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**From the Editor** – What is judicious drug use? According to the hotly-contested FDA Draft Guidance document *“The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals”*, it means that unnecessary or inappropriate use should be avoided. “Oh, here she goes again”, I hear you say, “harping on our antibiotic usage.” Well, readers, it is not just me. Let’s explore one kind of use on the farm and what might constitute unnecessary or inappropriate use with regards to the development of antimicrobial resistance in bacteria....

The first concern that FDA raises is the use of antimicrobials in feed. We have seen with our own research that the use of medicated milk or milk replacer is associated with observance of multi-drug resistant *E coli* strains in calves. Do we need to feed it? Depends on the preventive measures (such as colostrum management) you have in place. FDA considers that in-feed or in-water uses associated with treatment, control or prevention of diseases are “prudent” uses. But, before use of any antimicrobial, however, we need to make sure there is evidence for its effectiveness, the use is consistent with accepted veterinary practice, the use is targeted and that no reasonable alternatives for intervention exist. Does our use of neomycin in medicated milk replacers satisfy these criteria? We’ll see more on this issue, I’m sure ...

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## Featured Faculty – Dr. George Barrington, Associate Professor, Vet Clinical Sciences



Dr. George Barrington

Dr. Barrington joined the College of Veterinary Medicine in 1999 as an Assistant professor. He received his BS, DVM and PhD from Washington State University. His clinical specialty is in-house ag animal internal medicine and surgery where he also serves as coordinator of the Ag Animal Health Program. Dr. Barrington’s primary area of research is Johne’s disease in ruminants. He is popular among students, having won many teaching awards. Because of his US Army Reserves status, he was on active duty in 2005–2006. In his spare time, he raises (I’m told) great lamb....

## Checking Colostrum Quality by Dr. Dale Moore

Veterinarians and extension advisors have talked to dairy farmer clients for many years about checking colostrum quality before it is fed to newborn calves. The only on-farm tool we had to do that with in the past was the colostrometer (a hydrometer). The colostrometer measures the Specific Gravity of colostrum. The higher the Specific Gravity, the more concentrated the fluid is – indicating a higher immunoglobulin G (IgG) level. One problem identified with the colostrometer is that the evaluation of quality is dependent on the ambient temperature. If read at very low temperatures, you might make an error by calling a questionable sample “good” when it is “not good”. The manufacturer suggests reading the sample at about room temperature (about 72 degrees F).

A recent study in the *Journal of Dairy Science* evaluated a “new” tool we could use to measure the refractive index of a fluid (a measure of the concentration of the fluid) – the Brix refractometer (Bielmann 2009). The Brix refractometer can be purchased as temperature independent – meaning that it can evaluate the refractive index regardless of the outside temperature. The University of Guelph and University of Minnesota investigators evaluated colostrum samples (both fresh and frozen) from 288 Holstein cows using both digital and optical models of refractometers and compared the Brix scale readings with IgG concentration measured by radial immunodiffusion (a more direct, quantitative measure). From the comparisons, they hoped to determine a “cut-off” value below which a decision would be made “not to feed”.

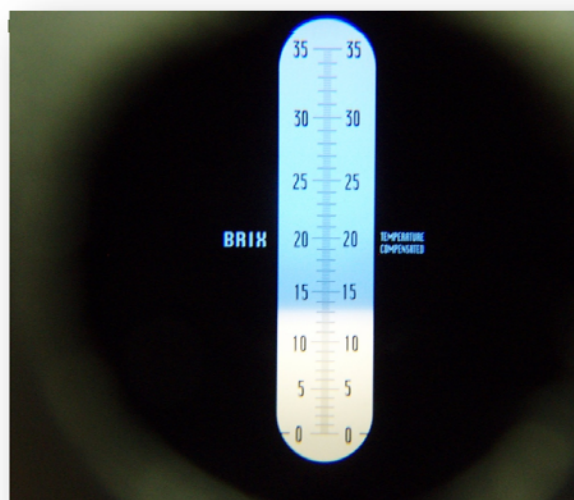
- The fresh and frozen samples did not differ in Brix scores using either of the two refractometers.
- Colostrum quality (measured by IgG concentration) was better for older cows compared to heifers.
- Correlation between IgG concentration and optical Brix scores was reasonable ( $r=0.71$ ;  $P<0.001$ ).
- The appropriate cut-off level to ensure good quality colostrum (over 50 g/L of IgG) was a Brix score of 22% or higher.

