W287 Variation of basal expression of a sodium-dependent phosphate transporter between sections of cattle small intestine. A. P. Foote*[1], B. D. Lambert[1,2], and J. A. Brady[2], [1]*Tarleton State University, Stephenville, TX*, [2]*Texas AgriLife Research, Stephenville*.

Phosphorus (P) nutrition in cattle is increasingly becoming an important topic with the growing concern over the role of production animals in surface water pollution. Excess P in the diet of dairy and beef cattle is excreted in the manure and can be washed into surface water causing increased algal growth and eutrophication. P transporters have been characterized in other species and homologous genes have been found to be expressed in bovine cell cultures. However, no other information is available regarding the active transport of phosphate in cattle. The objective of this study was to determine the patterns of expression of a known phosphate transporter, NaPi-IIb, in four sections of the small intestine of cattle. RNA was isolated from the duodenal, proximal jejunal, distal jejunal, and ileal mucosa of 20 harvested cattle. Relative amounts of NaPi-IIb mRNA expressed were determined using real-time RT-PCR. Expression of NaPi-IIb was highest in the two distal sections ($P < 0.0001$) and almost absent in the proximal sections. Expression did not differ between the two proximal sections ($P = 0.67$) or the two distal sections ($P = 0.3$). The data suggest that a sodium-dependent secondary active P transport system is not responsible for P absorption in the proximal portion of the bovine small intestine while it does contribute to the P absorbed in the distal sections of the bovine small intestine.

Key Words: phosphorus absorption, gene expression, NaPi-IIb

W288 Insulin and essential amino acids have significant but independent effects on protein synthesis signaling in bovine mammary epithelial cells in-vitro. A. L. Bell*, J. A. D. R. N. Appuhamy, J. Escobar, and M. D. Hanigan, *Virginia Polytechnic Institute and State University, Blacksburg*.

A better understanding of the regulation of milk protein synthesis could help improve the nitrogen efficiency of dairy cows. Protein synthesis responds to signals from hormones, energy substrate, and amino acid supply through several signaling proteins such as protein kinase B (Akt), mammalian target of rapamycin (mTOR), p70 ribosomal protein S6 kinase 1 (S6K1) and ribosomal protein S6 (rpS6) . This study investigated the effects of essential amino acids (EAA) and insulin on phosphorylation status (PS) of these signaling proteins using Mac-T bovine mammary epithelial (BME) cells. Cells were deprived of EAA and insulin overnight and then cultured with complete or EAA-deprived DMEM/F12 with and without 1 μg/ml of insulin (2x2 factorial design). After 1 h incubation, BME were lysed in the presence of protease and phosphatase inhibitors. Cell lysates were analyzed by Western immunoblotting with antibodies against phosphorylated mTOR (Ser^{2448}), Akt (Ser^{209}), rpS6 ($Ser^{235/236}$), and S6K1 (Thr389). Membranes were stripped and reprobed for the total form of each protein. The ratio of phosphorylated:total constitutes the PS of each signaling protein. Both EAA and insulin had significant effects on mTOR, S6K1, and S6 ($P<0.05$). EAA deprivation reduced PS by 55%, 47%, and 54%, respectively, and insulin deprivation reduced PS by 27%, 42%, and 46%, respectively. Akt PS was not affected by EAA status and markedly increased by insulin addition ($P<0.05$). There were no significant interactions between insulin and EAA on PS for any of the signaling proteins. Insulin and EAA appear to exert independent effects on cell signaling pathways in BME cells. If the same is true for intact mammary tissue, milk protein synthesis should be regulated independently by AA supply and insulin status.

Key Words: amino acid, cellular signaling, insulin

W289 Evaluation of the effects of ozonated water on the microbial ecology of the rumen *in vitro* and digestion of corn and alfalfa hay *in situ*. K. L. Neuhold*, S. K. Williams, K. K. Nightingale, and S. L. Archibeque, *Colorado State University, Department of Animal Sciences, Fort Collins*.

