

2007

## 2007 Nebraska Beef Cattle Report Summaries

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## 2007 Nebraska Beef Cattle Report Summaries

Dennis Brink, Extension Beef Specialist

Reports on recent beef research are briefly summarized. The full reports are available in the 2007 Nebraska Beef Report, available from University of Nebraska–Lincoln Extension at <http://www.ianrpubs.unl.edu/epublic/live/mp90/build/mp90.pdf>.

### Growing

**Analysis of Grazing Yearling Response to Distillers Grains.** Eight grazing experiments with yearlings supplemented with 4.0 or 7.5 lb distillers grains, dry matter basis, were summarized. Daily gains were increased 0.53 and 0.89 lb/day. Subsequent feedlot performance was not influenced by distillers grains supplementation on grass. In a six-trial summary, each 1.0 lb of distillers grains decreased forage intake by 0.5 lb. Economic return for each \$1.00 spent on distillers grains yielded returns from \$1.41 to \$1.94.

**Dried Distillers Grains Substitute for Forage and Nitrogen on Pasture: N Dynamics and Use Efficiency.** Steers supplemented with dried distillers grains with solubles (DDGS) on nonfertilized smooth brome grass pastures gained more (0.58 lb/day) than steers on fertilized and nonfertilized smooth brome grass. Fertilized and supplemented pastures were stocked at equal densities. Nitrogen use efficiency based on the amount of N applied as either fertilizer or in DDGS was 3.2 times greater for supplemented steers than nonsupplemented steers grazing fertilized pasture (26.38 % vs. 8.23%).

**Comparing a Modified Dry By-product to Dry Distillers Grains with Solubles in Growing Calf Diets.** Dakota Bran Cake (DBRAN) was compared to dry distillers grains with solubles (DDGS) in growing calf diets. Diet treatments included 15% DBRAN, 30% DBRAN, 15% DDGS, and 30% DDGS, replacing a blend of brome grass hay and alfalfa haylage (DM basis). Final BW, ADG, and DMI increased, while F:G decreased as inclusion level of both by-products increased from 15 to 30% DM. DDGS significantly improved ADG and F:G compared to feeding DBRAN at both inclusion levels. Feeding DBRAN and DDGS improved performance at higher inclusion levels, while DDGS tended to improve performance over DBRAN.

**Effect of Distillers Grains Composition and Level on Steers Consuming High Quality Forage.** Effects of dried distillers grains (DDG) supplementation level and composition on growing steer performance and forage intake were evaluated. Factors included DDG supplementation level (0.25, 0.50, 0.75 or 1.00% of BW), and DDG solubles level (0, 5.4, 14.5, 19.1, or 22.1% DM). Final BW improved, and forage intake decreased with increasing levels of DDG. An interaction between DDG supplementation level and solubles level was observed on ADG and F:G and was likely related to supplemental fat levels. Supplementation of forages with DDG improves performance while decreasing forage intake when fat levels are low.

**Replacement of Forage with Dried Distillers Grains**

**Reduces Ruminal Methane Production.** *In vitro* and *in vivo* methane production was reduced when brome hay was replaced with DDGS. A reduction in methane production *in vitro* is not associated with a reduction in energy produced in the form of volatile fatty acids or DM disappearance. Decreased ruminal methane production may increase retention of gross feed energy and explain the increase in ADG when DDGS are used to supplement cattle receiving a forage-based diet.

**Dried Distillers Grains as Creep Feed for Yearling Beef Cattle Grazing Sandhill Range.** Yearlings in the treatment group (TRT; n = 40) grazed native summer Sandhill range and had access to ad libitum dried distillers grains (DDG) pellet in a creep feeder for 54 days of a 63-day grazing period. Control (CON; n = 39) yearlings grazed in an adjacent pasture without DDG. Immediately after the grazing period, yearlings were placed in a feedlot. Intake of DDG averaged 11 lb/day DM. Summer ADG was greater for TRT than CON. Yearlings previously allowed access to DDG gained more during the first 30 days in the feedlot. Yearlings allowed access to DDG were harvested 14 days before CON. Final weight and ADG were similar between TRT and CON. There was a tendency for TRT cattle to have a higher percentage grading choice. The value of DDG to yearlings grazing Sandhill range was greater than estimated cost at both the grazing and harvest endpoints.