Now we have a tool that can be used for a couple of important functions on the dairy – measuring the quality of colostrum for feeding to newborns and estimating the total solids of waste milk – waste milk quality for pre-weaned calves (Moore 2009).

### References

Bielmann V, Gillan J, Perkins NR, Skidmore AL, Godden S, Leslie K. 2009. An evaluation of Brix refractometry instruments for measurement of colostrum quality in dairy cattle. *J Dairy Science*. 93:3713-3721.

Moore DA, Taylor J, Hartman ML, Sischo WM. 2009. Quality waste milk assessments on a calf ranch. *J Dairy Science*. 92:3503-3509.



Looking through an optical Brix refractometer.

# Comparison of 1 vs. 2 doses of PGF2 $\alpha$ at CIDR removal in a 5-day CIDR CO-Synch protocol on AI pregnancy rate in Angus cross-bred heifers

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**Introduction** -- The 5-day CIDR-CO-Synch protocol has been used successfully to facilitate fixed-time AI in beef cows. A study by Kasimanickam et al., (2008) investigated whether higher AI pregnancy rates could be achieved with a two doses of Prostaglandin F $2\alpha$  (PGF) compared to a single dose of PGF on day 5 at CIDR removal in beef cows. The study concluded that administration of 2 doses of PGF resulted in timed AI pregnancy rates of 69% across 6 herds whereas single dose of PGF or PGF analogue resulted in a 15 to 17% reduction in timed AI pregnancy rates. Similar studies are lacking in beef heifers. The objective was to determine the effect of two vs. one PGF administration at CIDR removal on day 5 on AI pregnancy rate in beef heifers synchronized with a 5 day CIDR-CO-Synch protocol.

**Methods** -- Angus cross beef heifers (N = 562) at six locations in WA and ID were included in this study. All heifers received 100 mg of gonadorelin hydrochloride (GnRH; Factrel<sup>®</sup>, Pfizer Animal Health, New York, NY, USA) and a controlled internal drug release insert (CIDR; Eazi-Breed<sup>™</sup> CIDR<sup>®</sup> cattle insert, Pfizer Animal Health, New York, NY, USA) on Day 0. Within farm, heifers were randomly allocated to receive 25 mg of dinoprost (PGF; Lutalyse<sup>®</sup> sterile solution, Pfizer Animal Health, New York, NY, USA) at the time of CIDR insert removal on Day 5 (1 PGF; N = 264) or two 25 mg doses of PGF, the first given on Day 5 at the time of CIDR removal and the second administration 6 h later (2 PGF; N = 298). Heifers (N=415) received heat detection patches at the time of CIDR removal. After CIDR removal, heifers were observed twice daily through Day 7 for estrus and heat detector patch status (activated, partially activated and lost vs. intact) was recorded. On Day 8, heifers were given 100 mg of GnRH, heat detector aid status was recorded, and heifers were inseminated at 72 h from CIDR removal. Mixed procedure of SAS was used to examine the effect of treatments (1 PGF vs. 2 PGF) on timed-AI pregnancy rates. Variables included in the timed-AI pregnancy Model body condition scores (<5,  $\geq$ 5; on a scale from 1-9; 1- emaciated; 9 - obese), Estrus detector aid status (activated or not activated), location (1-6) and appropriate interaction of main effects. AI sires offered as random effect in the model.

**Results** - Pregnancy rate to AI varied significantly by location. Accounting for significant variables such as location, heifers in estrus at or prior to AI, and treatment by location interaction, **2 doses of PGF administration had higher fixed time AI pregnancy rate compared to 1 dose of PGF administration on day 5 at CIDR removal** (P = 0.058; 62.1 vs. 54.2%).

**Conclusion** -- Two doses of PGF administration at CIDR removal on day 5 in a 5-day CIDR-CO-Synch protocol yielded 8% higher timed-AI pregnancy in heifers compared to 1 dose of PGF administration.

Acknowledgement: The authors thankful to Dr. John Hall, NMCREEC, UI and WA beef producers for their support. The authors also acknowledge WSU extension, Pfizer Animal Health Inc., for partial financial support. \*Contact: [ramkasi@vetmed.wsu.edu](mailto:ramkasi@vetmed.wsu.edu)

## Beef Calf Retention Decision Tool



An August 2010 *Journal of Extension* article highlighted the use of a decision tool that could be used by Extension educators and cow-calf producers for post-weaning marketing strategies for beef calves. Although this is not a health issue, getting more money for beef calves means more money that can be invested in preventive medicine programs. After weaning, cow-calf producers have several options for their calves: 1) **Sell**, 2) **Retain as stockers and then sell**, 3) **Retain as stockers and then retain in a custom feedlot**, or 4) **Retain in a custom feedlot**. Retaining ownership can yield some higher value but also comes with some increased risk.

