CEPTOR

Animal Health News
Volume 15, No. 1, March 2007

ISSN1488-8572

CEPTOR is published by: Animal Health and Welfare, Livestock Technology Branch, OMAFRA
Editor: Kathy Zurbrigg **Website**: www.omafra.gov.on.ca/english/livestock
Archived Issues of CEPTOR: www.oabp.ca

Animal Health and Welfare, OMAFRA
1 Stone Road West, Guelph, Ontario N1G 4Y2
Leslie Woodcock (519) 826-6364
Wellington Place, R. R. # 1, Fergus, Ontario N1M 2W3
Neil Anderson (519) 846-3410
Tim Blackwell (519) 846-3413
Ann Godkin (519) 846-3409
Jocelyn Jansen (519) 846-3414
Bob Wright (519) 846-3412
Kathy Zurbrigg (519) 846-3418
OVC, University of Guelph, Guelph, Ontario N1G 2W1
Babak Sanei (519) 824-4120 ext. 54650

Office of the Chief Veterinarian, OMAFRA
1 Stone Road West, Guelph, Ontario N1G 4Y2

Chief Veterinarian	Deb Stark	(519) 826-3528
Assistant Chief Veterinarian	David Alves	(519) 826-3127
Provincial Biosecurity	Paul Innes	(519) 826-4043
Epidemiology	Bruce McNab	(519) 826-4178

CEPTOR is Available Electronically.

Since its inception in May of 1993, CEPTOR's readership has continued to grow. We now print and distribute more than 900 copies to veterinarians, educators and industry personnel in Ontario and throughout Canada. CEPTOR does not accept sponsorship or advertising to offset the publishing costs. In an attempt to reduce current costs, we are asking our readers to switch from a paper to an electronic copy of CEPTOR, if possible. Readers considering the switch should have high-speed internet/e-mail access, as there are often a large number of graphics in each issue.

CEPTOR is emailed as a PDF file. Many of you contact us for permission to reprint CEPTOR articles in client handouts or for your own newsletters. Copying and pasting from a PDF file would make this process quicker and easier!

If you would like to receive CEPTOR electronically, please e-mail Kathy Zurbrigg.
kathy.zurbrigg@ontario.ca

Contact: Kathy Zurbrigg, Animal Health and Welfare
Ontario Ministry of Agriculture, Food and Rural Affairs
Wellington Place, R.R. #1, Fergus, Ontario, Canada N1M 2W3
Tel: (519) 846-3418 Fax: (519) 846-8101
E-mail: kathy.zurbrigg@ontario.ca

Version 2 … Bacterial Isolates from On-Farm Acidified Milk Samples

Neil Anderson, Animal Health and Welfare, OMAFRA

Several Ontario producers acidify colostrum, raw milk or milk replacer to reduce bacterial load and to store these at ambient temperature for free-access feeding. The success of acidification as a disinfectant may vary with contact time, the bacterium of interest, pH or other factors. We were curious about what might be growing in pails or barrels of acidified milk on Ontario farms. We visited 24 farms (dairy-cattle and dairy-goat operations), collected acidified milk from 48 containers, and submitted it for bacterial culture. Here are some of our findings.

Figures 1, 2 and 3 summarize data. From 48 on-farm samples, we found 74% were in the recommended pH range of 4.0-4.5. Nine were in the range of 4.6-4.7 and three were in the range 3.6-3.8. On aerobic bacterial culture, the majority of samples (31/48=65%) had less than 10,000 colony-forming units per millilitre (cfu/mL) of milk. Of milk samples in pH range 4.0-4.5, 68% had no growth of coliforms. Environmental Staphylococcus and Streptococcus species were cultured from 54% of the samples and coliforms from 35%. Two of 21 (9.5%) whole milk or colostrum samples yielded *Staphylococcus aureus* positive cultures with 1-500 cfu/ml. The two samples had contact times of 1 and 7 hours. None of the 21 yielded *Streptococcus agalactiae*.

Figure 1 shows the results reported as no growth, less than 500 colony-forming units per mL (cfu/mL) of milk, 600-1000 cfu/mL, 1100-5000 cfu/mL and greater than 5000 cfu/mL. The graph shows the number of samples that fell within those ranges for three bacterial species – Staphylococcus, Streptococcus and coliforms.

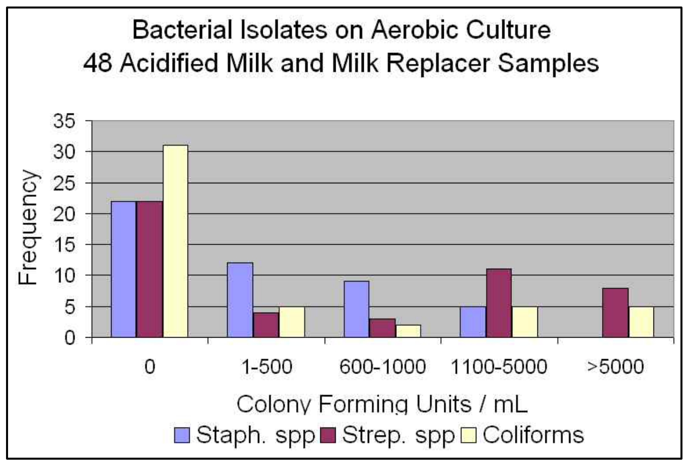


Figure 1. Bacterial Isolates from 48 Samples

Figure 2 shows the frequency of “no growth” and “positive” coliform cultures and the contact time with acid for the milk samples collected on the farms. For example, 5 samples had one hour contact time and of those, 3 had no growth and 2 were culture positive.

Contact with acid at the time of sample collection ranged from one to 48 hours for the bacterial cultures.

“No growth” for coliform bacteria was more frequent in samples with contact ≥12 hours (83%) vs. samples ≤7 hours (45%).

