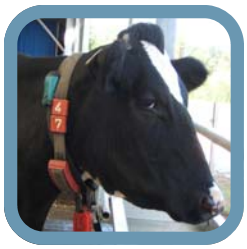
Ceptor Animal Health News

Volume 20, Issue No. 2, October 2012– ISSN1488-8572

Serving Ontario through veterinary science, technology transfer, outbreak investigation and animal health surveillance



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Ministry of Agriculture, Food and Rural Affairs

Ontario

Dr. Neil Anderson Awarded the 2012 Metacam® 20 Bovine Welfare Award

Excerpted from the Canadian Association of Bovine Veterinarians Press Release

At the Canadian Association of Bovine Veterinarians/ Association Canadienne des Vétérinaires Bovins Annual General Meeting on September 20, 2012, in Montreal, the CABV/ACVB presented the first Boehringer Ingelheim Metacam® 20 Bovine Welfare Award to Dr. Neil Anderson of Cheltenham, Ontario.

This award is given annually to a veterinarian, faculty member or a graduate student of a Canadian University to recognize his or her achievements in advancing the welfare of animals via leadership, public service, research/product development, and/or advocacy. The award honours those who have added to our knowledge of livestock behaviour, animal welfare and animal well-being in Canada.

Figure 1. Dr. John Campbell, Secretary-Treasurer of the CABV/ACVB (left) and Dr. Rob Tremblay, Technical Service Veterinarian with Boehringer Ingleheim (Canada) Ltd. (right) presented the 2012 Metacam® 20 Bovine Welfare Award to Dr. Neil Anderson.

Since the 1970's Dr. Neil Anderson has provided exemplary services to the Ontario beef and dairy industries as a practicing veterinarian and as an extension veterinarian with OMAFRA.
Dr. Anderson's work in veterinary extension is founded on the strong correlation between animal welfare and animal productivity. Dr. Anderson has promoted the appropriate use of medication in livestock; the best designs for housing systems for dairy cattle and has crusaded for optimized feeding systems for dairy calves. He has advocated for humane treatment of animals through his writings, lectures and farm visits in Ontario as well as across Canada and internationally.

Many veterinarians and dairy producers have had the pleasure to experience Dr. Anderson's impact as a teacher, practicing veterinarian, mentor, agricultural extension educator and as a true leader in the field of cattle welfare.

Congratulations Neil

Ceptor is published by: Veterinary Science and Policy Unit, OMAFRA
Editor: Ann Godkin
Graphics, layout and editing support provided by
Ora Zondervan, Regional Economic Development Branch
Website: www.ontario.ca/livestock
Archived Issues of Ceptor: www.oabp.ca

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Staff Changes Within the Animal Health and Welfare Branch of OMAFRA

Dr. Janet Alsop leaves the Veterinary Science and Policy Unit to take on the position of Lead Veterinarian—Regulatory Response with the Veterinary Services Unit. In this position, Janet will play a key role in implementation of Ontario's new *Animal Health Act* and its accompanying regulations.

Best Wishes Janet, from the staff of the Veterinary Science and Policy Unit.

New to the Veterinary Science and Policy Unit

Dr. Tim Pasma has been appointed the Lead Veterinarian – Epidemiology, an important position in the veterinary public health, disease detection, and epidemiology roles of our Branch. As well as leading a review of our animal disease surveillance network, his epidemiology and veterinary expertise will support the ongoing work to implement the *Animal Health Act* and proposed regulations, and support disease prevention, preparedness, and control work with our partners and stakeholders.

Tania Sendel is now our Animal Health Co-ordinator – Preparedness. Tania has been working in a secondment capacity in this position and has co-led, with Policy and Legal colleagues, the development of disease reporting and compensation regulations as well as leading the implementation planning for the *Animal Health Act* and the proposed regulations.

Welcome Tim and Tania

Low-risk Veterinary Natural Health Products

Gerrit Rietveld, Veterinary Services Unit, OMAFRA

In 2010, Health Canada embarked on a program to develop a regulatory framework to classify and categorize veterinary natural health products. These would include, but would not be restricted to, homeopathic preparations, botanicals, vitamins and minerals. The long-term objective is to develop a well-defined regulatory process for these products that is effective and efficient. Prior to this initiative, the manufacture, importation, distribution and sale of these products was not registered or regulated.

Items identified in the first phase of the interim pilot program are 'presumed safe products', in that they are not likely to have an impact on health of animals or safety of the food supply and do not present any particular risk to humans (i.e., workplace exposure) or to the environment. This registration system allows for efficient post-market surveillance and a mechanism to address corrective action should a product be non-compliant or present an unacceptable health risk. As many of these substances may produce significant therapeutic and or physiological effects, there is a potential that they may, either on their own, or in conjunction with other drugs, have a negative impact on food safety or animal well-being. Reviewing these products and categorizing them according to risk and target species will help to ensure their safe use.

North American Compendiums, in cooperation with Health Canada's Veterinary Drugs Directorate and the Canadian Animal Health Institute, has developed the Interim Notification Program (INP) for low-risk veterinary health products (LRVHPs) intended for administration to **companion animals and horses not intended for food**. These products, which have a Health Canada Notification Number (NN) on the

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label, may be sold over the counter in Ontario by outlet operators licensed under the authority of the *Livestock Medicines Act (Ontario).*

Health Canada has issued a List of Substances and guidance documents for labelling standards and health claims. Details of the program requirements can be found on the program website at *www.naccvp.com*. The list of approved LRVHPs for companion animals and horses can be found on the website: *http://lrvhp.ca*

The program will continue to develop to assess medium and higher-risk substances intended for use in other animals, i.e., food producing species.

West Nile Virus – The Threat Continues.

Janet Alsop , Veterinary Services Unit, OMAFRA

West Nile Virus (WNV) is endemic in Ontario and cases occur in the horse population at varying levels each year. There is the potential for a significant increase in the number of equine WNV cases in Ontario in 2012. Public Health Ontario has reported the highest number of WNV-positive mosquito pools since 2002, which is the first year that human and equine cases were identified in Ontario. As of September 15, 2012, there have been 189 confirmed or probable cases of human WNV in the province. As of September 21, 2012, the Animal Health Laboratory has reported six equine cases.

The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) requests that the veterinary community consider WNV in horses with neurological signs, and assist in identifying positive cases through appropriate testing. WNV is an immediately notifiable disease under the federal *Health of Animals Act*. Signs of equine WNV (such as lethargy, ataxia, facial tremors and limb paralysis) can mimic a variety of encephalitides, including rabies, Eastern Equine Encephalitis (EEE), Western Equine Encephalitis (WEE), botulism, hepatic encephalopathy, equine protozoal myeloencephalitis (EPM), tetanus, equine herpes virus 1 (EHV-1), lead poisoning and wobblers syndrome. Mortality rates amongst horses showing clinical signs of WNV are approximately 35%.

Most equine cases of WNV occur between August and September, although cases can occur into October if environmental conditions permit the survival of the mosquito vector species.

Ontario's local public health units are currently conducting mosquito surveillance. Birds are the natural host for the virus, which is transmitted to horses and humans by mosquitoes which have bitten an infected bird. As of September 15, 2012, there have been 454 WNV-positive mosquito pools identified in 29 health units across the province (*www.oahpp.ca/resources/vector-borne-disease-surveillance-reports.html#WNV*). This number is similar to the number identified in 2002, when there were 101 confirmed cases of equine WNV in Ontario.

Positive equine cases of WNV in Ontario, will be followed up by the local public health unit to determine whether the exposure of the horse was local or travel-related, and the vaccination status of the horse. The public health unit will also ensure that human exposure to mosquitoes in the area, which may potentially be carrying WNV, is minimized. Depending on the time of year, the owners of properties on which a positive equine WNV case is diagnosed may be asked to allow public health mosquito traps to be placed around their property for surveillance purposes. There is no cost to the property owner for this.