A spreadsheet decision tool, developed at Oklahoma State University, allows producers to enter their own specific ranch resource data, link to a 2 to 3-times monthly updated price information server at OSU, and allows for the creation of different scenarios to help them decide which option is the best economically at the time, compared to the default option of selling at weaning. One example the authors provided was that of examining the use of a wheat pasture for grazing weaned calves and the value that might provide, given other pricing considerations. (This year, with wheat prices so high that would not likely be a favorable option but in other years it might.)

Built into the program are standardized calf health management protocols on vaccination, etc. that could also help to bring additional value to the calves as well as information resources on the protocols. These protocols, such as a comprehensive vaccination program, would be very important to reduce risks of retained ownership. It's the reason that pre-conditioned calves receive a premium in some parts of the country.

Before the next breeding season, go to <http://www.beefextension.com/new%20site%202/cccalc.html> and at the bottom of the page, find the **Beef Calf Retention Decision Aid**. Download the spreadsheet and work with your ranch numbers. Maybe you can make more money on your calves next year!





## What's New at WADDL?

### AAVLD Accreditation Site Visit

During the last week of September WADDL will be hosting an accreditation visit by the American Association of Veterinary Laboratory Diagnosticians (AAVLD). The purpose of the AAVLD accreditation program is to accredit public veterinary diagnostic laboratories in North America relative to internationally accepted quality standards for management and technical competence with particular emphasis on tests for infectious diseases. The lab is looking forward to the site visit as an opportunity for continuous improvement of the services they offer to veterinarians and animal owners.

### WCA Bull Test information regarding BVD-PI testing

The Washington Cattlemen's Association (WCA) bull test will again require consigned bulls to be laboratory test negative for Bovine virus diarrhea virus persistent infection (BVD-PI). WSU-WADDL will again provide testing laboratory services for determining BVD-PI status. Below are instructions for submitting samples. Please note that consignors will NOT be charged the \$10 accession fee per submission, but only the \$5 per test charge for each bull.

**WADDL Sample submission form:** BVD-PI testing is done at the Washington Animal Disease Diagnostic Laboratory at WSU-Pullman. Accession forms can be printed directly from the WSU/WADDL webpage: [http://www.vetmed.wsu.edu/depts\\_waddl/](http://www.vetmed.wsu.edu/depts_waddl/). Consignors should complete the WADDL accession form being sure to include specific animal identification number, sample type (ear notch or blood), and test requested (BVD-PI testing in the "other" checkbox). Please write "WCA Bull Test" in the part of the accession form labeled "additional history".

**Sample type:** Two options

1. Ear notch skin sample. Ear notch sample should be about 1cm triangle (pig ear notcher size or about size of a dime). The ear notch sample can be submitted dry in a 10 ml red top blood tube (or similar sized plastic tube). Be sure not to pool more than one animal ear notch per tube so WADDL can maintain individual animal identification so that the test report lists individual animal results!
2. Blood serum (red top tube or serum separator tube). About 10 ml in a tube.

**Test type:** BVD-PI is determined by a USDA licensed test, the BVD-PI Antigen ELISA (IDEXX HerdCheck). The Ag-ELISA can be run on either ear notch skin or blood serum (blood in a red top tube).

**Test cost:** Cost of BVD-PI Antigen ELISA test is \$5.00 per sample (\$5 per bull). Sample can be either ear notch or blood. There will be no accession fee for WCA Bull Test Consignors; be sure to write "WCA Bull Test" in the part of the accession form labeled "additional history" in order to get the accession fee waived.

**Turnaround time:** 2 working days after samples is received by WADDL.

**Shipping Sample:** When submitting specimens, mark each container clearly and legibly with both the owner's name and the animal identification number/name. Place sample tube inside a whirlpack or ziplock plastic bag (in case of breakage and leakage), and place sample in a parcel container with ample padding material (to prevent tube breakage) and coolant. Sample parcels can be shipped to WADDL either by the US Postal Service or express courier like United Parcel Service (UPS) or Federal Express to the address listed on the WADDL Accession Form.

