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SYMPOSIA AND ORAL SESSIONS
Animal Behavior and Well-Being: Beef and Dairy Cattle

746 Effect of receiving weight on predicted days to onset of respiratory disease in feedlot steers. C. M. McAllister*[1], B. W. Brigham[1], R. M. Enns[1], R. L. Weaber[2], H. Van Campen[3], G. H. Loneran[4], J. L. Salak-Johnson[5], C. C. L. Chase[6], J. J. Wagner[1], and E. J. Pollak[7], [1]*Colorado State University*, *Fort Collins*, [2]*University of Missouri*, *Columbia*, [3]*Colorado State University*, *Fort Collins*, [4]*West Texas A&M*, *Canyon*, [5]*University of Illinois*, *Urbana*, [6]*South Dakota State University*, *Brookings*, [7]*Cornell University*, *Ithaca, NY*.

Data were collected to determine the relationship between receiving weight and predicted days until the onset of respiratory disease (PDTS). Crossbred steers (n=1,551) from a single source were shipped from western Nebraska to southeast Colorado. Cattle from 3 ranch units were received in shipments occurring over 3 separate days. Steers were housed overnight in feedlot receiving pens before being processed and allocated to their pens. In some cases, initial processing did not occur until the second day after arrival due to time limitations. Steers were weighed during initial processing and housed in pens until identified as sick by feedlot personnel. Sick animals were treated according to approved protocols and assigned to sick pens until time of recovery. Only animals identified as afflicted with bovine respiratory disease (n=675) were included; ($\bar{x}$=16.52, σ=9.94). Animals not identified as sick (n=879) were given a constant variable (250 d) as their PDTS representing the predicted days in the feedlot. Alternatively, only observations on sick animals could have been included. Therefore the total data set (n=1,551) had an average PDTS ($\bar{x}$=148.49) and a standard deviation (s=115.98). Animals identified as sick for other reasons were not included. A mixed effects model was used to analyze the data with SAS PROC MIXED. Ranch unit (n=3)-processing day combinations (n=5), and pen (n=6) were included as fixed class variables. Random effects were animal within ranch unit-feedlot pen. Receiving weight was included in the model as a covariate. Receiving weight and ranch-lot classes had significant effects on PDTS (P<0.001 and P<0.05 respectively). Therefore as receiving weight increased 0.33 ± 0.142 kg the PDTS was expected to increase by one day. These results indicate that heavier cattle are less susceptible to bovine respiratory disease due to processing stress than calves that enter feedlots at lighter weights.

Key Words: Beef Cattle, Bovine Respiratory Disease, Receiving Weight

747 Correlations among measures of temperament, weight and gain of steers at placement and reimplant in a commercial feed yard. R. L. Weaber*[1], R. M. Enns[2], H. Van Campen[2], G. H. Loneragan[3], J. L. Salak-Johnson[4], C. Chase[5], J. J. Wagner[2], and E. J. Pollak[6], [1]*University of Missouri*, *Columbia*, [2]*Colorado State University*, *Fort Collins*, [3]*West Texas A&M University*, *Canyon*, [4]*University of Illinois*, *Urbana*, [5]*South Dakota State University*, *Brookings*, [6]*Cornell University*, *Ithaca, NY*.

Single source, crossbred steers (n=1,551) were shipped from western Nebraska to southeast Colorado. Cattle from 3 ranch units were received over 3 separate days. Steers were housed overnight in receiving pens before processing and allocation to feedlot pens. In some cases, initial processing did not occur until the second day after arrival due to time limitations. Two data sets were collected to determine the relationship between measures of temperament and weight traits of steers at 1) placement into a commercial feedlot and 2) at reimplant approximately 75 d later. All body weight (BW) and temperament measures were recorded in a single processing facility at initial processing and at reimplant (RI). Beef Improvement Federation Chute Scores (CS; 1=gentle, 6=aggressive), collected by 4 independent trained observers (2 at each processing), and exit velocity (EV; m/sec) were used to measure temperament during both processing events. Processing time (PT) and EV were measured using an infrared triggered electronic time recording device as a steer entered the squeeze chute then traveled a fixed distance upon exit. Two CS collected for each animal within each processing were averaged (AVGCS and AVGCS_RI). Partial correlation coefficients were computed using the MANOVA features of SAS PROC GLM. Day of initial processing (n=5) and reimplant processing (n=4) were included as class variables. EV had correlations with EV_RI, AVGCS, AVGCS_RI, BW_RI, and PT of: 0.44, 0.12, 0.15, -0.06, and -0.07, respectively (all P<0.04). EV_RI had correlations with AVGCS, AVGCS_RI, BW_RI, gain, and average daily gain of: 0.15, 0.25, -0.08, -0.06 and -0.06, respectively (all P<0.03). AVGCS was correlated with AVGCS_RI (r=0.24, P<0.01) and PT (r=0.13, P<0.01). AVGCS_RI was correlated with PT_RI (r=0.09, P<0.01). Correlation between CS collected by observers 1 and 2 was 0.73 (P<0.01). The correlation between CS_RI collected by observers 3 and 4 was 0.85 (P<0.01). Increases in EV and EV_RI were associated with increases in AVGCS and AVGCS_RI. Trained observers assigned similar CS within a processing event. EV at reimplant was inversely associated with average daily gain.