The overall goal of this work was to evaluate the effects of ozone treated water on the microbial ecology of the bovine rumen and the subsequent effect on Enterohemmorhagic *Escherichia coli* serotype O157:H7, and *Salmonella* Typhimurium populations *in vitro* and digestibility parameters *in vitro* and *in situ*. To accomplish the objective, rumen contents were collected from three fistulated beef steers consuming a high concentrate diet and provided with control water (non chlorinated well water; 0.05 ppm ozone) or ozone treated water (0.30 ppm ozone) in a cross-over design for at least 15 d. On d 16 ruminal samples were obtained 2-h post feeding. Following rumen fluid collection, we simulated the rumen environment, *in vitro* and evaluated two treatments; 1) Control water; and 2) Ozonated water. The supplemented rumen contents were then inoculated with rifampicin resistant *Escherichia coli* O157:H7, or *Salmonella* Typhimurium. To determine the effect of treatments on the total bacterial population after inoculation, samples were removed at 0, 1, 4, 8, 12, 24 and 48 h post inoculation for analyses. *In vitro* bags were prepared with corn and alfalfa samples and placed in the steers at 0, 2, 6, 12, 24, 48 and 72 h. There was no effect of water treatment on enumerations of *Escherichia coli* O157:H7, or *Salmonella* Typhimurium populations *in vitro*. However, ozone treated water did increase ($P = 0.027$) *in vitro* dry matter digestibility of ground corn. Water treatment had no effect on *in situ* DM disappearance of corn ($P = 0.64$) or alfalfa hay ($P = 0.27$). These data indicate that while ozonated water may have little effect on pathogen viability, ozonated water may improve the digestibility of corn grain in the ruminal contents of finishing beef steers.

Key Words: ozone, pathogen, digestibility

Ruminant Nutrition: Vitamins and Minerals

W290 The influence of feeding chelated trace minerals on dairy cattle performance and colostrum quality. A. Formigoni[1], S. Emanuele*[2], C. Sniffen[3], G. Biagi[1], and M. Fustini[1], [1]*DIMORFIPA-University of Bologna, Bologna, Italy*, [2]*Balchem, New Hampton, NY*, [3]*Fencrest LLC, Plymouth, NH*.

Dairy cow diets are often formulated to exceed NRC 2001 guidelines for Zn and Cu by up to 50%. Trial objective was to determine the effect of chelated trace elements (KeyShure® Zn, Cu and Mn) on dairy cattle performance and colostrum quality when diets were formulated to NRC 2001 guidelines for Zn and Cu. The experiment was conducted at the Pasetto farm, Verona, Italy. There were 2 treatments and 2 pens per treatment with 148 animals per treatment. Experimental period started at dry-off and continued through 150 DIM. Average dry period length was 60 ±11.5 days. The dry cow and lactation diets consisted of a 1-group TMR and were fed ad libitum once daily. The mineral premix for the dry period and lactation control diets contained 100% of the Zn, Mn and Cu as inorganic sulfates. The mineral premix for the dry period KeyShure®

diet contained 50% of the Zn, Mn and Cu as chelated minerals and 50% as inorganic sulfates. Lactation period premix for the KeyShure® diet contained 25% of the Zn, Mn and Cu as chelated minerals and 75% as inorganic sulfates. The dry cow and lactation diets contained 36 ppm Zn, 16 ppm Cu and 43 ppm Mn and 53 ppm Zn, 10 ppm Cu and 31 ppm Mn respectively. Colostrum quality was measured by analysis for total immunoglobulin content. Statistical analysis was performed with STATISTICA 7.0 (STATSOFT, INC. 2004,). Milk records and BCS were analysed with ANOVA for repeated measures; other data were analysed with CHI- SQUARE test. There was no effect of treatment on colostrum yield. Immunoglobulin concentration was greater for the KeyShure® diet (68 g/l) versus the control diet (57 g/l) (p=0.001). There was no effect of treatment on milk yield. Milk fat % was increased on the KeyShure® diet during the first 150 DIM compared to the control diet (4.03% vs. 3.86%) (p=0.001). There was no effect of treatment on milk protein. Days to 1st estrus were reduced (p=0.10) in the cows receiving chelated minerals versus the control diet (56 versus 63 days).