US Postal service packages should be addressed to:

Washington State University–WADDL  
P.O. Box 647034  
Pullman, WA 99164–7034

Courier (UPS or Federal Express) packages should be addressed to:

Washington State University–WADDL  
155 N Bustad Hall  
Pullman, WA 99164–7034

*Please call WSU–WADDL at 509–335–9696 if you have questions.*

## Trich–Testing Reminders

Trichomoniasis testing of bulls in the state of Washington must be done by a certified veterinarian. Veterinarians who would like to become certified can do so by visiting the Veterinary Medicine Extension website: <http://vetextension.wsu.edu/programs/bovine/trich/index.htm> where they can register, view the program and take the quiz. Certification certificates will be provided by the WSDA once the veterinarian completes these requirements.

Remember to submit samples in the In–Pouch TF system containers. A veterinarian registered by WSDA to perform trichomoniasis testing must collect samples for trichomoniasis testing in bulls and must submit those samples within 48 hours to an official laboratory. **DO NOT SUBMIT SAMPLES TO ARRIVE ON FRIDAYS** because it takes some time to set up the tests. Currently, WSU–WADDL is the only Washington laboratory recognized by the State Veterinarian for official trichomoniasis testing. More information on sample submission can be found at: [http://www.vetmed.wsu.edu/depts\\_waddl/dx/trichomoniasis.aspx](http://www.vetmed.wsu.edu/depts_waddl/dx/trichomoniasis.aspx)

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## Newly Published Research from CVM:WSU Faculty

**Evaluation of a biological risk management tool on large western United States dairies.** Moore DA, Leach DA, Bickett–Weddle D, Andersen K, Castillo AR, Collar CA, Higginbotham G, Peterson N, Reed B, Hartman ML. J Dairy Sci. 2010 Sep;93(9):4096–104.

Critical to changing biosecurity practices on the farm is an individual assessment of those practices contributing to disease transmission. The purpose of this project was to assess, implement, and refine a biological risk management survey for use on large western United States dairy farms. Assessment tools developed by Iowa State University Center for Food Security and Public Health (Ames, IA) were refined using a focus group process and by testing them on 40 dairy herds in California. Each question was evaluated using standard criteria and producer responses. Some survey questions required refinement for clarity and others were considered unnecessary. New questions were added based on a biosecurity literature review, resulting in a new set of questions that can be used by extension educators and food animal veterinarians to help identify disease risk areas and educate dairy producers.

**From this research, we published a new set of recommended biosecurity questions to help veterinarians and dairy producers reduce the risk of infectious disease transmission:**

### **Recommended Dairy Biological Risk Management Assessment Questions**

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#### Cattle Purchases and Livestock Movement

1. Do you have a closed herd? (Do not bring new animals onto the dairy or allow animals to leave and return to dairy. This means no replacements, bulls, or show animals.) **If YES skip to question #8**
2. How often did you bring new animals (including all calves, heifers, bulls, cows) into the herd in the last 12 months? (More than three times, once or twice)
3. Do you quarantine new herd additions? (Quarantine means keeping new animals separate from the rest of your cattle for two to four weeks before they have direct contact.)
4. If YES to Question 3, do you have an area used only for the quarantine of new animals?
5. Do you examine and test new additions for common diseases or require testing prior to purchase?
6. How often do animals leave/reenter the herd (for shows, veterinary clinic, embryo transfer, etc.)?
7. Do you quarantine livestock returning to the farm?

#### Reducing Transmission On to the Farm

8. Do you have a perimeter fence or other farm perimeter control?
9. Do you have highly visible signs posted to restrict access to your facility?
10. Do you require visitors to sign in when entering your facility and disclose recent animal contact?
11. Do you minimize animal contact with people entering your facility?
12. Do you require clean clothing or coveralls on visitors entering your facility?
13. Do you require clean footwear or disposable boots on visitors entering your facility?
14. Do you have a designated visitor parking area?
15. Do you request that your employees avoid contact with livestock outside of your operation?
16. Do you require clean clothing or coveralls on your employees when entering your facility?
17. Do you require clean footwear on your employees when entering your facility?
18. Do you have a designated employee parking area?
19. Is rendering pickup designed to prevent rendering vehicles from bringing contamination to animal areas?
20. Are animals kept from contact with other livestock?