Effective equine vaccines for WNV are available and veterinarians should ensure that vaccinations are up-to-date in their clients' animals. There is no vaccine for humans and no treatment, other than supportive, once a person is infected.

Information on WNV prevention and control can be found at:
www.aaep.org/pdfs/control_guidelines/West%20Nile%20Virus.pdf

Surveillance data for equine neurological diseases in Ontario can be found at:
www.omafra.gov.on.ca/english/livestock/horses/westnile.htm#surveillance

(Continued on page 5)

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Supplementation with Hydro-Vit D_3® on an Ontario Swine Farm

Paisley Canning, Veterinary Student, Ontario Veterinary College, University of Guelph, and Tim Blackwell , Veterinary Science and Policy Unit, OMAFRA

In 2011, swine practitioners reported that many weaned pigs across the Midwest USA were vitamin D_3 deficient.(1) Vitamin D_3 is important in regulating calcium and phosphorus absorption and deficiencies are associated with poor growth and spinal deformities. Sow diets do contain vitamin D but there is some disagreement on the importance of colostrum and milk as contributors to piglet vitamin D levels.(1, 2) Placental transfer is thought to provide adequate vitamin D_3 levels to piglets in the farrowing barn, but there is little information on serum vitamin D_3 levels in pigs after weaning.(1) Recently one pilot project reported that nursery pigs on two Ontario farms had serum vitamin D_3 levels below reference ranges.(3)

To ensure piglets have sufficient vitamin D_3 levels at weaning, some practitioners recommend orally administering 1 cc of Hydro-Vit D_3® (guaranteed analysis: 80000 IU/mL vitamin D_3) to piglets at birth instead of diluting it in the drinking water as per label instructions. There is no research available on the product's effect on serum vitamin D_3 levels in the nursery period when administered in this manner. This pilot project was undertaken to determine if Hydro-Vit D_3® given orally by drenching at less than two days after birth could increase serum vitamin D_3 levels to reference ranges at weaning. A second objective was to correlate piglet serum vitamin D_3 levels with colostrum intake to elucidate the importance of colostrum as a vitamin D_3 source for suckling pigs.

Fifty-seven piglets from a 350-sow farrow-to-finish operation in Ontario were given 1 cc of Hydro-Vit D_3® (HVD)(a) or 1 cc of a placebo solution (strawberry syrup, SSP,(b) containing no vitamin D). Alltech® 3-cc drencher guns were used to administer HVD and SSP orally. Administrators were blinded as to treatment allocation. Piglets were blood sampled via jugular venipuncture at 2 to 4 days of age and at weaning at 24 to 26 days of age. All piglets received creep feed containing vitamin D_3 for one week before weaning. Serum collected at 2 to 4 days of age was submitted for radial immunodiffusion assay (RID) for porcine immunoglobulin G (IgG)(c) and for 25-hydroxy-vitamin D_3 levels (25-OH-D_3)(d). RID is an indirect measurement of colostrum consumption and 25-OH-D_3 is a metabolite of vitamin D used to measure the amount of vitamin D available to the pig. Serum collected at weaning was also submitted for 25-OH-D_3 levels.

Statistical analyses were completed on Statistix (©Analytical Software 2008 Tallahassee USA) for correlations between RID values and 25-OH-D_3 at 2 to 4 days of age and between 25-OH-D_3 concentrations at each sample point for each treatment group. Serum samples at weaning were not available for 5 of 57 pigs due to mortality (n=4) and laboratory error (n=1).

Table 1 lists the serum 25-OH-D_3 concentrations for both treatment groups at the two sample time points. **Figures 1** and **2** show serum 25-OH-D_3 levels from individual pigs at 2 to 4 days of age and at weaning for HVD pigs (n=25) and SSP pigs (n=27). Reference ranges for neonatal and nursery pigs are provided in Figures 1 and 2.

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Table 1. Descriptive Statistics for Serum 25-OH-D_3 for Both Treatment Groups

Treatment Group	Serum 25-OH-D_3 at 2 to 4 days of age (ng/mL)			Serum 25-OH-D_3 at weaning (ng/mL)		
	Mean ± SD	Range	Sample Size	Mean ± SD	Range	Sample Size
Hydro-Vit D_3® (HVD)	7.04 ± 1.03	4.30-9.80	n=25	23.30 ± 12.9	2.50-43.30	n=25
Strawberry syrup placebo solution (SSP)	6.85 ± 1.51	4.40-9.20	n=27	5.08 ± 3.59	2.50-17.30	n=27

The mean RID value for HVD pigs was 33.44±10.54 (range: 15.00-50.00 g/L) and for the SSP group mean RID values were 33.16±10.26 (range: 5.40-50.00 g/L); these values were not different (p=0.4435). There was significant but weak, negative linear correlation between serum RID values and serum 25-OH-D_3 concentrations at 2 to 4 days of age for all pigs (R^2=0.1458, p-value=0.0052). This mild negative correlation is in agreement with previous reports that indicate that colostrum contributes minimally to piglet vitamin D concentration in sera.[2]

Heartland Laboratories in Ames, IA, suggests 5 to 15 ng/mL as the reference range for acceptable serum 25-OH-D_3 for neonatal pigs.[e] Most pigs (n_{HVD}=24/25 and n_{SSP}=23/27) were within this reference range at 2 to 4 days of age. At weaning, HVD pigs had significantly greater mean 25-OH-D_3 levels than the placebo group (p-value<0.0001) but 14/25 HVD pigs had 25-OH-D_3 concentrations below the Heartland Laboratory reference range of 25 to 30 ng/mL.[e] All placebo pigs were below 25 to 30 ng/mL 25-OH-D_3 at weaning. All groups of pigs received creep feed containing vitamin D_3 for 5 to 7 days prior to weaning which may have

