

## Ruminant Nutrition: Beef: By-Product Feeds

**115 Effects of corn processing method and dietary inclusion of wet distillers grain with solubles on carbon-nitrogen balance of finishing cattle.** K. E. Hales<sup>\*1</sup>, N. A. Cole<sup>1</sup>, and J. C. MacDonald<sup>2</sup>, <sup>1</sup>USDA-ARS-CPRL, Bushland, TX, <sup>2</sup>Texas Agrilife Research Center, Amarillo.

The growing ethanol industry in the Southern Great Plains has increased the use of wet distillers grains with solubles (WDGS) in beef cattle finishing diets. Effects of corn processing method and WDGS on carbon (C) and nitrogen (N) balance were evaluated in 4 Jersey steers using respiration calorimetry chambers. A 2 × 2 factorial arrangement of treatments was used in a Latin square design. The factors consisted of corn processing method (steam flaked corn [SFC] or dry-rolled corn [DRC]) and inclusion of corn-based WDGS (0 or 30% on a DM basis). Thus, the 4 treatment combinations consisted of: (1) SFC-based diet with 0% WDGS (SFC-0); (2) SFC-based diet with 30% WDGS (SFC-30); (3) DRC-based diet with 0% WDGS (DRC-0); and (4) DRC-based diet with 30% WDGS (DRC-30). Diets were balanced for DIP and fat. Total C (including gaseous-C) excretion ( $P < 0.01$ ) and methane-C ( $P < 0.04$ ) were greater for cattle consuming DRC than SFC-based diets, and cattle consuming SFC diets retained a greater ( $P < 0.01$ ) quantity of C than those consuming DRC diets. Inclusion of WDGS did not affect ( $P > 0.52$ ) C balance, except that cattle consuming diets containing 30% WDGS excreted more ( $P < 0.01$ ) C in the urine than cattle consuming diets with no WDGS. No differences in N balance were detected ( $P > 0.19$ ) between grain processing methods, although apparent N digestibility was greater ( $P = 0.02$ ) for cattle consuming DRC- than SFC-based diets and N retained tended ( $P = 0.10$ ) to be greater for cattle consuming DRC than SFC-based diets. Due in part to greater N intake, cattle consuming diets containing 30% WDGS excreted more ( $P = 0.01$ ) total N and excreted a greater ( $P < 0.01$ ) quantity of N in the urine. Apparent N digestibility (g/d and % of N intake;  $P < 0.03$ ) and N retained ( $P < 0.05$ ) were also greater in cattle consuming 30 compared with 0% WDGS. From these results we conclude that finishing cattle excrete a greater amount of C when fed DRC compared with SFC-based diets, and that dietary inclusion of 30% WDGS increases urinary N excretion when diets are balanced for equal DIP concentration.

**Key words:** distillers grain, corn processing, nitrogen

**116 Effects of corn processing method and dietary inclusion of wet distillers grain with solubles on energy metabolism and enteric methane emissions of finishing cattle.** K. E. Hales<sup>\*1</sup>, N. A. Cole<sup>1</sup>, and J. C. MacDonald<sup>2</sup>, <sup>1</sup>USDA-ARS-CPRL, Bushland, TX, <sup>2</sup>Texas Agrilife Research Center, Amarillo.

Few studies have used steam-flaked corn (SFC)-based diets to evaluate the effects of wet distillers grains with solubles (WDGS) in finishing cattle diets, and a reliable estimate of the net energy value of WDGS has yet to be determined. Effects of corn processing method and WDGS on energy metabolism and enteric methane (CH<sub>4</sub>) production were evaluated in 4 Jersey steers using respiration calorimetry chambers. A 2 × 2 factorial arrangement of treatments was used in a Latin square design. The factors consisted of corn processing method (SFC or dry-rolled corn [DRC]) and inclusion of corn-based WDGS (0 or 30% on a DM basis). Thus, the resulting 4 treatment combinations consisted of: (1) SFC-based diet with 0% WDGS (SFC-0); (2) SFC-based diet with 30% WDGS (SFC-30); (3) DRC-based diet with 0% WDGS (DRC-0); and (4) DRC-based diet with 30% WDGS