#### Reducing Transmission Within the Farm

21. Do you limit calving pens to calving only (no isolation animals)?
  22. Do you remove calves from their mothers at birth before they've had a chance to nurse?
  23. Do you use single source colostrum (not pooled from multiple cows)?
  24. Do you raise your calves on the dairy? If NO, Skip to Question #29
  25. Do you use single source colostrum (not pooled from multiple cows)?
  26. Do you utilize individual calf housing for newborn calves?
  27. Do you avoid feeding waste milk to calves?
  28. If NO to 27, do you pasteurize waste milk prior to feeding it to calves?
  29. Do you limit nose to nose contact between animals of different groups?
  30. Do you prevent young animals from coming into contact with manure from older animals?
  31. Do you avoid feeding leftover/uneaten feed from lactating animals to young stock?
  32. During chores, do employees move from "clean" younger animals to adult animals to dirty/ill animals, then to isolation animals or are employees designated to work with specific groups of cattle -- only calves, only sick cows, only maternity, etc?
  33. Do employees clean and disinfect boots when moving to special areas of the farm such as maternity and calf areas?
  34. Do you use different equipment for feed and manure handling?
  35. If NO to 34, do you clean equipment used for both manure/feed handling prior to using it for feed?
  36. Do you have a pest control program?
  37. Do you follow a set schedule for pest control maintenance?
  38. Do you have a veterinarian necropsy animals that die from unexpected causes?
  39. Do you keep common housing areas clean to prevent manure buildup or areas of stagnant water?
  40. Do you keep bedding areas clean?
  41. Are feed bunks designed to prevent people from stepping in them?
  42. Are manure-contaminated truck or tractor tires kept from contaminating the feed (in alleys or on feed pads)?
  42. Do you separate sick cows (potentially contagious) from healthy cows ASAP?
  43. Do you isolate sick animals? (Isolation means no contact between sick and healthy cattle.)
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**Geographic, farm, and animal factors associated with multiple antimicrobial resistance in fecal *Escherichia coli* isolates from cattle in the western United States.** Berge AC, Hancock DD, Sisco WM, Besser TE. J Am Vet Med Assoc. 2010 Jun 15;236(12):1338–44.

**OBJECTIVE:** To describe geographic, farm-type, and animal-type factors associated with multiple antimicrobial resistance (MAR) in fecal *Escherichia coli* isolates from cattle.

**DESIGN:** Cross-sectional field study.

**SAMPLE POPULATION:** 1,736 fecal samples from cattle on 38 farms in California, Oregon, and Washington.

**PROCEDURES:** Fecal samples were collected from preweaned calves (2 to 4 weeks old) and cows that recently calved on dairy and beef cow-calf farms, preweaned calves on calf ranches, and 1-year-old steers on feedlots. One fecal *E coli* isolate per sample was isolated, and antimicrobial susceptibility was tested. *Escherichia coli* isolates were initially clustered by antimicrobial resistance patterns and categorized by number of antimicrobial resistances. A generalized estimating equations cumulative logistic regression model was used to identify factors associated with an increase in MAR in fecal *E coli* isolates from cattle.

**RESULTS:** MAR was higher in *E coli* isolates from cattle in California, compared with those from cattle in Washington or Oregon. Multiple antimicrobial resistance was highest in *E coli* isolates from calves on calf ranches and progressively lower in isolates from feedlot steers, dairy cattle, and beef cattle. Multiple antimicrobial resistance was higher in *E coli* isolates from calves than from adult cattle, in *E coli* isolates from cattle of conventional farms than of organic farms, and in isolates from beef cattle in intensive dairy farm regions than from beef cattle distant from dairy farm regions.

**CONCLUSIONS AND CLINICAL RELEVANCE:** MAR in fecal *E coli* isolates from cattle was influenced by factors not directly associated with the use of antimicrobials, including geographic region, animal age, and purpose (beef vs dairy).

## Congratulations to Dr. Moore!

Dr. Dale Moore, Director of Veterinary Extension in the WSU College of Veterinary Medicine and Extension was the recipient of the 2010 *Alpharma AABP Award of Excellence* in service to the profession at the recent American Association of Bovine Practitioners meeting in Albuquerque. The award is given annually to a nominee whose professional activities have had a consistent and direct influence on daily activities of veterinarians in bovine practice.