### Cow/Calf

**Utilization of Dried Distillers Grains for Developing Beef Heifers.** A two-year study evaluated feeding dried distillers grains (DDG) during heifer development on growth and reproductive performance. The supplements provided similar CP, energy, lipid, and fatty acids. Protein degradability of the supplements differed such that undegradable intake protein exceeded requirements of DDG heifers. Heifer pubertal development, artificial insemination (AI) pregnancy rate, and overall pregnancy rate were not affected. However, AI conception and pregnancy rates were improved by feeding DDG.

**Progesterin Concentrations Alter Follicle Characteristics and May Affect Quality of Oocytes (Eggs).** Cows were treated with two progesterin concentrations to develop ovulatory follicle. Cows were assigned to Control Group receiving a CIDR for 7 days (4–6 ng/ml of progesterin), or to MGA-14 Group receiving 5 mg/head/day of MGA for 14 days (< 1 ng of progesterin). Cows in the MGA-14 treatment had larger follicles and less granulosa cells per volume than controls, suggesting their development mimicked persistent follicles and may be of poorer quality.

### Beef Feedlot (Finishing)

**Effect of Feeding a By-product Combination at Two Levels or By-product Alone in Feedlot Diets.** A by-product combination was compared with the by-products fed alone, or a corn-based diet without by-products. Treatments consisted of 0% by-products, 30%

WCGF (wet corn gluten feed), 15% WCGF with 15% WDGS (wet distillers grains with solubles), 30% WDGS, and 30% WCGF with 30% WDGS (DM). Final BW, ADG, and F:G were improved for cattle fed by-products, including the 60% blend. No associative effects resulted from feeding WCGF and WDGS in a blend. Feed conversion was similar for feeding a by-product blend at 30 and 60% of dietary DM. The blend at 30% did not have any additive effects, while at 60% the blend had comparable F:G to the blend at 30% with higher gains than the corn diet.

**Effects of Different Inclusion Levels of Wet Distiller Grains in Feedlot Diets Containing Wet Corn Gluten Feed.** Levels of distillers grains plus solubles in finishing diets containing 30% wet corn gluten feed (WCGF, Sweet Bran<sup>®</sup>, Cargill, Blair, Neb.) were compared. Six (WDGS; Abengoa, York, Neb.) inclusion levels (0, 10, 15, 20, 25, 30%DM) were compared with a dry rolled corn/high moisture corn based diet. The inclusion of 30% Sweet Bran<sup>®</sup> in the diets improved DMI, ADG and F:G when compared to a corn-based diet. DMI tended to respond quadratically to WDGS inclusion level, ADG responded quadratically, while F:G was not affected by WDGS level. Diets containing 30% of both WCGF and WDGS improved performance compared with cattle fed no by-products. Optimum ADG and F:G were achieved with inclusions levels of WDGS ranging from 15 to 20% in diets containing 30% WCGF.

**Effects of Roughage Source and Level with the Inclusion of Wet Distillers Grains on Finishing Cattle Performance and Economics.** Roughage source and level were compared to no roughage inclusion in finishing diets containing 30% (DM basis) wet distillers grains plus solubles (WDGS). Roughage sources included alfalfa hay (AH), corn silage, or corn stalks fed at either a low (4% AH) or high (8% AH) level and sources were included on an equal NDF basis. In general, higher roughage levels increased DMI, ADG, and profit. However, steers fed 3% corn stalks performed similarly to steers fed high levels of roughage. When roughage was eliminated from the diet, DMI, ADG, and profit were decreased compared with diets containing corn stalks or high levels of AH or corn silage. Results indicate at high roughage levels, sources can be exchanged on an equal NDF basis in finishing diets containing 30% WDGS (DM basis).