(DRC-30). The diets were balanced for DIP and fat. Each Latin square period consisted of 14 d diet adaptation and 7 d of fecal, urine, and gas (oxygen consumption, and carbon dioxide and CH<sub>4</sub> production) collections. As a proportion of gross energy (GE) intake, grain processing method did not affect ( $P > 0.12$ ) fecal, digestible, urinary, and metabolizable energy or heat production. In contrast, retained energy tended to be greater ( $P = 0.09$ ) for cattle consuming SFC- than DRC-based diets. Inclusion of WDGS did not affect ( $P > 0.17$ ) fecal, digestible, urinary, metabolizable, and retained energy, or heat production as a proportion of GE intake. Steers consuming SFC diets produced less ( $P < 0.04$ ) CH<sub>4</sub> (L/kg of DMI, % of GE intake) than steers consuming DRC diets. No differences were noted ( $P > 0.55$ ) for CH<sub>4</sub> production between inclusion levels of WDGS. Results suggest that cattle consuming SFC diets produce less CH<sub>4</sub> and retain more energy than cattle fed DRC diets; however, dietary inclusion of WDGS at 30% seems to have little effect on CH<sub>4</sub> production and energy metabolism when diets are balanced for DIP and fat.

**Key words:** distillers grain, corn processing, methane

**117 Effects of spoilage of wet distillers grains plus solubles on feedlot performance.** J. L. Harding<sup>\*</sup>, B. N. Nuttleman, K. R. Rolfe, T. J. Klopfenstein, and G. E. Erickson, *University of Nebraska-Lincoln*.

A study was conducted using 60 individually fed crossbred steers (399 ± 30 kg initial BW) in a CRD to evaluate the impact of spoilage of wet distillers grains plus solubles (WDGS) on feedlot performance. The 3 treatments included a dry-rolled corn based diet (control) and 2 diets containing 40% WDGS replacing DRC. The WDGS was purchased from the same ethanol plant on the same day and split equally within semi-load into either an uncovered bunker (spoiled WDGS) or into a silo bag and stored anaerobically (non-spoiled WDGS). Storage occurred 38 d before the initiation of the experiment. To ensure representative quality, samples of both WDGS were collected daily after allowing the WDGS to mix alone in the truck before diet mixing. Samples were composited by week for nutrient analysis. Composition of non-spoiled WDGS was 33.4% DM, 5.6% ash, 14.8% fat, 31.7% NDF, 30.8% CP, and a pH of 4.2. Composition of spoiled WDGS was 35.2% DM, 6.4% ash, 14.1% fat, 33.3% NDF, 30.8% CP, and a pH of 4.8. Nutrient analyses on the non-spoiled and spoiled WDGS samples were used to calculate nutrient loss for the spoiled WDGS. Calculations suggest 12% of DM was lost during storage of spoiled WDGS, with 16% fat and 8% NDF also lost compared with non-spoiled WDGS. No differences were observed in mycotoxins between spoiled and non-spoiled WDGS. Feeding control, non-spoiled WDGS, or spoiled WDGS did not affect DMI ( $P = 0.50$ ). No differences ( $P \geq 0.26$ ) in ADG (1.39 ± 0.30 kg), final BW (571 ± 46 kg), or G:F were observed between non-spoiled and spoiled WDGS treatments with 0.135 and 0.140 observed for G:F, respectively. However, both WDGS treatments were greater ( $P \leq 0.04$ ) in ADG, final BW, and G:F compared with control (1.17 ± 0.24 kg ADG, 550 ± 43 kg final BW, and 0.117 G:F). No differences were observed for LM area ( $P = 0.35$ ), fat ( $P = 0.86$ ), marbling ( $P = 0.57$ ), or yield grade ( $P = 0.67$ ). Even though spoiled WDGS changed in nutrient composition, it did not affect feedlot performance of finishing steers.