Key Words: chelated minerals, zinc, copper

W291 Effect of zinc from zinc sulfate on trace mineral concentrations of milk in Varamini ewes. A. Zali and M. Ganjkhanlou*, *University of Tehran*, *Tehran, Iran*.

This study was conducted to evaluate the effect of feeding supplemental zinc (zinc sulfate) in different levels (15, 30, or 45 mg/kg) on mineral concentrations in milk of ewes. Thirty lactating Varaminni ewes were assigned to three experimental groups according to their live body weights, milk production and lambs sex in a completely randomized design. Ewes were fed a basal diet containing alfalfa, wheat straw, cottonseed meal, barley grain, wheat bran, cracked corn, and vitamin-mineral supplements at 3.2% of body weight (BW) to meet NRC requirements for protein, energy, macro minerals, and micro minerals, excluding zinc. The basal diet contained 15 mg/kg Zn and zinc sulfate was added to the basal diet to supply 30 or 45 mg/kg of dietary zinc. Daily milk yielded was recorded at 7 days intervals, and samples of the milk were taken once per week for determination of milk composition and trace mineral concentration. Concentrations of Zn, Cu, Mn and Fe in milk were determined. Dry matter intake (DMI), milk yield and milk compositions were not affected by supplemental zinc ($P > 0.05$). But zinc concentrations in milk were affected by supplemental zinc ($P < 0.05$). Other mineral concentrations were not affected by supplemental zinc ($P > 0.05$). It suggests that supplementation of ewes diet with zinc sulfate could be an effective way to increase zinc concentration in milk when zinc concentration of basal diets is limited for ewes in lactation period. Abbreviation: BW, body weight; DMI, dry matter intake

Key Words: supplemental zinc, zinc sulfate, Varamini ewes

W292 Mineral status of semi-confined dairy cattle from Marcos Castellanos, Michoacán. E. Aguillón Trejo, E. Cruz Hernández, M. Huerta Bravo*, and R. Améndola Massiotti, *Universidad Autónoma Chapingo*, *Chapingo, México, México*.

The objective was to measure the mineral status of semi-confined dairy cattle from nine farms of Marcos Castellanos, Michoacán, and México. Samples from soil (n= 42), feeds (n= 58), blood of dairy cows and calves (n= 116) and drinking water (31) were taken. Contents of calcium, phosphorous, magnesium, sodium, potassium, copper, iron, zinc and selenium were measured in all samples. Additionally, manganese was measured in feeds and soil. Spectrofluorometry, colorimetry and atomic absorption spectroscopy were used for selenium, phosphorus, and the rest of minerals, respectively. Copper and iron were not detected in water. The effects of farm, animal type and their interaction on the mineral content in blood serum were evaluated, as well as the effect of farm on the mineral content of feeds, soil and drinking water. Data sets were analyzed using GLM procedures. Contents of P, Fe, Zn and Se in blood serum from cattle were different ($P < .05$) among farms. Calves had higher ($P < .05$) levels of P and Zn in serum than cows; while that of Se was lower ($P < .05$). An interaction among animal type and farm was observed for serum contents of P, K, Fe, Zn, and Se ($P < .05$). Differences in mineral status of cows and calves among farms were related. Contents of all minerals in soils (excepting sodium) differed among farms ($P < .05$). Water sources differed ($P < .05$) for Ca, P, Mg, Na, and K. Feeds differed in all minerals ($P < .05$), except K and Fe that were highly variable. Serum of cattle was deficient in zinc (100%) and copper (70%). These deficiencies, confirmed by means of clinical signs, are related to low concentrations of the elements in water, forages, and the soils where forages are grown. Concentrates used by farmers are also low in these minerals. It is recommended to increase Zn and Cu in the supplementary feed or to use a palatable mineral supplement rich in these elements. *This study was carried out as part of EULACIAS INCO-dev Project, EU sixth Framework Programme, Contract No. 032387.*

