Veterinary Medicine Extension
Washington State University Extension

ag animal health
VETERINARY MEDICINE EXTENSION
Summer 2015

WASHINGTON STATE UNIVERSITY EXTENSION & WSU COLLEGE OF VETERINARY MEDICINE

In This Issue

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From the Editor – As I write this editorial, I recognize that June is National Dairy Month and July is National Ice Cream Month. Isn't summer wonderful? Although the dairy industry can celebrate the increased sales of dairy products, it is also a frustrating time of the year because of heat stress. In a review of one article, I'll discuss research into reducing ***heat stress effects*** on dairy cow reproduction. In addition to heat stress effects on reproduction, heat stress affects animal behavior, feed intake, and milk production. But because water reserves are low in the West, we'll revisit the strategies to reduce the impacts of heat stress while trying to limit water use… And more! We welcome an article by our new State Veterinarian and highlight a new bacterial testing system at the diagnostic lab.

The ag animal health newsletter is devoted to the transfer of current, relevant information to food animal owners and veterinarians.

Congratulations are in Order!

Abbi Olson (CVM Class of 2016) will be honored with an award and scholarship at the 48th Annual Conference of the American Association of Bovine Practitioners this September in New Orleans. This competitive award, the AABP Bovine Veterinary Student Recognition Award, is sponsored by Merck Animal Health. Abbi is being recognized because of her leadership both within the CVM Ag Animal Club and as a student representative to the AABP. Her selflessness also helped generate money for students to participate in food animal activities. The future Dr. Olson is looking to work with dairy cattle upon graduation. Congratulations, Abbi!


Abbi Olson

Research Project Leads the Way for Vet Student Beef Cattle Travel Fund by Katy Heaton

Shortly after Dr. Ram Kasimanickam came to WSU he started traveling throughout the Pacific Northwest visiting various ranches to enroll them in his "Artificial Insemination Synchronization Protocol Program" for beef heifers (See *Improving Beef Heifer Reproduction via Synchronization and Timed AI* at: http://vetextension.wsu.edu/bovine/). Over the years, Dr. Ram has taken WSU veterinary students with him on these trips to help with his AI program, but, more importantly get the students out in the field working with local cattle ranchers. Through this program students have been able to get hands-on experience working in the beef cattle industry, as well as gain valuable knowledge in beef cattle reproduction.

In 2010 Dr. Ram started working with the Kreps Ranch in White Salmon and enrolled a little over 100 heifers that first year. In 2014 he was able to take students out to work 200 heifers. The Kreps family have been so impressed with the training and experience these students are gaining that they have generously set up an endowment fund to help get veterinary students out and exposed to the local beef industry. The goal behind the fund is to help veterinary students that graduate from WSU gain more practical experience with large animals through programs like Dr. Ram's. We want to give a special THANKS to Kreps Ranch and Olga Jane Hecomovich for establishing this endowment fund for our veterinary students!

For more information on donating to the endowment fund contact Lynne Haley, Director of Development at 509-335-5021 or lhaley@vetmed.wsu.edu. If you are a ranch owner and would like to get involved in the student experience program contact Dr. Ram Kasimanickam at (Work) 509-335-6060, (Cell) 509-330-6040, or by e-mail at ramkasi@vetmed.wsu.edu.

CSI: Cow Scene Investigation – A BVD Outbreak in a Beef Cow Herd by Dr. Dale A Moore

The June 15, 2015 issue of JAVMA had a report about the consequences of BVD introduction into a cow-calf herd. **The calf-crop loss was 44% because of the introduction of BVD virus into a naïve herd.** Let's walk through this case and highlight what could have been done at specific steps along the way.

