

70 Wet corn gluten feed and CP for steam flaked corn-based finishing diets. H. C. Block^{*1}, C. N. Macken¹, T. J. Klopfenstein¹, R. J. Cooper², and R. A. Stock², ¹University of Nebraska - Lincoln, ²Cargill.

A 166-d feeding trial was conducted to evaluate combinations of wet corn gluten feed (WCGF) and CP in steam flaked corn-based finishing diets. The trial used 360 steer calves (288 ± 11 kg) in an incomplete 4 × 3 CRD feeding trial. Treatments were WCGF (0, 20, 30, and 40% of DM) and CP (13.0, 13.7, and 14.4% of DM) via supplemental urea. The 0% WCGF treatment included only 13.7% CP, and 40% WCGF included only 13.7 and 14.4% CP. Steers were housed in 36 open lot pens, allowing 4 replicates per treatment combination. Final CP contents were 13.9% CP for 0% WCGF, 13.4, 14.1, and 14.8% CP for 20% WCGF, 13.5, 14.2, and 14.9% CP for 30% WCGF, and 14.5 and 15.0% CP for 40% WCGF. Hot carcass weight, ADG, and feed efficiency (ADG:DMI) responded to WCGF in a quadratic fashion ($P \leq 0.05$). The 20, 30, and 40% WCGF treatments increased predicted ADG by 107, 106, and 103%, respectively, relative to 0% WCGF. Feed efficiency was 102, 101, and 98% for 20, 30, and 40% WCGF, respectively, relative to 0% WCGF. Dry matter intake increased linearly ($P \leq 0.05$) in response to increased WCGF. Hot carcass weight, ADG, and feed efficiency increased linearly ($P \leq 0.05$) in response to increased CP. Non-linear analysis for degradable intake protein (DIP) over the combined 20 and 30% WCGF treatments indicated DIP requirements of 8.6% of DM for ADG, and 8.4% of DM for feed efficiency, corresponding to 13.8 and 13.6% CP for 20% WCGF and 14.0 and 13.8% CP for 30% WCGF, respectively. Carcass fat thickness, marbling, ribeye area, and yield grade were unaffected by WCGF or CP. These results indicate that the amount of WCGF to include in steam flaked corn-based finishing diets to maximize ADG and feed efficiency was 20% to 30% of DM, with a linear response to increased CP supplementation. The requirement for DIP in these diets was approximately 8.5% of DM.

Key Words: Wet Corn Gluten Feed, CP, Steam Flaked Corn

71 The effect of freezing on Warner-Bratzler shear force values in beef longissimus steaks across several post-mortem aging periods. B. C. Shanks^{*}, D. M. Wulf, and R. J. Maddock, *South Dakota State University, Brookings, SD.*

The objective of this study was to compare two Warner-Bratzler shear force (WBSF) protocols: a) **Fresh protocol** = WBSF measurement of steaks cooked on the exact day the aging period ended vs b) **Frozen protocol** = WBSF measurement on steaks that were aged, frozen (-16C) for approximately two mo, thawed for 24 h, and then cooked. Right and left side strip loins from 20 crossbred heifers and steers were sliced into 11 steaks each (22 steaks per animal), individually vacuum-packaged, and randomly assigned to either fresh or frozen protocol and one of 11 aging periods (1, 2, 3, 4, 5, 6, 7, 10, 14, 21, or 35 d). Following the appropriate aging/storage protocol, steaks were broiled on Farberware Open Hearth electrical broilers to an internal temperature of 71C and up to six 1.27-cm-diameter cores parallel to muscle fiber orientation were sheared using a Warner-Bratzler shear machine. Frozen protocol resulted in lower ($P < 0.05$) WBSF values than fresh protocol for beef longissimus steaks that were aged for 1, 2, 3, 4, 6, 7, 10, 14, or 35 d post-mortem. The interaction between protocol and postmortem aging for WBSF was significant ($P < 0.05$) and indicated that the effect of freezing on WBSF values decreased as aging period increased. Correlations revealed that frozen protocol WBSF values were not highly indicative of fresh protocol WBSF values at the same period of postmortem aging, but rather, suggested that frozen protocol WBSF values at shorter aging times were useful in estimating WBSF values from fresh protocols at longer aging times. Cooking loss was higher ($P < 0.05$) for frozen vs fresh protocol steaks at all aging periods except for 14, 21, or 35 d. These findings suggest that if research constraints warrant the freezing of samples, d-7 WBSF should be used because it is the best measurement of fresh aged beef (14 to 21 d) tenderness. In trials where several postmortem aging periods or very short aging periods are of interest, it is recommended that WBSF be assessed using the fresh protocol.

