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From the Editor – I told you in the last newsletter that you would be hearing more about residues and drug use. Well – this time I have some good news. The National Milk Producers Federation just posted a **FREE** online manual on drug residue prevention. It can be found at their website for download: <http://www.nationaldairyfarm.com/residue-prevention.html>. The manual was updated from the Milk and Dairy Beef Drug Residue Prevention program and provides several lists of drugs with their respective meat and milk withdrawal times as well as some example treatment records.

Featured Faculty – Dr. Terry McElwain

Professor, Veterinary Microbiology & Pathology



Dr. Terry McElwain

Dr. McElwain joined the College of Veterinary Medicine in 1989 as an Assistant Professor. He received his BS and DVM degrees from Kansas State University and his PhD from WSU. He has led the diagnostic lab, the ag animal health program, and headed up research activities in the college as well as served as Interim Dean. He has received much recognition in his career both nationally and within the university such as election to the National Academy of Science's Institute of Medicine (IOM) and the 2009 Sahlin Faculty Excellence award for his efforts in university outreach and engagement. He is a diplomate of the American College of Veterinary Pathologists, professor of pathology, and executive director of the Washington Animal Disease Diagnostic Laboratory and is part of the WSU School for Global Animal Health.

What's New at WADDL? Practice Makes Perfect:

Preparing for a Foot and Mouth Disease Outbreak by Dr. Terry McElwain

No foreign animal disease would have a greater impact on US agriculture than an introduction of foot and mouth disease (FMD) virus. With recent FMD outbreaks in Asia and the large number of people and goods coming in daily to Washington State, the risk of an outbreak is greater than ever. Prior to 2002, FMD laboratory testing was restricted to the Foreign Animal Disease Diagnostic Laboratory at Plum Island. Creation of the National Animal Health Laboratory Network (NAHLN) in 2002, with defined operating procedures, communication channels, and test procedures, has now allowed testing in qualified state labs. For the western US, this is critical for an early response. It is estimated that delays in diagnosis beyond a week can result in additional losses of up to \$10M/hour!

The Washington Animal Disease Diagnostic Laboratory (WADDL) is one of 12 founding member labs of the NAHLN. As a core lab in the network, WADDL is responsible for surveillance testing, and if an outbreak is identified, high volume testing of up to 1,500 animals daily to identify infected herds or flocks, and ultimately to qualify the US as free from the disease once an outbreak has ended. It is vital that we operate effectively and efficiently in an emergency, yet (thankfully) the laboratory hasn't had a chance to use emergency procedures and to face the inevitable challenges that can impact emergency testing on a daily basis. On September 1st, WADDL hosted a NAHLN-organized regional laboratory-focused tabletop exercise on FMD in the College of Veterinary Medicine to do just that. The objectives of this exercise were to examine early, mid, and late-response activities regarding the decision-making process for NAHLN activation and de-activation, testing capacity, surveillance sample collection protocols, testing algorithms during different phases of the outbreak, and communication and coordination processes. Approximately 50 state and federal laboratory, regulatory, and field personnel and cattle industry representatives from Washington, Oregon, Idaho, and British Columbia attended.

Key Points

- FMD is THE most contagious animal disease
- Delayed diagnosis /reporting means \$\$ millions lost per hr
- WADDL can perform FMD preliminary testing
- WADDL could be overwhelmed so other labs agreed to help
- Communication is still a challenge
- Everyone needs to be aware and know the signs of FMD
- Signs of FMD: drooling, sores in mouth and on feet of cows, pigs, sheep, goats



FMD Mouth lesions in a cow

Presented with the scenario of FMD in south central Washington in the heart of our intensive dairy industry, participants worked through their roles in initial diagnosis, communication of presumptive positive results, and early response. A computer model developed by USDA generated information on the spread of the outbreak, which included movement across state and federal borders. The exercise was conducted to ensure that laboratory aspects of an FMD outbreak were emphasized, but regulatory personnel at federal and state levels also had an opportunity to practice emergency response plans. The morning focused on early outbreak response, while the afternoon session involved containment and eradication.



Dr. Eldridge, WA State Veterinarian, providing an “outbreak” update to the Lab.

