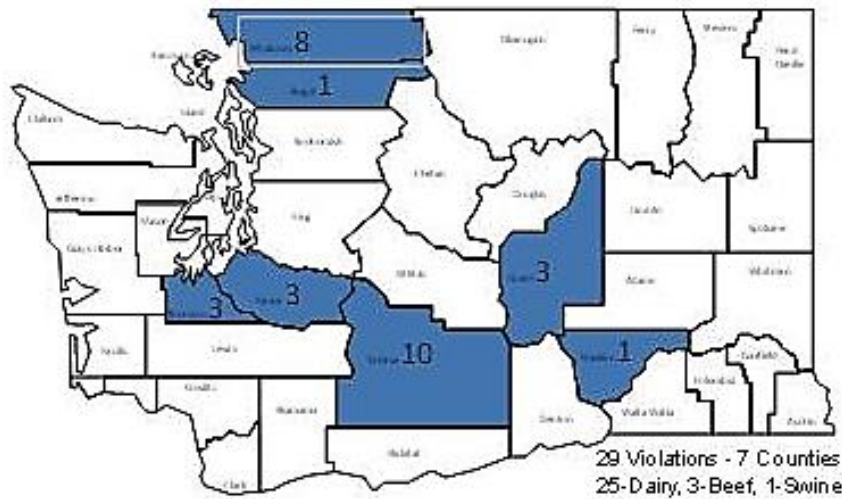
The instructors reported that the top drugs in tissue violations in 2014 cull cows include: desfuoylceftiofur, flunixin, sulfamethazine, and sulfadimethoxine. For bob veal (young calves sent to slaughter) the drugs included neomycin, desfuoylceftiofur, sulfamethoxizole, and tulathromycin.

The Wisconsin program has been training and educating producers and veterinarians since 2011. Does educating producers and veterinarians on residue risk reduction work?

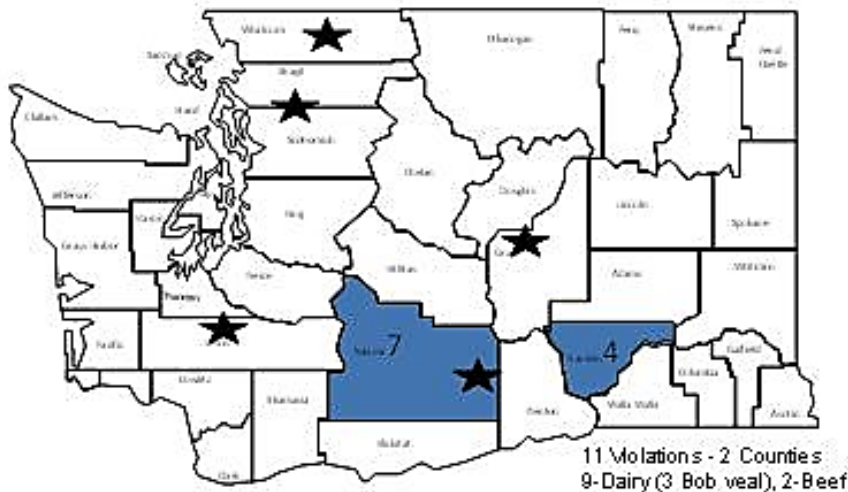
Wisconsin's experience was that in 2010 they had 81 residue violations, 37 in 2011 and now are reported to be zero. They went from 23 repeat violators in 2011 to just 3 in 2014.

You might remember that in 2011, the Washington State Department of Agriculture, Washington State Dairy Federation, NWDA, Pfizer and WSU Veterinary Medicine Extension worked together to inform dairy producers and veterinarians on (1) the FDA project to test for 26 drugs in milk after concerns about the level of residues in dairy market cattle, (2) the reasons for residues, and (3) how to improve record-keeping to reduce residues. The WSU/WSDA/NWDA team members met with producers and veterinarians in 5 locations in the state; Sunnyside, Moses Lake, Chehalis, Arlington and Lynden. How did we do? The following maps show the numbers of residues by county over time.

a. Meat Residue Violations April 2009 – May 2010

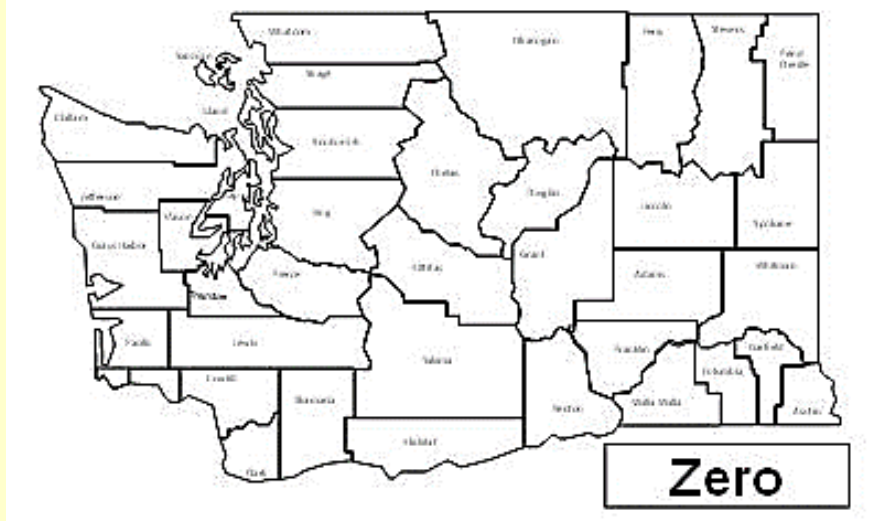


b. Meat Residue Violations May 2010 - April 2011



\*Star represents location of residue prevention meetings held March-April, 2011.