Key Words: copper, zinc, minerals

W293 Total mixed ration mineral content in California dairy farms. A. R. Castillo*[1], N. Silva del Rio[1], and N. St-Pierre[2], [1]*University of California*, *Tulare*, [2]*The Ohio State University*, *Columbus*.

Forty commercial dairy farms in Merced County (CA) were selected to evaluate the mineral composition of total mix rations (TMR) for lactating cows accordingly to NRC requirements. Duplicated samples of the total mixed rations (TMR) were collected on two non-consecutive days, and analyzed with wet chemistry for Ca, P, Mg, Cl, K, Na, S, Cu, Fe, Mn, Se, and Zn. Dietary mineral content per farm was calculated according to TMR mineral content weighted by the proportion of animals in each production group. Milk production was estimated based on Dairy Herd Improvement (DHI) records and when not available, on bulk tank milk data. Milk production ranged from 20.6 to 43.5 kg/cow per day. The mineral content in the TMR were classified as: < 80%, 80% to 120%, >120% to 200% and >200% of NRC 2001 requirements for lactating cows. The higher near value for milk production was used to determine NRC mineral requirements. Results are presented in Table 1. Dietary Ca and Se content were below 80% of the NRC requirements in 2.5% of the dairies and in 7.5% for Cu. However, the dietary mineral content per farm was 120% or more of the NRC requirements in 57.5% and in 100% of the dairies, depending on the mineral. This study indicates that there is opportunity to adjust dietary macrominerals and trace minerals in lactating dairy cow diets in California.

Table 1. Proportions of California dairies (n=40) fed different percentages of NRC requirements in the total mix ration.

	% of NRC		Requirements	
mineral	<80	80 to 120	120 to 200	>200
Ca1	2.5	40	57.5	--
P	--	37.5	62.5	--
Mg	--	--	82.5	17.5
Cl	--	2.5	32.5	65
K	--	7.5	85	7.5
Na	--	15	37.5	47.5
S	--	25	75	--
Cu	7.5	27.5	47.5	17.5
Fe	--	--	--	100
Mn	--	--	--	100
Se	2.5	15	77.5	5
Zn	--	17.5	65	17.5

1 The higher near value for milk production was used to determine NRC requirements

Key Words: TMR mineral content, mineral requirement, dairy cow

W294 Effects of supplementation of beef cattle ration with rare earth elements on fermentation and digestion in batch culture. W. Z. Yang* and M. L. He, *Agriculture and Agri-Food Canada*, *Lethbridge, AB, Canada*.

