

ag animal health
VETERINARY MEDICINE EXTENSION
Spring 2015

WASHINGTON STATE UNIVERSITY EXTENSION & WSU COLLEGE OF VETERINARY MEDICINE

In This Issue

From the Editor – Great job dairy farmers!	1
What have we been up to?	1
WSU Ag Animal Health Research	2
Aujesky's Disease -- Pigs	4
What's New at WADDL?	6
Beef Calf Castration – Newer Methods?	6
Dairy Calves–Intensive feeding...	7
Continuing Education Opportunities	9

YOU CAN VIEW PAST ISSUES OF

ag animal health:

<http://extension.wsu.edu/vetextension/Pages/Newsletters.aspx>

From the Editor - Great job Dairy Farmers! From Dairy Herd Improvement Association (DHIA) test-day data, Washington dairy farms have high quality milk. Although not all farms are included in DHIA data (some have invested in daily milk testing for production), the 2013 national report showed that the average Somatic Cell Count (SCC) was less than 170,000 cells/ml in WA herds (national average 199,000 cells/ml). Looking at the national DHIA figures, the bigger the herd size, the lower the SCC. If that isn't good enough, the National Milk Drug Residue Database annual report (Feb 2015) showed that just 0.014% tankers tested positive (less than 2 per 10,000 tankers). This is about a 10-fold reduction in 15 years. And, in the report released this spring on FDA's investigation into drugs in milk, less than 1% of the 1,912 total samples tested positive, three times more in the violator target-herds (1.2%) compared to the random samples (0.4%). And! I could not find a single Washington farm that has received a warning letter for tissue residues since 2012 (FDA warning letter website). Great collective works!

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

What have we been up to?

Veterinary Medicine Extension and FDIU

Drs. Moore and Sischo attended the Steering Committee meeting for the *Western Center for Ruminant Health*. The 5 Western veterinary colleges are getting together to do more with collaborations on ruminant health teaching, research and outreach. Drs. Allen and Moore were in Stanwood in January for the *Country Living Expo and Cattlemen's Winterschool*. Combined, we did 8 hours of lecture. Our team, led by graduate student Dr. Amos Peterson, was also there to interview animal owners about veterinary service needs for urban/peri-urban ag animals. Dr. Larry Fox received the *Award of Excellence for Contribution to Mastitis Prevention and Control* from the NMC! The week of February 16th, Drs. Moore and Sischo visited with dairy veterinarians and producers in Whatcom County about research findings and new projects and in March visited with folks in Eastern Washington. Dr. Moore talked to 4H youth with swine projects in Asotin about disease

prevention and Dr. Sischo led graduate students through Washington DC for Animal Health Policy training.

WSU Ag Animal Health Research Abstracts

DAIRY

1) Alabdullah HA, Fox LK, Gay JM, Barrington GM, Mealey RH. Effects of dexamethasone and *Mycoplasma bovis* on bovine neutrophil function in vitro. *Vet Immunol Immunopathol.* 2015;164(1-2):67-73.

