

E X T E N S I O N

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Dairy

August 2005

DR. HAMMON LEAVES USU

Dr. Doug Hammon has been assisting with Extension Veterinary work at USU for the past few months and has done a great job. However he has been employed by Pfizer, leaves USU on Aug 31 and will locate in California. I'm sure he will be a great asset both to the company as well as to the producers and veterinarians that he deals with. But, he will be missed here.

Thanks Dr Hammon, for the good work. (CVB)

FEED PARTICLE SIZE AND PROCESSING FORM AFFECTS INTESTINAL MUCIN SECRETION AND ADHERENCE OF SALMONELLA TO THE ILEUM OF PIGS

(Although the following article deals with swine, the implications for cattle could be very important as well. CVB)

An experiment was conducted to investigate the effects of feed particle size and processing on morphological characteristics of the intestine and the adhesion of *Salmonella enteric serovar Typhimurium* DT12 to the ileum of pigs. Ninety six pigs (approximately ~33 kg BW) were assigned to one of 4 experimental diets. Experimental diets were based with barley, wheat, and soybean meal and differed only with regard to particle size (fine vs. coarse) and feed processing form (non-pelleted vs. pelleted). The experimental diets were: fine non-pelleted (F-NP), coarse non-pelleted (C-NP), fine pelleted (FP), and coarse pelleted (CP). Water and diets were fed to pigs on an ad libitum basis for 28 days after which a representative number of pigs (n=6 pigs/diet treatment) were euthanized and segments of the small and large intestine were harvested for

morphological and histological analyses and in vitro *Salmonella* adhesion assays.

Results: Experimental diets had no effect of weight gain or feed intake, however feed:gain was significantly improved in pigs fed pelleted feed ($P<0.05$). There was a statistically significant interaction between form of feed and particle size with pigs fed the C-NP diets having longer villi compared with pigs fed CP diets. Increased crypt depths were observed in the colon of pigs fed coarse feed compared with finely ground feed ($P<0.05$). Intestinal mucin staining (neutral, acidic and sulfomucins) was greater in pigs fed pelleted feed compared with non-pelleted feed when measured in the distal small intestine ($P = 0.01$). There were no differences between experimental diets with regards to lectin binding characteristics in the distal small intestine or cecum. Using an in vitro pig intestine organ culture model, ileum from pigs fed non-pelleted feed had less adherence of *Salmonella* compared to ileal tissues from pigs fed pelleted feed.

Overall, results from this study suggest that pigs fed pelleted diets had increased mucin secretion in the villi of the distal small intestine compared with non-pelleted feed. The increased mucin secretion in pelleted diets may enhance the adherence of *Salmonella* to the ileum.

J. Anim. Sci. 83: 1554-1562, 2005.

EVALUATION OF A COW-SIDE IMMUNOASSAY KIT FOR ASSESSING IGG CONCENTRATION IN COLOSTRUM

Objective—To determine sensitivity and specificity of a cow-side immunoassay kit for assessing IgG concentration in colostrum.

Design—Prospective study.

Animals—76 dairy and 11 beef cows of various parities.

Procedure—Colostrum from first, second, and third milkings and milk samples were collected, and IgG concentration was determined by means of radial immunodiffusion. The immunoassay was performed according to the manufacturer's instructions, and sensitivity and specificity were calculated by comparing results of the immunoassay (positive vs negative) with results of immunodiffusion (< 50 g/L vs ≥ 50 g/L).

Results—135 colostrum or milk samples were collected. Mean ± SD colostrum IgG concentrations, determined by means of radial immunodiffusion for dairy and beef cows were 65.4 ± 51.4 g/L and 114.8 ± 42.7 g/L, respectively. Mean IgG concentrations for first-, second-, and third-milking colostrum samples and for milk samples were 92 ± 49.0 g/L, 74.6 ± 45.1 g/L, 47.5 ± 32 g/L, and 6.8 ± 3.8 g/L, respectively. Sensitivity of the immunoassay (ie, percentage of samples with IgG concentration < 50 g/L with a positive immunoassay result) was 93%, and specificity (ie, percentage of samples with IgG concentration ≥ 50 g/L with a negative immunoassay result) was 76%.