**Key words:** cattle, spoilage, wet distillers grains plus solubles

**118 Effect of partially replacing barley grain with wheat bran alone or in combination with condensed liquid whey on performance of backgrounding steers.** A. D. Friedt<sup>1</sup>, T. A. McAllister<sup>2</sup>, B. Wildeman<sup>3</sup>, and J. J. McKinnon<sup>1</sup>, <sup>1</sup>University of Saskatchewan, Saskatoon, SK, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Lethbridge Research Centre, AB, Canada, <sup>3</sup>Pound-Maker Agventures Ltd., Lanigan, SK, Canada.

Debranning of wheat can increase starch throughput and thus increase the efficiency of ethanol production. It also generates a unique by-product, wheat bran (WB) that can potentially be used as cattle feed. Few published results are available on WB as a feed source for cattle, particularly in combination with other byproducts such as condensed liquid whey (CLW). The objective of this trial was to evaluate the use of WB as a replacement for rolled barley (RB) in backgrounding diets, alone or in conjunction with CLW. Angus cross steers ( $n = 312, 303 \pm 65$  kg) were randomly assigned to 1 of 24 pens and fed 1 of 6 diets in a 2x3 factorial design. Dietary treatment included 2 levels of CLW (0 and 4.5%) and 3 levels of WB (0, 14 and 28%). Diet 1 consisted of 31.8% RB, 40.6% grass hay, 13.5% barley silage, 7.3% corn/wheat blend DDGS and 6.9% supplement (DM basis). Diet 2 was identical to diet 1 except 4.5% of RB was replaced with CLW. In the remaining diets, at each level of CLW, WB replaced RB at 14 and 28% (DM basis). Performance data over a 90 d period was analyzed as a completely randomized design with a factorial treatment arrangement with pen as the experimental unit. No ( $P > 0.10$ ) WB by CLW interactions were detected. As well, no ( $P > 0.10$ ) influence of CLW was seen on any performance parameter. Dry matter intake (DMI) was increased ( $P < 0.01$ ) at each level of WB. Average daily gain (ADG) was not ( $P > 0.05$ ) affected by treatment, however gain:feed was reduced ( $P < 0.01$ ) at each level of WB inclusion. As a result,  $NE_m$  and  $NE_g$  of the diets, calculated based on animal performance was lower ( $P < 0.01$ ) in the WB diets. Ultrasound l. dorsi area and subcutaneous fat thickness were not ( $P > 0.10$ ) affected by treatment. The results of this study indicate that WB from front end processing of wheat at ethanol production facilities is a viable source of energy for growing cattle when fed with or without CLW. However, dietary  $NE_g$  concentration will be up to 16% lower when WB is fed as a replacement for RB at levels up to 28% of diet DM.

**Key words:** wheat bran,  $NE_g$ , backgrounding

**119 Effects of wet distillers grains plus solubles on health and performance of high-risk calves.** J. J. Wagner\*, C. R. Krehbiel, D. B. Burken, B. K. Wilson, D. L. Step, and C. J. Richards, Oklahoma State University, Stillwater.

A randomized complete block design utilizing 180 high-risk crossbred yearling steers (initial BW =  $212.3 \pm 1.9$  kg) was used to study the effects of including wet distillers grains plus solubles (WDGS) in a receiving diet on ADG, DMI, G:F, and morbidity over a 42-d period. Steers were sorted into light and heavy weight blocks and randomly assigned within block to 15 pens, each with 6 animals. Experimental treatments consisted of diets with inclusion of 0%, 15%, or 30% WDGS. Pens were considered the experimental unit and each treatment diet was fed to calves in 10 pens. Cattle were fed 2 times daily with approximately 50% of the daily allowance fed at each feeding. Feed refusals were measured following adverse weather and on weigh days. Steers were individually weighed at the start of the experiment, on d 14, and on d 42. During the experiment, 3 steers on the 0% treatment were diagnosed as chronically morbid with bovine respiratory disease (BRD) and were removed from the experiment. Average daily

gain ( $P < 0.20$ ; 0.96, 1.13, and 1.14 kg/d), DMI ( $P < 0.27$ ; 4.75, 5.16, and 5.04 kg/d), G:F ( $P < 0.79$ ; 0.222, 0.213, and 0.212), and animals treated for BRD ( $P < 0.20$ ; 0.19, 0.20, 0.23) did not differ among treatments for 0, 15, or 30% WDGS, respectively. There were 3 chronics and no deaths during this experiment. Feeding WDGS receiving diets to high-risk calves did not impact animal health or performance. We conclude that up to 30% WDGS can be included in receiving diets for high-risk calves.