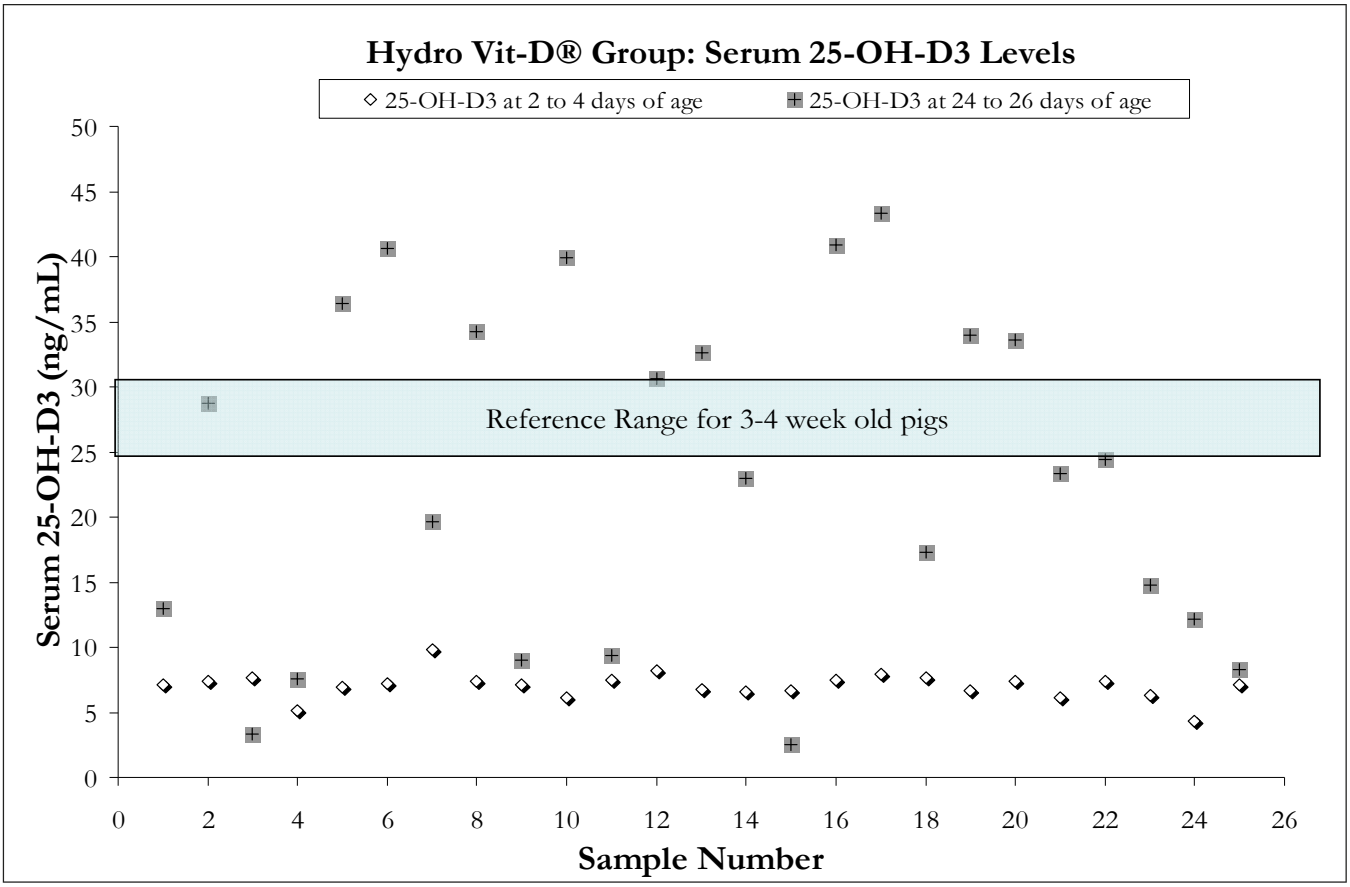

Figure 1

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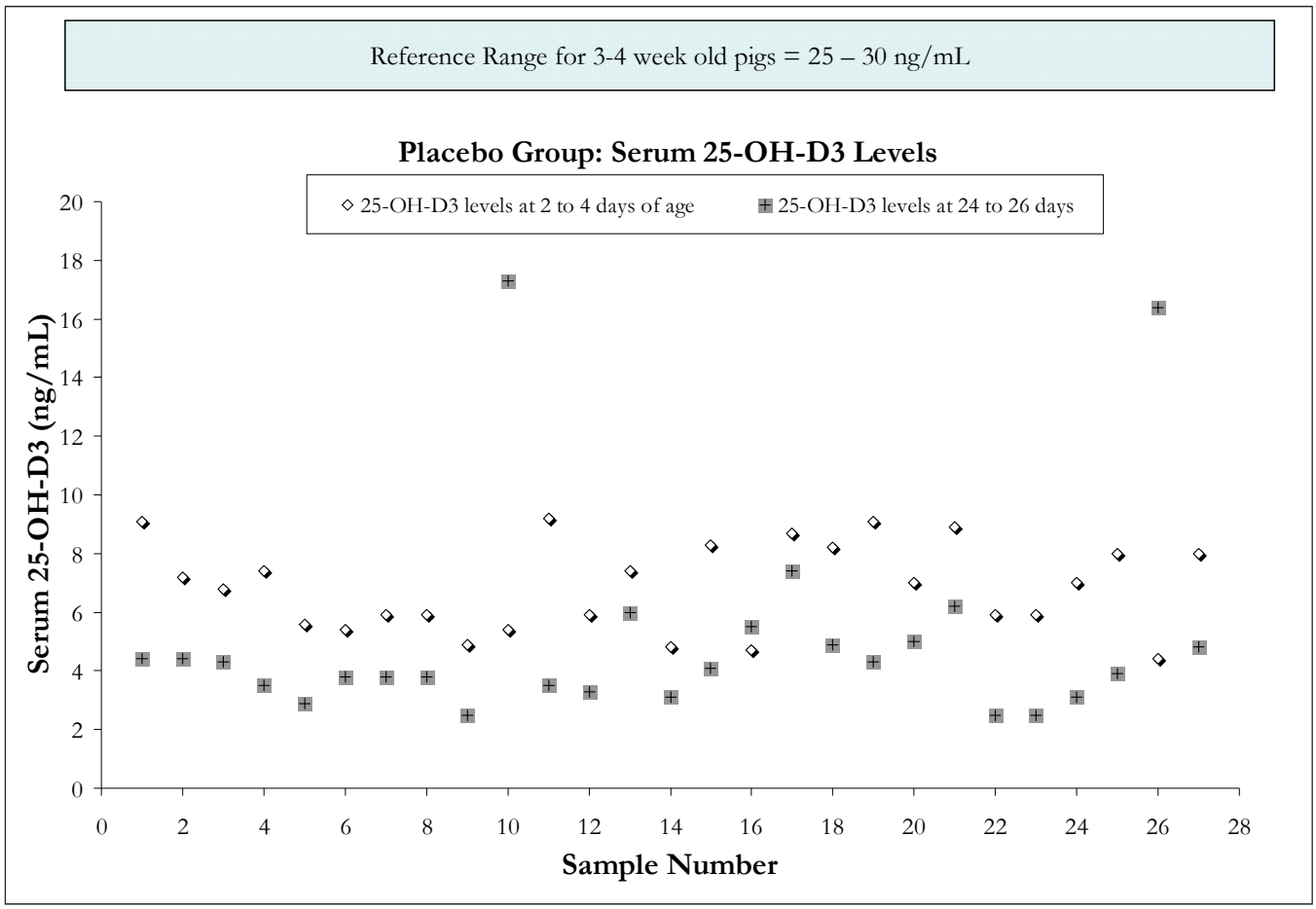

Figure 2

contributed to above average (16-18 ng/mL) 25-OH-D_3 values for two pigs in the placebo group.

These preliminary results suggest that without supplementation, the vitamin D_3 concentration of pigs at weaning is below concentrations currently reported as appropriate. Because feed is the only source of vitamin D_3 for piglets after birth, pigs may become deficient in the nursery period, particularly if they do not start on feed promptly after weaning. It should be noted that there was no noticeable effect on pig health or mortality as a result of vitamin D_3 supplementation. This project involved one farm and the protocol is being repeated on a second farm to increase the study's power.

1. *Madson D, Abbott J. Vitamin D Current Observations from the Veterinary Diagnostic Laboratory. Swine Disease Conference for Swine Practitioners. Iowa State University 2011:69-75.*
2. *Stuart R. Fat-soluble vitamin needs for nursing and weaned pigs. Proceedings AASV 2012:291-292.*
3. *Canning P, Blackwell T. Testing for Vitamin D_3 in Ontario Swine Herds. Ceptor Animal Health News. 2012; May:4.*

Additional Notes:

a. Hydro-Vit D_3® Solution. Cherry Flavoured 500 mL Guaranteed Analysis contains 7.68x10^7 I.U per kg or 80000 I.U. per mL vitamin D_3. Vétoquinol Canada.

b. Strawberry Syrup 500 mL. Dispensed from Ontario Veterinary College Pharmacy 2012.

c. RID IgG Single Subclass Test Method: IAV-CIS230 Animal Health Laboratory (AHL)

d. Total 25(OH)D3 by Liaison® at Heartland Assays, LLC. 2711 South Loop Drive, Suit 4400, Ames, Iowa 50010.

e. References ranges provided by Drs. Jesse Goff and Ron Horst at Heartland Labs Iowa and Iowa State Veterinary Diagnostic Laboratory. May 2012.

Post-weaning Sudden Death in Nursery Pigs—a case study

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A 250-sow farrow-to-finish herd experienced sudden death among nursery pigs 16 to 20 days post-weaning. Mortality varied between 15 and 25% per group, with few or no clinical signs prior to death. Manure pit gas exposure was initially suspected as the cause. An investigation revealed normal levels of hydrogen sulphide, ammonia and methane but elevated carbon monoxide (CO) levels (180-190 ppm) in the affected nursery rooms. High CO levels (exposure limits for health; short term - less than 15-minute exposure at 400 ppm and longer term - 8-hour exposure at 35-40 ppm)[1] were attributed to improperly functioning fans and natural gas box heaters. All malfunctioning equipment was fixed or replaced. Despite improvements to ventilation, sudden deaths, around three weeks post placement in the nursery, continued. Pigs were most often found dead with few clinical signs observed prior to death; however, surviving pigs demonstrated weakness, lethargy and mild ataxia suspected to be of neurological origin. Palpebral edema was noted on some affected pigs.

