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 involved 96 steer calves (288 ± 11 kg) in a complete 4 x 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% and 13.8% CP for 30% WCGF, respectively. Carcass fat thickness, hot carcass weight, ADG, and feed efficiency (ADG:DM) responded to WCGF in a quadratic fashion (P ≤ 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. Carcass fat thickness, marbling, ribeye area, and yield grade were unaffected by WCGF or CP.

Initial oxygen consumption by the liver was greater (P=.02) in HGW than 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 ruminal 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<.01) than HGW or NGW (12.06 ± 5.77 ± 4.97 mL min⁻¹ tissue⁻¹). Initial ruminal oxygen consumption in GHW 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 g kg⁻¹d⁻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 x 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) mean glucose concentration 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 level was lower (P<0.01) for sows fed the diet with Cr and highest for sows fed the control, with sows fed diets with Carn or Cr having intermediate responses (Carn x 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 x Cr, P<0.01). No differences were observed for IGF-1 or glucagon (P>0.30); however, sow's 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

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

Forty-eight fall-weaned crossbred steers (231±25 kg) were used in a completely randomized design to determine the effect of previous liveweight gain on visceral organ mass and oxygen consumption. During the 14-d growing phase, treatments were high (HGW: 1.28 kg/d) or low (LGW: 0.48 kg/d) daily BW gain on wheat pasture or dormant native range (NR: 0.21 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<0.01) for HGW steers than LGW, which were greater than NR steers (382±303 to 245 kg EBW, respectively). Liver, rumen, and small intestine (g/kg EBW) were greater (P<0.01) in NR than HGW or LGW. Similarly, total gastrointestinal tract (GIT) and total splanchnic tissues (TST) were greater (P<0.01) 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<.01) than HGW or NGW (12.06±5.77±4.97 mL min⁻¹ tissue⁻¹). Initial ruminal oxygen consumption in GHW 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 g kg⁻¹d⁻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: 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 (WBFS) protocols: a) Fresh protocol = WBFS measurement of steaks cooked on the exact day the aging period ended vs b) Frozen protocol = WBFS measurement on steaks that were aged, frozen (<19°C) 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 electric roaster to an internal temperature of 71°C 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) WBFS values than fresh protocol for beef longissimus steaks that were aged for 1, 2, 3, 4, 5, 6, 7, 10, 14, 21, or 35 d post-mortem. The interaction between protocol and postmortem aging for WBFS was significant (P<0.05) and indicated that the effect of freezing on WBFS values decreased as aging period increased. Correlations revealed that frozen protocol WBFS values were not highly indicative of fresh protocol WBFS values at the same period of postmortem aging, but rather, suggested that frozen protocol WBFS values at shorter aging times were useful in estimating WBFS 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 WBFS 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 WBFS be assessed using the fresh protocol.

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