**Key words:** WDGS, high-risk calves, yearling steers

**120 Effect of feeding crude glycerin on prevalence of *E. coli* O157:H7 in growing cattle.** C. Aperce\*, J. Heidenreich, C. J. Schneider, and J. S. Drouillard, Kansas State University, Manhattan, Kansas.

The objective of this study was to evaluate the effect of crude glycerin inclusion on *E. coli* O157:H7 prevalence in feces of cattle fed growing diets. Three levels of crude glycerin, 0, 4 or 8%, were added to growing diets containing dry-rolled corn, corn silage, alfalfa hay, and corn steep liquor. Each treatment was represented by 16 pens, each containing 7 to 8 heifers. Fecal grab samples were taken once/wk for 6 wk during summer of 2010. One gram of feces was incubated for 6 h at 40°C in gram-negative broth with cefixime (0.05 mg/L), cefsulodin (10 mg/L), and vancomycin (8 mg/L). One milliliter of broth was then added to *E. coli* O157 beads, subjected to immunomagnetic separation (IMS), and plated onto MacConkey agar with sorbitol, cefixime, and tellurite (CT-SMAC). After overnight incubation at 37°C, non-sorbitol fermenting colonies were picked and tested for indole production and O157 antigen agglutination. Positive colonies for both tests were confirmed as *E. coli* O157:H7 using the API 20E kit. Treatment effects and interactions were analyzed using Proc Glimmix of SAS. There was no interaction between sampling day and level of crude glycerin ( $P > 0.2$ ). Percentages of samples that tested positive for *E. coli* O157:H7 were 1.3, 0.8, 4.3, 8.8, 4.3, and 5.8% during wk 1 through 6, respectively (effect of sampling day,  $P < 0.01$ ). Fecal incidence rates of *E. coli* O157:H7 were 5.8, 4.3, and 2.4% for heifers fed 0, 4, and 8% glycerin, respectively (Linear,  $P < 0.01$ ). Prevalence in heifers fed 4% glycerin tended to differ from that of cattle fed 8% glycerin ( $P = 0.06$ ), but was not different from that of cattle fed the diet with 0% glycerin. Glycerin previously has been shown to inhibit the activity of cellulolytic bacteria in the rumen. Consequently, changes in fecal prevalence of *E. coli* O157:H7 observed in this study might be explained by alterations in gastrointestinal flora, with higher levels of glycerin producing a less favorable environment for the proliferation of pathogenic *E. coli*. Glycerin may be useful as a means of decreasing fecal prevalence of *E. coli* O157:H7 in cattle.

**Key words:** *E. coli* O157:H7, glycerin

**121 Effects of distillers grain with soluble and supplemental copper and molybdenum on ammonia emissions and nitrogen retention.** L. D. Cross\*, S. R. Rust, and W. J. Powers, Michigan State University.

When moderate to high levels of DGS are fed, dietary CP is elevated, which may contribute to environmental pollution from increased nitrogen (N) emissions. A study was conducted to evaluate the effects of dried distillers grain with soluble (DDGS) on ammonia ( $NH_3$ ) emissions. Twelve Holstein steers were housed in environmentally controlled rooms; 4 steers per dietary treatment. Three dietary treatments were fed; 0% DDGS (control), 40% DDGS, and 40% DDGS plus 6 ppm molybdenum (Mo) and 60 ppm copper (Cu) added to the diet. The