Post-mortem examinations failed to identify a cause of death. Lesions noted included atrophic enteritis, meningitis, chronic cellulitis, dermatitis, emaciation, pneumonia, bronchiolitis, mild facial edema, and leukocytoclastic vasculitis. A complete feed analysis, including testing for protein, sodium, arsenic, selenium, and zinc, was performed on creep feed and nursery rations. All results were within normal limits. Vitamin A and mercury levels of necropsied pigs were also normal. After repeated submissions of whole pigs, blood, and fecal samples over a four-week period, a Shiga toxin 2 (Stx2e)-producing F18 *E. coli* (F18:STEC) was isolated and a diagnosis of Edema Disease (ED) was made.

Post-weaning *E. coli* infections in Ontario are most commonly associated with F4 enterotoxigenic strains (F4:ETEC) that produce heat stable (ST) and heat labile (LT) enterotoxins that cause severe enteritis and diarrhea. F18 *E. coli* strains do not always produce enterotoxins that cause enteritis and diarrhea, but do often produce Shiga toxin (Stx2e), which causes systemic vascular damage after absorption into the bloodstream.

In Ontario, post-weaning colibacillosis typically involves enteritis and it is unusual to encounter sudden death attributable to colibacillosis in the absence of enteric signs. Reports from clinical cases in the United States suggest that the prevalence of F18 strains associated with post-weaning colibacillosis have begun to match that of F4 strains.[2,3,4] Depending upon which toxins are secreted by the F18 *E. coli*, F18 strains can cause post-weaning diarrhea (PWD) or ED or both. There is no information on the prevalence of F18 strains in swine herds in Ontario, but based on trends among isolates reported in other regions, it is possible that practitioners may observe increasing involvement of F18 strains in post-weaning colibacillosis in the future.

1. *Canadian Centre for Occupational Health and Safety 2000, reported in Lemay S, Chénard L. What Should I Know About Air Quality In Pig Buildings? Prairie Swine Centre Inc., Saskatchewan. 2000* www.gov.mb.ca/agriculture/livestock/pork/pdf/bab13s10.pdf
2. *Post K, Bosworth B, Knoth J. Frequency of virulence factors in Escherichia coli isolated from pigs with post weaning diarrhea and edema disease in North Carolina. Swine Health and Production 2000; 8(3):119-120.*
3. *Hicks J. Edema Disease – Field Problems and Observations. ISU Swine Disease Conference 2004:24-26.*
4. *Francis D. Post-weaning E. coli – diagnosis, treatment, control, and its effect on subsequent growth performance. Proceedings AASV 2004:495-500.*

Colibacillosis Part 2: Recommended Diagnostic Procedures for Suspected Colibacillosis in Nursery Pigs

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The preceding case study demonstrates some of the challenges associated with diagnosing colibacillosis, particularly when an F18 strain of Shiga toxin producing *E. coli* (STEC) is involved. Edema disease (ED) can be difficult to diagnose using bacteriology and gross pathology because clinically affected animals may no longer be colonized with F18 *E. coli* and gross lesions are not consistently present. In addition, post-weaning colibacillosis cases may involve mixed infections of F4 and F18 *E. coli* producing multiple toxins (shiga toxin and/or diarrhea-associated toxins), which can complicate a diagnosis.[1,2] Based on reports from the Midwest and Quebec, practitioners are more likely to encounter F18 associated colibacillosis in the future; therefore, recommended sampling and diagnostic procedures for colibacillosis are described below.

In ED outbreaks, few clinical signs may be observed before sudden mortality occurs. Surviving pigs show ataxia, paresis and wasting. Gross lesions, if present, are most commonly observed in acutely affected individuals.

Clinical signs and lesions associated with ED[1]:

- Sudden death of large, well conditioned pigs 2-4 weeks post-weaning
- Neurological signs, including ataxia, oral repetitive behaviours and recumbency.
- Wasting in surviving pigs
- Diarrhea
- Gross lesions are not consistently present but may include periorbital and facial edema, edema of the mesocolon and/or gastric mucosa.
- Histological findings are often limited to an angiopathy.

If you suspect post-weaning colibacillosis, submission of the following specimens to a veterinary diagnostic laboratory is recommended:

- fecal swabs for bacteriology
- multiple affected whole pigs (live, recently deceased, or euthanized) for post-mortem examination and bacteriology

Fecal samples with the greatest likelihood of containing F18:STEC come from acutely affected animals or from pigs sampled immediately prior to the time that clinical signs are expected. This is because colonization occurs several days prior to clinical signs and the Shiga toxin (Stx2e) is released when the F18 *E. coli* die. Toxin is absorbed into the systemic circulation where it produces its lethal effects on the vasculature. By this time, the F18 population in the intestine may be waning and below detectable limits. F18:STEC is rarely cultured from surviving pigs.

A typical colibacillosis diagnosis from fecal samples relies on agglutination assays which are available for F4 antigens only. F18 antigens are poorly expressed in culture, making the development of an accurate F18 agglutination assay difficult. Consequently, to identify and isolate entertoxingenic (ETEC) F4, F18, and/or F18:STEC, multiplex total DNA PCR genotyping is preferred. For total DNA PCR genotyping, fecal swabs are incubated in an enrichment broth that supports *E. coli* growth, or selected bacterial colonies are removed from the culture plate and placed in an enrichment broth. DNA extraction for genotyping is performed on the broth culture potentially containing multiple strains of *E.coli*. Total DNA PCR genotyping uses PCR to identify specific fimbriae and toxin genes from all *E. coli* isolates in the enrichment broth.[2] It is performed on a composite of *E. coli* DNA in the broth and does not identify which isolates express virulent fimbriae and toxin genes. As a result, total DNA PCR must be interpreted in conjunction with clinical signs and necropsy lesions. If requested, PCR genotyping on individual colonies can be performed to confirm that a pathogenic F18 isolate is involved.[2]

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The Animal Health Laboratory (AHL) in Guelph offers an "ETEC genotyping panel" which identifies fimbriae antigen genes such as F18, F4, and F41, as well as toxin genes including ST, LT and Stx2e associated with enteritis and ED. Genotyping on total DNA is two to three times more expensive than F4 agglutination but can detect multiple virulence genes such as F4, F18, Stx2e and diarrhea-associated enterotoxins. Agglutination assays provide limited information as they do not detect toxins or F18 fimbriae.

Remember:

- If you suspect colibacillosis, especially ED, start with ETEC PCR genotyping on total DNA from fecal swabs. Genotyping is the best method for detecting pathogenic *E. coli* because agglutination is limited to F4 antigens and gross lesions are inconsistent.
- F18:STEC is difficult to isolate. Colonization occurs prior to clinical signs and is of short duration. Rectal swabs collected from pigs immediately at the onset or immediately prior to the time that clinical signs are expected provide the best chance of isolating F18:STEC.