Conclusions and Clinical Relevance—**Results suggested that the immunoassay kit was an acceptable cow-side test to identify colostrum samples with IgG concentrations < 50 g/L. The immunoassay kit should be useful in screening colostrum for adequate IgG concentration before feeding to calves or storage.**

J Am Vet Med Assoc 2005;227:129–131

COMPARISON OF THE ODDS OF ISOLATION, GENOTYPES, AND IN VIVO PRODUCTION OF MAJOR TOXINS BY CLOSTRIDIUM PERFRINGENS OBTAINED FROM THE GASTROINTESTINAL TRACT OF DAIRY COWS WITH HEMORRHAGIC BOWEL SYNDROME OR LEFT-DISPLACED ABOMASUMS

Objective—To compare the frequency of isolation, genotypes, and in vivo production of major lethal toxins of *Clostridium perfringens* in adult dairy cows affected with hemorrhagic bowel

syndrome (HBS) versus left-displaced abomasum (LDA).

Design—Case-control study.

Animals—10 adult dairy cattle with HBS (cases) and 10 adult dairy cattle with LDA matched with cases by herd of origin (controls).

Procedure—Samples of gastrointestinal contents were obtained from multiple sites during surgery or necropsy examination. Each sample underwent testing for anaerobic bacteria by use of 3 culture methods. The genotype of isolates of *C perfringens* was determined via multiplex polymerase chain reaction assay. Major lethal toxins were detected by use of an ELISA. Data were analyzed with multivariable logistic regression and χ^2 analysis.

Results—*C perfringens* type A and type A with the beta2 gene (A + beta2) were the only genotypes isolated. Isolation of *C perfringens* type A and type A + beta2 was 6.56 and 3.3 times as likely, respectively, to occur in samples from cattle with HBS than in cattle with LDA. Alpha toxin was detected in 7 of 36 samples from cases and in 0 of 32 samples from controls. Beta2 toxin was detected in 9 of 36 samples from cases and 0 of 36 samples from controls.

Conclusions and Clinical Relevance—***C perfringens* type A and type A + beta2 can be isolated from the gastrointestinal tract with significantly greater odds in cattle with HBS than in herdmates with LDA. Alpha and beta2 toxins were detected in samples from cows with HBS but not from cows with LDA.**

J Am Vet Med Assoc 2005;227:132–138

PREVALENCE AND GENOTYPES OF GIARDIA DUODENALIS IN POST-WEANED DAIRY CALVES.

To determine the prevalence of *Giardia* genotypes in post-weaned dairy calves, fecal specimens were collected from 3 to 11-month-old dairy calves per farm on two farms in Vermont, New York, Pennsylvania, Maryland, Virginia, North Carolina, and Florida. Specimens cleaned of fecal debris and concentrated using CsCl density gradient centrifugation were stained and examined by immunofluorescence microscopy and also subjected to PCR and DNA sequence analysis.

Overall, PCR provided more sensitive detection than IFA. Prevalence of Giardia infection, as detected by PCR ranged from 20% on NC-2 to 81% on VT-2, with an overall prevalence of 52% (237 positive samples out of 456 total). DNA sequence analysis of the 16S rRNA gene revealed 87% of the 237 Giardia isolates were Assemblage E, and 13% were Assemblage A although the prevalence of these genotypes varied greatly from farm to farm, with five farms having no Assemblage A Giardia. Therefore, Assemblage E was present in 45% of all animals tested and

Assemblage A was present in 7% of the animals. Thus, while many of the calves were infected with a genotype that is not known to be infectious for humans, post-weaned calves on nine of 14 farms did harbor Assemblage A Giardia. **Therefore calves should be considered as a potential source of human infectious cysts in the environment, with some farms representing a much higher risk than others.**

Vet Parasitol. 2005 Jun 30;130(3-4):177-83. Epub 2005 Apr 25.