diet supplemented with Mo and Cu will be referred to as 40% DDGS plus. The study was divided into phases; phase 1 monitored emissions data for 22 d from the animal and manure (feces and urine mixture) and phase 2 monitored emissions for 4 d while steers were fitted with fecal bags to separate feces from urine. Ammonia emissions across all treatments were reduced from 74.8 mg/g N intake (NI)/d during phase 1 to 11.2 mg/g NI/d during phase 2 ( $P < 0.01$ ). Within phase 1, both 40% DDGS diets had significantly greater  $\text{NH}_3$  emissions at 83.0 mg/g NI/d compared with the control diets at 58.5 mg/g NI/d ( $P < 0.01$ ). The 40% DDGS diet also differed in  $\text{NH}_3$  emissions from 76.3 mg/g NI/d to 89.7 mg/g NI/d in 40% DDGS plus ( $P = 0.05$ ). Total N balance was calculated from data collected during phase 2. Nitrogen intake increased from 129.8 g/d to 214.1 g/d in both 40% diets ( $P < 0.01$ ). Nitrogen loss from gas ( $\text{NH}_3$ ,  $\text{NO}_2$ , and  $\text{NO}$ ) and feces were similar among treatments; however urine increased from 43.2 g/d to 78.1 g/d in both 40% DDGS diets ( $P < 0.01$ ). The 40% DDGS plus diets had the greatest levels of total expelled N at 155.4 g/d compared with the control diets at 108.1 g/d. Additionally, inclusion of DDGS at 40% increased N retention from 21.7 g/d in the control diets to 69.3 g/d in the 40% DDGS diet ( $P = 0.03$ ). The 40% DDGS plus diets had a mean N retention of 57.0 g/d, which was not significantly different from the control diets.

**Key words:** distillers grain with soluble, ammonia & nitrogen, molybdenum & copper

**122 Effect of adding rumen degradable protein to a dried distillers grain supplement on growth performance and body composition in yearling Angus and Brangus heifers.** E. N. Alava\*, A. M. Monari, M. J. Hersom, and J. V. Yelich, *University of Florida, Gainesville.*

The objective of the experiment was to evaluate addition of a RDP source to a dried distillers grain (DDG) supplement in Angus ( $n = 30$ ;  $229 \pm 4$  kg) and Brangus ( $n = 30$ ;  $250 \pm 4$  kg) yearling heifers. On d 0, heifers were stratified by BW, breed, and sire to 12 pens of 5 heifers per pen and pens were randomly assigned to one of 3 supplementation treatments: DDG only (DDG), DDG plus soybean meal at 7.5% of total supplement (DDG+7.5), and DDG plus soybean meal at 15% of total supplement (DDG+15). Heifers were supplemented at a rate of 0.75% of BW, based on mean pen BW, and adjusted on a 28 d basis. All treatment groups also received ad libitum access to bermudagrass (*Cynodon dactylon*) round bale silage. Supplement was offered 3 d/wk. From d 0 to 140, BW and BCS were collected every 14 d and hip height (HH) every 28 d. On d 0 and 140 ultrasound measurements of the LM area (REA), 13th rib fat thickness (RIBFT), rump fat thickness (RMPFT), and intramuscular fat (IMF) were taken. Data were analyzed using MIXED procedure of SAS. There were no treatment differences ( $P > 0.05$ ) in BW ( $351 \pm 4.1$  kg), BCS ( $5.6 \pm 0.05$ ) or HH ( $121 \pm 0.5$  cm) at d 140. Hip height was greater ( $P \leq 0.05$ ) for Brangus than Angus at d 0 ( $115 \pm 1.4$  vs.  $109 \pm 1.4$  cm) and d 140 ( $123 \pm 1.2$  vs.  $118 \pm 1.2$  cm), respectively. There were no treatment differences ( $P > 0.05$ ) for d 140 IMF, REA/100 kg BW, RMPFT, RIBFT, or ADG. However, DDG+15 ( $61.5 \pm 1.6$  cm<sup>2</sup>) had a larger ( $P \leq 0.05$ ) REA than DDG+7.5 ( $57.0 \pm 1.6$  cm<sup>2</sup>) and DDG ( $57.2 \pm 1.6$  cm<sup>2</sup>). Angus heifers had greater d 140 IMF ( $P \leq 0.05$ ;  $4.8 \pm 0.2$  vs.  $3.1 \pm 0.2$  %), smaller REA ( $P \leq 0.05$ ;  $54.3 \pm 1.3$  vs.  $62.8 \pm 1.3$  cm<sup>2</sup>), smaller REA/100 kg BW ( $P \leq 0.05$ ;  $15.8 \pm 0.3$  vs.  $17.5 \pm 0.3$  cm<sup>2</sup>), and less RMPFT ( $P \leq 0.05$ ;  $0.54 \pm 0.02$  vs.  $0.31 \pm 0.25$  cm) than Brangus, respectively. Final pregnancy rates were similar ( $P > 0.05$ ; DDG = 95.0, DDG+7.5 = 78.9, DDG+15 = 80.0%) across treatments. Addition of RDP to a DDG supplement provided no additional benefit to growing yearling Angus or Brangus heifers.