It is well established that exposure either to elevated levels of glucocorticoids, or to *Mycoplasma bovis* (*M. bovis*), has a negative effect on bovine neutrophil function. The objective of this research was to determine whether in vitro treatment of bovine neutrophils by *M. bovis* strains (n=4) and glucocorticoids would additively impair phagocyte function. Twenty, healthy, dairy cows were enrolled. Whole blood was collected from all cows for neutrophil isolation. Phagocytosis and the generation of superoxide anion (O₂(-)) were tested in vitro by incubation of neutrophils with FITC labeled *Escherichia coli* (*E. coli*) and cytochrome c after treatment. Treatments included: NM1-4D (neutrophils treated with dexamethasone and exposed to one of the four *M. bovis* strains); NM1-4 (neutrophils exposed to one of the four *M. bovis* strains only); ND (neutrophils treated with dexamethasone only); and N (non-treated control neutrophils). The overall percentages of neutrophils phagocytizing *E. coli* were: 32%, 51%, 37%, and 53%±5.25% for treatments NM1-4D, NM1-4, ND, and N, respectively. The overall statistically transformed means of phagocytized *E. coli* per neutrophil were: 1.37, 1.72, 1.33, and 1.67±0.057 for treatments NM1-4D, NM1-4, ND, and N, respectively. The overall statistically transformed means of neutrophil O₂(-) production were: 8.60, 11.91, 9.01, and 12.21±0.21nmol/10(6) for treatments NM1-4D, NM1-4, ND, and N, respectively. Exposure of neutrophils to *M. bovis* plus dexamethasone had an additive effect on generation of reactive oxygen species (p=0.0057), but not on the percentage of neutrophils phagocytizing *E. coli* (p=0.0817) or number of *E. coli* phagocytized per neutrophil (p=0.2946). Only one of the four *M. bovis* strains had a negative effect on neutrophil phagocytic function. Dexamethasone treatment consistently decreased neutrophil function as indicated by decreased percentage of neutrophils phagocytizing *E. coli*, decreased number of *E. coli* phagocytized per neutrophil, and decreased neutrophil O₂(-) production, compared to controls (p<0.0001). Results suggested a synergistic effect of in vitro incubation of glucocorticoids and *M. bovis* on reduction of bovine neutrophil function as measured by generation of reactive oxygen species. These findings may explain in part the interaction between stressful events and outbreak of *Mycoplasma bovis* associated bovine disease.

[From the Editor: Mycoplasma infections continue to perplex dairy producers and veterinarians. Because there is no treatment for mycoplasma mastitis, milk culture and management are the only tools. Glucocorticoids (such as the stress hormone cortisol) appear to affect the ability of a white blood cell defense system. Add low stress handling, good transition management, and cow comfort to the list of tools.]

DAIRY

2) Enger BD, Fox LK, Gay JM, Johnson KA. Reduction of teat skin mastitis pathogen loads: Differences between strains, dips, and contact times. *J Dairy Sci.* 2015;98(2):1354-61

The purpose of these experiments was to (1) assess differences in mastitis pathogen strain sensitivities to teat disinfectants (teat dips), and (2) determine the optimum time for premilking teat dips to remain in contact with teat skin to reduce pathogen loads on teat skin. Two experiments were conducted using the excised teat model. In experiment 1, the differences in mastitis pathogen strain sensitivities to 4 commercially available dips (dip A: 1% H₂O₂; dip B: 1% chlorine dioxide; dip C: 1% iodophor; and dip D: 0.5% iodophor) were evaluated. Four strains of 11 common mastitis pathogens (*Staphylococcus aureus*, *Streptococcus agalactiae*, *Mycoplasma bovis*, *Streptococcus dysgalactiae*, *Streptococcus uberis*, *Escherichia coli*, *Staphylococcus chromogenes*, *Staphylococcus epidermidis*, *Staphylococcus hyicus*, *Staphylococcus xylosus*, and *Staphylococcus haemolyticus*) were tested. In experiment 2, the percentage log reduction of mastitis pathogens (*Escherichia coli*, *Streptococcus uberis*, *Streptococcus dysgalactiae*, *Klebsiella* species, *Staphylococcus chromogenes*, *Staphylococcus haemolyticus*, *Staphylococcus xylosus*, and *Staphylococcus epidermidis*) on teat skin with 3 commercially available teat dips: dip A; dip D; and dip E: 0.25% iodophor, using dip contact times of 15, 30, and 45 s(econds), was evaluated. Experiment 1 results indicated significant differences in strain sensitivities to dips within pathogen species: *Staphylococcus aureus*, *Staphylococcus chromogenes*, and *Streptococcus uberis*. Species differences were also found where *Mycoplasma bovis* (97.9% log reduction) was the most sensitive to tested teat dips and *Staphylococcus haemolyticus* (71.4% log reduction) the most resistant. Experiment 2 results indicated that contact times of 30 and 45 s were equally effective in reducing recovered bacteria for dips D and E and were also significantly more effective than a 15-s contact time. No differences were seen in recovered bacteria between tested contact times after treatment with dip A. It can be concluded that different mastitis pathogen species and strains within species may possess different sensitivities to teat dips, which may have implications in selection of teat dips on dairies. Furthermore, a 30-s premilking dip contact time for iodophors and 15-s for H₂O₂ dips may be optimal in reducing pathogen load in the shortest amount of time. A reduction in premilking teat dip contact time may improve milking parlor efficiency.