EFFECT OF HALOFUGINONE LACTATE ON THE OCCURRENCE OF CRYPTOSPORIDIUM PARVUM AND GROWTH OF NEONATAL DAIRY CALVES.

Thirty-one Holstein bull calves were purchased at birth from 3 dairy farms in Eastern Ontario. Each calf was assigned at random to oral treatment with either 5 mg of halofuginone lactate in 10.0 mL of aqueous carrier solution (Halocur, base comprised 10 mg of benzoic acid, 100 mg of lactic acid, and 0.3 mg of tartrazine) or 10 mL of placebo (Halocur base minus the active ingredient, halofuginone lactate) administered 15 to 30 min after morning milk feeding for the first 7 d of life. Intakes of milk, calf starter, and water, and fecal consistency score were recorded daily for 56 d. Calf weights were recorded weekly for 56 d. Fecal samples were taken from all calves at approximately 2, 7, 14, 21, and 28 d of age for isolation of Cryptosporidium parvum oocysts. Logistic and linear regression analyses were used to assess the effect of treatment on the incidence of diarrhea and C. parvum infection status.

The odds of C. parvum shedding among calves in the halofuginone lactate-treated group

was 70% lower than the odds of shedding among calves in the placebo group. In calves treated with halofuginone lactate, no oocyst shedding occurred until 2 wk of age, whereas 12.5% of calves in the placebo group began shedding oocysts during wk 1. From all ages of placebo-treated calves, 31 of 73 samples (42.5%) were positive for C. parvum, whereas only 15 of 67 samples (22.4%) from all ages of halofuginone lactate-treated calves tested positive.

The largest number of C. parvum-positive samples occurred in the third week of life. **There was a significant delay of 3.1 d in the incidence of diarrhea among calves treated with halofuginone lactate.** Intake of milk and starter, body weight gains, and age at weaning were not significantly different between treatment groups.

J Dairy Sci. 2005 May;88(5):1801-6.

PREGNANCY RATES IN LACTATING DAIRY COWS AFTER PRESYNCHRONIZATION OF ESTROUS CYCLES AND VARIATIONS OF THE OVSYNCH PROTOCOL.

Our objectives were to determine pregnancy rates after altering times of the second GnRH injection, insemination, or both in a combined Presynch + Ovsynch protocol, to accommodate once-daily lockup of dairy cows.

Lactating dairy cows (n = 665) from 2 dairy herds in northeastern Kansas were studied. Cows ranged from 24 to 44 d in milk (DIM) at the start of the Pre-synch protocol, which consisted of 2 injections of PGF(2alpha) 14 d apart, with the second injection given 12 d before initiating the Ovsynch protocol. Cows were blocked by lactation number and assigned randomly to 3 treatments consisting of variations of the Ovsynch protocol. Cows in 2 treatments received injections of GnRH 7 d before and 48 h (G48) after the PGF(2alpha) injection. Timed AI (TAI) was conducted at the time of the second GnRH injection (G48 + TAI48) or 24 h later (G48 + TAI72). Cows in the third treatment received the injections of GnRH 7 d before and at 72 h after PGF(2alpha) and were inseminated at the time of the second GnRH injection (G72 + TAI72).

Pregnancy was diagnosed weekly by palpation per rectum of uterine contents on d 40 or 41 after TAI.

Pregnancy rates differed between herds, but they were consistently greater for G72 + TAI72 than for G48 + TAI48 and G72 + TAI72. Subsequent calving rates were consistent with differences in initial TAI pregnancy rates. Pregnancy loss was least for cows on the G72 + TAI72 treatment.

Body condition scores (BCS) ranged from 1.0 to 4.0 when assessed on Monday of the breeding week. An interaction of BCS and herd was detected in which cows in herd 1 having poorer BCS (<2.25) had greater pregnancy rates than cows of greater BCS (≥ 2.25), whereas the reverse was true in herd 2 in which overall pregnancy rates were greater.

We concluded that inseminating at 48 or 72 h after PGF(2alpha), when GnRH was administered at 48 h after PGF(2alpha), produced fewer pregnancies than inseminating and injecting GnRH at 72 h after PGF(2alpha) for cows whose estrous cycles were synchronized before initiating this variant of the Ovsynch protocol.