**Key words:** *Bos indicus*, dried distillers grain, heifer

**123 Feeding distillers grains containing elevated sulfur concentration depresses performance of feedlot steers.** S. Uwituze<sup>1</sup>, C. L. Van Bibber\*<sup>1</sup>, K. A. Miller<sup>1</sup>, K. K. Karges<sup>2</sup>, L. C. Hollis<sup>1</sup>, J. J. Higgins<sup>3</sup>, and J. S. Drouillard<sup>1</sup>, <sup>1</sup>Department of Animal Sciences and Industry Kansas State University, Manhattan, <sup>2</sup>Poet Nutrition, Sioux Falls, SD, <sup>3</sup>Department of Statistics Kansas State University, Manhattan.

Crossbred yearling steers ( $n = 50$ ;  $462 \pm 26.6$  kg BW) were used in a finishing trial to evaluate effects of feeding dried distillers grains with solubles (DDGS) containing elevated sulfur levels on feed consumption, growth performance, and carcass traits. The study was a randomized complete block design with 3 treatments: chronic high S (CHS; 0.60% DM), chronic intermediate S (CIS; 0.50% DM), and sporadic intermediate S (SIS; 0.40 or 0.60% DM). Two DRC-based finishing diets (0.40 and 0.60% S) containing 30% DM of DDGS were mixed each morning. The CIS diet was made by mixing (50:50) 0.40 and 0.60% S diets. The SIS treatment consisted of intermittent feeding of either 0.40 or 0.60% S based on a random feeding schedule. The CIS and SIS treatments delivered same S content over the entire study period. Steers were blocked by weight and randomly assigned within block to treatments and 50 individual concrete surfaced pens equipped with feed bunks and water fountains that allowed free access to feed and clean water. Steers were fed once daily at approximately 0800 h and feed refusals were determined at approximately 0700 h the following day, thus making it possible to determine actual daily DMI. Steers were harvested on d 100 ( $n = 27$ ) and 135 ( $n = 23$ ). There were no treatment effects on carcass traits ( $P > 0.10$ ). Treatment effects on growth performance are summarized below. Elevated dietary S depresses feed intake by feedlot cattle.

**Table 1.** Treatment effects on performance of feedlot steers

Item	Treatments			SEM	P-value
	CHS	CIS	SIS		
DMI, kg/d <sup>1</sup>	9.8 <sup>a</sup>	10.9 <sup>b</sup>	10.4 <sup>b</sup>	0.28	0.02
ADG, kg/d	1.19	1.41	1.33	0.072	0.09
G:F	0.119	0.128	0.127	0.006	0.46
HCW, kg	381.2	391.2	390.9	5.33	0.35

<sup>1</sup>within a row, numbers bearing different superscripts are different,  $P < 0.05$ .