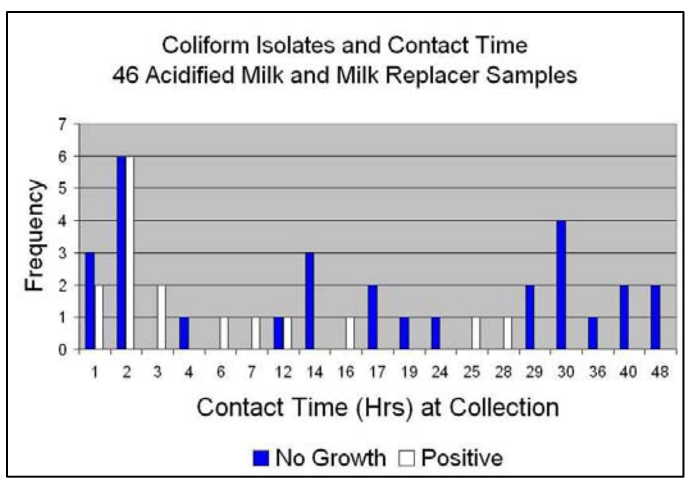


Figure 2. Coliform Isolates and Contact Times

Figure 3 shows the frequency of "no growth" and "positive" coliform cultures and the pH of the samples for milk collected on the farms. The graph shows seven samples with pH 4.2. Four of those had no growth and three were culture positive.

Milk samples ranged in pH from 3.6 to 4.7. The frequency of "no growth" samples for coliform bacteria was greater for pH≤4.5 (68%) vs. samples ≥4.6 (44%).

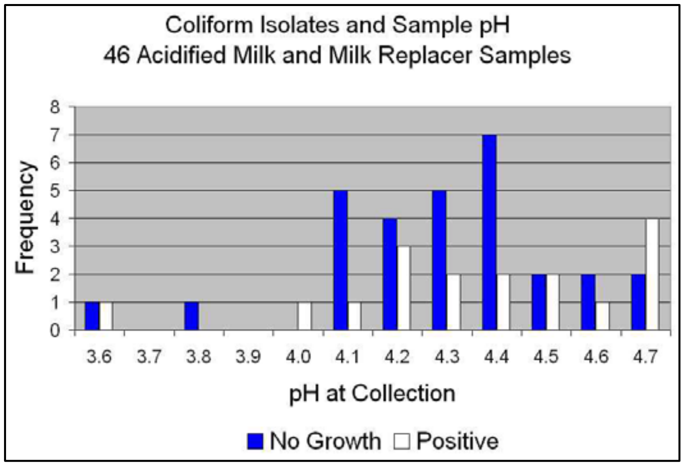


Figure 3. Coliform Isolates and Sample pH

The frequency of "no growth" and "positive" cultures for coliforms and Streptococcus species were similar for milk replacer and milk/colostrum samples. However, milk/colostrum samples yielded "no growth" for Staphylococcus species more frequently than milk replacer samples (68% vs. 27%, respectively).

Sources of bacteria in milk for calves may include intramammary, environmental contamination (manure, bedding) at harvesting or contaminated equipment (harvesting, storing, mixing, and feeding). Milk replacer powder is not sterile and water for preparation may be contaminated. For the 48 milk samples in our observational study, the source or degree of bacterial contamination prior to acidification is unknown. Although milk or milk replacer samples generally have unacceptable levels of bacteria when stored for several hours at ambient temperatures, acidified samples from this study yielded low levels on bacterial culture.

With our limited information, we recommend 8 hours of contact at pH 4-4.5 to reduce bacterial load or to preserve milk/milk replacer for free-access feeding. In practical on-farm application, it would be appropriate to acidify milk in the morning and feed it late in the afternoon or acidify in the afternoon and feed it the next morning. The bacterial hazard in on-farm acidified milk was low and meets or exceeds guidelines (McGuirk S. 2003) for colostrum used to feed calves.

Colostrum Culture Goals

- Total bacterial count < 100,000 cfu/ml
- Fecal coliforms (lactose positive) < 10,000
- Other gram negative bacteria < 50,000
- Streptococcus agalactiae 0
- Streptococcus non-agalactiae < 50,000
- Coagulase positive Staphylococcus 0
- Coagulase negative Staphylococcus < 50,000
- Others 0 (Mycoplasma bovis, Salmonella)

McGuirk S. 2003

Acknowledgements

Miss Jennifer Garner, OMAFRA 2006 summer-experience student, collected milk samples and survey data at 24 farms. Dr. Anna Bashiri, Mastitis Research Laboratory, Department of Population Medicine, Ontario Veterinary College, University of Guelph, provided laboratory services. Twenty-four Ontario dairy producers welcomed us to their farms to study their free-access feeding systems.

McGuirk S. Solving calf morbidity and mortality problems. Preconvention Seminar 7: Dairy Herd Problem Investigation Strategies. American Association of Bovine Practitioners 36th Annual Conference, September 15-17, 2003.Columbus, OH http://www.vetmed.wisc.edu/dms/fapm/fapmtools/8calf/calfmorbid.pdf

Accessibility and Usability – Easing the Walk to the Home Pen

Neil Anderson, Animal Health and Welfare, OMAFRA

Accessibility and usability should be concerns when designing a cow's workplace. Accessibility describes the ease of reaching a certain location. Usability describes the ease of use of an environment to achieve a particular goal. A recent visit to a new dairy barn revealed examples of compromises in both for dairy cows. The case is a good example of a caring producer quickly altering his barn to give his cows a better life.

The parlor had return lanes on both sides. On one side, cows walked down slope on a solid floor to a 90°corner and right-hand turn onto a slatted floor. The barn had a slatted floor over the manure flow-gutter to the transfer alley and the free-stall pens. These design features provided challenges for sound and lame cows. The floor surface changed from solid to slats at a tight turn. Ideally, for traffic flow, cows should have floors of similar traction when moving between areas in the barn. Although safety is a prime concern, floor type and slipperiness affects speed of cow traffic.

Simple changes **(Figures 1 and 2)** resulted in noticeable improvements in cows using the return lane and transfer alley. The owner rounded-off the corner by removing the corner post, installing two others and replacing the pipes. In addition, he installed rubber flooring at the turn. He also laid a rubber track down the center of the slatted floor. Lastly, he covered the slats completely so cows could transition easily onto the concrete transfer alley. Slots are still available for washing into the flow gutter. When assessing barns for cow comfort, consider the ease with which cows can move from one area of their workplace to another. Simple design features could ease accessibility and usability during daily trips to the milk parlor.