J Dairy Sci. 2005 Mar;88(3):914-21.

EFFECT OF WATER ADDITION ON SELECTIVE CONSUMPTION (SORTING) OF DRY DIETS BY DAIRY CATTLE.

The objective of this study was to determine whether adding water to a dry diet would reduce sorting and improve cow performance. Eighteen multiparous lactating Holstein cows were used in a cross-over design with 21-d periods. Treatments had the same dietary composition and differed only by adding water (WET) or not (DRY). Diets consisted of 10% alfalfa silage, 30% hay (approximately 80% grass and 20% alfalfa), and 60% concentrate [dry matter (DM) basis]. Dietary DM was 80.8% for DRY and 64.4% for WET. Both diets contained 16.9% crude protein and 24.3% neutral detergent fiber. Particle size was determined using the Wisconsin Particle Size Separator on the as-fed diets. The separator has five square-hole screens (Y(1) to Y(5)) with diagonal openings of 26.9 mm for Y(1), 18 mm for Y(2), 8.98 mm for Y(3), 5.61 mm for Y(4), and 1.65 mm for Y(5), and one pan.

Sorting was calculated on a 60 degrees C DM basis (60DM). Predicted intake of Y(i) was calculated as the product of 60DM intake (60DMI) and the 60DM fraction of Y(i) in the total mixed ration for that screen.

For DRY and WET, actual 60DMI by screen expressed as a percentage of predicted intake was 61.4% vs. 75.2% for Y(1), 83.8% vs. 98.6% for Y(2), 85.6% vs. 90.8% for Y(3), 95.2% vs. 96.0% for Y(4), 100.1% vs. 101.9% for Y(5), and 105.9% vs. 102.9% for pan, respectively.

Adding water did not affect total DM intake (28.3 kg/d) or milk production (41.3 kg/d). Neutral detergent fiber intake was 6.42 kg/d for WET and 6.15 kg/d for DRY. Milk fat percentage tended to be higher (3.41% vs. 3.31%) when cows consumed WET vs. DRY. No differences in ruminal pH, NH(3), and volatile fatty acids were observed. Cows sorted against long particles in favor of shorter particles on both diets.

Adding water to dry diets reduced sorting and tended to increase neutral detergent fiber intake and milk fat percentage.

J Dairy Sci. 2005 Mar;88(3):1043-9.

DISPLACED ABOMASUM AND MILK PRODUCTION TRAITS IN HOLSTEIN COWS

Displaced abomasums (DA) occurs in Holstein dairy cattle more frequently than in other cattle breeds. Lactational incidences of DA ranging from about 0.5 to 5.5% have been reported for Holstein dairy cows. Milk losses attributable to DA or diseases associated with DA or both have been estimated at about 300-600 kg milk, 12 kg fat and 10 kg milk protein per location. High milk yield is one of the reported predisposing risk factors for DA in dairy cows. Milk losses caused by DA were greatest among the highest yielding cows. Long-term selection responses for increased fat yield may lead to higher prevalences of DA in dairy cows.

The objective of this study was to analyse the heritability of the lactational incidence of displaced abomasum (DA) and the relationships of DA with milk production traits in German Holstein cows. Data were recorded between February 1999 and January 2000 in cooperation with five veterinary practitioners. The

investigation included 160 dairy farms under the official milk-recording scheme with 9,315 cows. The lactational incidence of the left abomasal displacement amounted to 1.21%, and of the right abomasal displacement to 0.41%, respectively. The linear heritability estimates for the lactational incidences of left and right DA were $h^2 = 0.05 + 0.012$ and $h^2 = 0.004 + 0.005$, respectively. Using the Dempster – Lerner – transformation the corresponding heritabilities were $h^2 = 0.53$ and 0.09 , respectively. Milk losses for the lactation when DA was diagnosed were significant and reached 1,016 kg milk, 41 kg fat, 36 kg protein and 0.07% protein. Fat content significantly increased by 0.18%.