What did we learn? From the lab perspective, the magnitude of our responsibility as a NAHLN core laboratory when faced with emergency testing of this magnitude was sobering. It is clear that business as usual will simply stop if we are involved in an FMD outbreak. We confirmed that our current facility was far too small to reasonably meet the large testing volume during response and recovery. We learned a great deal about communication and how hard it is to balance everyone’s needs. Communication of lab results during an outbreak is governed by a well-defined procedure that restricts who will receive information and when. Communication in general is a challenge, but we must not forget that all partners in the process have a critical need for information, including our livestock industries who have a critical role in helping to contain an outbreak and who ultimately will suffer the greatest losses.

We learned that initial entry of sample information into a database and communication of results is a bottleneck that poses one of our greatest challenges. Fortunately this is solvable with computer technology. It just needs to be done! From a broader NAHLN perspective,

lessons learned included the need for rapid communication among all NAHLN laboratories (and other stakeholders), the need for development of other test procedures such as milk testing and serum antibody testing in different phases of the response, and better estimates of the volume of testing that will be required. In addition, USDA gained perspective on what life is like on the front lines in a state laboratory. We learned that WADDL has prepared well for this challenge, with an emergency response plan and a formal memorandum of understanding with our sister laboratory in California to conduct routine testing that could not be done in WADDL during an outbreak.



Cattle industry representatives “at the table”. From L to R: Dick Coon, Jr. (cattle), Ed Field (feeders), Dave Boon (dairy)

The take home lesson for all who participated was the enormity of the challenge we would face with an FMD outbreak. Prevention and early detection are key! Strict biosecurity practices on livestock operations are vital. And as Dick Coon, Jr. wrote in his Ketch Pen commentary, recognition of an animal with signs of FMD as something other than the typical case of foot rot is perhaps our Achilles’ heel. If we don’t know about it, we can’t diagnose it, and if we can’t diagnose it, we can’t respond at the earliest stage.

So don’t hesitate to contact your local veterinarian or Dr. Eldridge’s office if you have any reason to suspect something unusual. Better to be safe than sorry!

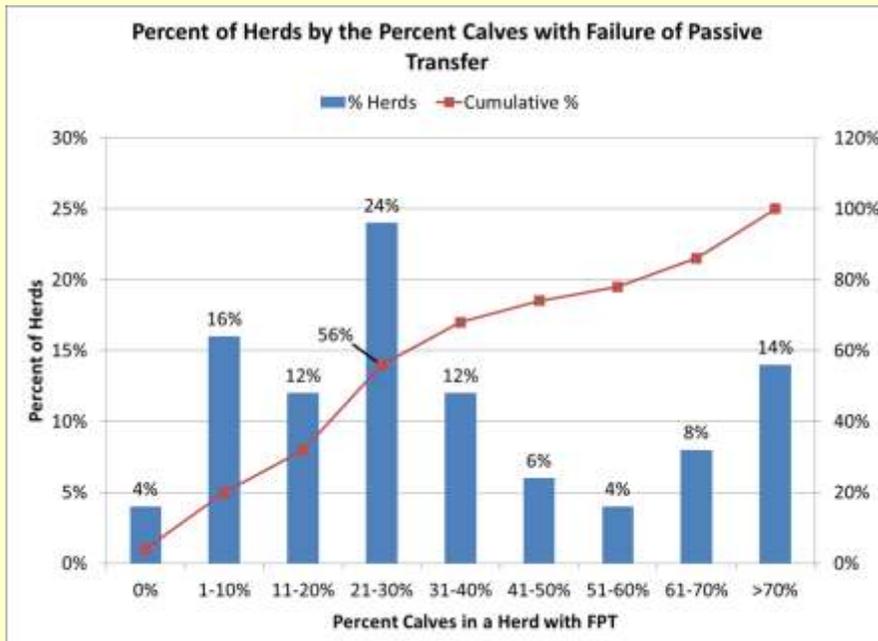
New Research Study for Beef Heifer Reproduction

Dr. Ram Kasimanickam is recruiting cow-calf herds to participate in a second heifer synchronization study. This study will determine the effect of timing of insemination on AI pregnancy rate in beef heifers synchronized with a 5-d CO-Synch + CIDR protocol. If you are interested in participating, Please Contact: ramkasi@vetmed.wsu.edu

Passive Transfer of Immunity and Associated Management on WA Dairies – Project Summary by Dr. John Wenz

This summer we completed a project with three objectives: 1. Estimate the prevalence of failure of passive transfer (FPT) of immunity in WA calves; 2. Identify colostrum management practices on WA dairies; and 3. Evaluate use of a Brix scale refractometer to assess FPT in dairy calves. This article highlights some interesting project findings.