[From the Editor: Pre-milking teat disinfection is one tool to reduce the chance for intramammary infections. This paper demonstrates some differences in pre-dip choices on effectiveness based on the bacteria. A challenge is to institute pre-dipping and fore-stripping on some farms. If the contact time doesn't have to be very long, it might help with compliance for this part of the milking protocol.]

BEEF

3) Kasimanickam R, Schroeder S, Hall JB, Whittier WD. Fertility after implementation of long- and short-term progesterone-based ovulation synchronization protocols for fixed-time artificial insemination in beef heifers. *Theriogenology*. 2015 Jan 10. pii: S0093-691X(15)00005-9. doi:10.1016/j.theriogenology.2015.01.004. [Epub ahead of print]

Two experiments were conducted to evaluate the effect of long-term (LT; a 14-day controlled internal drug release insert [CIDR]-PGF₂α [PGF]-GnRH) and short-term (ST; 5-day CO-Synch + CIDR) progesterone-based protocols on pregnancy rate to fixed-time artificial insemination (FTAI) in beef heifers. In experiment 1, Angus cross beef heifers (N = 1887) at nine locations received a body condition score and a reproductive tract score (RTS). Within the herd, heifers were randomly assigned to LT-72 and ST-56 protocol groups. Heifers in the LT-72 group received a CIDR from Days 0 to 14, followed by 25 mg of

PGF 16 days later (Day 30). Heifers in the ST-56 group received a CIDR and 100 µg of gonadorelin hydrochloride (GnRH) on Day 25 followed by 25 mg of PGF at CIDR removal on Day 30 and a second dose of PGF 6 hours later (Day 30). Artificial insemination was performed at 56 hours (Day 32) after CIDR removal for the ST-56 group and at 72 hours (Day 33) after CIDR removal for the LT-72 group, and all heifers were given GnRH (100 µg, intramuscular) at the time of AI. In experiment 2, Angus cross beef heifers (N = 718) at four locations received a body condition score and an RTS. Within the herd, heifers were randomly assigned to LT-72 and ST-72 protocol groups. The protocol was similar to experiment 1 except that AI was performed at 72 hours after CIDR removal for both LT-72 and ST-72 groups. In experiment 1, no difference in AI pregnancy rates between the LT-72 and ST-56 groups was observed (54.5% [489 of 897] and 55.5% [549 of 990], respectively; P = 0.92) after accounting for the RTS. The AI pregnancy rates for heifers with RTS 3 or less, 4, and 5 were 52.6%, 53.6%, and 59.9%, respectively (P < 0.05). In experiment 2, controlling for the RTS, no difference in AI pregnancy rates was observed between the LT-72 and ST-72 groups, 56.9% (198 of 347) and 57.8% (214 of 371), respectively (P = 0.87). The AI pregnancy rates for heifers with RTS 3 or less, 4, and 5 were 49.3%, 58.4%, and 62.1%, respectively (P < 0.05). In conclusion, heifers synchronized for fixed-time AI with LT and ST protocols resulted in a similar AI pregnancy rate. Approximately, 55% of the herd was pregnant to one insemination in 33 days with the LT protocol compared with just 8 days with the ST protocol.

[From the Editor: Reproductive tract scoring (RTS) was influential in AI pregnancy rates in this study and needed to be controlled for to evaluate synchronization protocols. The tract scores indicate maturity and the readiness to be bred for beef heifers. For a how-to, see: http://www.sites.ext.vt.edu/newsletter-archive/livestock/aps-98_07/aps-935.html]

Aujesky's Disease

By Dr. Vanmathy Kasimanickam

What is Aujesky's disease?

Aujesky's disease or pseudorabies is an acute, frequently fatal, highly contagious and economically important viral disease of swine. The virus can affect most domesticated and wild mammals including cattle, sheep, goats, cats and dogs. It does not infect humans and infections in horses are rare.

Where is Aujesky's disease found?