For more information on PCR genotyping performed at AHL, please contact Dr. Durda Slavic— dslavic@uoguelph.ca

1. *Zimmerman J et al., ed. Diseases of Swine. 10th ed. Chichester, West Sussex UK: John Wiley & Sons Ltd., 2012:733-738.*
2. *Fairbrother J, Nadeau É. Strategy for identification and isolation of pathogenic F4 and/or F18-positive Escherichia ecoli associated with diarrhea and edema disease in pigs. 2012 OIE Reference laboratory for Escherichia ecoli (EcL) Université de Montréal.*

Australian EI Outbreak in 2007: Biosecurity Implementation Lessons

Michael Krystolovich, Veterinary Student, Ontario Veterinary College, University of Guelph, and OMAFRA Summer Student and

Ann Godkin, Veterinary Science and Policy Unit, OMAFRA

In 2007, a dramatic, four-month-long outbreak of Equine Influenza (EI) occurred in south eastern Australia. Approximately 76,000 horses on about 10,651 premises were affected. Australia had been free of EI previously and vaccination was not practiced, resulting in a highly susceptible population. The outbreak was costly, as many horse industry activities in the region, including racing, showing and breeding, were ordered to a standstill in an effort to stop the spread of the virus. Implemented regional control measures, including movement restrictions, targeted vaccination, premise quarantine and the issuing of farm biosecurity guidelines to horse owners successfully contained the outbreak and eventually eradicated EI again from the region.

The outbreak offered Australian researchers the chance to follow up with studies of the effectiveness of the various on-farm practices adopted during the outbreak and the horse owner's attitudes to recommended biosecurity protocols. Recent publications highlight their findings. Prior to the outbreak, there were no standard recommendations in the Australian horse industry for biosecurity procedures for equine farmsteads. During the outbreak, on-farm biosecurity practices recommended were derived from expert opinion.

In 2009, 200 horse owners from 100 EI-case and 100 control farms, were interviewed to specifically examine the on-farm factors that appeared to have been successful in preventing further EI spread between farms. The findings revealed that case farms were more likely to be within 5 km of a known infected premise, suggesting a buffer zone of 10 km around an infected premise was a successful containment strategy for EI. Case farms were four times less likely to have had a footbath in place the week before their first case, were seven times more likely to have kept daily records of horse health monitoring, were 18 times more likely to have had a horse attend an event and were four times more likely to be keeping horses for recreation only. Researchers speculated that having a footbath may

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have prevented EI introduction on footwear but also was likely a marker for generally higher attention by owners to prevention of EI introduction by a variety of fomites. Higher rates of health monitoring and record keeping among case herds was a surprising finding and was speculated to reflect activities undertaken by herd owners once it was known that EI outbreaks were occurring nearby.

One year after the outbreak a study of owner attitudes to biosecurity determined that horse owners were more likely to have been low compliers with recommended biosecurity practices if they were younger, believed the recommended procedures were "not effective or probably not effective" or felt the risk of a future EI outbreak was low. Horse owners were more likely to be in the high compliance group if they had directly experienced great financial losses due to the 2007 outbreak.

Based on these findings, the researchers suggest that future extension efforts about biosecurity should clearly communicate the threat disease outbreaks pose to the horse industry and the proven effectiveness of the recommended biosecurity practices. The outbreak provided a basis for the development of standard on–farm biosecurity protocols. Additionally, they recommended that their data be used to develop a profile of a population of horse owners that can be quickly identified as "quick responders and willing to change to rapidly adopt protective practices" should a future outbreak occur. Having some owners comply very quickly with recommendations may effectively help to limit disease spread in the very early stages of an outbreak.

Further attention needs to be focussed on the role horse professionals (veterinarians, farriers, chiropractors, etc.) play in spreading disease when they travel among multiple horse farms over a short period of time. In the Australian studies, horse owners were divided as to the importance their horse professionals placed on adherence to good biosecurity practices when working on their farms. Veterinary practitioners should evaluate whether they currently inspire their clients by example!

Schemann K, Taylor MR, Toribio JA, Dhand NK. Horse owners' biosecurity practices following the first equine influenza outbreak in Australia. Prev Vet Med. 2011 Dec 15; 102(4):304-314.

Firestone SM, Schemann KA, Toribio JA, Ward MP, Dhand NK. A case-control study of risk factors for equine influenza spread onto horse premises during the 2007 epidemic in Australia. Prev Vet Med. 2011 Jun 1; 100(1):53-63.

Stall Savvy Dairy Cows—Preference and Resting

Michael Krystolovich, Veterinary Student, Ontario Veterinary College, University of Guelph, and OMAFRA Summer Student and Neil Anderson, Veterinary Science and Policy Unit, OMAFRA

Partitions, size of the lying space, bedding type and depth, style and design of brisket locators may have an effect on the length of time dairy cows spend lying down in stalls. Ideally, stall design encompasses cow comfort, welfare, practicality for the producer, and cleanliness. We investigated a three-row free-stall barn of approximately thirty milking cows because of hock lesions ranging from hair loss and swelling to open sores. The barn had head-to-head free stalls with EVA cow mats, softwood shavings, and sleeve and collar mount partitions between stalls. This article describes cow preferences in a sample of nine stalls.

Our time-lapse video cameras recorded activities in a row of nine stalls over four days in July 2012. We subsequently reviewed these videos using the 10-minute scan sampling technique (1) to record stall usage as empty or with a cow perching, standing, or lying down. Stall #1 had a concrete partition supporting a water trough in the cross-over alley. Stall #9 had a typical concrete curb separating the end of the stall and the adjacent cross-over alley.

Figure 1 shows the percentage of observations with cows resting in each stall. Cows lay down less frequently in the two end stalls (#1 and #9). We also observed that cows attempting to lie down in these stalls needed more time to achieve a

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comfortable position. Stall usage for resting was greatest in the middle stall (#5) of the row. The percentages of observations (not shown) for standing or perching were similar in the nine stalls.

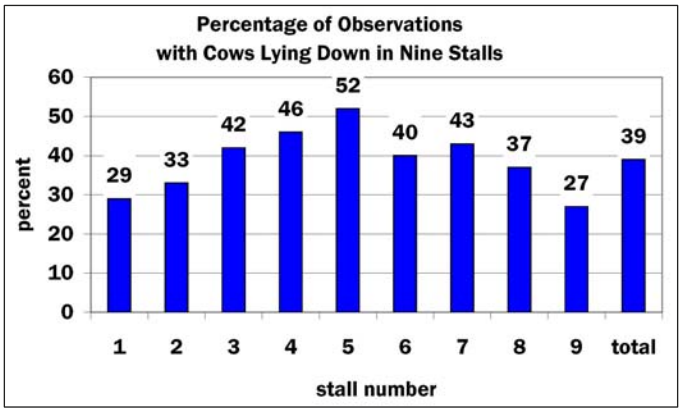

Figure 1.

These findings suggest and are consistent with the concept that cows prefer stalls with greater allowance for lateral movement amongst partitions [2]. The concrete wall in stall #1 and curb in stall #9 prevented cows from stretching their legs while lying in one direction. In some new barns, producers successfully use a plastic brisket locator as an alternative to a concrete curb at a cross-over alley. Although we haven't studied stall usage in barns with this innovation, it merits consideration.

1. *Overton MW, Sischo WM, Temple GD, Moore DA. Using time-lapse video photography to assess dairy cattle lying behaviour in a free-stall barn. J. Dairy Sci 2002; 85:2407-2413.*
2. *Ruud LE, Boe KE. Flexible and fixed partitions in freestalls - effects on lying behaviour and cow preference. J. Dairy Sci 2011; 94:4856-4862.*

Mobile (Robotic) Barn Cleaner Leaves Some Floor Un-cleaned

Michael Krystolovich, Veterinary Student, Ontario Veterinary College, University of Guelph, and OMAFRA Summer Student and

Neil Anderson, Veterinary Science and Policy Unit, OMAFRA

Risk assessments for lactating cow mastitis include evaluations of cow, bedding and floor cleanliness. It is common belief that cleaner floors contribute to cleaner claws, beds, bedding, teat ends, and a reduced risk of mastitis or high somatic cell counts. This report describes seasonal variation and selective exclusion of floor cleaning in a slatted-floor barn with a mobile floor cleaner.

The study farm used a Lely *Discovery* 90SW mobile barn cleaner that has an onboard water spray system. With this model, Lely advertises intelligent cleaning without cow disturbance, flexible routing, an option for more frequent cleaning of some areas during specific times of the day, and enhanced floor cleaning and grip with water spray. Additional claims include optimum hygiene, less manure in the cubicles, cleaner claws, tails and udders, and prevention of claw and udder diseases. Certainly, results may vary with the operator's programming or the machine's performance under conditions in a barn.