With help from producers and veterinarians, Julie Caldwell collected serum samples from 952 calves on 56 farms across Washington, May to October 2010. Samples were from 18 apparently healthy calves aged 2 to 7 days on each farm. FPT was evaluated by serum total proteins (TP) using a refractometer. Complete calf data (all 18 calves) were available from 49 farms. An interview identified colostrum management practices associated with FPT (TP <5.2 g/dL). A subsample of 150 serum samples was tested for IgG concentration to compare with Brix scale refractometer readings.



Failure of Passive Transfer on Washington Dairies

- 34% of calves had FPT (TP <5.2g/dL) (300 of 882 calves from 49 farms with complete calf data). This is double the 19% reported for the US
- 20% of herds had \leq 20% of calves with FPT
- 44% of herds had >30% of calves with FPT

Management Factors Associated with FPT on Washington Dairies

Colostrum management practices surveys were collected from 30 herds. The odds of having FPT (Serum TP < 5.2g/dL) were:

- 3.7 times greater if a milker was responsible for collecting colostrum versus other personnel, suggesting that milkers may be too busy to collect quality colostrum.

- 2.3 times greater if colostrum quality was not evaluated versus evaluated by a colostrometer, suggesting that using a colostrometer to eliminate first feedings of poor quality colostrum may help reduce FPT.
- 8.9 times greater if a colostrum supplement was added to maternal colostrum. This suggests adulteration of maternal colostrum with supplements may increase FPT on a farm. Alternatively, herds that feel it necessary to add supplements to colostrum may have other factors contributing to poor quality colostrum and thus FPT.

Use of Brix Scale Refractometer to Monitor FPT

- Brix scale reading of 8.3% correlated with 10 mg/mL IgG in serum (a commonly used minimum IgG level corresponding to adequate passive transfer).

This study indicates that there are still calves that are not absorbing enough antibodies or not getting enough colostrum on WA dairies. Some management factors such as designated personnel for colostrum harvest and feeding, evaluating colostrum quality, and questioning the need for colostrum supplements should be considered. If using a Brix scale refractometer for evaluating passive transfer of immunity, 8.3% is a reasonable cutoff.

What Affects Colostrum Quality? by Dr. Dale A. Moore

At a recent dairy meeting, I was asked if the time after calving when a cow is milked for the first time makes a difference on colostrum quality. The answer is “Yes” and “No”. It depends on how you measure it and how long it is between calving and first milking.

A study recently reported in the *Journal of the American Veterinary Medical Association* showed that the concentration of IgG (immunoglobulins) in Holstein cow colostrum decreased 3.7% for each hour after calving (the time after calving to milking ranged from 0.3 to 23.8 hours). Although statistically significant, the time after calving could only account for 18% of the variability in colostrums IgG concentration amongst the cows tested. Other studies have shown that the concentration of IgG is NOT different if the colostrum is harvested within 8 or 9 hours after calving. In the new study, the total mass of IgG found in the colostrum did not change by time after calving. So, what’s happening? It’s obvious that more milk is being secreted the longer the time after calving but no additional IgG is being secreted – and, there are other things that can affect the IgG concentration in the cow’s colostrum.

What can affect the variability of IgG concentration in colostrum? The IgG concentration in the recent study ranged from 9 to 121 g/L (average of 41 g/L) and the IgG mass ranged from 11 to 702 grams – quite a spread in these cows. High quality colostrum should have at least 50 g/L of IgG. The IgG and other proteins accumulate in the mammary gland starting about five weeks before calving and ceases at the time of calving. Therefore, a short dry

period will likely reduce the IgG concentration in the colostrum. Although a few studies have shown greater IgG concentration in cow vs heifer colostrum, heifer colostrum is often greater than 50 g/L and should not be summarily discarded. Other factors that will reduce IgG concentration in colostrum include high ambient temperatures, or heat stress, and breed – Holsteins appear to have the lowest concentration of immunoglobulins, on average, followed by Guernsey, Brown Swiss, Ayrshire, and Jersey – having the highest IgG concentration, on average.