Key Words: Temperament, Exit Velocity, Beef Cattle

748 The effect of exit velocity at receiving and re-implant on average daily gain and weight at re-implant. A. R. Pepper*[1], R. M. Enns[1], R. L. Weaber[3], H. Van Campen[2], G. H. Loneragan[4], J. L. Salak-Johnson[5], C. C. L. Chase[6], J. J. Wagner[1], and E. J. Pollak[7], [1]*Colorado State University*, *Fort Collins*, [2]*Colorado State University*, *Fort Collins*, [3]*University of Missouri*, *Columbia*, [4]*West Texas A&M University*, *Canyon*, [5]*University of Illinois*, *Urbna*, [6]*South Dakota State University*, *Brookings*, [7]*Cornell University*, *Ithaca, NY*.

The objective of this study was to explore the relationship between temperament, as measured by exit velocity at receiving and re-implant, and weight (**IW**) and average daily gain (**ADG**) after 75 d in the feedlot. Crossbred steers (n=1,551) from a single source were shipped from western Nebraska to southeast Colorado. Cattle from 3 ranch units within that source were received in shipments occurring over 3 separate days. Steers were housed overnight in feedlot receiving pens before being processed and allocated to their lots (n=6). Exit velocity was measured at receiving (**EV**; m/s) and approximately 75 d later at re-implant (**EV_RI**; m/s) using 2 infrared electronic triggers to start and stop an electronic time recording device, the first as the steer left the chute and a second 2 m away from the first to finalize the exit velocity. Analyses were conducted using the MIXED procedure of SAS. In the first 2, EV_RI was evaluated as to its influence on IW and ADG (calculated as IW minus receiving weight divided by the number of days on feed). A third analysis evaluated the effect of EV on IW. All 3 models included the fixed effect of ranch-lot class, along with a random animal effect. An increase of 1 m/s in EV_RI resulted in a decrease in IW and ADG of 2.68 kg (P<0.001) and 0.03 kg (P<0.01), respectively. Similarly a 1 m/s increase in EV decreased IW by 2.89 kg (P<0.01). The ranch-lot class effect was significant in all 3 models (P<0.05). These results suggest that cattle with calmer temperaments gain better in the first 75 d of feeding.

Key Words: Average Daily Gain, Beef Cattle, Exit Velocity

749 Effect of processing stress on feedlot cattle sickness. B. W. Brigham*[1], R. M. Enns[1], R. L. Weaber[2], H. VanCampen[1], G. H. Loneragan[3], J. L. Salak-Johnson[4], C. C. L. Chase[5], J. J. Wagner[1], C. M. McAllister[1], and E. J. Pollak[6], [1]*Colorado State University*, *Fort Collins*, [2]*University of Missouri*, *Columbia*, [3]*West Texas A&M University*, *Canyon*, [4]*University of Illinois*, *Urbana*, [5]*South Dakota State University*, *Brookings*, [6]*Cornell University*, *Ithaca, NY*.