The disease can be found in parts of Europe, Southeast Asia, Central and South America, Cuba, Samoa and Rwanda. In the US, the disease was endemic before and has been eradicated from the domestic pigs since 2007. However, *feral pigs* harbor the virus so is still a concern. It is a reportable disease and an active surveillance program is ongoing.



In pigs, the virus is transmitted by direct contact, aerosol transmission, and indirect contact via fomites (like feeding equipment) and can be found in the carcasses of infected pigs. Sexual transmission is possible and transmission between sow and fetus can occur. Other animal species can be infected via contact with infected pigs or eating infected pork.

What are the clinical signs observed in animals?

Clinical signs vary depending on age and species of animals infected. Affected piglets have fever, anorexia, listlessness and neurological signs. The disease is acute in piglets and they often die within two to three days, with mortality rates high. In adults, respiratory signs predominate over neurological signs. The infection is usually mild, but some affected adults may show severe respiratory signs. Pregnant sows can abort or farrow weak piglets. Feral pigs do not show clinical signs. The disease is severe and often fatal in other animals. Clinical signs in non-porcine animals are similar to those of rabies: intense itchiness, difficulty breathing, convulsions and death. Dogs and cats have neurological signs, difficulty swallowing and excessive salivation and often die. No signs of infection or clinical signs of disease have been reported in humans.

Action, protection and prevention

Because the disease has been eradicated in domestic pigs in the US, the real concern is the potential comingling of domestic and feral pigs. From the USDA eradication report: “*Neither feral swine nor the endemic PRV infection of feral swine will disappear soon. For this reason, adequate separation between the populations, surveillance efforts, education and understanding of the risks associated with feral swine, and the reduction of feral pig movement must all continue.*”

A report from Oklahoma in 2011 discussed infection with PRV in hunting dogs. If there is a suspicion of the disease, attention should be taken. Local and state authorities should be notified. New animals entering the herd should be tested and isolated before introduction. Proper disinfection measures can prevent the spread of the disease. Domestic pigs should be kept away from feral swine population since feral pigs harbor the virus without showing any clinical illness. Vaccines are available to control the signs of disease but the vaccines available can't control or prevent the infection.

Sources:

1. Cramer SD et al. Pseudorabies virus infection in Oklahoma hunting dogs. J Vet Diag Invest. 2011;23:915-923
2. Merck Manual
http://www.merckmanuals.com/vet/nervous_system/pseudorabies/overview_of_pseudorabies.html
3. USDA
http://www.aphis.usda.gov/wps/wcm/connect/aphis_content_library/sa_our_focus/sa_animal_health/sa_animal_disease_information/sa_swine_health/ct_f_a_q
4. USDA. Pseudorabies (Aujesky's Disease) and its eradication: A review of the US experience. APHIS Tech Bull. No. 1923. October, 2008.



What's New at WADDL?

Pregnancy Testing in Ruminants

One result of the recent WADDL client survey is the introduction of pregnancy testing for ruminants using a blood test, requested by a number of clients. The test can be used for cattle, sheep, goats and buffalo. For more information on how the test works, see:
<http://waddl.vetmed.wsu.edu/animal-disease-faq/pregnancy-testing-in-ruminants>



Beef Calf Castration – Newer Methods?

By: Dale A. Moore

Cattle owners have been castrating calves for centuries. The benefits are well-established as are the possible complications and consequences. Are there other methods than our traditional cutting or banding?

In a recent survey of bovine veterinarians in the US, Cotzee and others (2010) found that producers were primarily responsible for performing castrations of calves less than 200 lbs but that for calves over 550 lbs, the veterinarian did most of the castrations (few of these large-calf castrations were done in a year). Surgical castration with a scalpel followed by twisting was the most common method. Elastrator rubber rings were more commonly used on calves less than 200 lbs. The burdizzo method was not commonly used. Less than 1/4th of the practitioners used local anesthesia or analgesics for castrations.

The burdizzo method is not always effective and band castration can produce chronic pain. Chemical castration with an injectable toxin (e.g. lactic acid) into the testicular parenchyma is an older method (more than 25 years old) that has been used by some but is more difficult to do and has a longer healing time (AVMA, 2014).