How do I know if the colostrum from any particular cow is of high enough quality to feed to calves? Many dairy producers require that the colostrum be tested using a colostrometer. The colostrometer measures the specific gravity (a surrogate for the concentration of a fluid). The only problem with the colostrometer is that it should be read at room temperature (about 72 degrees F) to give an accurate reading. A newer, temperature-independent method, the Brix refractometer, can be used to evaluate colostrum quality (see next article). Probably the easiest way to ensure that adequate IgG gets into calves is to feed 4 quarts (for Holsteins) of colostrum right after birth. Even if the quality was 25 g/L, you could get the needed 100 g of IgG into the calf. And – harvesting the colostrum closer to calving time is still the best idea, but recognize that there are many other factors that can affect colostrum quality.

References

Godden S. Colostrum management for dairy calves. *Veterinary Clinics of North America: Food Animal Practice*. 2008;24:19-39.

Morin DE, et al. Effect of colostrum volume, interval between calving and first milking, and photoperiod on colostrum IgG concentrations in dairy cattle. *Journal of the American Veterinary Medical Association*. 2010;237(4):420-428.

Using a Brix scale Refractometer to Monitor Colostrum Management and Waste Milk Feeding by John Wenz and Sandy Poisson

A Brix scale represents the percentage of sugar (sucrose specifically) in a solution. It has traditionally been used to measure the percentage of sugar in fluids such as wine, fruit juice and honey with a refractometer. When applied to colostrum, calf serum, and waste milk it is used to approximate the dissolved solids content. Dr. Moore recently reported on the use of a Brix scale refractometer to evaluate the total solids in waste milk (Moore et al., 2009). This article provides information on how a single Brix refractometer could be used for two additional functions: to evaluate colostrum quality and passive transfer status of calves.

Monitoring Colostrum Quality

The goal of colostrum management is to provide a minimum of 150 g of IgG to a calf within 24 hours of age to give adequate passive transfer of immunity. Assuming delivery of 3.0 L of colostrum, 'good' quality colostrum is that with a concentration of $\geq 50\text{g/L}$. Three studies have evaluated the use of a Brix refractometer to evaluate colostrum quality:

- Chigerwe et al. (2008) evaluated 171 colostrum samples by 4 methods including use of a digital Brix scale refractometer and 2 colostrometers.
- Bielmann et al. (2010) evaluated 288 colostrum samples using optical and digital Brix scale refractometers on both fresh and previously frozen colostrum.
- In an abstract, Dinsmore and Skidmore (2008) evaluated 117 colostrum samples using an optical Brix scale refractometer and evaluated by parity.

Brix cutoffs and test performance at those cutoffs for identifying poor quality colostrum

Study	Refractometer	Brix % Cutoff	Sensitivity*	Specificity*
Chigerwe 2008	Digital	22%	0.75	0.78
Bielmann 2010	Optical	22%	0.85	0.91
	Digital	22%	0.80	0.93
Dinsmore 2008	Optical	23% - Lactation 1	0.56	0.85
	Optical	20% -Lactation 2+	0.63	0.79

* Where a 'positive' test (\leq Brix % Cutoff) identified colostrum of poor quality ($< 50\text{g/L}$)

The results of these studies suggest 1. that colostrum that tests $<22\%$ solids should not be used as first colostrum feedings for newborn calves; 2. Less expensive optical refractometers perform about as well as more expensive digital models. (However, Dinsmore and Skidmore (2008) found 25% of colostrum samples had a 'wide band of color transition' that was associated with fat concentration of the sample, which could make reading these samples with an optical refractometer difficult.); 3. Freezing has no impact on test results; and 4. Brix scale refractometers perform as well as colostrometers, are more convenient to use, but, unlike colostrometers, the results are not influenced by temperature and they are not as fragile and likely to be broken.

Evaluating Passive Transfer of Immunity in Calves

The ultimate test of colostrum management is evaluating the IgG concentration in calf serum. The 'gold standard' test for IgG is radial immunodiffusion which is costly and time consuming. Serum total protein (TP) measured by refractometer is a commonly used, more convenient method to estimate IgG concentration and determine adequacy of passive transfer. Since a Brix scale refractometer could be used to evaluate colostrum quality, a recent WSU College of Vet Med study evaluated its use to identify calves with failure of passive transfer (FPT) as well. Serum from 150 healthy calves aged 2 to 7 days were

evaluated by radial immunodiffusion to determine IgG concentration and by Brix scale and total solids (TP) refractometers.