Processing time and order were measured to determine their effect on sickness rate in feedlot cattle. Crossbred steers (n=1,551) from a single source were shipped from western Nebraska to southeast Colorado. Cattle from 3 ranch units were received in shipments occurring over 3 d. Steers were housed overnight in feedlot receiving pens before being processed and allocated to their feedlot pens. In some cases, initial processing did not occur until the second day after arrival due to time limitations. All animals to be processed in a single day were removed from the receiving pen and held in alleys until processing was completed. Processing included radio frequency identification tag, visual tags, oral wormer, injectable wormer, growth promotant, 30 ml of blood collected and carcass ultrasound measurements of loin eye muscle area, backfat and percent intramuscular fat. Processing time ranged from 50 to 577 s with an average time of 112 s. An average of 320 animals were processed daily. Post processing, calves were placed in feedlot pens where they remained unless identified as sick. Individual animals were considered sick if they exhibited clinical signs typical of bovine respiratory disease such as lethargy, depression, coughing, and nasal discharge, as determined by feedlot personnel. Sick animals were treated according to defined protocols and housed separately with other sick animals until recovered. The outcome, sick versus not sick, was analyzed with the GENMOD procedure of SAS on the binomial scale (yes/no). The model included the fixed effects of feedlot pen-unit class, time in the processing chute, and processing order. Fixed effects that influenced outcome included feedlot pen by unit-class (P<0.05), processing time in seconds (P=0.06) and processing order within day (P=0.06). As the processing order each day or processing time increased the probability of becoming sick increased by 0.15 ±0.3 and 0.24 ±0.13 percent, respectively. These results indicate animals that spent more time awaiting processing or being processed had a higher likelihood of becoming sick.

Key Words: Beef Cattle, Processing Stress, Feedlot

750 Effect of daily ambient temperature and wind speed on sickness of feedlot cattle. S. E. Speidel*[1], R. M. Enns[1], G. H. Loneragan[2], R. L. Weaber[3], H. Van Campen[1], J. L. Salak-Johnson[4], C. C. L. Chase[5], J. J. Wagner[1], and E. J. Pollak[6], [1]*Colorado State University*, *Fort Collins*, [2]*West Texas A&M University*, *Canyon,*, [3]*University of Missouri*, *Columbia*, [4]*University of Illinois*, *Urbana*, [5]*South Dakota State University*, *Brookings*, [6]*Cornell University*, *Ithaca, NY*.

The objective of this study was to determine the magnitude of the effect of daily temperature range and mean wind speed on the probability an individual animal would be identified as sick. Crossbred steers (n=1,551) from a single source were shipped from western Nebraska to southeast Colorado. Cattle from 3 ranch units were received in shipments occurring over 3 separate days. Steers were housed overnight in feedlot receiving pens before being processed and allocated to their feedlot pens. In some cases, initial processing did not occur until the second day after arrival due to time limitations. Individual animals were considered sick if they exhibited clinical signs typical of bovine respiratory disease such as lethargy, depression, coughing, and nasal discharge; as determined by feedlot personnel. The effects of weather (difference between daily maximum and minimum temperature, TDIFF, and mean wind speed, MWS) from 7 d prior to sickness identification through d 0, the day the animal was observed sick, were evaluated as to their influence on sick observations using binary logistic regression and the GENMOD procedure of SAS; where an animal was coded "1" if diagnosed sick on a particular day or "0" if healthy. The model resulted in a significant pen by ranch interaction (P<0.005) and significant effects of TDIFF and MWS on sickness diagnosis. On d 0, unit increases in both TDIFF (1 ° C) and MWS (1 m/s) increased the probability of an animal being pulled by 5.9 ± 0.02% (P<0.001) and 10.1 ± 0.04% (P<0.03), respectively. At d -2 and earlier, MWS did not have a significant effect on the probability of an animal being pulled (all P>0.23). Likewise, TDIFF had no significant effect on the probability of an animal being pulled prior to d -3 (all P>0.13). These results indicate that TDIFF and MWS can influence whether or not an animal becomes sick in the feedlot up to 3 d prior to the onset of disease.

Key Words: Beef Cattle, Feedlot Sickness, Weather

751 Effect of rubber flooring on cow locomotion and gene expression. K. O'Driscoll[1,2], M. M. Schutz[3], and S. D. Eicher*[4], [1]*Teagasc*, *Fermoy, Ireland*, [2]*NUI Dublin*, *Dublin, Ireland*, [3]*Purdue University*, *West Lafayette, IN*, [4]*USDA-ARS*, *West Lafayette, IN*.