### c. Meat Residue Violations April 2011-March 2012



Knowledge is power. Knowledge translated into action creates change. For a recap on reasons for residues, visit the veterinary medicine Extension website at: (have your audio up!) <http://breeze.wsu.edu/p42969801/>

## WSDA Corner

### Q-Fever Herd Management Plan



The Washington Department of Agriculture released a final version of the **Q-Fever Herd Management Plan**. The purpose of this herd plan is to outline appropriate actions and management practices to protect public health by reducing exposure to *Coxiella burnetii* (the bacteria that causes Q-fever), to educate potentially



exposed persons regarding Q-fever transmission, to limit the spread of *Coxiella burnetii* in herd owner's livestock, and to detect suspect animals as soon as possible. This herd plan is voluntary, is subject to review and revision, and is not intended to represent a legal contract. These management practices are necessary to protect public health and animal health and it is the responsibility of the herd owner to comply with these standards. The plan consists of the following:

**BEST MANAGEMENT PRACTICES:** The highest risk for human illness is due to contact with contaminated birth products (e.g., placentas, fetuses, amniotic fluids). Birth products and soiled bedding materials should be removed immediately, placed in a sealed, double-bagged trash bag, and disposed by incinerating or burying with a depth of at least 3 feet of soil. If the birth products are to be composted see. Additional references on composting are at the end of this document. Immune-compromised or other high risk individuals should consult their healthcare provider for counsel on the advisability of being in birthing areas.



**BIOSECURITY:** Consumption of only pasteurized dairy products is recommended. People at high risk for severe Q-fever illness (e.g. pregnant women, immunosuppressed persons, and persons with heart valve defects) should be informed of the potential hazards and access into the livestock holding areas should be strongly discouraged.

- Ideally, the birthing area should be constructed of impervious material and birth products should be removed immediately. All organic material in the area (i.e straw, other bedding) should be removed and the area disinfected (see below for disinfectants). Concrete floors and steel fences are recommended for ease of cleaning and disinfection.
- Avoid cleaning out buildings and moving soiled bedding on windy days. If using a high pressure washer after cleanout, dampen the area down first using a low pressure spray to decrease production of fine aerosols and wear appropriate respiratory protection.
- Limit visitors' access into the livestock holding areas or barns, unless necessary.
- Pregnant animals close to parturition or animals that have given birth within the last 2 weeks should not be moved off of the farm.
- Hands and arms should be washed thoroughly using warm water and soap after animal contact. If soap and water are not available, then alcohol-based hand sanitizers are a good second choice.
- Clothing worn in livestock holding areas or barns should be removed immediately after leaving the areas and washed in hot water using any commercial laundry product. These clothes should not be worn into your home because of the strong possibility of tracking contagious bacteria into the house.
- Boots should be cleaned and disinfected upon leaving the livestock areas or disposable boot covers should be used and removed and left on the farm. Be aware of the necessary contact time to ensure proper disinfection.
- Manure should be composted as described below. Do not sell manure to the public or use it in garden areas.
- Practice good rodent and tick control; keep dogs and cats away from birth products, carcasses or composting areas.

**ANIMAL RECORDS:** Maintain a detailed registry, which should record all livestock on the premises and any history of adverse pregnancy events (APE). An APE is defined as an abortion, stillbirth, or birth of a weak newborn. The criteria for notification of these events in herds with >100 animals is higher than 5% of pregnant animals. For herds with <100 animals, a criteria of >1 events in a 60 day period applies. This record should be updated whenever an animal is bought or sold. Sales records of individuals who purchase or lease livestock from you including names, addresses, date of transaction and animal sold should also be maintained. This would be very similar to records required for meeting Scrapie rules.

**ANIMAL MOVEMENTS:** Adhere to Animal Health Regulations when buying, selling, importing, and exporting livestock. If animals are obtained from out of state, one should obtain a health certificate, import permit, and meet any additional requirements specific to the species being imported. Learn the health history of newly purchased animals,

particularly history of recent APEs. WSDA recommends Q-fever testing of newly purchased animals, followed by segregation from the rest of your herd for 30 days, and then retesting prior to commingling with your established herd.

**SURVEILLANCE/TESTING:** Q-fever is not uncommon in livestock and animal testing has limitations; therefore culling of animals based on serologic (blood) testing is not recommended as this will NOT ensure a negative herd. A positive Q-fever blood test does not mean that the animal is actively shedding the bacteria and a negative Q-fever blood test does not mean the animal is not currently shedding the bacteria. Blood tests reflect the level of past exposure at the herd level and should not be used to determine the fate of individual animals.