Timeline:

- Fall -- 136 pregnant (to Angus bulls) AngusX 3-year old cows purchased and transported to a single range/pasture.
- Spring -- (March to May) 128/136 calved within a 2 month calving season; 8 cows did not calve; 9 calves born with congenital problems – "white eye" or corneal opacity, hair loss, red hair. All cows and calves stayed on the same pasture until calves weaning.
- Spring -- 8 calves died less than 1 month of age
- June – 44/120 (37%) of surviving calves (5 of the 9 with congenital abnormalities) and *none* of cow ear-notches positive for BVD Virus antigen.
- August – calves were weaned; 5 calves died just after weaning.
- Fall -- At the feedlot, of 39 BVDV test-positive (isolated at the feedlot), 36 were Persistently Infected (PI, and shedding virus). The other 3 calves were considered TI (transiently infected). Two of the PI calves were euthanized for chronic ill thrift.
- Summer -- At the feedlot, 23 of the 36 PI calves died, 17 of which had lesions consistent with mucosal disease (including extensive necrosis of the lymphoid tissues.

The diagnostic lab at South Dakota State University initially identified a single strain of BVDV Type II in the first set of ear notches. Records analysis showed that BVDV positive calves were born throughout the calving season and that their mean birthweight was much lower than the test-negatives. If you owned these cattle and, in particular, retained ownership in the feedlot, it would have been a really bad year for you.

What do you think initiated this cascade of bad events?

1. Infection of **non-well-vaccinated cows** with **BVDV from a Persistently Infected (PI) animal or an acutely ill animal** within the first 40 days of pregnancy can result in early embryonic death.
2. If a cow is **infected between 40-150 days into pregnancy**, a **PI calf** may result. The PI calf will be born and shed virus and may die of mucosal disease later, even after a year of age.
3. If a cow is **infected after 150 days into pregnancy**, she may **abort, have a congenitally-infected calf with abnormalities, or a weak calf.**

The cows in this herd appeared to be infected at any time during their pregnancies. A PI cow, who could have been shedding virus to her herdmates was never found. If a PI bull, heifer or cow not included in the purchase was allowed to run with the cows during their pregnancy, the outcomes seen could have resulted. The cows in this outbreak were up to 6 months pregnant at the time of purchase.

How to prevent an outbreak like this?

1. Test heifers for BVDV PI status. Cull PI heifers.
2. Vaccinate heifers at least twice before breeding. Use the same vaccine, following label directions.
3. Use BVDV test-negative bulls.
4. If BVDV PI animals are found in the herd, detect through ear notch testing and cull PI calves, heifers and cows (and home bulls).

Reference: Kane SE, et al. Bovine viral diarrhea virus outbreak in a beef cow herd in South Dakota. J Am Vet Med Assoc. 2015;246(12):1358-1362.

Birds on Dairies

Spread the Word: Participants Needed for Birds on Dairies Survey

Are you a Washington dairy producer? Do you have pest birds on your dairy? If you answered yes to these questions, then please take ten minutes to complete an online Birds on Dairies survey found at the following website: https://www.surveymonkey.com/s/dairybirds.

Researchers from Washington State University and Trinity Western University have partnered with three Whatcom County dairy producers to collect survey data on the number and species of pest birds found on Washington dairies, the estimated damage caused by these birds on dairies, and current pest bird management practices used by dairies. Information on the perceived effectiveness of currently-used pest bird management practices will be collected.

This farmer-led project is funded by the USDA Sustainable Agriculture Research and Education program with the objective of assessing the current state of pest bird control on dairies and providing educational information on how to use falconry or native raptors for pest bird management. Anyone interested in learning more about this project may contact one of the team leaders listed below.

Amber Adams-Progar, Washington State University: amber.adams-progar@wsu.edu
Susan Kerr, Washington State University: kerrs@wsu.edu
Karen Steensma, Trinity Western University: steensma@twu.ca

Hazards of Raw Milk by Dr. Dale A Moore

Okay, I confess. I drank milk from the bulk tank when I milked cows in the late ‘70’s. … And I had a bad case of Strep throat as a result. However, I could have had something worse. I was reminded of this by a recent ProMed posting on a small outbreak of Campylobacteriosis in California from consumption of raw goat milk. Three children under the age of five were sick and one of them was hospitalized.