Key Words: Beef, Freezing, Warner-Bratzler Shear Force

72 Effect of previous liveweight gain on visceral organ mass and oxygen consumption in cattle during high-grain feeding. M. J. Hersom^{*}, C. R. Krehbiel, and G. W. Horn, *Oklahoma State University, Stillwater, OK.*

Forty-eight fall-weaned crossbred steers (231±25 kg) were used in a completely random design to determine the effect of previous liveweight gain on visceral organ mass and oxygen consumption. During the 143-d growing phase, treatments were high (HGW; 1.28 kg/d) or low (LGW; .48 kg/d) daily BW gain on wheat pasture or dormant native range (NR; .21 kg/d). Before finishing, four steers per treatment were harvested, organ mass recorded, and oxygen consumption by liver, ruminal epithelium, and duodenal tissues was measured. All remaining steers were individually fed a high-grain diet for 86, 111, and 162 d for HGW, LGW and NR, respectively, to a common 1.27 cm of backfat. At final harvest, six steers per treatment were selected for harvest to obtain organ mass and measure oxygen consumption. Initial empty body weight (EBW) was greater ($P < .01$) for HGW steers than LGW, which were greater than NR steers (382>303>245 kg EBW, respectively). Liver, rumen, and small intestine (g/kg EBW) were greater ($P < .01$) in NR than HGW or LGW. Similarly, total gastrointestinal tract (GIT) and total splanchnic tissues (TST) were greater ($P < .01$) in NR than HGW and LGW (80.3>51.8 and 57.9, and 108.3>90.0 and 90.2 g/kg EBW, respectively). Initial oxygen consumption by the liver was greater ($P = .02$) in HGW and LGW than NR (35.2 and 33.8>16.2 mL·min⁻¹·tissue⁻¹), whereas duodenal initial oxygen consumption was greater ($P = .02$) in LGW than HGW or NR (12.06>5.77 or 4.97 mL·min⁻¹·tissue⁻¹). Initial ruminal epithelium oxygen consumption in HGW was greater ($P = .03$) than NR. During finishing, NR steers increased EBW at a greater rate ($P < .01$) than either HGW or LGW (1.83>1.38 and 1.28 kg·d⁻¹). In contrast, change in GIT and TST were less ($P < .01$) in NR than HGW and LGW steers (-.12<.13 and .08, and .01<.23 and .21 g/kg EBW·d⁻¹, respectively). Native range steers had a greater rate of EBW gain and a lower rate of GIT and TST gain than HGW or LGW steers. Coupled with lower oxygen consumption by splanchnic tissues, this could relate to an increased efficiency of energy use for maintenance during feedlot finishing in NR steers.

Key Words: Splanchnic Tissue, Oxygen Consumption, Cattle

73 Influence of carnitine and/or chromium on blood parameters of gestating sows. J.C. Woodworth^{*}, M.D. Tokach, J.L. Nelssen, R.D. Goodband, S.S. Dritz, J.E. Minton, and K.Q. Owen¹, *Kansas State University, Manhattan, ¹Lonza, Inc., Fair Lawn, NJ.*

Gestating sows (n=44; parity=2.0; BW=208 kg) were used to determine the effects of dietary L-carnitine (Carn) and/or chromium picolinate (Cr) on daily blood parameter profiles. Diets were formulated as a 2 × 2 factorial with Carn (0 or 50 ppm) and Cr (0 or 200 ppb) and were fed from breeding, through gestation, lactation, and 30 d into the next gestation at which time blood collection occurred. Sows were fed one meal per day during gestation (2.1 kg) and ad libitum during lactation. Sows were fitted with indwelling venous catheters and blood (serum) was collected at feeding, once every 15 min for the first 3 h after feeding, and at 6, 9, 15, 20, and 24 h after feeding. Chromium elicited its greatest effect immediately after feeding (0-3 h) by decreasing ($P < 0.05$) insulin and c-peptide, whereas Carn decreased ($P < 0.05$) NEFA and urea N (SUN) in the fasted state (6-24 h post-feeding). Sows fed both Carn and Cr exhibited intermediate responses. Post-feeding glucose peak was lower ($P < 0.05$) for diets with Carn and/or Cr versus the control and mean glucose concentration was lower ($P < 0.01$) for sows fed diets with Cr. Mean insulin and c-peptide concentration was lowest ($P < 0.01$) for sows fed the diet with Cr and highest for sows fed the control, with sows fed diets with Carn or Carn and Cr having intermediate responses (Carn × Cr, $P < 0.01$). Mean NEFA was lower ($P < 0.01$) for sows fed diets with Carn and higher ($P < 0.03$) for sows fed the diet with Cr compared to control sows. Sows fed the diet with only Carn had the lowest SUN, but no differences were observed between the other three diets (Carn × Cr, $P < 0.01$). No differences were observed for IGF-1 or glucagon ($P > 0.10$); however, sows fed Carn had numerically higher ($P = 0.11$) IGF-1. In summary, the changes in metabolites and metabolic hormones indicate that both Carn and Cr influence energy metabolism of gestating sows; however, their effects on blood parameters are different. Thus, adding both Carn and Cr may have a synergistic effect on reproductive performance.

Key Words: Sow, Carnitine, Chromium