During an initial cool-weather (May) visit to the three-row barn, the *Discovery* was cleaning about 60% of the floor area as shown in **Figure 1**. It cleaned the entire floor in the two crossovers and the 10-foot-wide outside alley. It also cleaned about five feet (i.e., two passes) of floor adjacent to the stall curb in the 14-foot-wide feed alley and some of the floor in the collection area adjacent to the two robotic milkers. It did not clean the floor where cows stood to eat at the bunk or the collection area closest to the automated milkers.

At a later visit in June, the *Discovery* was cleaning less floor area. It cleaned a single pass (about 34 inches) adjacent to the stall curbs for each of the three rows of stalls. (Figure 1) Overall, *Discovery* cleaned about 38% of the floor area and left the remaining 62% for cows to manage with their feet.

Discovery navigates by a combination of a gyroscope, ultrasound and wheel revolutions. The gyroscope maintains orientation; ultrasound determines the distance from walls and curbs; and wheel revolution measures distance. Disruption to the navigational program happens when the wheels spin on slippery floors. Human intervention is needed to get *Discovery* reoriented. This well-ventilated study barn had wide alleys, low cow densities, and open

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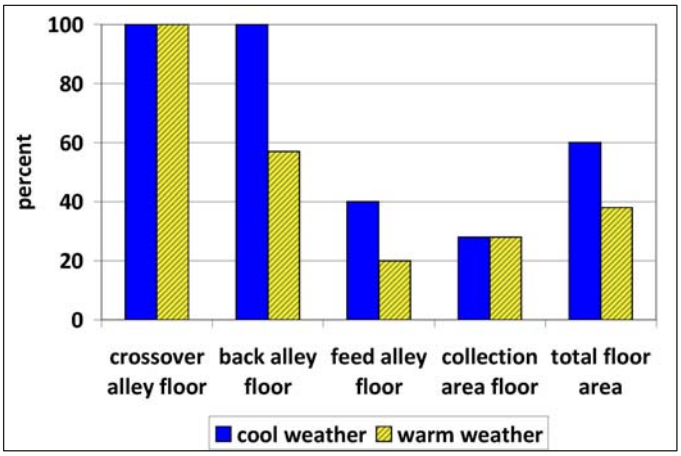


Figure 1. Percentage of floor area cleaned by a mobile floor cleaner in a slatted-floor free-stall barn was greater in cool weather (60%) than in warm weather (38%).

curtains. Warm days caused the floors to be slippery. *Discovery* spun its wheels and parked in unwanted places. The solution was to program it to clean only the wettest, heavily contaminated floor areas. Ultimately about 62% of the floor was not cleaned because of practical problems including *Discovery's* incapacity (e.g., grip/traction), labour (e.g., fetching *Discovery*), cow well-being (e.g., eating undisturbed, traction), or milking opportunities (e.g., undisturbed entry to automated milkers).

We need to be aware of changes in floor cleaning when consulting about mastitis or milk quality. As in this study barn, the risk of dirty floors, claws, beds or mastitis may be greater for several days, weeks or a few months each year. During times of reduced floor cleaning, more frequent and complete cleaning of the beds may counterbalance some risk.

Modifications to an Automated Calf Feeder Permit Simultaneous Suckling.

Neil Anderson, Veterinary Science and Policy Unit, OMAFRA

The installation of updated feeding stations for his *Urban automated calf feeder* brought joy to an Ontario producer and more milk to his calves. He reports much easier training and introduction, greater daily intakes at younger ages and more satisfied calves. The original machine supplied two nipples, each shared by two pens, with a calf in one of the four pens having access at any time. There was no change to the mixer. It still prepares a single batch of milk replacer. The new feeding stations allow simultaneous suckling and receipt of milk from three separate nipples. Each new feeding station has its own metering system for keeping data about milk intakes. Briefly, the calf barn has four pens, three with the new feeding stations and one (the weaning pen) with an original station.

Figure 1 shows an historical comparison of average daily intakes at 3, 5, 8, 11, 14, and 17 days of age, and an overall average from introduction to 17 days of age. The data were from April 4 to August 15, 2011 for the original feeding station (75 calves) and from April 5 to August 12, 2012 for the updated feeding station (60 calves). The milk replacer brand and formulation were consistent from year to year. The automated feeder programming remained the same, delivering three Litres (L) per meal, 12 L per day, and 150 g of powder into one L of water. Husbandry was similar in both years with free access to water and calf starter.

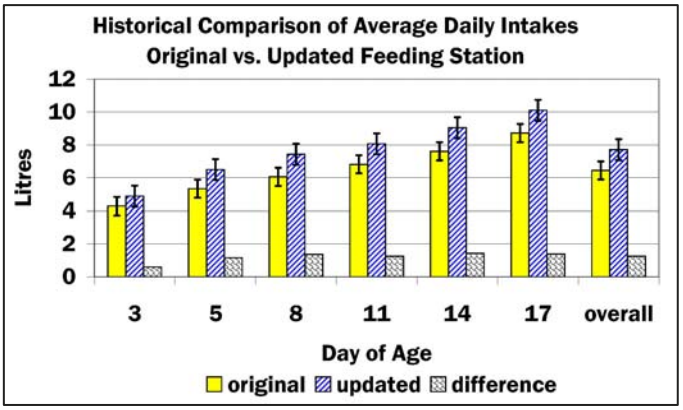


Figure 1. The comparison of average daily milk replacer intakes.

Figure 1 shows the comparison in average daily milk replacer intakes. Bars on the columns indicate the standard error of the means. Three days of age was day one on the feeder for about 80% of the calves. There was no significant difference in daily intake at three days of age for the original and updated feeding stations. At the other ages, there was a difference of 1.2 to 1.4 L per day greater intake for calves suckling from the updated feeding station. Overall, calves suckled 7.7 L vs. 6.4 L per day with the updated feeding station and original feeding

(Continued on page 14)

station, respectively. Median intakes (not shown) were similar to the averages at each age and indicated that half the calves suckled more than the amounts shown in Figure 1.

Potential differences (e.g., weather) between 2011 and 2012 may mislead us to believe the new feeding stations had a positive effect. The data can not measure the change in contentment of the calves. Bullying, bunting at dry nipples, and stepping back and forth in the feed stall were common events with the old configuration but are rare with the new. Milk is readily available at the nipple and there is almost instant satisfaction when a calf arrives for feeding. Testimonials and historical comparisons may be viewed as weak evidence to adopt new technology. Nonetheless, an investment in the new feeding stations merits consideration for calf well-being. We will have to wait for an appropriately designed research trial to confirm or disprove our clinical impressions.

Prototheca in Dairy Herds Meets Test-day Milk-sample PCR Test

Michael Krystolovich, Veterinary Student, Ontario Veterinary College, University of Guelph, and OMAFRA Summer Student and
Ann Godkin, Veterinary Science and Policy Unit, OMAFRA

Prototheca sp. is an alga that grows well in moist locations and appears to be an emerging important cause of mastitis in dairy cows. Milk culture is used to confirm a diagnosis, but infected cows can shed the algae intermittently with periods of negative culture results lasting for months. Prototheca sp. mastitis does not respond to therapy. Persistently infected cows have very high somatic cell counts (SCCs) and may become a source of infection for herd mates. For prevention of further cases on many farms with endemic Prototheca mastitis, identification and segregation or removal of infected cows as soon as possible, is often the strategy adopted. We conducted a pilot study to explore the use of a polymerase chain reaction (PCR) test for its utility and accuracy for the identification of cows infected with Prototheca using DHI test-day milk samples in comparison to conventional milk culture.