Although I have heard from individuals about the numerous benefits attributed to raw milk consumption, the US Food and Drug Administration evaluated many of these claims and has provided the available evidence against many of these 'health' claims. For information: http://www.fda.gov/Food/FoodborneIllnessContaminants/BuyStoreServeSafeFood/ucm247991.htm

WSDA Corner

by Dr. Joe Baker, State Veterinarian

Well, we have rolled into the hot and sunny days of summer in Washington. We have put highly pathogenic avian influenza behind us (at least temporarily) and have been able to turn our attention to some other animal diseases for a change! And there have been some disease issues to note.

Oregon reported cases of neurological equine herpesvirus (equine herpesvirus myeloencephalopathy, or EHM) associated with a regional high school equestrian team event in the Willamette Valley in late April. A total of four horses were clinically ill. All affected premises were quarantined, and there was no apparent spread to other horses that had not attended the event. We were fortunate that no WA horses were at the OR event. Just as OR was close to releasing the last of the quarantines a new case was reported in a horse which had no link to any horse events or to any of the infected horses or premises from April.

Equine herpesvirus (EHV-1) causes respiratory illness typically more in young horses, and can also cause abortion in pregnant mares. It is thought that after respiratory infection the virus become dormant in at least some horses, can undergo some subtle genetic changes and re-emerge later in life in a form that affects the nervous system. The neurological illness is often triggered by stress; hence they are often associated with shows and events, such as the outbreak associated with a large regional cutting horse event in Utah in 2011, which ended up affecting a number of horses in nineteen states, with over 50 animals affected and the loss of 13 horses. A horse with EHM sheds virus which can infect other horses.

Oregon has also reported an outbreak of equine influenza. This viral disease causes fever, nasal discharge and cough that will usually resolve with little or no treatment over about two weeks. There have been reports of some Washington horses being exposed in Oregon and breaking with signs after their return to our state. Owners should self-quarantine their horses until all affected animals have been without signs for two weeks.

Spring and summer are also the seasons for vesicular stomatitis, and there have been cases reported in four states to date: Arizona, New Mexico, Utah and Texas. Last year a very extensive outbreak involve Colorado, with hundreds of cases and quarantine that rolled into the late fall. There does seem to be a tendency for these outbreaks to be starting earlier in the spring, and persisting later into the fall months. There was only about a two month break between the last cases associated with the 2014 outbreak and the new cases in 2015. They usually start in the southwestern states and move up through the Rocky Mountain States. Occasionally, outbreaks will reach Washington and the western Canadian provinces.

The disease is of concern because of potential economic and trade impacts. It tends to be seen more in horses but can infect cattle, pigs and to a lesser degree sheep and goats. It clinically mimics foot and mouth disease (FMD), and therefore reported cases are quickly investigated and tested. It causes blisters (vesicles) to form in the mouth and coronary bands, but because these blisters break down quickly, owners and veterinarians often see ulcerated lesions as the presenting sign, along with salivation, fever and lack of appetite. The lesions are painful, often interfering with eating and drinking, but generally resolve without specific treatment over a two to three week period. Virus is shed from the lesions for at least the first several days. Affected premises are quarantined until fourteen days have passed since the last newly-infected animals are diagnosed.

And finally, we at WSDA Animal Services Division have been taking advantage of the HPAI hiatus to review our response efforts and identify areas of response that need to be strengthened or improved. We are not sure what to expect this fall and winter, but if the virus follows the pattern it has established in Europe and Asia, we can expect that the migratory birds will likely bring virus with them again this fall and perhaps for the next few years, and new cases of infection will be detected.