Figure 1. Return lane with rounded-off corner and rubber mats

Figure 2. Slatted floor with rubber track to transfer alley

Free-Stall and Tie-Stall Dairy Housing Seminars – Manuals for Sale

Resource manuals for the 2007 Ontario Dairy Housing Seminars are available. The binders contain a comprehensive table of contents with papers in nine sections of each binder. You will also find lists of contractors, suppliers, OMAFRA nutrient management staff, and nutrient management consultants. The cost for each binder is $25.00. You may pay by credit card. To order, please contact:
Mary Van den Borre, Client Service Representative, OMAFRA, Fergus, Ontario
Office Telephone Number: (519) 846-0941
E-mail: mary.vandenborre@ontario.ca

Cooling Barns a Hot Topic: Observations in an Ontario Tie-Stall Dairy Barn

Neil Anderson, Animal Health and Welfare, OMAFRA

Today, with subzero temperatures, it warms me to recall an August day with 30°C and 63% Relative Humidity (RH). Combined, it would be a Humidex of 40°C and would make us seek cool shelter. Ontario dairy cows can suffer from heat stress. To protect them, producers often confine them in their tie-stall barns during the day or during both day and night. The barns provide shade, natural ventilation, tunnel ventilation or high-pressure misters to cool cows. However, there is scant information to document conditions within the barns.

Weather data from Waterloo-Wellington airport (within 35 km of the barn) showed temperature and RH readings were high enough to issue a Humidex alert for people starting about 800 hours, July 31, and ending 2000 hours, August 2. A drop in temperature, followed by rain at about 2100 hours on August 2, provided relief from the heat wave. The following temperature and humidity data are from July 31- August 3, 2006.

Photo 1 shows the barns with a new tie-stall addition built in 2002. The new barn has two rows of 24 stalls (total = 48) in tail-to-tail configuration. Cows remained indoors during the summer months. The longest dimension of the barn is North-South with the tunnel fans mounted on the North. An automated system controlled sidewall panels (about 4-foot opening), tunnel ventilation fans and high-pressure misters. Sidewall panels closed and tunnel ventilation turned on at 21°C. High-pressure misters turned on at 22.8°C and shut off at 90% RH.

Photo 1. Tie-stall dairy barn with natural and tunnel ventilation

Hobo® Data Loggers captured data at southwest, center and northeast locations within the barn and at a shaded south-west location outside the barn. Averages of hourly recordings at the three inside locations were used to generate the data set. The Temperature Humidity Index (THI) formula for cattle presented by Hahn was used to calculate THI for this report (*Journal of Animal Science, Vol. 77, Suppl. 2 / Journal of Dairy Science Vol. 82, Suppl. 2/1999*). $THI = 0.81\ tdb + RH\ (tdb - 14.4) + 46.4$ where tdb = dry bulb temperature, °C, and RH = relative humidity in decimal form. Scientists suggest the onset of heat stress for dairy cattle starts at 22°C at 100% RH and 25°C at 50% RH.

Figure 1 shows findings inside the tie-stall barn during a period of heat stress. The scale for temperature and THI appear on the left axis and RH% on the right axis. THI for cattle heat stress (≥22°C) began about 700 hours on July 31 and ended about 400 hours on August 3. Cows experienced 71 heat-stress hours during the period of observation. Inside the barn, RH ranged from 70-97% and temperature from 21-29°C. THI reached a maximum of 28°C in the barn.

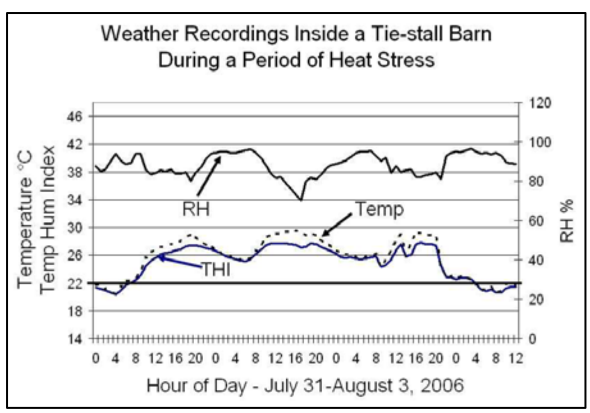


Figure 1. Inside Temperature, Temperature Humidity Index, Relative Humidity

Figure 2 shows hourly THI inside (solid line) and outside (dotted line) the tie-stall barn. THI followed a cyclic pattern associated with day and night hours. In general, THI inside the barn was lower than outside during mid-morning to evening hours. During the day, indoors should have provided lower heat-stress conditions than outdoors. Outdoor THI was lower than inside THI from evening to mid-morning.

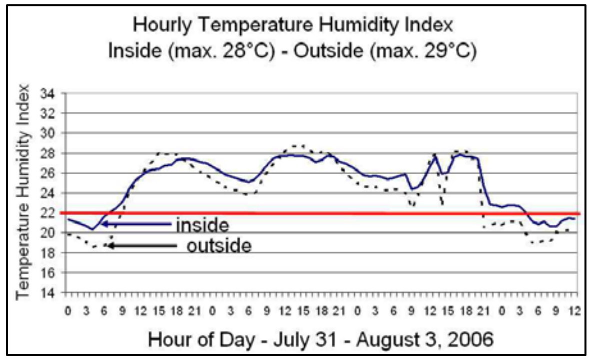


Figure 2. Hourly Temperature Humidity Index (THI)

Figure 3 shows the differences in THI between indoors and outdoors in the tie-stall dairy barn. The difference equals inside minus outside THI. The scale has positive and negative values. Positive values indicate indoor THI was higher (warmer) than outdoors. Negative values indicate indoor THI was lower (cooler) than outside.