Rare earth elements (REE) have been used as feed additives for many years in China and recently shown to improve growth performance of pigs in Europe. A study was conducted to investigate the effects of adding a mixture of REE in diet varied ratios of forage to concentrate (F:C) on fermentation and DM digestion in batch culture. The experiment was a complete randomized block design with 2 x 4 factorial arrangement of treatments. The treatments were high F:C (55:45) or low F:C (10:90) diet combined each with 4 dosages of REE: control (0 mg), low (400 mg), medium (800 mg) and high REE (1200 mg/kg diet, DM basis). The mixture of REE contains 38% of $LaCI_36H_2O$, 52% of $CeCI_36H_2O$ and 10% chlorides of other light REE. There were no interaction between F:C and REE. Fermentation pH linearly (P<0.05) decreased from 6.22 to 6.17 with increasing dosages of REE, which was consistent with linearly increasing concentrations of total VFA (from 25.3 to 34.6 m*M*), acetate (from 8.9 to 12.8 m*M*) and propionate (from 8.2 to 11.3 m*M*). However, the molar proportion of acetate, propionate and butyrate was not affected by REE. Gas production (ml/g of OM) was not affected at 4, 8, 14 and 24 h of incubation, but was quadratically changed (P<0.04) at 48 h of incubation for the highest with medium REE (398) and for the lowest with control (310). Similarly, digestibility of DM was also quadratically changed (P<0.04) ranging from 62.3, 62.8, 65.2 and 63.3% for control, low, medium and high REE, respectively, at 48 h of incubation. As expected, with decreasing dietary F:C, mean fermentation pH slightly reduced (P<0.01) from 6.23 to 6.15, which was consistent with linearly increase of concentration of total VFA from 29.8 to 33.6 m*M* (P<0.10). The results indicate that adding mixture of REE in beef diet increased feed fermentation with a dose-dependent manner but not associated with dietary forage proportion. The overall effects of REE on rumen fermentation and digestion are apparently limited.

Key Words: rare earth elements, fermentation, batch culture

W295 The effects of trace mineral source, water quality, and choline supplementation on performance and carcass characteristics of steers. J. S. Schutz*[1], J. L. Seabrook[1], K. L. Neuhold[1], J. J. Wagner[1], M. de Veth[2], and T. E. Engle[1], [1]*Colorado State University*, *Fort Collins*, [2]*Balchem Corporation*, *New Hampton, NY*.

Two hundred and eighty eight steers (316.0 ± 13.8 kg) were utilized to determine the effects of trace mineral source, water quality, and choline supplementation on performance and carcass characteristics. Upon entry into the feedlot, cattle were processed, randomly assigned to trace mineral and water treatments (2 × 2 factorial), and housed in 9 head pens. Trace mineral treatments consisted of: 1) control, 15 mg Cu/kg DM, 20 mg Mn/kg DM, and 45 mg Zn/kg DM supplemental trace minerals in inorganic form and 2) organic, iso-concentrations to the inorganic trace minerals composed of 50% organic and 50% inorganic trace mineral. Water treatments consisted of: 1) a blend of reverse osmosis and well water (1072.4 mg SO4/L) and 2) well water (2377.5 mg SO4/L). Standard receiving and finishing diets were fed twice daily. Twenty nine days prior to harvest, 4 pens per trace mineral and water treatment were supplemented with 20 g of protected choline/h/d and the remaining 4 pens served as the controls (0 g of supplemental choline). Steers were weighed on d 0, 28 and then at approximately 56 d increments until the experiment was terminated. There were no trace mineral source x time, trace mineral source x water quality, or trace mineral source x water quality x time interactions for BW, ADG, DMI, G/F, or F/G. Initial and final body weights, ADG, DMI, F/G and G/F were similar across trace mineral and water treatments. Choline supplementation for only the last 29 d on feed did not impact performance. Morbidity, mortality, and percent repulls were similar across trace mineral and water treatments. Steers receiving organic trace mineral had an improved USDA yield grade compared to steers receiving inorganic trace minerals (2.61 vs 2.82, respectively, P<0.03). Steers consuming well water tended (P < 0.08) to have greater longissimus muscle area (REA) and lower (P < 0.08) calculated YG than steers consuming RO water. Other carcass characteristics parameters were not affected by water quality, trace mineral source, or choline supplementation.

Key Words: steer, trace mineral, choline

W296 Effects of rumen protected choline on productive performance and blood metabolites of Holstein lactating cows. M. Dehghan-Banadaky*, F. Fatehi, and T. Ghasemi, *University of Tehran, Department of Animal Sci.*, *Karaj, Iran*.