**Key words:** distillers grains, feedlot, sulfur

**124 Effects of crude glycerin in byproducts diets on performance and carcass characteristics of feedlot cattle.** E. H. C. B. van Cleef\*<sup>2</sup>, S. Uwituze<sup>1</sup>, C. L. Van Bibber<sup>1</sup>, K. A. Miller<sup>1</sup>, C. C. Aperce<sup>1</sup>, K. L. Blaine<sup>1</sup>, J. J. Higgins<sup>1</sup>, and J. S. Drouillard<sup>1</sup>, <sup>1</sup>Kansas State University, Manhattan, <sup>2</sup>São Paulo State University, Jaboticabal, São Paulo, Brazil.

Crossbred heifers ( $n = 374$ ;  $334 \pm 37$  kg BW) were used to evaluate feedlot performance and carcass traits when fed diets containing 0, 7.5, or 15% crude glycerin. Treatments (5 diets) consisted of a control diet containing 31% dry-rolled corn, 10% corn silage, 35% wet corn gluten feed, 20% soybean hulls, 0.3% salt, and 3.7% supplement, and diets containing 7.5 or 15% glycerin (DM basis) with and without 0.3% salt. Glycerin replaced dry-rolled corn. Heifers were vaccinated against common viral and clostridial diseases, de-wormed, implanted,



and stratified by initial BW. Within strata, heifers were assigned randomly to 25 feedlot pens (5/treatment). Over a period of 21 d, heifers were transitioned from diets containing 50% concentrate to their respective 90% concentrate finishing diets using 4 step-up diets that contained progressively greater proportions of concentrate. Final diets provided 14% CP, 0.7% Ca; 0.5 mg/d melengestrol acetate, 300 mg/d monensin, and 90 mg/d tylosin. Zilpaterol was included in the diet starting 23 d before harvest, and fed for 20 d, and cattle were harvested on d 125. Data were analyzed using the Mixed procedure of SAS, with treatment as a fixed effect and weight strata as a random effect. Removing salt from glycerin-based diets did not impact finishing performance ( $P \geq 0.50$ ). Glycerin did not influence ADG ( $P \geq 0.3$ ), but resulted in a linear decrease in DMI (12.4, 11.8, and 11.3 kg/d for 0, 7.5, and 15% glycerin, respectively;  $P \leq 0.01$ ) and a linear improvement in gain efficiency (0.148, 0.151, and 0.158;  $P \leq 0.05$ ). Carcass weight, USDA yield grade, LM area, and % KPH were unaffected ( $P \geq 0.10$ ) by diet. Twelfth rib fat thickness was less for heifers fed 15% glycerin without salt compared with other treatments ( $P \leq 0.05$ ), but the remaining treatments did not differ ( $P \geq 0.10$ ). Marbling was less for heifers fed diets containing glycerin compared with heifers fed the control diet (linear effect of glycerin,  $P \leq 0.01$ ; quadratic effect,  $P \leq 0.05$ ). Including glycerin in byproduct-based diets improves feed efficiency by decreasing feed intake, but also depresses marbling score and quality grade.

**Key words:** byproducts, glycerin, salt

**125 Use of corn or crude glycerol as energy source to supplement holstein calves fed with sorghum silage ad-libitum.** P. Chilibroste\*<sup>1</sup>, A. Elias<sup>2</sup>, and J. P. Marchelli<sup>1</sup>, <sup>1</sup>Agronomy Faculty, EEMAC, Paysandu, Uruguay, <sup>2</sup>Instituto de Ciencia Animal, San Josepe de las Lajas, La Habana, Cuba.