The steps that can be taken to protect poultry from HPAI (or any other poultry disease) are collectively known as biosecurity measures. They include things like housing the birds indoors during higher-risk periods when migratory waterfowl are active, keeping feed and water vessels clean, preventing contact between wild birds (particularly wild waterfowl) and domestic birds and using protective clothing, footbaths and hand washing to help prevent the introduction of disease into or from a flock, and not allowing visitors to have contact with poultry. Care and good hygiene should be practiced if you are on any premises where there are birds, including feed stores, so that you do not bring infection back to your birds from those sources.

HPAI will cause a variety of signs in affected birds including cough, nasal discharge, diarrhea, discoloration of wattles and combs, decreased appetite and drop in egg production. But in many cases the disease will progress so rapidly that the owner may notice little but lethargy and mortality. WSDA has a **Sick and Dead Bird Hotline** to report sick and dead domestic birds: **(800) 606-3056**. We have funding to have dead birds or samples sent to either the Avian Health/Food Safety Laboratory (AHFSL) in Puyallup or the Washington Animal Disease Diagnostic Laboratory (WADDL) in Pullman and having them tested for avian influenza. Because mortality events in flocks are most often the signalment of HPAI infection, it will be extremely important for such deaths in poultry to be promptly reported by poultry owners in Washington.

What's New at WADDL? Next Generation Bacterial Identification: MALDI - TOF by Dr. D. Diaz-Campos

WADDL has added a MALDI-TOF mass spectrometer to its arsenal of diagnostic tools available in the bacteriology lab. MALDI-TOF stands for matrix-assisted laser desorption time-of-flight mass spectrometry, an instrument that allows our microbiologists to quickly identify bacteria and fungi based on the organism's protein composition. The MALDI-TOF uses a unique "protein fingerprint" to identify organisms such as bacteria, fungi and

mycobacterium. This means that WADDL is able to produce accurate, molecular-based results faster than ever before. Results for many bacteriology submissions will now be released the day after the specimen arrives at the laboratory.

The MALDI-TOF foundation -- The basis of the technique is that bacterial species exhibit specific protein profiles that are considered biomarkers (proteins, peptides, nucleic acids). Mass spectrometry (MS) is a technique that allows the measurement of the mass of this molecules based on the mass-to-charge ratio (m/z) of its ion. The use of MS to identify and characterize microorganisms has been of great interest for the scientific community for a long time. Among the different developed methods, the MALDI-TOF MS is the most popular method used to identify bacteria and fungi. The MALDI-TOF system features extensive library spectra of analyzed microorganisms.

MALDI-TOF vs. traditional testing -- Traditionally, the identification of bacteria and fungus is accomplished by phenotypic characteristics, together with their response to biochemical tests. The use of conventional methods can take days or even weeks. There are some clinical scenarios in which identifying microorganisms to the species level is essential to select appropriate therapy. However, when using biochemical testing, the differentiation to the species level is limited, therefore identification is accomplished only to the genus. Because of these reasons, laboratories resort to molecular techniques for correct identification, which can be very expensive. The MALDI-TOF system offers accurate and high confidence results available at 24 – 48 hours.

The MALDI-TOF limitations -- The MALDI-TOF used at WADDL is accompanied by Biotyper ®, which is a software program designed to store the genetic fingerprint of thousands of microorganisms. The fingerprint of the tested microorganism is compared with the Biotyper library and if the microorganism is not included in the library the MALDI-TOF won't be able to identify it. In addition, some microorganisms, such as fungus and Mycobacterium species, are slow growers and require an additional extraction method that will delay the identification. There are some bacterial species belonging to certain families or genera in which the protein profiles are very similar. In these cases, the software may have difficulties in differentiating species between them. However, because additional profiles are added to the library as the technology is adopted, the misidentification of pathogens will decrease over time.