The aim of this study was to evaluate the effect of 2 free stall flooring systems on cow locomotion (including speed) and expression of genes associated with lameness, during the dry and peri-parturient period. Cows were assigned to free-stall housing with either rubber (RUB; n=13) or concrete (CON; n=14) at the feed alley immediately after their first calving, and managed on this system during all subsequent lactations. Between lactations cows remained in a straw bedded-pack dry-cow pen. Cows entered the experiment at the end of either their 1st (n=16) or 2nd (n=11) lactations. Locomotion scores (5 point system each for foot rotation, tracking, back arch, and head carriage, and speed) and blood samples were obtained at approximately -60, -30, 0, +7 and +14 days relative to calving. Expression of genes in blood leukocytes which may be related to pain or lameness; substance-P receptor (TAC1), histamine receptor (HRH1), and metalloproteinase-13 (MMP13) was estimated using qRT-PCR. Treatment effects on locomotion scores, cow speed, and gene expression were analyzed using repeated measures ANOVA. Contrary to expectation, rubber flooring did not improve dairy cow locomotion (1.7 vs 1.8 ±0.85). However d had an effect on locomotion score (1.7, 1.6, 1.9, 1.9, 1.8 ± 0.8 for d -60, -30, 0, 7, and 14)) and speed (6.2, 6.2, 8.4, 7.6, and 7.1 ±0.48 for d -60, -30, 0, 7, and 14), both peaking on day 0. Post calving, cows on CON were slower than RUB, relative to pre calving (P=0.01). Cows at the end of the 2nd lactation were slower than cows at the end of the 1st (6.0 vs 8.2 ±0.42), particularly RUB cows (CON = 6.6 and 7.7 ±0.56 and RUB = 5.4 and 8.8 ±0.60 for 1st and 2nd lactations). RUB cows had higher expression of MMP13 than CON (0.24 vs 0.19 ±0.04), which was more highly expressed in lame than in sound cows in previous work by others. Cows in RUB also tended to have higher expression levels of TAC1 (0.47 vs 0.32 ±0.07). In summary, bedded-pack surfaces during the dry period may have resulted in more pain for cows coming from rubber flooring than from concrete flooring and MMP13 is up-regulated in clinically lame cows and thus this gene holds promise as an objective indicator of lameness.

Key Words: Lameness, Locomotion, PCR

752 Effect of feed bunk sprinklers on attendance at un-shaded feed bunks in dry-lot dairies. B. H. Carter*, T. H. Friend, J. E. Sawyer, and M. A. Tomazewski, *Texas A&M University*, *College Station*.

Feed bunk sprinklers combined with fans effectively increase feed bunk attendance when bunks are shaded. This summer study characterized feed bunk attendance at a Texas Panhandle dairy where sprinklers were installed above un-shaded feed bunks. Holstein-Friesian cows were housed in pens with shade structures 45 m from and parallel to feed bunks. Three pens were equipped with sprinklers above the feed bunk that sprayed the backs of cows in 1.5 min on, 10 min off cycles when temperature was above 22.2°C. Two pens without sprinklers served as controls. Cow numbers and pen density were similar among treatments. Each pen held 135 to 390 cows. Bunk attendance (proportion of cows within 2 m of the feed bunk) was recorded for each pen at 2-h intervals over a 48-h period. Data were analyzed as repeated measures with sprinkler treatment, time, and their interaction as effects in a mixed model with pen (treatment) as the subject. Means associated with time-treatment interactions were separated using t-tests. Relationships between bunk attendance, thermal heat index **(THI)** and wind speed within treatment were evaluated using linear regression. Sprinkler effect on bunk attendance was dependant on time of day ($P < 0.01$). Bunk attendance was greater in pens with sprinklers than pens without at 1700 h for both 24-h periods ($P < 0.02$), corresponding to peak daily THI. Bunk attendance was greater for pens without sprinklers at 0900 h of the first 24-h period and 2100, 0300 and 1100 h of the second 24-h period ($P < 0.01$), all of which occurred at lower THI. Bunk attendance was similar between treatments at all other times ($P > 0.09$). Bunk attendance decreased with increasing THI in pens without sprinklers ($P = 0.02$), but was not influenced by THI for pens with sprinklers ($P = 0.54$). Wind speed did not affect bunk attendance for either treatment ($P > 0.10$). Sprinklers altered the timing of bunk attendance but did not alter overall mean bunk attendance ($P = 0.91$). Further research is needed to determine if altered feeding pattern influences feeding duration, intake and milk yield.

Key Words: Sprinkler, Dairy, Feedbunk

753 Effect of shade on panting score of feedlot cattle exposed to heat stress. J. B. Gaughan*[1], M. L. Sullivan[1], J. Cawdell-Smith[1], and T. L. Mader[2], [1]*The University of Queensland*, *Gatton, Qld, Australia*, [2]*University of Nebraska*, *Concord*.