An experiment was conducted to determine the BW and DMI of Holstein calves fed sorghum silage as the only fiber source and supplemented or not with a concentrate based either in corn grain or crude glycerol as energy source. The experiment took place between October 26 and December 21 of 2010 at the Experimental Station M. A. Cassinoni, Agronomy Faculty of the Republic University in Uruguay. Data were analyzed in a completely randomized block design with a repeated measurement in time model. Twenty-four  $6.6 \pm 1.2$  mo old Holstein female dairy calves were randomly assigned to one of the following 3 treatments: TS = whole crop sorghum silage fed ad-libitum, TSC = TS plus a corn based supplement (10g/kg LW), TSG = TS plus a glycerol based supplement (10g/kg LW). Chemical composition of sorghum silage, corn and glycerol based supplement are shown in Table 1. BW of calves at the beginning of the experiment was  $181.5 \pm 14.2$  kg. Feeds were offered once a day andorts were collected, weighed and sampled daily before the new offer. Animals were weighed every 15 d with overnight fasting. Average daily gains (kg/day) were significantly higher ( $P < 0.01$ ) for TSC (0.518) and TSG (0.571) than TS (0.189) while TSC and TSG were not significantly different between them. Mean silage intake (as fed) was  $16.6 \pm 2.84$

kg/day with no significant difference between treatments neither in the mean value nor in the slope heterogeneity test. We conclude that both supplements (TSC and TSG) can be used to feed Holstein calves with similar efficiency.

**Table 1.** Feeds chemical composition

Fraction	Sorghum silage	Corn based supplement	Glycerol based supplement
CP %	7.0±0.67	31.6±3.2	30.3±5.6
NDF %	73.9±1.62	22.3±2.3	16.5±0.7
ADF %	45.9±2.5	9.15±1.2	9.05±2.76

**Key words:** corn, crude glycerol, Holstein calves

**126 Substitution of distillers grains and glycerin for steam-flaked corn in finishing cattle diets on performance and carcass characteristics.** J. Jaderborg\*, D. M. Paulus, G. I. Crawford, and A. DiCostanzo, University of Minnesota, St. Paul.

This study was designed to determine the effect of substituting modified distillers grains (DGS) or soy glycerin for steam-flaked corn (SFC) in finishing diets on performance and carcass characteristics of yearling cattle. Forty-eight crossbred yearling cattle (21 steers and 27 heifers) averaging 380 kg initial BW were blocked by sex and allotted to one of 48 individual feed bunks. Nine animals were removed from the study; one for health reasons, and the others were confirmed outliers resulting from feed stealing. Cattle were fed one of 4 dietary treatments once daily at 0800. Treatments resulted from the  $2 \times 2$  factorial arrangement of DGS at 0% or 35% of diet DM and glycerin at 0% or 10% of diet DM in SFC (0.47 kg/L flake density) and grass hay (10% of diet DM) diets: 1) DGS and no glycerin, 2) no DGS and no glycerin, 3) DGS and glycerin, 4) no DGS and glycerin. Diets contained 16.5% CP, 1.48 Mcal NEg/kg DM, 0.75% Ca, 0.47% P, and from 0.17% to 0.25% S. Dry matter intake was greater ( $P < 0.003$ ) for cattle fed diets containing DGS than for those fed diets without DGS (9.97 vs. 8.43 kg/d). Carcass-adjusted ADG ( $1.41 \pm 0.24$  kg) was not affected ( $P > 0.10$ ) by feeding either co-product. A tendency ( $P = 0.06$ ) for greater carcass-adjusted G:F (0.171 vs. 0.145) was observed for cattle consuming diets without DGS. Carcass-adjusted G:F was similar ( $P > 0.10$ ) for cattle fed glycerin and those fed no glycerin (0.157 vs. 0.159). Hot carcass weight ( $370 \pm 28$  kg), LM area ( $82.6 \pm 6.45$  cm<sup>2</sup>), 12th rib fat depth ( $1.40 \pm 0.37$ cm), yield grade ( $2.74 \pm 0.64$ ) and marbling score ( $530 \pm 60$ ) were not ( $P > 0.10$ ) affected by dietary treatment. However, KPH was greater ( $P < 0.01$ ) for cattle fed DGS diets than for those fed diets without DGS (2.71% vs. 2.42%). Iterated ME values of diets containing DGS were 13% lower ( $P < 0.05$ ) than those without DGS. At the inclusion levels in this study, soy glycerin had a similar energy value and DGS a lesser energy value than SFC.

**Key words:** cattle, distillers grains, glycerin