What types of samples are needed for MALDI-TOF testing? -- An isolated microorganism is required to use the MALDI-TOF as a tool for pathogen identification. Therefore, the procedure for collection of samples is the same as for traditional methods. For identification of bacteria and fungus, the ideal samples are fluids or tissues, although swabs may be used if those are not available. There is a kit that allows the use of MALDI-TOF directly from blood without initial culture for animals that are clinically suspected to be septicemic. The sample should be collected in blood culture bottles and the laboratory should be contacted in advance. For more information about the guidelines for sample collection, refer to the bacteriology section (http://waddl.vetmed.wsu.edu/open-user-guide/bacteriology) or call the laboratory.

References

Santos, AF, Cayô, R, Schandert, L, Gales, AC. (2013). Evaluation of MALDI-TOF MS in the microbiology laboratory. Jornal Brasileiro de Patologia e Medicina Laboratorial, 49(3), 191-19.7

Croxatto A, Prod'hom G, Greub G. (2012). Applications of MALDI-TOF mass spectrometry in clinical diagnostic microbiology. FEMS Microbiol Rev. 36(2): 380-407.

Can We Mitigate Heat Stress *and* Limit Water Use?

by Dr. Dale A Moore

Water use, through utilization of sprinklers, misters and other cooling devices is very effective at reducing cattle body temperatures and mitigating the effects of heat stress such as lower dry matter intake and milk production. But in the West this summer, water resources are dearer than ever because of the lack of snowpack and little rain. In a report from the state government on June 15th, the snowpack was recorded as zero percent of normal with record lows for stream flows and we are officially in a drought situation. For information on the state's drought response see: http://www.ecy.wa.gov/drought/.

Even if they don't look distressed, these cows could be undergoing heat stress.

In 2008 I wrote an article on heat stress in dairy cattle that highlights the effects of heat stress and how to manage it on the dairy (for the full article see "*Dairy Cattle and Heat Stress*" under Management at: http://vetextension.wsu.edu/dairy/). That article also provides those mitigation steps in order of importance and a number of details on the behavioral and physiological aspects of heat stress. Let's revisit the mitigation steps and discuss how we can keep cows cool without a lot of water.

1. **Drinking water is still number ONE regardless of water resources.** It has to be plentiful and it has to be cool. A cow producing 80 lb of milk a day at 80˚F needs 122 L or 32 gallons and MORE if hot. Cows can consume 6 gallons/hour so water flow is also important.
2. **Shade is still number TWO.** Permanent OR temporary shade (in the way of shade cloth) can be used but the recommendations are about 48 square feet of shade per adult cow.
3. **Pen and cow management is number THREE.** Reduce walking, reduce time in the holding pen, work cows only in the morning, and reduce the stocking density.
4. **Create air movement with fans and provide for ventilation is the new number FOUR.** If you have to restrict the misters or soakers' water output, improving the flow of air through the barn should be your next priority.
5. **Wet the cows at the bunk, in the holding area.** Wetting the cows and blowing air over them for evaporative cooling is an effective method to cool cows in the dry West.
6. **Feeding changes.** Changes to the ration such as yeast products, NDF decreases, increases in minerals, and additional fat have been reported to help cows during heat stress. Results, however, are variable. Working with a nutritionist who has experience feeding cows successfully under heat stress in your area is the best bet. Timing of feeding could be adjusted, however, to reduce the heat of rumen fermentation during hotter times of the day. Dr. Peter Robinson, from UC Cooperative Extension, suggests 65% of the ration be fed at 6 to 7 pm and the balance fed before 5 am.

A heat stress detection application for the iPhone and Android is now available from the University of Missouri at: http://thermalnet.missouri.edu/ThermalAid/. This tool will provide your local weather information and assess the heat stress conditions for cattle for

your mitigation decision-making. You can also use the application to keep track of respiration rates of the cows to see how your strategies are working.

Resources: Robinson PH. Feeding strategies for heat stressed dairy cows during hot dry weather. UCCE. Link at: http://cdrf.org/2013/09/12/heat-stress-in-dairy-cows/ Under "Feed" paragraph in Payne M. Heat Stress in Dairy Cows. September 12, 2013.