Among the cows affected by DA and cows that had not been diagnosed with DA no significant differences in breeding values for milk performance traits could be estimated. The analysis of 305-day milk performances according to the lactation groups by disease status for DA showed no significant differences for the lactation records prior to the lactation when the diagnosis of DA was recorded. The additive genetic correlation between 305-day milk performance and left DA were low.

The results indicated that cows with a high milk production and superior breeding values for milk performance were not exposed to an increased risk for DA.

J Vet Med A Physiol Pathol Clin Med.
2004 May;51(4):203-8.

COMPARISON OF EAR NOTCH IMMUNOHISTOCHEMISTRY, EAR NOTCH ANTIGEN-CAPTURE ELISA, AND BUFFY COAT VIRUS ISOLATION FOR DETECTION OF CALVES PERSISTENTLY INFECTED WITH BOVINE VIRAL DIARRHEA VIRUS.

Two techniques performed on skin biopsy samples (ear notches), immunohistochemistry (IHC) and antigen-capture ELISA (AgELISA), were compared for detection of bovine viral diarrhea virus (BVDV) persistent infection (PI) in 559 Angus calves between the ages of 1 and 5 months. The calves also were tested for BVDV infection using virus isolation (VI) and reverse transcription (RT)-PCR on buffy coat samples and

for antibodies to BVDV types 1a and 2 by serum neutralization (SN). Sixty-seven of 559 (12.0%) calves tested positive at initial screening by IHC, AgELISA, or VI, and all 67 were kept for a minimum of 3 months and retested monthly by IHC, AgELISA, VI, RT-PCR, and SN.

Of the calves positive at initial screening, 59/67 (88.1%) were determined PI and 8/67 (11.9%) were determined acutely infected. Both IHC and AgELISA detected 100% of PI calves; however, IHC and AgELISA also detected 6 and 8 acutely infected calves, respectively, at initial screening. Furthermore, IHC and AgELISA continued to detect 3 and 4 acutely infected calves, respectively, 3 months after initial screening. Three acutely infected calves had IHC staining indistinguishable from PI calves at initial screening.

Both IHC and AgELISA are accurate at detecting BVDV-infected calves, but veterinarians and producers should be advised that both tests detect some calves acutely infected with BVDV in addition to PI animals. Repeat testing using VI or RT-PCR on buffy coat samples should be performed at 30 days after initial screening to conclusively discriminate between acute and PI.

J Vet Diagn Invest. 2005 Mar;17(2):110-7.

EFFECTS OF TYPE OF FORAGE FED TO DAIRY HEIFERS: ASSOCIATIONS BETWEEN CLAW CHARACTERISTICS, CLINICAL LAMENESS, ENVIRONMENT AND BEHAVIOUR.

Heifers were reared separately on wet fermented (WF) (grass silage based) or dry unfermented (DU) (straw based) diets. Clinical lameness was recorded and physical claw attributes were measured regularly, up to six months after calving at approximately two years of age. Two months before calving, some aspects of animal behaviour and the properties of slurry were studied. The incidence of lameness due to claw horn lesions was significantly higher in WF than in DU. WF suffered more serious heel erosion prior to calving and had softer claw horn at two (heel and axial sole) out of five sites throughout. The slurry produced by WF had lower total solids content and viscosity.

WF spent longer standing and feeding. It is proposed that standing for longer in less viscous slurry

contributed to softer claw horn and more severe heel erosion, predisposing WF to claw horn lesions causing lameness. Reducing contact with low dry matter slurry is recommended for improving claw health.

This study provides evidence that feeding a wet diet to dairy young stock is deleterious to claw health both before and after calving. The design of the experiment does not allow explanation of the etiology of the lesions. The results suggest that there would be an advantage in reducing the time that any animals' feet are in contact with slurry. This can be achieved by providing comfortable lying areas to encourage lying down, and frequently removing slurry from concrete surfaces where cattle will walk. **Second, the results consolidate the evidence that poor claw health in young stock is likely to cause problems subsequently in lactation.** They indicate that the benefits in feeding dry, unfermented forages during rearing persist beyond the period when the forage is fed.

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