**Effect of Corn Processing and Wet Distillers Grains Inclusion Level in Finishing Diets.** Dry-rolled corn (DRC), high-moisture corn (HMC), or steam-flaked corn (SFC) was replaced with increasing levels of wet distillers grains with solubles (WDGS; 0, 15, 27.5, 40% DM) in finishing steer diets. Optimal feedlot performance was observed with 40%, 27.5%, and 15% WDGS in DRC, HMC, and SFC based diets, respectively. Fat thickness, DMI, and marbling score responded quadratically to WDGS level and incidence of liver abscess decreased linearly with increasing WDGS levels. A greater response to WDGS level was observed with less intensely processed corn.

**Optimum Levels of Dry Distillers Grains with Solubles for Finishing Beef Steers.** Increasing levels of dry distillers grains with solubles (DDGS) were evaluated in corn-based diets. Treatments consisted of 0, 10, 20, 30, 40, and 50% (DM basis) DDGS dietary inclusion. Quadratic trends were observed for final BW and ADG with increasing levels of DDGS and 20% inclusion being the most improved. DMI was not changed with DDGS treatment level, while F:G was numerically optimum for 20% inclusion, although all DDGS levels had improved F:G compared to the 0% treatment. Energy value of DDGS at 10 to 40% dietary inclusion remained above 100% with the most improved values at 10 and 20% inclusion.

**Digestibility, Rumen Metabolism, and Site of Digestion for Finishing Diets Containing Wet Distillers Grains or Corn Oil.** A 40% WDGS diet, a composite of corn fiber and corn protein (COMP), COMP plus corn oil to equal the distillers diet (COMP+OIL), and dry-rolled corn control diets without (CON) or with corn oil (CON+OIL) were fed to five ruminally

and duodenally fistulated, Holstein steers. Cattle fed WDGS had numerically lower rumen pH compared with cattle fed other treatments. Cattle fed the WDGS had greater propionate, lower acetate:propionate ratios, greater total tract fat digestion, and a greater proportion of unsaturated fatty acids reaching the duodenum than cattle fed other treatments. The data indicate the higher energy value of WDGS compared with corn is due to higher propionate production and fat digestibility, and more unsaturated fatty acids reaching the duodenum.

**Pen Density and Straw Bedding During Feedlot Finishing.** Two experiments evaluated effects of straw bedding (in sheltered and unsheltered facilities) and pen density (in unsheltered facilities) on cattle performance during different seasons. Bedding had no effect on overall performance in the sheltered facilities, but performance improvements were noted from December through February in unsheltered facilities. Lowering pen density (increasing pen space per animal) improved performance and lowered mud condition scores on the animal and in the feedlot.

**Environmental Factors Affecting Water Intake in Steers Finishing in Feedlots.** Regression analyses were executed using records of six experiments (1999 to 2006) conducted at the University of Nebraska Northeast Research and Extension Center. The analysis provided regression equations for summer, winter and both seasons (overall model). From simple regression analysis, the best predictor of water intake was minimum temperature with  $r^2=0.61$  in the overall model. Whereas, from multiple regression analysis the overall model with the best fit had  $R^2=0.70$ . This model included four factors; daily mean minimum temperature, solar radiation, dry matter intake and wind speed.

**Feedlot Surface Conditions and Ammonia Emissions.** Moisture and urine were applied to a feedlot surface. Forced-air wind tunnels were used to determine differences in net flux of ammonia ( $NH_3$ ) being volatilized. Surface DM, pH and surface temperature were all analyzed within each treatment to determine effect on  $NH_3$  net flux. No effects of urine were detected. No differences were detected due to moisture and moisture\*time with the dry plots releasing significantly more  $NH_3$ .