Heat Stress and Reproduction in Cattle

by Dr. Dale A Moore

In a recent review article by De Rensis et al. (2015), the specific effects of heat stress on dairy cow reproduction were outlined and ways to counter its effects were highlighted. Specific effects on fertility include:

1. Shorter duration and intensity of estrus signs/estrous behavior, likely due to ovarian steroid capacity and lower estrogen levels.
2. Ovulation failure leading to a persistent follicle or ovarian cyst.
3. Oocyte quality (in vitro, during embryo transfer) or ovulation of the second-wave dominant follicle which may be aged.
4. Reduced blood flow to the uterus with a speculated poor environment for oocyte or sperm survival.
5. Compromised embryo growth up to Day 17.
6. Increased risk of abortion (in one study the risk increased by 3.7 times for singletons to 5.4 times for twins) between Day 50 and 90 in warm season compared to cool.

In addition to managing for heat stress through environmental controls, the authors offered some counter measures for effects of heat stress on fertility that included specific hormonal control measures. These measures needed to be combined with a fixed-time AI program so that heat detection was not needed and include:

1. Ovsynch protocol initiated 6 days after estrus during the first 40 days in milk. GnRH, then PGF2a 7 days later, GnRH 48 hours later, and Fixed Time AI 16-22 hours after the second GnRH.
2. Equine chorionic gonadotropin (200 to 1000 IU) after progesterone releasing device use and followed by a Fixed Time AI protocol.
3. Other Progesterone-based synchronization protocols.

The bottom line is that hormonal control of the cows' cycles can improve conception rates during times of heat stress. Combined with cow cooling, many cows will successfully breed back during times of heat stress.

Reference: De Rensis F, Garcia-Ispierto I, Lopez-Gatius F. Seasonal heat stress: Clinical implications and hormone treatments for the fertility of dairy cows. Theriogenology. 2015; http://dx.doi.org/10.1016/j.theriogenology.2015.04.021

WSU Ag Animal Health Research Abstracts

1) Moore DA, Smith DR, Sischo WM, Heaton K, Besser TE. Escherichia coli O157:H7 – Discerning facts from fiction: An integrated research project for multiple audiences. Zoonoses Public Hlth. 2015; Doi: 10.1111/zph.12206.

The O157:H7 (EcO157) epidemiology of Shiga-toxin-producing Escherichia coli (STEC) in cattle is complex, and myths about pre-harvest control are perpetuated. The objectives of this project were to identify perpetuated misinformation and inform four audiences about evidence-based risks and pre-harvest control of EcO157 by addressing: (i) EcO157 epidemiology and pre-harvest control; (ii) how food safety policy is created; and (iii) how to present accurate information about EcO157. An environmental scan using a daily Internet search helped identify themes for education. A literature review of pre-harvest control measures contributed to the development of educational materials (fact sheets, website, web presentations and conferences). Conference 1 was a webinar with 315 registrants, 10 countries including 41 US states and four Canadian provinces. Most participants felt confident in using their new knowledge, more than half felt confident enough to answer EcO157 questions from the public and many would recommend the recorded version of the webinar to colleagues. Conference 2 was live in the Washington, DC, area with most participants employed by the US government. All agreed that they better understood pre-harvest control, how food safety policy was made, and were confident they could create an effective message about STEC pre-harvest control. Videos were posted and received 348 Internet visitors within 2 months. Conference 3 was a webinar with a live audience and Twitter feeds, targeting people who give nutrition advice. Almost all ranked the programme good to excellent and relevant to their work. About 25% indicated that they would share: 'grass-fed beef is not safer than grain-fed', 25% would share information on effectiveness of cattle vaccines, and 14% would share information on message mapping. **Across all conferences, major changes in knowledge included the following: there is no additional risk of EcO157 shedding from grain-fed versus grass-fed cattle, pre-harvest vaccination is efficacious, and production systems (pasture versus confinement) do not affect EcO157 shedding rates.**