Another method of “castration” is through immunization against gonadotropin-releasing hormone (GnRH). A very recent study of beef calves (about 250 days of age) compared intact bulls, band-castrated, and anti-GnRH vaccine (Marti et al., 2015). The vaccinated calves received two doses, 35 days apart. The bottom line was that the immunized group had better weight gains than either of the other groups, and had no indications of physiological or behavioral changes associated with pain. Serum testosterone levels dropped to mostly zero by day 14 after the second injection, mimicking band castration and resulting in reduced sexual and aggressive behavior. The welfare advantages are obvious, but this technique requires handling the bull calves twice for the initial effect and the potential need for revaccination 3 to 4 months later.

Pain from any of the procedures, except immunization, can either be instant (acute) or chronic (long-lasting). In a summary of pain and pain alleviation with castration, Cotzee (2013) described the benefits of local lidocaine for anesthesia that is fast-acting (2-5 minutes) and relatively long-lasting (90 minutes). Coupled with analgesics, like ketoprofen or meloxicam, calves had less “stress” and pain outcomes of the procedures for at least a week. Regardless of the method of castration used, low stress handling, performing castration early in life, and using pain mitigation are still the keys to reducing stress.

References

AVMA. Literature review on the welfare implications of castration of cattle. Available at:
<https://www.avma.org/KB/Resources/LiteratureReviews/Pages/castration-cattle-bgnd.aspx>

Cotzee JF, Nutsch AL, Barbur LA, Bradburn RM. A survey of castration methods and associated livestock management practices performed by bovine veterinarians in the United States. BMC Vet Res. 2010;6:12.

Cotzee JF. Assessment and management of pain associated with castration in cattle. Vet Clin Food Anim. 2013;29:75.

Marti S, Devant M, Amatayakul-Chantler S, et al. Effect of anti-gonadotropin-releasing factor vaccine and band castration on indicators of welfare in beef cattle. J Anim Sci. 2015;93: doi:10.2527/jas2014-8346.



Dairy Calves – What does intensive feeding do?

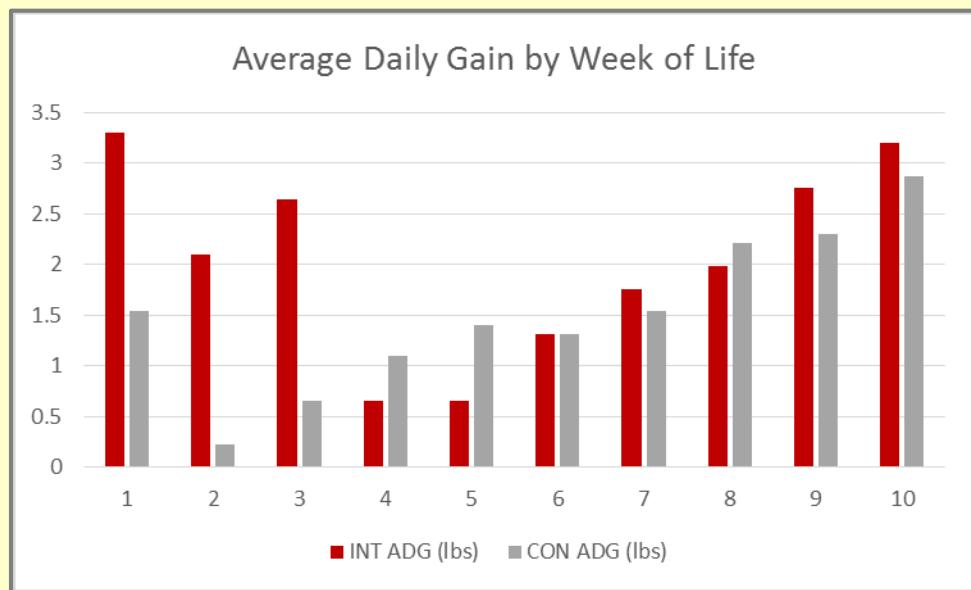
By: Dale A. Moore

Debate continues on the cost-benefit of intensive-feeding of dairy calves (see <http://extension.wsu.edu/vetextension/dairy/Pages/default.aspx>, Management, *Heifers: Begin with the End in Mind*, for a review) but the evidence points to better first lactation production in intensively-fed calves, as well as other benefits. But, what is actually happening in the calf when an intensive feeding system is implemented?