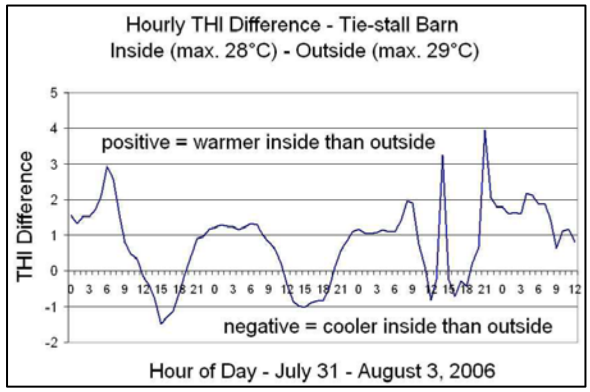


Figure 3. THI Difference – inside minus outside

From about 1000 to 2000 hours, outside RH ranged between 55-80% - dry enough for the mister system to operate during the day. Automation shut the misters off when RH reached 90% inside the barn. For example, this would have happened between 2200 hours, July 31, to 900 hours, August 1, and midnight and 1000 hours, August 2. In general, misters and tunnel ventilation were operational during mid-morning to evening hours – about 52% of the heat stress hours. Tunnel ventilation, alone, was operational during nighttime to mid-morning hours – about 48% of the heat stress hours. Airspeed from tunnel ventilation could provide a cooling effect during nighttime.

In summary, during the period of heat stress, THI inside this tie-stall barn was lower than THI outside only when tunnel ventilation and high-pressure misters were in operation. During 71 hours with THI≥22°C inside the barn, 13 hourly intervals were cooler than outside, 18 were equal to outside, and 40 were warmer than outside the barn. The warmer inside-THI hours were most frequent from evening to mid-morning.

Acknowledgement

The data for this report came from the farm of Brad and Edith Martin, Drayton, Ontario. They provided generous access to their farm and descriptions of their ventilation and mister system.

CFIA Advises Not to Use Chemically-Treated Wood Near Livestock Feed.

Kathy Zurbrigg, Animal Health and Welfare, OMAFRA
(Adapted from a CFIA and Health Canada notice to the industry)

The Canadian Food Inspection Agency (CFIA) is advising livestock producers across Canada not to use chemically-treated wood structures near livestock feed or food-producing animals. The treated wood can transfer potentially harmful levels of chemicals into animal products, such as meat, milk and eggs.

The warning comes after higher than normal levels of dioxin were detected in raw milk from two British Columbia dairy operations. The dioxin was found at levels that are not considered an immediate health risk by Health Canada. The investigation indicated that chemically-treated wood used in some silage bunkers may be the source of the dioxin detected. After precautionary measures were taken, follow-up testing indicated lowered levels of dioxin.

Producers should ensure that livestock feed is not stored where it can come into direct contact with chemically-treated wood structures. Animals, also, should not be allowed to come into contact with chemically-treated wood, including sawdust or shavings. Bunker silos constructed of chemically-treated wood should be lined with a plastic tarp and untreated lumber.

For more information on dioxins, visit the Health Canada website at: www.hc-sc.gc.ca/iyh-vsv/environ/dioxin_e.html or the CFIA website at www.inspection.gc.ca

Computer Simulation of Disease Spread and Control

Bruce McNab, Office of the Chief Veterinarian for Ontario, OMAFRA

Fortunately, it is rare for Canadian livestock and poultry to experience major outbreaks of diseases, but they can occur. Recent examples include Porcine Respiratory and Reproductive Syndrome (PRRS) and H3N2 Influenza in swine and Highly Pathogenic Avian Influenza (HPAI). Observational studies, controlled experiments and field trials can be used to learn about factors influencing disease spread and to test various methods of control. Another research tool, which is increasingly available, involves the use of computer simulation of disease spread and control. OMAFRA is participating in a joint project with the Canadian Food Inspection Agency, University of Guelph, USDA, and Colorado State University, in the development and use of a North American Animal Disease Simulation Model (NAADSM).

Researchers developed two versions of the NAADSM software. One runs in a Windows™ personal-computer platform. It is used to demonstrate principles of disease spread and control, and to develop and test small-scale disease models. The other version runs on the Ontario SharcNet super computer system (www.SharcNet.ca). This version can harness thousands of central processing units to run large-scale simulations of outbreaks and scenarios of disease control, among tens-of-thousands of virtual “farms”. The models will be used to identify disease-control strategies and policies that are robust enough to work under a wide range of situations and uncertainty.

OMAFRA staff recently participated in a workshop in Ottawa, sponsored by the CFIA, to discuss the development and application of computer models for agriculture, in the areas of animal health, plant health and ag-economics. These research tools will have increased use in the future.

Cranial-ventral Consolidated Lung in a Healthy Coughing Pig: Isn't That M. hyo.?

Tim Blackwell, Animal Health and Welfare, OMAFRA, and
Murray Hazlett, Animal Health Laboratory, University of Guelph

The more you learn, the less you know. This is particularly true with swine diagnostics in 2007. New diseases and new diagnostic technologies are combining to make accurate diagnoses ever more challenging. Four recently weaned pigs that were coughing were sent to the Animal Health Laboratory at the University of Guelph to determine the cause of the cough. All four pigs were below average weight for their age and had similar lesions. **Figure 1** is a photograph of the lungs of one of the four pigs.

The photograph shows a typical pattern of cranial-ventral consolidation that is commonly associated with *Mycoplasma hyopneumoniae* infection in swine (area in photo that is circled). *M. hyopneumoniae* colonizes the bronchi and bronchioles, causing inflammation and subsequent blockage of many of the infected airways with inflammatory debris. Once the airway is blocked, air trapped in alveoli is reabsorbed and the affected section of lung collapses. This creates the plum-coloured, dense lung tissue commonly associated with *M. hyopneumoniae* infection.