**Effect of Phase Feeding Protein on Cattle Performance and Nitrogen Mass balance in Open Feedlots.** Phase diets were formulated to balance degradable intake protein and metabolizable protein. Two experiments using calves fed 176 days from November to May (WINTER) and yearlings fed 117 days from May to September (SUMMER). Phase feeding resulted in greater ADG and better F:G in WINTER and similar performance in SUMMER than traditional feeding methods. Nitrogen excretion was significantly reduced in both WINTER and SUMMER which translated into significantly less N volatilization without impacting N removed in manure.

**Changes in Gain through the Feeding Period.** Three years of research trials were compiled to determine how weight gain changes throughout the feeding period. Results suggest BW and carcass weight increase linearly through the feeding period. While ADG decreases on a BW basis, it remains constant on a carcass basis suggesting nearly all weight gain is transferred to the carcass at the end of the feeding period.

**Comparison of a Long Yearling System and Calf-fed Performance and Economics.** Calf-feeding and a yearling production system were compared. Yearlings had higher ADG; however, calf-feds were more efficient than yearlings. Yearlings produced more weight than calf-feds leading to an improvement in profitability for yearlings compared to calf-feds. No differences in yield grade or percentage grading Choice for yearlings compared to calf-feds occurred, even though calf-feds had higher fat thickness compared to yearlings.

**Effect of Sorting and Feeding Optaflexx on Performance and Economics of Long Yearling Steers.** Effects of sorting long

yearling steers by initial feedlot BW and supplementing 200 mg/steer of Optaflexx daily the last 28 days of the feeding period on ADG, F:G, carcass characteristics and profitability were evaluated in a two-year study. Feedlot ADG, F:G, and profitability were not effected by sorting. However, sorted cattle exhibited increased fat thickness, increased ribeye area, and increased percentage of carcasses with a yield grade of four or higher. Supplementing Optaflexx the last 28 days of the feeding period had no effect on feedlot performance, carcass characteristics, or profitability.

**Performance Profile and Carcass Characteristics of Steers Fed Optaflexx.** Two Optaflexx levels (0 vs. 200 mg per steer daily) and two Optaflexx feeding durations (28 or 42 days immediately prior to slaughter) were compared. Optaflexx was started on the same day (day 151 of the feeding period). Feeding 200 mg/steer daily of Optaflexx significantly improved final BW, ADG, and F:G compared to controls. Feeding 200 mg/steer daily of Optaflexx provided 16.4 and 18.8 lb of added BW above controls for the 28 and 42 feeding duration, respectively, but most (approximately 87%) of this weight gain was within the first 28 days of Optaflexx feeding.

**Evaluation of Excede<sup>®</sup> Given at Either Initial Processing or Revaccination on Bovine Respiratory Disease and Pasture vs. Feedlot Receiving Systems.** Effects of Excede<sup>®</sup> at arrival or at revaccination in feedlot and pasture receiving systems were evaluated in Exp. 1. A second experiment evaluated effects of feedlot and pasture receiving systems on animal health. In Exp. 1, initial or final BW, and ADG were not different. In Exp. 1, initial BW, treatment, receiving system (pasture or feedlot); and buyer of cattle explained cumulative incidence of bovine respiratory disease (BRD). Incidence of BRD was 4.7%, 11.0%, and 13.8% for arrival, control, and revaccination treatments respectively. Arrival medication reduced BRD incidence. BRD was less for pasture receiving than feedlot receiving, 7.4% and 11.0% respectively. In Exp. 2 BRD was less for pasture receiving than feedlot receiving with 23% and 53% treated for BRD respectively.

**Evaluation of Synovex Choice versus Revalor Implant Strategies in Beef Finishing Steers.** Synovex-Choice/Synovex-Choice (Choice) implant strategies were compared to a Revalor-IS/Revalor-S (Revalor) strategy. When calculated from carcass adjusted FW, ADG was not significantly different between Choice and Revalor implant strategies. Consequently, F:G was not significantly different when Choice strategy was compared with Revalor strategy. Based on carcass-adjusted performance, significant differences did not exist in performance between the two implant strategies.