- Contact your local veterinarian if an adverse pregnancy event (APE) occurs in your herd or flock.
- A full abortion workup is recommended to accurately determine the cause of the outbreak. The fetus if available, the placenta and maternal blood sample collected in a red top tube should be submitted for testing purposes. Vaginal swabs are also a good idea especially if there is not fetus or placenta sample available. Please contact a veterinary diagnostic lab such as WADDL for more information. (509-335-9696)
- Q-Fever is a reportable disease in Washington, and you are legally obligated to report a positive Q-fever- associated disease event to the Washington State Department of Agriculture when it occurs in your herd or flock. If you suspect you are experiencing illness in your herd or flock due to Q-fever, immediately provide notice to WSDA at 360-902-1878.
- If an animal on your farm experiences an APE that has been confirmed as Q-fever, immediately contact the Washington State Department of Health at 206-418-5500 to inform them of the potentially exposure to you and your visitors on your farm.
- A positive Q-fever animal may be retested with the same test 30 days after the initial test or 30 days after a birthing event.
- WSDA strongly recommends pasteurization of milk and milk products from positive animals or diverting this milk to other uses. WSDA field veterinarians will follow-up with further educational resources.

**EDUCATION:** All persons who purchase/lease livestock from you or allow their livestock to board at your farm should be informed of the potential risk of Q-fever transmission from livestock and of existing educational material available (i.e. Q-fever Information and CDC Q-fever FAQ Sheet). Provide visitors, especially those who enter the barns and livestock holding areas, with educational material (i.e., the CDC Q fever FAQ sheet). Any visitor to your farm that develops an unexplained illness with fever should be informed of the risk of Q-fever transmission from livestock. For the CDC information on Q-Fever, visit:

[http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6203a1.htm?s\\_cid=rr6203a1\\_e](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6203a1.htm?s_cid=rr6203a1_e)

For the WADDL Q fever Disease FAQ: [www.vetmed.wsu.edu/depts\\_waddl/dx/qfever.aspx](http://www.vetmed.wsu.edu/depts_waddl/dx/qfever.aspx)

For more information and a copy of the complete plan for your farm, go to:

[http://agr.wa.gov/FoodAnimal/AnimalHealth/Diseases/QFever\\_Herd\\_Management\\_Plan2014.PDF](http://agr.wa.gov/FoodAnimal/AnimalHealth/Diseases/QFever_Herd_Management_Plan2014.PDF)

## Continuing Education in Our Region

### Veterinarians

#### Zoobiquity: Human and Animal Health in a Changing Environment

November 1, 2014. 7:30 am to 7:00 pm. University of Washington and the Woodland Park Zoo. Seattle, WA. For more information: <http://www.vetmed.wsu.edu/ce/>

#### Dairy Genomics Workshop FREE!

December 1, 2014. 10:00 am to 2:00 pm. Jerome, ID.

December 3, 2014. 10:00 am to 2:00 pm. Sunnyside, WA.

Please contact Dr. Joe Dalton to reserve your spot! [jdalton@uidaho.edu](mailto:jdalton@uidaho.edu) or (208) 454-7633.

#### Academy of Dairy Veterinary Consultants

The Spring 2015 Meeting will be in April. Location, agenda and date to be announced. To get on the mailing list, contact Dale Moore at [damoore@vetmed.wsu.edu](mailto:damoore@vetmed.wsu.edu)

### Producers

#### FREE! Bovine Respiratory Disease (BRD) Risk Assessment for Cow-Calf Operations

Washington State University Extension developed a set of fact sheets and a ranch risk assessment for BRD in cow-calf herds in collaboration with the US BRD Complex Coordinated Agricultural Project. To evaluate your own ranch for BRD risks, visit:

<http://www.brdcomplex.org/CowCalfBiosecurityCalculator/CowCalfBiosecuritycalculator.html>

#### Poultry Institute – From the Avian Health & Food Safety Laboratory

November 4, 2014. 8:30 am to 2:30 pm. Allmendinger Conference Hall, WSU Puyallup R & E Center. For more information:

<http://extension.wsu.edu/vetextension/calendar/Lists/Events/DispForm.aspx?ID=95&Source=/vetextension/Pages/default.aspx>

#### Washington State Dairy Federation – Dairy Industry Annual Meeting

November 10-11, 2014. Heathman Lodge, Vancouver, WA. For more information:

<http://wastatedairy.com/events/dairy-industry-annual-meeting/>

#### Washington Cattlemen's Association – Annual Convention

November 12-14, 2014. Red Lion Inn at The Park, Spokane, WA. For more information:

<http://www.washingtoncattlemen.org/Convention.html>

#### Dairy Genomics Workshop FREE!

December 1, 2014. 10:00 am to 2:00 pm. Jerome, ID.

December 3, 2014. 10:00 am to 2:00 pm. Sunnyside, WA.

Please contact Dr. Joe Dalton to reserve your spot! [jdalton@uidaho.edu](mailto:jdalton@uidaho.edu) or (208) 454-7633.

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