Fifty four Holstein cows in early lactation (90±11 days in milk, milk production 34±3.3 kg/day) were used to evaluating the effects of feeding ruminally protected choline on milk yield and composition and blood metabolites for 40 days (10 days for adaptation, 30 days for data collection), between November to December of 2007. Cows were used in a complete block design with 2 blocks (parity, monoparous and multiparous), two treatments (choline supplement and control) and 27 replicates (cows). Cows in first group fed total mixed ration (TMR) with 100 gr Col24 (contain 24% rumen protected choline, SODA) /head/day as mixed to diet and cows in second group fed same TMR without choline additive (control). Cows fed ad libitum (10% refusal from previous day) and milked 3 times per day. Daily milk production recorded and milk samples taken for milk composition analysis as weekly also group dry matter intakes were measured daily. Blood samples were taken from jugular on day 38 (2 h after morning meal) for plasma metabolites analysis. Col24 significantly increased milk production of cows (32.98 vs. 31.63 kg/day) but did not affect milk composition and feed intake. Col24 supplement did not change concentration of non esterified fatty

acid (NEFA), beta hydroxyl butyric acid (BHBA), glucose, Aspartate aminotransferase (AST), cholesterol and total protein of plasma (P>0.05). We concluded that rumen protected choline supplement can improve milk production of cows in early lactating cows.

Key Words: rumen-protected choline, milk, Holstein cows

W297 Effectiveness of different levels of dietary vitamin E to prevent milk fat depression in dairy cows fed rich soybean oil diet. L. Q. Wang, J. Q. Wang*, D. P. Bu, S. J. Liu, G. C. Luan, and L. Wang, *State Key Laboratory of Animal Nutrition, Institute of Animal Science, Chinese Academy of Agricultural Sciences*, *Beijing, China*.

The present study was to evaluate the effectiveness of different levels of dietary vitamin E to prevent milk fat depression when cows receiving rich soybean oil diet and to examine the effect of dietary vitamin E on the *cis*-9, *trans*-11 CLA concentration. Forty-eight Holstein dairy cows were randomly assigned to 4 treatments. The control diet consisted of 60% forage and 40% concentration (no soybean oil) at dry matter (DM) basis, fed as a total mixed ration (TMR). The concentrate was partially replaced in the treatment groups with 4% of DM soybean oil (SOY), 4% of DM soybean oil plus daily 30 g of Vitamin E (containing 15,000 IU of α-tocopheryl, SOY/VE1), and 4% of DM soybean oil plus daily 40 g of Vitamin E (containing 20,000 IU of α-tocopheryl, SOY/VE2). Experiment lasted for 9 weeks. Measurements were taken during 3-9 wk of the experiment. Feed intake, milk yield, energy-corrected milk yield, and energy-corrected milk produced/kg of feed intake were similar among treatments. Percentage and yield of milk protein were not significantly different among treatments. The milk fat production was reduced by 22% when diets were partial replaced by soybean oil (Control vs. SOY). Diets of SOY/VE1 and SOY/VE2 enhanced the milk fat production by 6 (P>0.05) and 16% (P<0.05) compared with SOY treatment, respectively. There was no significant difference at *cis*-9, *trans*-11 CLA concentration when Vitamin E added to soybean oil diets (4.15, 3.95, and 3.60% of total fatty acids for SOY, SOY/VE1, and SOY/VE2; respectively). It was concluded from the present study that supplementation of Vitamin E (at 20,000 IU of α-tocopheryl in 4% of DM soybean oil) was effective to reduce the depression of milk fat, and no negative effect on concentration of *cis*-9, *trans*-11 CLA.

Key Words: vitamin E, soybean oil, milk fat

Ruminant Nutrition: Experimental Methods

W298 Water bath method for measuring NDF and ADF. A. C. Pereira, E. J. Bungenstab, J. C. Lin, and S. P. Schmidt*, *Auburn University*, *Auburn, AL*.