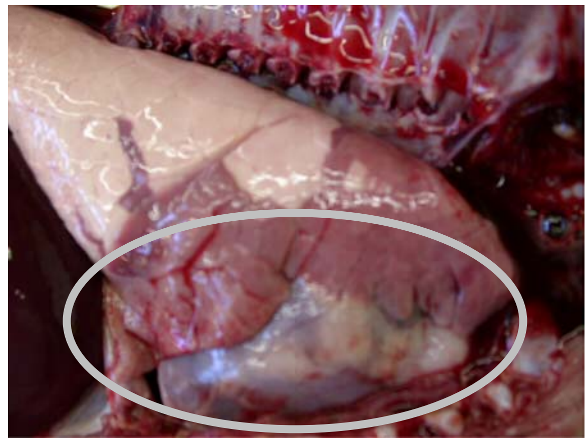


Figure 1

The four pigs submitted for postmortem examination were from a *M. hyopeumoniae*-free herd that is regularly monitored for the presence of *M. hyopneumoniae* antibodies. All four pigs sent for postmortem were PCR negative for *M. hyopneumoniae* and the herd has remained sero-negative for antibodies against *M. hyopneumoniae*. Swine influenza virus was considered a possible cause of the bronchiolitis and cough but lung tissues were also PCR negative for swine influenza. *Streptococcus suis* and *Haemophilus parasuis* were isolated from the lungs of these pigs.

The final histologic diagnosis was neutrophilic bronchiolitis and pneumonitis, with a suggestion of PCV2 (Porcine Circovirus 2) infection in some lymph nodes and lung sections. The bacterial isolates were considered to be secondary pathogens in a pneumonia of this sort. This is particularly true when multiple pigs are affected and the initiating cause of the bronchiolitis is undetermined. Influenza virus could have initiated the bronchiolitis if the virus was eliminated from the pigs by the time the four pigs were sent for postmortem.

If the lesions in Figure 1 were found during an on-farm postmortem examination of poor-doing, coughing pigs in a *M. hyopneumoniae* positive herd, it would be easy to justify treatment or preventive measures for *M. hyopneumoniae* infection. Only laboratory confirmation, however, can assure the veterinarian that the obvious diagnosis is the correct one.

Responding to Change: Group Gestation Housing for Sows in North America

Kathy Zurbrigg, Animal Health and Welfare, OMAFRA

Charles Darwin said, “It is not the strongest or the most intelligent who survive, but those who are most responsive to change.” While this explanation of evolution is true within the animal kingdom, the world will soon see if it includes the swine industry. The “response” is the move towards group housing of gestating sows. This response is due to pressure from consumers and animal-rights groups.

The “most responsive,” in this case, are the US swine giant, Smithfield’s and their Canadian counterpart, Maple Leaf Foods. In January of this year, both companies declared that all of their gestating-sow barns will be changed to group housing within the next ten (10) years.

Within the swine industry, the news was met with mixed reviews. A small percentage of the industry is pleased with these large-scale corporations shifting to group housing and the resulting improvement in the welfare of sows. Others complain that consumers don’t understand swine production and, therefore, have no right to criticize or dictate how sows are managed. Others curse the animal-rights groups for striking a “devastating blow” to the industry.

Whether or not you agree with their tactics, animal-rights groups, such as PETA (People for the Ethical Treatment of Animals) and HSUS (Humane Society of the United States), are changing the industry. Numerous reports in scientific journals and university extension papers indicate that production rates (litter size, number of pigs weaned, etc.) between sows kept in gestation crates and those in group housing are equal. It is also true that it costs significantly less to build a group-housing facility than it does to build a crated system. However, many in the industry do not want to consider a change to their sow-housing practices. It took those who “don’t understand swine production” to force the industry to accept that, if there are two methods for managing sows, choosing the one where the sows can walk around is preferable.

A common sentiment from those who do not support the move away from gestation crates is that the industry is not ready for group housing. They argue that the pen designs and management techniques to minimize sow aggression and maintain even weights have not yet been perfected. They further assert that switching to pens before this information is available will decrease sow welfare, not improve it.

Numerous Ontario producers already have it figured out. These producers have continually refined their group-housing systems to make them more desirable for both the sows and the employees. These people did not install group housing as a response to consumer pressure or because they read an article by PETA. They were confident that they could build a group housing system that would result in good production. They also knew that they wanted to work in a barn that was pleasant for both the animals and staff. If members of the swine industry are worried about the “burden” of phasing out gestation crates, perhaps they should seek out those who are truly the most responsive…those producers who made the choice long ago and have a well-functioning group-housing system already in place.

Ontario Pork in conjunction with OMAFRA has created a video showing several group-housing systems in Ontario. It includes producer commentary on the pros and cons of each system. For a VHS tape or DVD of this video, or a variety of group-housing plans, please contact Kathy Zurbrigg at OMAFRA, kathy.zurbrigg@ontario.ca, (519) 846-3418.

Kansas State University Researchers Identify a Key to Minimizing Aggression in Floor-Fed Sows in Group Housing.

Kathy Zurbrigg, Animal Health and Welfare, OMAFRA

"Boss" or dominant sows can be a problem when gestating sows are housed in groups. These bossy pigs can consume more than their share of feed and are often aggressive towards other sows within the group. Kansas State researchers theorized that having more frequent, smaller meals throughout the day would keep boss sows more satisfied. This should result in more even weight gain and fewer injuries among group-housed sows.

The experiment included 208 sows, housed in groups of 8, with 20 square feet/sow of space in the pen. Feed drops were set to provide 5.5 lb of feed/sow/day, dropped on solid concrete floors. Thirteen of the pens were fed twice a day (7:00 a.m. and 3:30 p.m.) and the other thirteen were fed six times a day (7:00, 7:30, and 8:00 a.m. and 3:30, 4:00 and 4:30 p.m.). Before the sows were mixed into groups, and every two weeks afterwards, they were scored for lameness, hoof integrity and lesions on their skin and vulva. As they entered and left the group housing, sows were weighed and a back-fat measurement was taken.

No difference was found on overall gain, average daily gain and back-fat change between pens of sows fed twice or six times a day. There was also no difference between the two groups in the number of piglets born alive, stillborn or mummified. However, differences were seen in aggressive behaviour between sow pens. The sows fed six times a day had fewer lameness and hoof problems than those fed twice a day. Sows fed twice a day had higher scores of skin and vulva lesions, indicating increased fighting.

Assuming automatic timers are part of the existing feed drops in floor-fed sow pens, producers can ensure even weight gain while decreasing fighting in group-housed sows by changing to multiple feedings over a 24-hour period.