Nineteen cows from five different farms were enrolled in this study. Ten cows were strongly suspected to have Prototheca mastitis and nine cows were high SCC cows but had never been positive on culture for Prototheca. Each farm was visited twice. The first visit was to obtain milk samples for culture to confirm and identify Prototheca-positive cows. The second visit was during each herd's next monthly DHI test to collect samples from case and control cows. On test day we collected aseptic teat-end milk samples which were split into two vials (one with preservative, one left fresh) and duplicate conventional DHI test-day samples (preserved and metered). The aseptic fresh (unpreserved) samples were cultured at the Animal Health Laboratory in Guelph. PCR tests were run at CanWest DHI.

The test results are shown in **Table 1**.

We calculated a Kappa statistic to determine the level of agreement between the results of the culture and PCR tests. We found:

- perfect agreement (Kappa of 1) for three comparisons:
  - the preliminary herd teat-end sample culture results vs. the teat-end sample PCR results,
  - the teat-end sample PCR results vs. the DHI meter sample results, and
  - any teat-end culture results (either the preliminary teat-end samples or the teat-end samples taken during the DHI test) vs. DHI meter sample PCR results.

- substantial agreement (Kappa of 0.79) for two comparisons:
  - the teat-end sample culture results vs. the teat-end sample PCR results, and
  - the teat-end sample culture results vs. the teat-end sample PCR results.

The less than perfect agreements were due to the results for cows 2 and 8. Both had positive preliminary cultures for Prototheca, but were negative on the test-day cultures. However both were positive on the PCR test for both the test-day samples (teat-end and metered samples).

(Continued on page 15)

Table 1. Milk Culture and PCR Tests for Prototheca

	Preliminary Testing	DHI Test Day		
Cow #	Culture Result	Aseptic teat-end sample Culture Result	Aseptic teat-end sample PCR P+ test	Metered sample PCR P+ test
1	*Staph aureus*	*Staph aureus*	Negative for P+	Negative for P+
2	Prototheca	Mixed growth	P+ positive	P+ positive
3	Mixed growth	Mixed growth	Negative for P+	Negative for P+
4	*Strep uberis*	No growth	negative	negative
5	Prototheca	Prototheca	P+ positive	P+ positive
6	Prototheca	Prototheca & *Staph aureus*	positive	positive
7	No growth	Mixed growth	Negative for P+	Negative for P+
8	Prototheca	No growth	P+ positive	P+ positive
9	Prototheca	Prototheca	P+ positive	P+ positive
10	Prototheca	Prototheca	P+ positive	P+ positive
11	Prototheca	Prototheca	P+ positive	P+ positive
12	Prototheca	Prototheca	P+ positive	P+ positive
13	*Strep uberis*	No growth	Negative for P+	Negative for P+
14	*Staph aureus*	*Staph aureus*	Negative for P+	Negative for P+
15	*Enterobacter agglomerans*	Mixed growth	Negative for P+	Negative for P+
16	*Staph aureus*	No growth	Negative for P+	Negative for P+
17	Prototheca	Prototheca	P+ positive	P+ positive
18	Prototheca	Prototheca	P+ positive	P+ positive
19	Mixed growth	Mixed growth	Negative for P+	Negative for P+

In this small pilot study, there was strong agreement between culture and PCR tests and between the two samples per cow tested on the PCR itself. This suggests that testing cows for Prototheca infection using routinely collected DHI test-day samples, may be an appropriate management strategy, at least for cows like the ones in this study with advanced, persistent Prototheca mastitis. This could be useful for herds with previously confirmed, culture-positive cases of Prototheca mastitis. From other Ontario research using Animal Health Laboratory data it appears that herds that have had one case of Prototheca mastitis are at higher risk of having subsequent ones. Rapid identification of cows with new evidence of mastitis as Prototheca cases may assist in preventing further spread.

This study was funded by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA).

Supporting SCC Improvement in Ontario

Ann Godkin, Veterinary Science and Policy Unit, OMAFRA

The reduction in the regulatory limit for bulk tank somatic cell counts (SCCs) to 400,000 cells/mL August 1, 2012, has increased interest in trouble-shooting mastitis problems. Typically August and September are times when producers have the most difficulty in maintaining low SCCs – this year many have been motivated to try a little harder!

In anticipation of a surge in mastitis problem-solving opportunities, the SCC200 Working Group, an ad hoc group of veterinarians, advisors, industry professionals and researchers, presented a series of workshops in June 2012. The targeted audience were veterinary practitioners and advisory staff from dairy supply companies. During the workshops the attendees were exposed to several tools that were developed to bring consistency and structure to on-farm milk quality management evaluation.

The use of one new tool, the Mastitis Risk Assessment and Management Plan (Mastitis RAMP), was demonstrated in a case study. A "User's Guide" on how to assess management and farm practices was also provided. Subsequently 20 veterinarians evaluated the Mastitis RAMP by using it on 80 of their client's farms. Their evaluations are just being completed.

During the workshops, Melanie Quist-Moyer of Dairy Comp Support at CanWest DHI, introduced participants to the use of Dairy Comp "Guide" for summarizing herd performance over time, using DHI cow SCC information. To assist with completing the mastitis history on a farm that the Mastitis RAMP requests, Melanie developed and provided participants with a one page guideline entitled "Dairy Comp Commands for Mastitis RAMPs". This makes deriving the SCC parameters by using commands in Dairy Comp, or by using "Guide", very easy.

All these materials, including the Mastitis RAMP form, the Users Guide and the Dairy Comp Commands for Mastitis RAMPs are posted on the SCC200 project website at *www.scc200.ca*

Watch for the Mastitis RAMP form to be updated when the suggestions from the veterinary practitioner's evaluations are implemented.

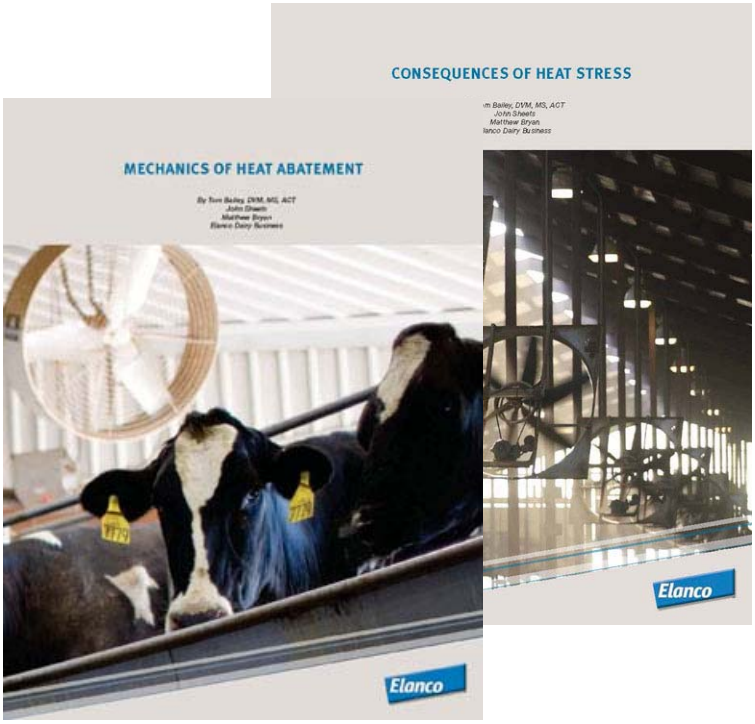
Mechanics of Heat Abatement Consequences of Heat Stress

by Tom Bailey, DVM, MS, ACT, John Sheets, Matthew Bryan, Elanco Dairy Business

It is important for dairy producers to consider a cow cooling system in the modern dairy of today.

This booklet discusses the mechanics around a heat abatement, or cow cooling, system and the four elements required for the most effective cow cooling: shade, air, water, and time.