A modified procedure was developed for the sequential analysis of NDF and ADF that allows a high volume of samples to be analyzed in a relatively short period of time. In the modified procedure, 60 forage samples (0.5 to 1.0g) were weighed into individual pre-weighed and identified filter bags (F57, 25 µm, Ankom® Technology Corp.) and then heat sealed. The samples were placed in a water bath with either NDF or ADF detergent solutions (10 L for 60 samples) and maintained at a constant temperature (99°C) with agitation at 60 rpm for 60 min. Filter bags were kept immersed with a metal basket. The fiber bag ANKOM® method served as the control for evaluation of the modified water bath method (WB). The objective was to compare both procedures using different harvests of ryegrass, rye and oats forage samples. A completely randomized design with a replicated 2 (analytical procedures) × 3 (forages) × 2 (harvests) factorial arrangement of treatments was used. Mainly, the only difference between the two procedures was the substitution of the pressurized chamber from the Ankom® fiber analyzer by an inexpensive and simple water bath. There was a harvest and forage effect ($P<0.01$) for NDF and ADF and also a harvest × forage interaction ($P<0.05$ for NDF and $P<0.01$ for ADF), but there were no differences between the methods ($P> 0.05$) for either NDF (31.93% WB vs. 31.33% ANKOM®) or ADF (15.54% WB vs. 15.96% ANKOM®). The inter-assay coefficients of variation (CV) were low for NDF (100% of samples with CVs below 2.8%) and for ADF (83% of samples with CVs below 5% with the highest CV at 5.9%). The difference in the NDF value between methods and the mean was 0.3 percentage unit, which is just 0.95% of the mean. For ADF, the value of the difference was 0.21 percentage unit, which is 1.3% of the mean. There was a high relationship for both NDF ($R^2 = 0.97$) and ADF ($R^2 = 0.89$) between the methods. The WB analysis method produced repeatable results that were comparable to the ANKOM® method and can be used to process a large number of samples (up to 60 replicate samples) in the same amount of time that 12 replicate samples are processed using the ANKOM® method.

Key Words: detergent system, NDF and ADF, fiber analyses

W299 Analysis of fiber from coarsely ground corn plant components within in situ dacron bags. L. J. Nuzback, W. M. Rutherford, and F. N. Owens*, *Pioneer Hi-Bred International*, *Johnston, IA*.

Analysis of fiber within in situ bags would simplify measurement of NDF digestion by avoiding transfer and regrinding of samples and also could increase statistical precision. Automated aNDF analysis employs finely ground (1 mm) samples in stiff Dacron (F-57) bags. In contrast, the Dacron bags used for in situ measurement typically have a larger pore size and the test samples preferably are ground more coarsely. To determine if a modified NDF (CNDF) procedure would give estimates of fiber that match commercially measured aNDF values, 288 samples (whole plant and seven different corn plant parts from 3 hybrids harvested on 3 dates from 4 plots) were assayed. For CNDF analysis, 16 replicate 0.5 g coarsely ground (6 mm Wiley mill) sub-samples were placed in 5X5 cm 50 micron Dacron bags and heat sealed. Standard extraction procedures (Ankom Technology, Macedon, NY) were followed, but because the in situ bags slipped through holes in trays within the automated NDF extractor, screens were developed to guard the bag suspender holes. Following amylase treatment and extraction, residue weights closely matched aNDF (CNDF = 1.089 ± 0.19 aNDF – 5.77 ± 1.17; root MSE 4.0) with the difference being dependent on sample source. CNDF exceeded aNDF for cobs by an average of 4.4%. But CNDF averaged 3.6% less than aNDF for whole plant samples, with this difference being negatively ($R^2 = 0.86$) related to hemicellulose content of samples. Because assays agreed closely for all of the plant parts devoid of starch, increased weight loss by the CNDF procedure may reflect incomplete filtration of starch-rich samples by commercial aNDF procedures. Reliability of CNDF analysis for other sample types and its in vivo applicability remain to be determined. This CNDF procedure could markedly simplify and speed in situ fiber digestibility measurements.

Key Words: NDF digestion, analysis, fiber