**Effect of CRINA RUMINANTS AF, a Mixture of Essential Oil Compounds, on Finishing Beef Steer Performance.** Crossbred yearling steers were fed one of four treatments: 1) Control (CON) 2) CRINA RUMINANTS AF (CRINA) 3) CRINA RUMINANTS AF plus Tylan<sup>®</sup> (CRINA + T), and 4) Rumensin<sup>®</sup> plus Tylan<sup>®</sup> (RUM + T). No differences in final BW or ADG between treatments occurred. Steers fed RUM + T had lower DMI than other treatments and F:G was improved for CRINA + T and RUM + T fed steers compared with CON steers. Treatments containing Tylan<sup>®</sup> had significantly fewer liver abscesses compared to other treatments. Addition of CRINA RUMINANTS AF plus Tylan<sup>®</sup> or Rumensin<sup>®</sup> plus Tylan<sup>®</sup> improved F:G and decreased liver abscesses compared to no additives.

**Effect of CRINA RUMINANTS AF, a Mixture of Essential Oil Compounds, on Ruminal Fermentation and Digestibility.** Ruminally fistulated yearling steers were fed: 1) Control (CON); 2) CRINA RUMINANTS AF (CRINA); and 3) Rumensin<sup>®</sup> (RUM). No differences in DMI, OM intake, total tract DM and OM digestibilities, or pH occurred among treatments. Steers fed CRINA consumed 24.5% fewer meals than CON. Ruminal acetate was greatest and total VFA concentrations tended to be greatest for CRINA treatment. Acetate: propionate was 2.29, 1.67, and 1.83 for CON, CRINA, and RUM,

respectively, suggesting addition of CRINA RUMINANTS AF favorably alters rumen fermentation end products without negatively affecting intake or rumen pH.

**Feeding Potassium Bicarbonate and Sodium Chloride in Finishing Diets.** Steers were assigned one of four treatments: 1) control; 2) potassium (diet containing 2.1% KHCO<sub>3</sub>); 3) sodium (diet containing 1.1% NaCl); or 4) potassium and sodium (diet containing 2.1% KHCO<sub>3</sub> and 1.1% NaCl). Daily water intake was increased and DMI to daily water intake ratio was decreased for cattle fed potassium and potassium and sodium rations. Tympanic temperatures did not differ among dietary treatments under thermoneutral or hot environmental conditions.

**Effect of Feeding DAS-59122-7 Corn Grain and Non-transgenic Corn Grain to Finishing Feedlot Steers.** Steers were individually fed either corn genetically modified for corn rootworm protection (DAS-59122-7), a conventional non-transgenic corn hybrid, or a near isoline control. Corn was coarsely rolled (geometric mean diameter = 4,200 microns) and treatments offered in the finishing diet at 82% of diet (DM basis). Dry matter intakes, ADG, and F:G were similar among all three corn hybrids. Carcass characteristics were not different among treatments. Feeding this genetically modified hybrid did not impact steer performance or carcass quality.

## Beef Products

**Identification of Off-Flavor Compounds in Beef Round and Chuck Muscles.** Using purge and trap gas chromatography and mass spectrometry, some volatile compounds were shown to have different concentrations in normal-flavored beef, compared to samples with liver-like off-flavor. Most of the compounds, like pentanol, hexanal, hexanol, 1-octen-3-ol, and nonanol, are associated with lipid oxidation. The compounds,  $\beta$ -pinene and 1-octen-3-ol were in higher concentration in the liver-like samples in all muscles tested. Several, small, unidentified peaks also differed between samples.

**Fatty Acids and Minerals Affect the Liver-Like Off-Flavor in Cooked Beef.** Sixty knuckle centers were obtained from a local harvesting facility to determine factors causing the liver-like off-flavor in beef. Medium chain unsaturated fatty acids and sodium explain 46% of the variation of the liver-like off-flavor intensity ratings in cooked knuckle center steaks. Future studies to manipulate the fatty acid and mineral profiles of muscle might prove beneficial in lowering the incidence of the liver-like off-flavor in beef.