Rapid and Unexpected Death in Horses - Toxins

Adapted from an OMAFRA Infosheet by
Bob Wright, Animal Health and Welfare, OMAFRA, and
Margaret Stalker, Animal Health Laboratory, University of Guelph

The most common acute toxins that kill horses in a few hours to 36 hours include:

- Botulism – often associated with haylage feeding
- Ionophore toxicity – associated with feed contamination
- Yew toxicity – associated with horses consuming clippings from this common ornamental shrub
- Poison-hemlock - found in swampy areas
- Red maple leaf poisoning

Botulism

Botulism is caused by the bacteria, *Clostridium botulinum*. In Ontario, botulism is most commonly associated with the feeding of haylage containing the preformed toxin. However, botulism has also been associated with the ingestion of lawn clippings and, occasionally, other forms of forage, including: acid of providing-treated hay, dry hay and corn silage. The greater the moisture content of the material, the greater the danger the ideal conditions for the bacteria to grow. The risk of botulism increases as you move from feeding dry hay to wetter forms (dry hay < acid treated < bagged small bales < wrapped or bagged large bales). Horses are susceptible to botulinum toxin at two (2) parts per trillion. Typical clinical signs include: muscle weakness, tremors, difficulty swallowing, drooping eyelids and mydriasis (dilation of the pupils), occasionally leading to recumbency and death due to cardiac and respiratory failure.

Ionophore Toxicity

Ionophores are coccidiostats used in the poultry industry but may be included in some cattle feed. Ionophores include monensin (Rumensin) and lasalocid (Bovatec). The most common clinical signs of toxicosis include: lethargy, cyanosis, depression, pulmonary edema, myocardial degeneration and death. The lethal dose 50 (LD^{50}) of monensin for horses is 1-2 mg/kg of body weight. The LD^{50} of lasalocid in horses is estimated to be 21.5 mg/kg of body weight [(1)].

Yew Poisoning

The genus Taxus consists of three commonly grown ornamental shrubs: English yew (*Taxus baccata)*; Canada yew (*Taxus canadensis*), a native shrub; and Japanese yew (*Taxus cuspidata*). They are commonly used as landscape shrubs. The needles and seeds of all yews are highly poisonous to horses, both in the fresh and dry form. However, the red fleshy seed covering is not poisonous. The toxic principle is taxine. As little as 0.1% of a horse's body weight or one pound of English yew is toxic to a horse. Horses eating yew will die within 1 - 3 hours. Death is attributed to cardiac arrest and asphyxia.

Poison Hemlock

Poison hemlock (*Conium maculatum)* is a naturalized herb with an umbrella-form shape similar to wild carrot (Queen Anne's Lace). The plant grows in swampy areas, in wet meadows, and along the edges of streams and drainage ditches. Animal species vary in their susceptibility to acute toxicity [(2)].

	Susceptibility	Time from Ingestion to Death
Cows	3.3 mg/kg body weight	1.5 - 2 hr
Ewes	44 mg/kg body weight	1.5 - 2 hr
Mares	15.5 mg/kg body weight	30 - 40 min

Poison hemlock contains a neurotoxin, which causes muscle tremors and violent convulsions and death in 2 - 3 hours in some species. Horses tend to exhibit less violent signs. Poison hemlock contains the chemical coniine, a potential teratogen. Poisonings occur from the ingestion of the foliage or tubers. It has 2 - 8 thick tubers. Dried foliage is less toxic but can be a problem in hay.

Red Maple Leaf Poisoning

Red maple (*Acer rubrum*) leaf poisoning is associated with horses eating wilted red-maple leaves. The amount of toxin increases in leaves during the summer. Fallen leaves remain toxic for a few weeks or more. Ingestion of fresh leaves does not appear to cause disease. The ingestion of 1.5 - 3 grams of wilted leaves per kilogram of body weight (0.7 - 1.5 kg for the average 450-kg horse) will cause haemolytic disease characterized by severe depression, anemia and hemoglobinuria (presence of free hemoglobin in the urine). The toxic principle is thought to be gallic acid. Gallic acid has also been found in silver maple and sugar maple.

Summary

For owners and veterinarians, it is extremely frustrating when a horse dies suddenly and no explanation can be found. While intoxications as a cause of unexpected death are relatively uncommon, it is important to be aware of them, as they are potentially preventable.

1. *Hanson LJ, Eisenbeis HG, Givens SV. Toxic effects of lasalocid in horses. Am J Vet Res 1981;42 (3): 456-461.*
2. *Keeler RF, Balls LD, Shupe JL, Crowe MW. Teratogenicity and toxicity of coniine in cows, ewes and mares. Cornell Vet 1980;70: 19-26.*

The Visual World of the Horse

Brian Timney, Faculty of Social Science, University of Western Ontario and
Bob Wright, Animal Health and Welfare, OMAFRA

We have a tendency to attribute human qualities to our animals when we think about the senses, so it's natural to assume that the visual world of the horse is very much like our own. In fact, it may be quite different. Although the basic features of the equine eye are like those of most mammals, they differ in their details and that influences the way that they see. Here we summarize some of the major aspects of equine vision. A more detailed account of both vision and hearing in horses can be found in a review article by Brian Timney and Todd Macuda (2001).

Figure 1. The visual world of the horse may be quite different from that of humans.

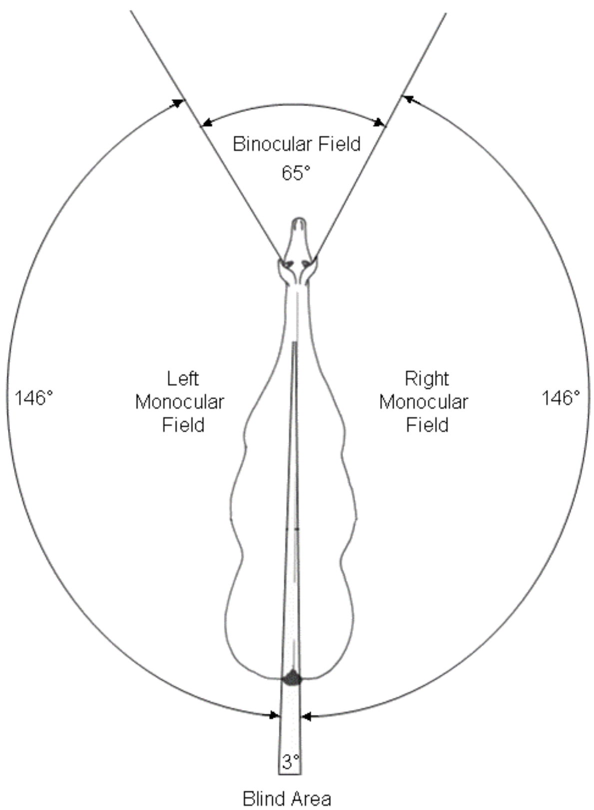


Figure 2. Visual Field of the Horse
(Drawing by Gerrit Rietveld)