- Calves with a serum IgG < 10 mg/mL were considered to have FPT.
- The ideal cutoff with the best balance between true positive and false positive rates was 8.3% which identified 93% of calves with FPT and only misclassified 14% as having FPT when their serum IgG was \geq 10 mg/mL.
- Brix values performed just as well as TP values for evaluating passive transfer.
- Test performance of other Brix % cutoffs are provided so you can decide which cutoff would be best for your situation.

Serum Brix % cutoff test performance to identify a calf with Failure of Passive Transfer (<10mg/mL IgG) based on 150 calf serum samples.

Brix Cutoff (%)	Sensitivity	Specificity
7.5	0.26	0.98
8.3	0.74	0.86
8.5	0.93	0.70
9.0	1.00	0.35
9.5	1.00	0.23

References:

- Bielmann, V., J. Gillian, N.R. Perkins, A.L. Skidmore, S. Godden, and K.E. Leslie. 2010. An evaluation of Brix refractometry instruments for measurement of colostrum quality in dairy cattle. J. Dairy Sci. 93:3713–3721.*
- Chigerwe, M., J.W. Tyler, J.R. Middleton, J.N. Spain, J.S. Dill, and B.J. Steevens. 2008. Comparison of four methods to assess colostral IgG concentration in dairy cows. J. Am. Vet. Med. Assoc. 233:761–766.*
- Dinsmore, P. and A. Skidmore. 2008. Comparison of Brix (sugar) refractometer and colostrometer for evaluation of colostrum quality in dairy cows. J. Dairy Sci. 91 E-Suppl. 1:355.*
- Moore, D.A., J. Taylor, M.L. Hartman, and W.M. Sischo. 2009. Quality assessments of waste milk at a calf ranch. J. Dairy Sci. 92:3503–3509.*

“Shipping Fever” in Cattle by Dr. Ram Kasimanickam

Bovine respiratory disease (BRD) is the most common and costliest problem encountered in stocker or feedlot calves. BRD, also called “shipping fever”, causes major economic losses to the producer by reducing average daily gain, feed efficiency, and overall performance of beef calves. For more information, go to our new factsheet on BRD:

http://vetextension.wsu.edu/publications/documents/BovineRespiratoryDisease_Aug2010.pdf

WSDA Corner by Dr. Leonard Eldridge, State Veterinarian

Veterinary Medicine Loan Repayment Program (VMLRP) -- In recent years, studies have indicated a shortage of veterinarians in nearly all sectors and that food supply veterinarians are in the greatest need. Food supply veterinary medicine embraces a broad array of

veterinary professional activities and is defined as the full range of veterinary medical practices contributing to the production of a safe and wholesome food supply and to animal, human, and environmental health. The private food animal veterinary practitioner population within the US is the single most important component of the food supply veterinary medical sector. Food animal veterinarians, working closely with livestock producers, and state and federal officials constitute the first line of defense against the spread of endemic and zoonotic diseases. The introduction of high consequence foreign animal diseases or other threats to the health and well-being of both animals and humans that consume animal products is a threat to human health, animal health, and the economic well-being of the livestock industry and the state's economy. Studies have also confirmed that insufficient numbers of veterinary students are selecting food supply veterinary careers, which has resulted in projections for worsening shortages over the next 10 years. While there are many reasons students listed for opting not to choose a career in food animal practice or other food supply veterinary sectors, among other reasons was a concern over burdensome educational debt. The average educational debt for students graduating from veterinary school is approximately \$130,000. Such debt prompts students to select other veterinary careers such as companion animal medicine, which pays more, allowing them to pay off debt more rapidly. Student debt repayment and scholarship programs are the most important strategies to remedy projected shortages in food animal practitioners.

The VMLRP has tasked the State Veterinarian with identifying areas of their state with the greatest need for food animal practitioners. The first round of funding and process was a learning experience. The reviewing committee disallowed our applications telling me I needed to be more specific in the area identified and the type of activity needed. I need livestock producers to identify areas of need for veterinary service in the state. The need must be specific and the area can be no larger than 1 to 3 counties depending on animal population. I also need information if there are food animal practitioners that still have student debt and that reducing that debt would allow them to remain in an area of the state to serve as a food animal practitioner.