A 120-d finisher feedlot study using 126 Angus heifers (BW = 350 ± 45 kg) was undertaken to determine the optimal shade area to alleviate heat stress. Four shade treatments (70% solar block) were used: no shade, 2.0, 3.3 and 4.7 m^2/animal. The shade was 4 m high with a north-south orientation. Cattle were randomly allocated to pen (9/pen; 19.2 m^2/animal). Climatic conditions (ambient temperature, relative humidity (RH), black globe temperature (BG), wind speed (WS)) were recorded every 10 min. From these data the heat load index {HLI; $HLI_{BG>25}$=8.62+(0.38×RH)+(1.55×BG) - (0.5 - WS)+[$e^{2.4 - WS}$], and $HLI_{BG<25}$=10.66+(0.28×RH)+(1.3×BG) - WS, (approximate value of e = 2.71828)} and accumulated heat load units (AHLU; based on the time cattle are exposed to HLI > 86) were determined. The HLI and the AHLU were combined to determine climatic stress: low stress: HLI<70; AHLU<1, moderate stress: HLI 70.1-77; AHLU 1-10, high stress: HLI 77.1-86; AHLU 20-50, and extreme stress: HLI>86; AHLU>50. Individual panting scores were obtained every 2 h from 0600 to 1800. Treatment mean panting scores (MPS) were then determined. A MPS of 0 to 0.4 indicates no stress; 0.4 to 0.8 low stress; 0.8 to 1.2 high stress, and >1.2 extreme stress. Treatment differences were examined using repeated measures analysis. Within treatment, MPS increased ($P < 0.01$) when climatic stress shifted from low to moderate. There were no between treatment differences. There were small changes in MPS between moderate and high climatic stress, and larger increases ($P < 0.01$) between high and extreme. The MPS was greatest (MPS = 1.72; $P < 0.001$) in the un-shaded cattle under extreme conditions. There were no differences ($P > 0.05$) between the shaded treatments (MPS = 1.03) when climatic stress was extreme. The provision of shade reduced the effects of extreme climatic stress conditions. There does not appear to be an advantage of increasing the area of shade above 2.0 m^2. This project was funded by Meat Livestock Australia P/L.

Key Words: Heat Stress, Welfare, Beef Cattle

754 A comparison of behavior of steers raised in hoop buildings or feedlots. R. Baker*, A. Johnson, S. Lonergan, M. Honeyman, K. Stalder, L. Sadler, and P. Lammers, *Iowa State University*, *Ames*.

The objective of this study was to compare steer behavior between 2 treatments; hoop building (HP n=3; 4.65m^2 / steer), which is a semi-cylindrical structure, vs. feedlot (FD n=3; 14.7m^2 / steer) dirt pad with concrete strip for the feed bunks. A total of 240 crossbred Bos taurus steers was used. Steers were ear tagged, implanted, and weighed (445 ± 31.7 kg) upon arrival and sorted by weight and breed. All steers were fed a completely balanced diet and offered water ad libitum from 1 drinker/pen. Corn stalks were provided to HP steers for bedding. Behavioral data were collected using a 10 min scan sampling technique using live observation by 2 experienced observers from 0700h to 1600h on d 34, 56, and 91 of the trial. Two behaviors (head in bunk and drinking) and 3 postures (lying, walking, and standing) were recorded. The day after behavior collection, steers were moved through a squeeze chute for subjective temperament scoring. Scores ranged from 1 (calm) to 5 (wild). Behavioral data was transformed using the arcsine of the measure to normalize the distribution and subsequently analyzed using ANOVA (PROC MIXED, SAS). Temperament scores were analyzed using non-parametric methods (PROC GLIMMIX, SAS). There were no (P>0.05) differences for head in bunk behavior between treatments. However there was a difference (P=0.02) for drinking, with HP steers spending more time at the drinker than FD. Lying was greater (P<0.004) for HP vs. FD steers. Fewer (P<0.05) steers exhibited walking or standing behavior in the HP compared to their FD counterparts. Temperament scores were not different between treatments (P=0.13) but day and day*treatment (P<0.001) were significant sources of variation for temperament measures. In conclusion, overall time budget differences were observed with HP steers being less active yet with more time spent engaged in drinking related behaviors, and steer temperament at exit increased over the trial. Therefore, housing steers in a hoop does not result in detrimental behavior or temperament alterations.