Anatomy of the Eye and Field of View

Horses have the largest eyes of almost any mammal, with a diameter about twice that of humans. The eyes are positioned laterally but they project forward. This gives them a panoramic view of the world. Each eye has a horizontal field of approximately 190^{o} and a vertical field of about 180^{o}. Vision with both eyes gives them an almost completely spherical field of view. However, they have two narrow blind spots, one directly behind the head and the other just in front of and below the nose. You need to be aware of these blind spots as you approach an animal, particularly from the rear. You shouldn't approach a horse directly from the rear. When you pass behind a horse, speak to let him know you are there. Because their eyes face forward, horses have an overlapping binocular field of view that can aid in their ability to see depth (**Figure 2**).

Focusing and Accommodation

For a long time, it was thought that horses could not change the shape of the lens in their eye to adjust the focus for different distances. It was believed that they had a "ramped retina" in which different regions of the retina were at different distances from the lens. Focusing was thought to occur through raising and lowering the head, much as a human does with bifocal glasses. However, more recent research has shown that the retina is not ramped and that horses do have some limited ability to accommodate by changing the thickness of their lens.

Visual Acuity

Acuity, the ability to see fine details, depends on the size of the eye and the packing density of the individual visual receptors (the rods and the cones). In the horse, although the receptors are not as numerous as in humans, their very large eyes probably contribute to the fact that equine acuity is better than most mammals. A typical horse has a visual acuity approximately 2/3 as good as the average human (i.e. 20/30 vs. 20/20).

Depth Perception

Humans use both monocular and binocular cues to make judgments about distance, although the binocular cues give the most accurate information. The sense of "real" depth that we get from old-fashioned stereoscopes and 3-D movies relies on these binocular cues. Because of their lateral eyes, it was assumed that horses could only use monocular depth cues, such as relative size or perspective. However, their overlapping binocular field allows for the possibility of true stereoscopic vision, and research has shown that they do have stereopsis, three-dimensional vision (**Figure 3**). They are not nearly as accurate as humans, but their stereoacuity is sufficient for them to be able to judge height and distance very well when they have to clear fences.

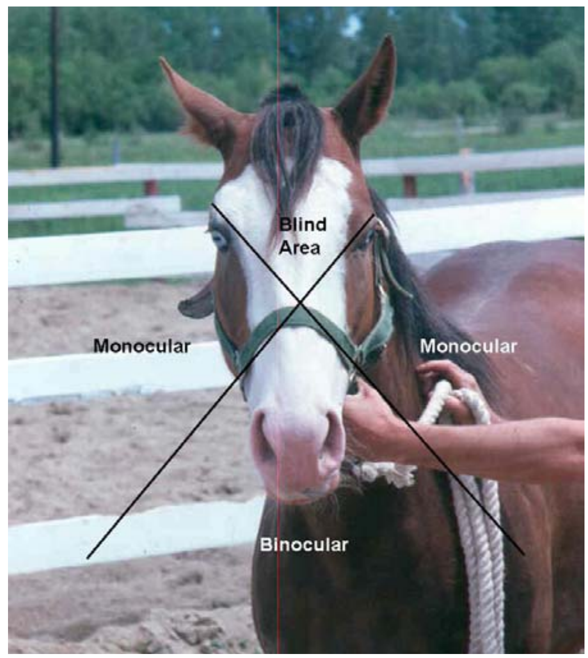


Figure 3. Monocular and Binocular Visual Fields of the Horse

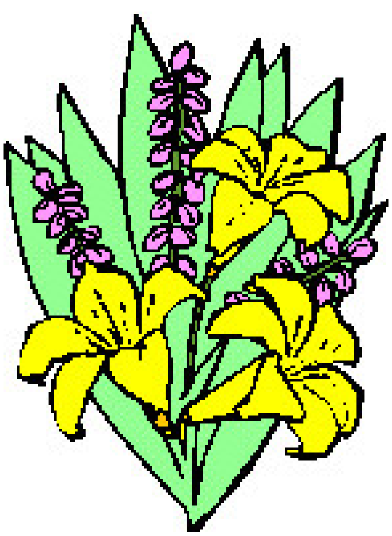
Colour Vision

There is a common misconception that most domesticated animals cannot see colour. This is not true, although their colour vision is not as good as ours. The ability to see colour depends on having several different kinds of cone receptors in the retina. Most humans have three different kinds of cones that allow us to see the range of colours that we do. Colour-deficient humans are typically missing one of these cones and, although they can still see colour, they will confuse, say, reds and greens and browns. Horses only have two cone types, so they probably see the world in the same way that a red-green colour-deficient human would. They can easily discriminate red or blue from grey, but find greens and yellows much more difficult to distinguish. Greens and yellows probably look more or less the same, but they will appear to be lighter or darker than each other. The horse's world will not be as colourful as ours, but it is not black and white. Colour is important because it allows us to distinguish objects from the background. Poor colour vision reduces this ability. So, a sitting rabbit or bird may be readily seen by the rider, but may remain invisible to a horse until it moves.

Night Vision
The rods and the cones are the receptors in the eye. The cones are specialized for vision in bright light and the rods only function when the light is very dim. Humans have about 20 cones for every rod, while in horses the ratio is about 9:1. However, horses have an advantage over humans in dim light because they also have a *tapetum lucidum*, a reflective coating on the back of the eye that bounces back light that might otherwise be lost, so that it can be absorbed by the rods. It is the *tapetum* that gives the "eye shine" that you see when a horse is caught in car headlights at night. Although no formal studies have been done, it is almost certain that horses can see to some extent in very dim light, but they would not be able to make out details. In daylight, the rods stop working; so, when a horse is faced with entering an enclosed trailer, all it may see is a black hole. The trailer may be perceived as a dark cave and the horse has no idea what might be inside. It is important for handlers to consider what the trailer might mean for the horse when trying to persuade it to enter.