**Off-Flavor Mitigation in Cow Steaks.** Strip loins from fed (high energy diet for at least 60 days) and nonfed cows were treated with 1% water a solution containing one of four commercial bitter blockers to determine if off-flavors could be blocked. Neither trained nor consumer taste panels detected differences among bitter blockers. Trained panelists frequently found metallic, sour, rancid, bloody, salty, and bitter flavors, with nonfed cow beef having more bloody, bitter, and burnt off-flavors. Consumers most frequently identified bloody, metallic and liver-like off-flavors in cow beef, but found no differences in frequency of off-flavor notes between fed and nonfed cow beef. Commercial bitter blockers did not improve flavor. Feeding a high energy diet for at least 60 days prior to harvest changes the flavor of cow beef.

**Masking Off-Flavors in Ground Beef.** Ground beef derived from fed (high energy diet for at least 60 d) and nonfed cows was combined with one of five commercial bitter blockers to determine if off-flavors could be masked. Off-flavor scores were generally low; no significant treatment effects were observed. Trained panelists more frequently noted sour, fatty, rancid and liver-like off-flavors in nonfed cow beef (and metallic flavors in fed cow beef). Consumers found no differences in flavor notes. Bitter blockers did not affect flavor perception. Greatest differences were between fed and non-fed cow beef.

**Effects of Aging on Beef Chuck and Round Muscles Enhanced with Ammonium Hydroxide and Salt.** This study was conducted to determine if aging alters beneficial effects of enhancement with a 20% solution of water, ammonium hydroxide, and salt, on beef steaks. For all muscles (triceps brachii, biceps femoris, rectus femoris), steaks had lower shear force values when compared to non-pumped controls at every aging period (1, 7, 14 days). Enhanced steaks received more desirable evaluations for tenderness, juiciness, flavor, and overall acceptability at every aging period from consumer taste panels. These data indicate aging does not decrease the benefits of enhancement.

**Enhancement of Beef Chuck and Round Muscles with Ammonium Hydroxide.** By increasing muscle pH with ammonium hydroxide, shear force values of triceps brachii, biceps femoris, and rectus femoris were decreased and sensory scores for tenderness improved with higher levels of added solution. Any level of treatment was beneficial. In all cases, no shear force differences between steaks pumped to 15% and 22.5% occurred. Ultimate pH was strongly related to shear force values. These data suggest adjusting pH in beef with 20% of a solution of ammonium hydroxide can increase tenderness in beef chuck and round muscles.

**Ranking Beef Muscles for Warner-Bratzler Shear Force and Trained Sensory Panel Ratings.** Combining 60 years of published research, 40 different beef muscles were ranked by Warner-Bratzler shear force. Relative ranks for tenderness, juiciness and beef flavor ratings were also determined. The psoas major and infraspinatus were most tender. Sensory tenderness ratings correlated to shear force means (-0.85), where a desirable tenderness rating reflected a low shear force. These data help reconcile differences among various studies of beef tenderness and provide a weighted ranking for beef muscles.

### New Technology

**Hyperspectral Imaging: A Non-Invasive Technique to Predict Beef Tenderness.** A hyperspectral imaging apparatus was developed and assembled to predict 14 days tenderness of beef steaks. USDA Choice and Select grade longissimus steaks (n=111) from between the 12<sup>th</sup> and 13<sup>th</sup> ribs were frozen at 14 days post-mortem, cut to 1-inch thickness, and thawed overnight for scanning, cooking, and obtaining slice shear force data. The model predicted three tenderness categories with 96.4% accuracy, correctly classifying 93 tender, nine intermediate and all five tough samples. One tender sample was misclassified as intermediate, and three intermediate samples were misclassified as tender.