Key Words: Behavior, Hoops, Steers

755 Effects of soil surface temperature on daily water intake in feedlot steers. R. A. Arias*[1] and T. L. Mader[2], [1]*Universidad Católica de Temuco*, *Temuco, Chile*, [2]*University of Nebraska*, *Lincoln*.

Ambient temperature (AT) has been used as indicator of cattle comfort and productivity. This study explores the relationship between soil surface temperature (SST), 10.2 cm depth soil temperature (ST), and daily water intake (DWI). Equations to predict DWI from SST (99 d) and ST (186 d) were developed with data collected from 2004 to 2006. Data from an experiment conducted during summer of 2007 (60 d) were used to validate these equations. Environmental variables were collected from a weather station located in the feedlot. The DWI was obtained by dividing the amount of water consumed per day in 2 adjacent pens by the number of animals present. Animals (n=116) were crossbred Angus cattle on finishing diets. The procedures included simple and polynomial linear regression. A repeated measures analysis was conducted to compare differences among ST, SST, and AT using SAS software. During July and August the mean of SST and ST were similar and higher than mean AT being 26.7±.2, 26.5±.07, and 23.5±.12, °C respectively (P<0.001). However, ST was higher than AT between 8 p.m. and 10 a.m. The SST was higher than AT between 7 a.m. and 8 p.m. On the other hand, ST and AT were similar between 9 am and 3 p.m., whereas SST and AT were similar between 9 p.m. and 6 a.m. The data set was analyzed in 2 ways: the overall model representing the period May to October and the summer model representing the period June to August. In the overall model, SST was a better predictor of DWI than ST (r^2=0.82 vs. 0.65, P<0.001). The greatest r^2=0.86 (P<0.001) was reached with SST in a quadratic model. A Similar response was observed in the summer model (STT, r^2=0.70, P<0.001). In the validation process, the summer and overall model tended to over predict slightly DWI for the period July to August (13.5% and 12.5%, respectively). In conclusion, ST has a significant effect on DWI, whereas SST appears as the best predictor for DWI compared with other weather variables such as AT. Further studies of variables affecting DWI are required.

Key Words: Soil Temperature, Daily Water Intake, Modeling

756 Effect on performance and animal welfare of an all-concentrate diet fed to heifers. G. Faleiro, L. A. González, A. Ferret*, X. Manteca, J. L. Ruiz de la Torre, and S. Calsamiglia, *Nutrition, Management and Animal Welfare Research Group, Universitat Autònoma Barcelona*, *Bellaterra, Barcelona, Spain*.

Forty-eight Friesian female calves (Initial BW = 84.5 kg) were assigned to a factorial arrangement of treatments in a randomized complete block design with 2 treatments and 4 BW blocks, to study the effects of an all-concentrate diet on performance and animal welfare. Treatments consisted of concentrate with barley straw (C) and the same concentrate without straw (BP). Ingredients of the concentrate (DM basis) were 31.3, 32.2, 16.0, 8.0, 9.0, 1.1, 1.0 and 1.0% of barley, corn, beet pulp, soybean meal, corn gluten feed, calcium carbonate, sodium bicarbonate and salt, respectively, with the remainder being minerals and vitamins. Feeding management allowed ad libitum consumption of diets, which were fed daily at 0830. During 9 periods of 28 d each, DMI and ADG were measured, and blood samples were taken for haptoglobin determination as a welfare indicator. Animals were slaughtered at 350 kg BW, in a commercial abattoir where hot carcass weight was registered and dressing percentage calculated. A logarithmic transformation was applied to blood haptoglobin concentrations. Variables normally distributed were analyzed using the PROC MIXED of SAS. Concentrate intake was similar in both treatments (6.7 and 6.5 kg ± 0.28 for C and BP, respectively), but there were differences in total feed intake (7.3 and 6.5 kg ± 0.31 for C and BP, respectively; P = 0.045). Because there were no differences in ADG between treatments (1.12 and 1.11 kg/d ± 0.058 for C and BP, respectively), feed efficiency was lower in C (0.151 kg BW/kg DMI) than in BP (0.168 kg BW/kg DMI; SEM = 0.0046; P = 0.019). There were no differences between treatments in dressing percentage and hot carcass weight. Blood concentrations of haptoglobin were not different between treatments (0.233 and 0.221 mg/mL ± 0.027 in C and BP, respectively). In conclusion, performance was not different and well-being as reflected by haptoglobin levels was not affected by treatments.

Key Words: Beef Cattle, Performance, Welfare