Conclusions
It is impossible to see through another person's (or animal's) eyes, but it is possible to get an understanding of what they might be seeing if we understand their visual systems. We can assume that most humans see the world in more or less the same way because we all have the same visual apparatus. But the visual world of a horse, with its large eyes, panoramic field of view, and different organization of the retina, will not be quite the same as ours. For those who work with horses, it is important to keep this in mind. For example, many horse owners have commented that an animal will spook at an object when it passes it going in one direction, but not when coming back in the opposite direction. There is no anatomical basis for this separation of information between the two eyes, but it is the case that each eye has a quite different view of the world and the horse's brain must combine this information in a way that could not happen in the human visual system. Similarly, the head position of an animal doing dressage may be such that it does not have a clear view of objects directly in front, because they fall into that blind region below the nose. When working with and training horses, keep in mind their limitations. If we understand more about how they might be experiencing their environment, through their eyes, ears, nose and every other sense, then it becomes much easier for us to develop effective training programs for them.

Timney B, Macuda T. Vision and hearing in horses. J Amer Vet Med Assoc 2001;218(10): 1567-1574.



Happy Easter

Continuing Education/Coming Events

March 19 - 21, 2007	American Dairy Science Association (Midwestern Section) and American Society of Animal Science Annual Meeting, Polk County Convention Center, Des Moines, Iowa. www.asas.org/midwest/2007/
April 3 - 4 2007	London Swine Conference, London Convention Centre, London , Ontario. Contact Linda Dillon, Ontario Ministry of Agriculture, Food and Rural Affairs, Box 159, Clinton, Ontario, N0M 1L0, (519) 482-3333, or fax (519) 482-5031 by March 20, 2007. No registration at the door. Space is limited. www.londonswineconference.ca/
April 2 - 3, 2007	Alfred College 3rd Annual Organic Dairy Information Day: Research and Production (Lectures in English and French), Alfred College, Alfred, Ontario. (613) 679-2218, e-mail: flabelle@alfredc.uoguelph.ca
April 3, 2007	Ontario Farm Animal Council Annual Meeting, Guelph, Ontario. (519) 837-1326 www.ofac.org
April 18, 2007	Ontario Association of Bovine Practitioners Spring Meeting, Holiday Inn, Guelph, Ontario. E-mail: info@oabp.ca , www.oabp.ca
April 23 - 24, 2007	Future Directions for Schools of Public Health and Colleges of Veterinary Medicine, Atlanta, Georgia. Contact Hanna Benedict, (202) 371-9195 ext. 46, e-mail: hbenedict@aavmc.org
June 5 - 6, 2007	American Association of Swine Veterinarians Wet Lab: Advanced Techniques for Swine Veterinarians, Iowa State University, Ames, Iowa. (515) 465-5255, e-mail: aasv@aasv.org
June 6 - 15, 2007	Canadian Association of Veterinary Epidemiology and Preventative Medicine (CAVEPM) Annual General Meeting, conference and courses on surveillance - concepts in food safety and animal health, University of Alberta, Edmonton, Alberta. www.avri.afhe.ualberta.ca/cavepm-2007/
June 7 - 9, 2007	World Pork Expo, Iowa State Fairgrounds, Des Moines, Iowa. (417) 451-6004, e-mail: wrigleyj@nppc.org , www.worldpork.org
June 16 - 18, 2007	Sixth International Dairy Housing Conference, Minneapolis, Minnesota. Contact Joe Zulovich, Conference Chair: zulovichJ@missouri.edu Joe Harner, Program Chair: jharner@bae.ksu.edu Brian Holmes, Proceedings Chair: bjholmes@wisc.edu
June 22 - 24, 2007	Equine Dentistry: Current Concepts and Fundamentals, University of Minnesota. 1-800-380-8636, e-mail: vop@umn.edu
June 25 - 27, 2007	2007 Annual Conference on Antimicrobial Resistance, Hyatt Regency, Bethesda, Maryland. www.nfid.org/conferences/resistance07/

Summer Meat-Plant Welfare Training - Interest Sought in June 2007 Course

The Professional Animal Auditor Certification Organization (PAACO) is seeking to determine International interest in their Meat-Plant Welfare Auditor Training course. PAACO proposes holding the training in Omaha, NE following the June World Pork Expo. Tentative dates are June 12-13. Information on PAACO and the scope of training is available on the PAACO website, www.animalauditor.org. Training covers swine, beef and lamb welfare issues based on the American Meat Institute's audit. It is appropriate for industry technical/professionals, veterinarians, meat plant staff and customers of the meat industry (retail and foodservice). Training is limited to 20 individuals and it is presented in English. Please direct your interest or questions to Mike Simpson at mike@animalauditor.org.

CEPTOR feedback form

Please add our clinic to your mailing list. ❑ Please change our clinic address. ❑

Our policy is to provide one copy of CEPTOR per practice of up to four veterinarians. If yours is a larger clinic and you require additional copies, please let us know.
We have _____ practitioners in our clinic and would like to receive ____ copies of CEPTOR.
(Indicate #)

Clinic name: ....

Practitioners: ....

Mailing address: ....

Town/City: .... Postal Code: ....

Telephone: .... Fax: ....

E-mail: ....

Please return this form with your comments to:

Kathy Zurbrigg, Animal Health and Welfare, Ontario Ministry of Agriculture, Food and Rural Affairs
Wellington Place, R.R. # 1, Fergus, Ontario N1M 2W3
Tel.: (519) 846-3418 Fax: (519) 846-8101 E-mail: kathy.zurbrigg@ontario.ca

Comments: ....

....

....

....

Deadline for next issue: May 25, 2007

Ontario
Ministry of Agriculture,
Food and Rural Affairs

Animal Health and Welfare
2nd Floor, Wellington Place
R.R. #1, Fergus, Ontario
N1M 2W3