In a recent paper from the *Journal of Animal Science*, German investigators reported on a study evaluating the physiological effects of intensive rearing of dairy bull calves. Forty-two calves were housed in hutches and randomly assigned to the intensive rearing program or a control rearing program. During the first 3 weeks of life, the intensively-reared calves were offered 6-9 L of milk twice a day and each calf received a 50 g supplement (added protein, fat, and vitamins) in their milk. The control (restricted-fed) calves received 2 L of milk twice a day during the first week and 6 L daily after that in addition to being moved to group housing. All calves had access to starter grain and water. After the 25th day of life, all calves were moved into group pens and fed the same thing. They moved again at weaning (about 85 days) and were slaughtered at about 8 months.

In the first 3 weeks, Metabolizable Energy intake was two times greater in intensive versus control calves and weight gains were higher in intensive calves during this time period and these calves remained heavier at weaning. The weight gain advantage seemed to disappear after the calves were moved again after weaning. At the end, though, the overall average daily weight gain (ADG) was not different. However, the intensive calves had higher numbers of islets of Langerhans in the pancreas (responsible for insulin production) and total stained insulin area in the pancreas. The post-natal weight gain was correlated with permanent morphology of the pancreas, establishing the long-term effects of early nutrition and supporting the theory of metabolic programming.

The authors noted that the movement of calves from hutches into group pens and change in feeding reduced the intakes in both groups in this study, but the intensive calves seemed to adapt better to the changes. These kinds of changes we often see after weaning in our traditional hutch-to-group pens after weaning dairy heifers. Early movement of neonatal calves may set them back even greater. In the chart (adapted from Prokop et al., 2015) we can see the tremendous ADG (lbs per day) in the INT group and then, after movement to groups (3 weeks), lower ADG.



Overnutrition in neonates with carbohydrates can lead to diabetes as an adult. *Under nutrition* (primarily protein malnourishment) could predispose to Beta-cell (the insulin secretion cells in the pancreas) dysfunction and decreased secretory capacity for insulin. If

the neonatal effects of diet last throughout life, then the adult cow could be affected. Insulin stimulates steroid hormone production in the ovary and low insulin has been associated with cystic ovarian disease in cows. Insulin also plays a role in stimulating glucose uptake by certain tissues. Although as a ruminant the adult cow uses primarily volatile fatty acids (VFAs) for energy, a lot of glucose is used by the pregnant uterus (for the fetus) and the mammary gland (for milk production). This new research gives us a peek at what might be happening within the calves when we look for the benefits of the more “intensive” feeding program, but exactly what happens in adult cows still needs investigation.

References

De Koster JD, Opsomer G. Insulin resistance in dairy cows. *Vet Clin Food Anim.* 2013;29:299-322.

Prokop L, et al. Intensive rearing of male calves during the first three weeks of life has long-term effects on number of islets of Langerhans and insulin stained area in the pancreas. *J Anim Sci.* 2015;93: doi:10.2527/jas2014-8144.



Continuing Education in Our Region

Veterinarians

Academy of Dairy Veterinary Consultants

The Spring 2015 Meeting will be April 17-18, 2015, in Phoenix, AZ. Contact Dale Moore at damoore@vetmed.wsu.edu for more information.

Genomics of Dairy Cow Fertility Workshop

April 30, 2015, 10 am to 2:30 pm, UC Davis Veterinary Medicine Teaching and Research Center. Contact Joe Dalton at jdalton@uidaho.edu

Producers

Genomics of Dairy Cow Fertility Workshop

April 30, 2015, 10 am to 2:30 pm, UC Davis Veterinary Medicine Teaching and Research Center. Contact Joe Dalton at jdalton@uidaho.edu

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>

Send newsletter comments to the Editor: *ag animal health*
Veterinary Medicine Extension - Washington State University
P.O. Box 646610
Pullman, WA 99164-6610
(509) 335-8221 VetExtension@vetmed.wsu.edu

*WSU Extension programs and employment are available to all without discrimination.
Evidence of noncompliance may be reported through your local WSU Extension office.*