My deadline to submit for veterinary shortage areas is February 1, 2011. I am asking you to send me your feedback by January 14, 2011. This will allow me to fully develop position descriptions for our state underserved veterinarian areas you have identified. On March 1, 2011 USDA will post state approved awards. Veterinarian applicants will have 60-days to submit applications for VMLRP with offers made to selected individual veterinarian applicants by September 1, 2011. The VMLRP will pay up to \$25,000 each year towards qualified educational loans of eligible veterinarians who agree to serve in a National Institute of Food and Agriculture (NIFA) designated veterinarian shortage situation for a period of three years. <mailto:Leldrige@agr.wa.gov>

South Korea and Foot and Mouth Disease

I'm sure most of you know that South Korea has identified several herds with Foot-and-Mouth Disease (FMD). The South Korean government increased its alert after more suspicious cases of FMD were found outside of Andong, the epicenter of the outbreak. All 84 livestock markets across the nation were closed on Wednesday of the first week of infection. The Ministry for Food, Agriculture, Forestry and Fisheries originally planned to close down 82 cattle markets on the mainland to prevent spread and two markets on Jeju Island joined the shutdown voluntarily. Cases of FMD were discovered on two pig farms and a cattle farm in Andong, Monday and Tuesday, November 29th and 30th, respectively and FMD is spreading at an alarming rate since identifying these index cases.

As a precaution, the National Veterinary Research and Quarantine Service in South Korea have secured vaccines for 300,000 livestock, while requesting raw materials for 3 million more vaccines from a U.K. pharmaceutical company. The South Korean Government is attempting to refrain from using the vaccine, because if it did so, it would lose its FMD-free status from the World Organization for Animal Health (OIE) for at least a year.

When folks call and ask what I am doing to keep FMD out of our state, my answer is complicated. In reality, USDA oversees our active seaports and international borders. These active seaports and land entry ports are very busy, and it is impossible to determine if any container might contain the virus. Our best defense is early identification and quick containment. My office, along with USDA, determines where an infected animal came from and what it has been exposed to. We then must determine where all the exposed animals are located.

Animal producers volunteer to give me individual animal identification that they use for production purposes, and they seem to feel that this alone will take care of traceability. The reality is that while the individual animal identification is important, the information must be entered into a database to complete the necessary traceability. This is all important if there is ever a hope of early identification and quick containment needed to prevent a disaster. The needed information includes but is not limited to, all individual animal identification, including back tags, vaccination information, testing information, health certificates, and movement documents (brand). All documents must then be scanned and attached to the animal identification in order to do efficient traceability.

A few years ago our system, while not completed at that time, recently did assist in tracing infected Tuberculosis cattle back to Canada. This task preserved the confidence of our trading partners from other states and nations showing that Washington was still free of Tuberculosis. This event further shows how important the Animal Disease Traceability System is to the health of livestock in our State.

I am writing this on the 10th of December and I have been in frequent communication with Dr. Baszler at the Washington Animal Diagnostic Laboratory. We tested an animal with clinical signs consistent with FMD, however, this animal turned out to be infected with Malignant Catarrhal Fever. This is further evidence that we must test every suspicious case if we are to do the early identification and quick containment to protect the livestock industry in the state of Washington.

Continuing Education

Veterinarians/Technicians

Veterinarian Online CE for Official Trich Testing

To take the course and receive certification - go to:

<http://vetextension.wsu.edu/programs/bovine/trich/index.htm>

Veterinarian Online CE for TB Testing Certification

To take the course and receive certification - go to:

<http://vetextension.wsu.edu/programs/bovine/tb/index.htm>

Assessing Calf Housing and Environments: Part I for veterinarians at

<http://breeze.wsu.edu/e20657177/event/registration.html>

Producers

DairyBeef: Maximizing Quality and Profits at <http://dairybeef.wsu.edu>

Assessing Calf Housing and Environments for producers at <http://breeze.wsu.edu/p79398318/>

4-H Leaders

Disease Prevention and Quality Assurance Volunteer Leaders Online Program

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

Send newsletter comments to the Editor:

ag animal health

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