To download this publication, click on either cover—
www.elanco.us/Content/pdfs/USDBUNON00147-Update-Heat-Guide.pdf

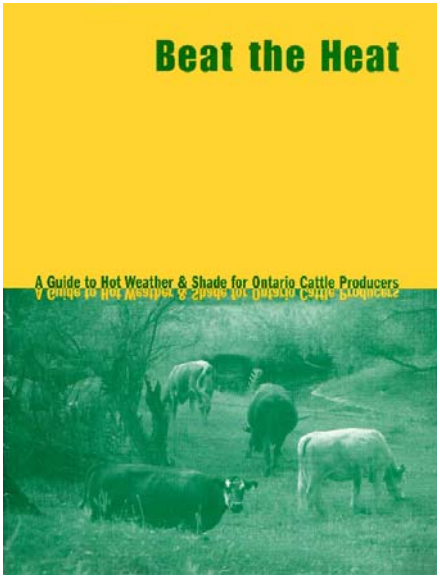


Beat the Heat—A Guide to Hot Weather and Shade for Ontario Cattle Producers

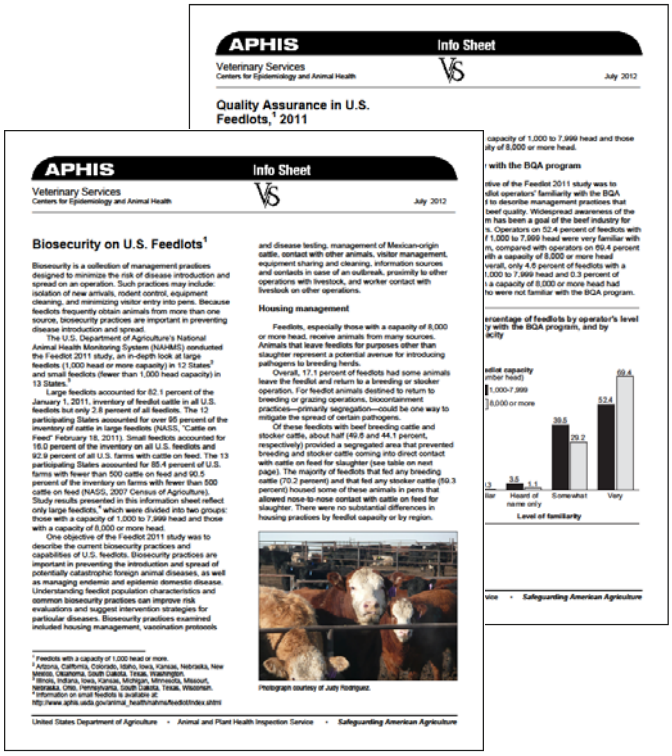
> "Maintaining healthy body temperature depends on a balance between the heat produced by the animal and heat gained and lost due to the environment.
>
> As environmental temperature and humidity rise, it becomes difficult for cattle to lose heat so they must reduce heat production. This means a reduction in feeding, growth, lactation and reproduction. Solar radiation tips the balance even further."

The Campbell Centre for the Study of Animal Welfare published this document in 1998. Although the information is older, it is very accurate and informative.

The publication can be found at
www.uoguelph.ca/csaw/doc/beat_the_heat.pdf



NAHMS Beef Feedlot Studies



USDA's National Animal Health Monitoring System (NAHMS) has released four information sheets from its Feedlot 2011 study. One portion of the study took an in-depth look at large U.S. feedlots (1,000 head or more capacity) in twelve States which were divided into two groups: those with a capacity of 1,000 to 7,999 head and those with a capacity of 8,000 or more head. Feedlot 2011 took a broad look at animal health and management practices on feedlots throughout the major cattle feeding region of the United States.

The four information sheets:

- Biosecurity on U.S. Feedlots
- Emergency Preparedness and Management on U.S. Feedlots
- Importance of Pre-arrival Management Practices to Operators of U.S. Feedlots
- Quality Assurance in U.S. Feedlots, 2011

can be downloaded from the Animal and Plant Health Inspection Service (APHIS) website at *www.aphis.usda.gov/animal_health/nahms/feedlot/* or click on the above graphic.

Continuing Education/Coming Events

October 12 & 13, 2012	Ontario Association of Swine Veterinarians Fall Conference, Delta Guelph, Guelph, Ontario. *www.oasv.ca*
October 24-26, 2012	Dairy Cattle Welfare Symposium, Delta Guelph Hotel and Conference Centre, Guelph, Ontario. *www.dairycattlewelfaresymposium.ca*
October 25, 2012	Small Ruminant Veterinarians of Ontario Fall Meeting—Alpaca Health Management, Orangeville Fairgrounds, Orangeville, Ontario. *www.srvo.ca*
October 25 & 26, 2012	Central Canada Veterinary Association Fall Conference, Strathmere Inn, North Gower, Ontario. The bovine speaker for both days is Dr. Wm Dee Whittier, Director of Veterinary Extension, Bovine Extension Specialist, Virginia-Maryland Regional College of Veterinary Medicine. Contact Jan Shapiro—jshapiro@kemptvillec.uoguelph.ca
November 6-9, 2012	The Dairy Practices Council 43rd Annual Conference, Crowne Plaza Madison, Madison, Wisconsin. *www.dairypc.org/dpc-news/2012-annual-conference-info---registration*
November 7, 2012	Ruminant Feed Industry Day, Drayton (PMD) Arena and Community Centre, Drayton, Ontario. *http://Ontario.ca/x684*

(Continued on page 19)

Continuing Education/Coming Events (continued)

November 13-15, 2012	Dairy Systems Seminars, Ramada Plaza, Abbotsford, British Columbia: ▪ Management Success with Robotic Milking (November 13) ▪ Dairy Facility Design and Management for Improved Cow Comfort, Health and Longevity (November 14-15) *http://bcmilkproducers.ca/events/details/dairy_systems_seminar*
November 14 & 15, 2012	Ontario Association of Bovine Practitioners (OABP) Fall Continuing Education Program, Holiday Inn, Guelph, Ontario. *www.oabp.ca*
November 25 - December 1, 2012	Six-day workshop on Herd Health, organized by Hachaklait Veterinary Services, Caesarea, Israel. Hachaklait, serving the majority of Israel dairy farms, implements an intensive Herd Health program that combines comprehensive clinical work on the individual cow in the barn with recording, gathering, monitoring and analyzing of the herd data. Interactions between veterinary medicine, nutrition, management and economics are important aspects. Opportunity to see dairy production medicine advancements in Israel. *www.hachaklait.org.il/english.asp*
November 28, 2012	The F. W. Presant Memorial Lecture—Economics of farm animal welfare—will be delivered by Dr. Jayson Lusk, Professor at Oklahoma State University. *www.uoguelph.ca/ccsaw*
December 1-5, 2012	58th Annual Convention of the American Association of Equine Practitioners, Anaheim Convention Centre, Anaheim, California. *www.aaep.org/convention.htm*
December 5 & 7 2012	Building the Foundation—Dairy and Veal Healthy Calf Conference. December 5—Stratford Rotary Complex, Stratford, Ontario December 7—Chesterville Legion Hall, Chesterville, Ontario *http://calfcare.ca*
December 12 & 13 2012	Pro-Dairy Program—Group-Housed Dairy Calf Systems, Doubletree Hotel, Syracuse, New York. *www.ansci.cornell.edu/prodairy/calfsystems/index.html*
January 15, 16 & 17 2013	2013 Herd Management Conference presented by CanWest DHI. January 15—Chesterville Legion Hall, Chesterville, Ontario January 16—Memorial Hall, Tavistock, Ontario January 17—PMD Complex, Drayton, Ontario *www.canwestdhi.com*
January 27-29, 2013	National Mastitis Council 52nd Annual Meeting, Omni Hotel, San Diego, California. *www.nmconline.org*
February 6 & 7, 2013	Canadian Dairy Xpo, Canada's National Dairy Showcase, Stratford Rotary Complex, Stratford, Ontario. *www.dairyxpo.ca*
February 18-22, 2013	International Sheep Veterinary Congress, Christchurch Convention Centre, Christchurch, New Zealand. *http://conference.intsheepvetassoc.org*

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Deadline for next issue: December 7, 2012

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