[*From the Editor: This Extension project uniquely identified the national conversation about E coli O157:H7 using daily Internet alerts. Many "myths" were being perpetuated and the conferences helped clarify and give the audience tools to discuss the evidence about pre-harvest control with their clientele.*]

2) Pereira RV, Siler JD, Cummings KJ, Davis MA, Warnick LD. Effect of heifer-raising practices on *E.coli* antimicrobial resistance and Salmonella prevalence in heifer raisers. Epidemiol Infect. 2015 23: 1-10.

Although cattle movement and commingling play an important role in the inter-herd transmission of pathogens, little is known about the effect of commingling of heifers at raising operations. The objective of this study was to compare the resistance of E. coli and prevalence of Salmonella from pooled faecal pats of heifers raised off-farm at multi-source raisers (MULTI) that raised heifers from at least two farms compared with on-farm raisers (HOME), with heifers from only that farm. MULTI faecal pat samples were collected from pens with animals that had arrived at the farm within the previous 2 months (AP) and from animals that would be departing the heifer raiser in 2-3 months (DP). Corresponding age sampling was conducted at HOME raisers. Odds of ampicillin resistance were 3·0 times greater in E. coli collected from MULTI compared to HOME raisers. E. coli from AP pens had

significantly (P < 0·05) higher odds of resistance to ampicillin, neomycin, streptomycin, and tetracycline compared to DP pens. Salmonella recovery was not significantly different between heifer-raising systems (P = 0·3). Heifer-raising system did not have a major overall impact on selection of resistant E. coli, which was strongly affected by the age of the animals sampled.

[*From the Editor: This is another example of the ability of bacteria, in this case E coli carrying resistance traits, to move with the animals.*]

3) Davis MA, Sischo WM, Jones LP, Moore DA, Ahmed S, Short DM, Besser TE. Recent emergence of Escherichia coli with cephalosporin resistance conferred by blacTX-M on Washington state dairy farms. Appl Environ Micro. 2015; 81(13): 4403-10.
Enterobacteriaceae-associated blaCTX-M genes have become globally widespread within the past 30 years. Among isolates from Washington State cattle, Escherichia coli strains carrying blaCTX-M (CTX-M E. coli strains) were absent from a set of 2008 isolates but present in a set of isolates from 2011. On 30 Washington State dairy farms sampled in 2012, CTX-M E. coli prevalence was significantly higher on eastern than on northwestern Washington farms, on farms with more than 3,000 adult cows, and on farms that recently received new animals. The addition of fresh bedding to calf hutches at least weekly and use of residual fly sprays were associated with lower prevalence of CTX-M E. coli. In Washington State, the occurrence of human pathogens carrying blaCTX-M genes preceded the emergence of blaCTX-M-associated E. coli in cattle, indicating that these resistance determinants and/or their bacterial hosts may have emerged in human populations prior to their dissemination to cattle populations.

[*From the Editor: This paper highlights a new gene for resistance to drugs like ceftiofur seen now in Washington state. But unlike many resistance papers, the evidence shows that cattle are likely secondary to human carriage of bugs with these resistance genes.]*

Continuing Education in Our Region

Veterinarians

Academy of Dairy Veterinary Consultants – Veterinarian's Role in Genomic Consulting
The Fall 2015 Meeting will be October 2-3, 2015, in Sacramento, CA. Contact Dale Moore at damoore@vetmed.wsu.edu for more information.

Genomics of Dairy Cow Fertility
September 29, 2015, 7 - 8:30 pm, Quality Inn, Madison, WI. Contact Joe Dalton at jdalton@uidaho.edu

Producers

Genomics of Dairy Cow Fertility Workshop
World Dairy Expo, Madison Wisconsin, September 29, 2015 at the Quality Inn and Suites. Contact Joe Dalton at jdalton@uidaho.edu

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