Dr. Moore's career has been devoted to the continuing education of practicing veterinarians, beginning with a US Dairy Production Medicine Certificate program developed while she was an extension veterinarian in Pennsylvania. While at the University of California, she refocused the Certificate programs toward emerging issues in the industry, and engaged practicing dairy veterinarians throughout California. As Director of Veterinary Medicine Extension at Washington State University, she has a much larger constituency for her programs including youth, producers, and veterinarians and has broadened her bovine continuing education work to include beef production. She has developed CE programs that utilize new media including web based courses that lead to certificates (Dairy Beef and



Residue Avoidance), twitter feeds to notify practitioners of emerging issues, and more traditional meetings across the state with small and large groups. She actively engages with bovine producer groups including the Washington Cattlemen's Association, Washington State Cattle Feeders, and Washington Dairy Federation. Dale is recognized for her commitment to ensuring that these programs are informed by sound adult learning practices and that all her programs are properly evaluated to measure their impact. She was invited to participate in a Harvard University program in Continuing Medical Education, has actively designed methods to measure impact of her own programs, and has published the results of these impact evaluations in peer reviewed journals. These efforts clearly distinguish Dr. Moore as a leader in her field.

Dr. Moore has been an active AABP member since she received her DVM degree, and has been an officer in the Academy of Dairy Veterinary Consultants for many years. She is board certified in the American College of Veterinary Preventive Medicine, has served on the exam committee for the epidemiology specialty and the general examination for the last six years, and is currently chair of the examination committee. Dale also represents veterinary medicine as a member of the Advisory Committee on Foreign Animal Diseases to the US Secretary of Agriculture and is currently nominated for a second term on that committee. Congratulations to Dr. Moore on this most deserving award! When you next see Dale, ask her to show off her new ring. *By Terry McElwain, Professor and Executive Director, Washington Animal Disease Diagnostic Laboratory*

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## Continuing Education

### **Veterinarians/Technicians**

#### **WSVMA Conference**

October 1-3, 2010 - Spokane Convention Center. Link: <http://www.wsvma.org>

#### **Pet Poultry for Veterinary Technicians**

October 9, 2010 – WSU Puyallup from 8:00am to 12:00pm, go to:  
<http://agr.wa.gov/FoodAnimal/AvianHealth/Docs/VetTechCourse.pdf>

#### **Academy of Dairy Veterinary Consultants Fall Meeting**

October 15-16, 2010 - Hyatt Seattle Place, Seattle, WA.  
Agenda and Membership Form: <http://www.vetmed.wsu.edu/orgADVC/upcoming.asp>

#### **Veterinarian Online CE for Official Trich Testing**

To take the course and receive certification - go to:  
<http://vetextension.wsu.edu/programs/bovine/trich/index.htm>

#### **Veterinarian Online CE for TB Testing Certification**

To take the course and receive certification - go to:  
<http://vetextension.wsu.edu/programs/bovine/tb/index.htm>

#### **Wild West Veterinary Conference**

October 13-17, 2010 – Grand Sierra Resort, Reno Nevada.  
Link: <http://www.wildwestvc.com/>

#### **Dairy Cattle Reproduction Council**

Annual Meeting → November 11-12, 2010 – St. Paul, Minnesota.  
Link: <http://www.drcouncil.org/CONVENTIONS/Default.aspx>

## Producers

For Dairy Market Cattle Quality Assurance, Go to our website **DairyBeef: Maximizing Quality and Profits** at <http://dairybeef.wsu.edu>. Also find **Spanish** educational materials on managing dairy cows for marketability.

### WSU Swine AI School

September 20, 2010 - Grant County Fairgrounds in Moses Lake, WA.

Link: <http://livestocktopics.wsu.edu/pdf/SwineAI5Better.pdf>

### WSU Lamb 100

October 1-2, 2010 – Sumner High School in Sumner, WA.

Link: [http://vetextension.wsu.edu/documents/WSULAMB100Registration-2010\\_000.pdf](http://vetextension.wsu.edu/documents/WSULAMB100Registration-2010_000.pdf)

### WA State Dairy Industry Annual Meeting

Annual Meeting → November 2-4, 2010; Holiday Inn in Everett, WA.

Registration Form: <http://www.wadairyfederation.org/Registration%20Form%202010.htm>

### Washington Cattlemen's Association

Annual Meeting → November 10-13, 2010 – Suncadia Resort in Cle Elum, WA.

Link: <http://www.washingtoncattlemen.org/conventioninfo.htm>

## 4-H Leaders

### Disease Prevention and Quality Assurance Volunteer Leaders Online Program

<http://vetextension.wsu.edu/programs/4-H/index.htm>

**4H and Fair Materials** – Find on the VME homepage! <http://vetextension.wsu.edu/>

Send newsletter comments to the Editor:

*ag animal health*

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