**Evaluating Use of Urinary Purine Derivative to Creatinine Ratio as an Estimate of Microbial Protein Production in Steers.** Six ruminally and duodenally fistulated steers were fed three diets, a steam-flaked corn (SFC)-based diet with or without 1.5% urea, or a corn milling byproduct-based diet (BYPROD). Feeding BYPROD resulted in greater ruminal pH and less time below ruminal pH 5.6, total tract OM digestibility, and ruminal propionate concentration when compared with either SFC-based treatment. The BYPROD produced greater urinary purine derivative:creatinine (PD:C) ratio and microbial crude protein (MCP) production as estimated by PD:C when compared with the SFC, no urea treatment. Responses in ruminal pH, MCP production, and PD:C indicate BYPROD provided a more favorable rumen environment compared with SFC-based diets, and urinary PD:C can be used to estimate differences in MCP production.

**Diurnal and Dietary Impacts on Purine Derivative Excretion from Spot Samples of Urine.** Heifers individually fed one of three diets formulated to produce differences in microbial CP (MCP): an 85% steam-flaked corn-based diet (SFC); the SFC diet with 1.5% urea (UREA); or a corn milling byproduct-based diet (BYPROD). Spot samples of urine were collected at 0700 and 1700 hours. Dry matter intake, ADG, and F:G were poorest with the SFC treatment. Urinary purine derivative:creatinine (PD:C) ratio was greatest with the BYPROD treatment and lowest with the SFC treatment, measuring 0.94, 1.18, and 1.25 for the SFC, UREA, and BYPROD treatments, respectively. Regardless of diet, PD:C was greater with samples collected later in the day, and differences in PD:C due to diet can be observed regardless of collection time.

**Chronic Exposure of Ruminal Fluid Cultures to Treatments That Inhibit Methanogenesis.** Methanogenesis in ruminal cultures was inhibited by Yucca shidigera, 2-bromoethanesulfonate, and a nitrofuranyl para-aminobenzoic acid derivative. Only the nitrofuranyl para-aminobenzoic acid derivative remained effective beyond 10 days of culture indicating it may be an effective treatment for chronically inhibiting methane production in cattle.

**Comparison of *In Vivo* Digestibility to *In Vitro* Digestibility of Five Forages Fed to Steers.** Eight crossbred yearling steers were used to determine the *in vivo* digestibility of five forages. Feed intakes were higher when steers were fed forages with higher IVDMD. *In vivo* digestibility of the hay was highly correlated to *in vitro* digestibility. *In vitro* DMD was 5.4 percentage units higher than *in vivo* digestibility. These five hay samples as standards for *in vitro* analysis allow researchers to compare samples analyzed across *in vitro* runs and to adjust the *in vitro* DMD to *in vivo* DMD.

**Using a Modified *In-Vitro* Procedure to Measure Corn Bran Buoyancy.** Inoculum was obtained from beef heifers and mixed with McDougall's buffer then distributed to the *in vitro* tubes for 30 hour incubation at 100°F. Fibrous material formed a matte layer which was measured to describe buoyancy. Tubes contained 6g of a feedlot-type diet with 7.5% fiber type (alfalfa hay, grass hay, corn silage, or corn stalks), with no replacement or 25% replacement of the remaining corn with corn bran. Buoyancy declined over time. Alfalfa hay had the most positive effect on buoyancy of corn bran. This new method offers promise for describing rumen buoyancy.

**Vascular Endothelial Growth Factor mRNA Isoforms 120 and 164 are Differentially Regulated Prior to Ovulation.** From the studies, Vascular Endothelial Growth Factor (VEGF) isoforms are differentially regulated during both CL regression and after a simulated LH surge. Differences observed in VEGF isoform regulation may allow for manipulation of ovulation in the beef cow.

**Inhibition of Vascular Endothelial Growth Factor Manipulates Follicles in Beef Females.** In previous studies, blocking the actions of Vascular Endothelial Growth Factor (VEGF) decreased activation of early stage follicles in neonatal rat ovary cultures. Therefore, we hypothesized inhibition of VEGF actions would also inhibit follicle activation in bovine ovarian cortical cultures. Inhibition of VEGF did inhibit follicle progression, thus regulation of VEGF may be a way to manipulate follicle development and more accurately time ovulation.

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1975, Revised November 2006

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