1264 (W151) Sun dried meat quality derived from young bulls fed licuri cake derived from biodiesel production. R. L. Oliveira*, A. A. L. Govêa, A. G. Leão, N. G. D. N. Júnior, W. F. D. Souza, S. T. Carvalho, T. M. Silva, A. D. S. Nunes, and R. R. D. Albuquerque, *Universidade Federal da Bahia, Salvador, Brazil.*

This study was conducted to determine the best level of licuri cake in the diets of young bulls based on physical-chemical evaluation and sensory sun dried meat. The experiment was conducted at the School of Veterinary Medicine and Animal Science of the Federal University of Bahia, located in São Gonçalo do Campos, Bahia, Brazil, for 99 d with 15 d for the adaptation of animals, management and diets. Thirty two Nellore bulls non castrated average age of 24 mo and initial body weight of 368 ± 32 kg. Before beginning, the animals were vaccinated against clostridia, and wormed against endo and ectoparasites. Later, they were housed in individual 8-m^2 pens, with slatted floors, and provided with food and water in a covered area. The animals were distributed into four treatment groups, constituting diets with 0, 7, 14, and 21% of licuri cake in the dry matter. The forage used was hay of Tifton with particle size of approximately 5 cm and forage:concentrate ratio of 40:60. Treatments consisted of isonitrogen diets and formulated for 1.2 kg/day for gain according to NRC (1996). For the preparation of sun dried meat, a sample of the soft round (*Semimenbranosus*) was then divided into sections 5 in thick each. We used salt in a proportion of 5% (± 150 g) in relation to the weight of natural matter (3 kg), which was manually rubbed surfaces of the pieces evenly. After this process, the pieces were kept in an ambient temperature of 25°C for better penetration of salt. At the end of 16 h curing was taken drainage of exudate and washing the pieces in water to remove excess salt. The licuri cake added to the diet quadratic effect on the shear force ($P < 0.05$). For sensory parameters was no effect on aroma where the inclusion of 7 to 14% of the licuri cake reduced of sun meat appreciation ($P < 0.05$). There was no effect for the other characteristics evaluated. Licuri cake can be added to the diet of crossbred cattle to the level of 7% without causing changes in the quality of sun dried meat.

Key Words: flavor, *semimembranosus*, shear force

1265 (W152) Processed burguer quality derived from young bulls fed licuri cake from biodiesel production. R. L. Oliveira[*1], A. A. L. Govêa[1], A. G. Leão[1], C. B. D. Pellegrini[1], N. G. D. N. Júnior[1], C. L. D. Abreu[1], T. M. Silva[1], V. B. D. Silva[1], and E. S. dos Santos[2], *[1]Universidade Federal da Bahia, Salvador, Brazil, [2]Federal University of Bahia, Salvador, Brazil.*

This study was conducted to determine the physicochemical and sensory parameters of burgers from young bulls fed diets containing licuri cake. The experiment was conducted at the School of Veterinary Medicine and Animal Science of the Federal University of Bahia, located in São Gonçalo dos Campos, Brazil, over a period from July to October 2012. Thirty-two Nellore bulls were used, with initial weight of 368 ± 32 kg. Before the beginning of the experiment, the animals were vaccinated against clostridia, wormed against endo and ectoparasites and then assigned to individual 8-m^2 pens with food and water in a covered area. The experimental period was 84 d, with 15 d added for animal adaptation, totaling 99 d. The experimental design was completely randomized. The animals were divided into four treatments consisting of diets with 0, 7, 14, and 21% of licuri cake inclusion, based on dry matter. The forage used was hay of Tifton with particle size of approximately 5 cm and forage:concentrate ratio of 40:60. Treatments consisted of isonitrogen diets and formulated for 1.2 kg/d for gain according to NRC (1996). At the end of the experiment, the animals were submitted to feed fasting and slaughtered. The portion of beef burger used in processing was *Semimenbranosus* muscle (81.3%) and pig fat (15%). Other ingredients added to the burger were salt (3%), black pepper (0.2%), garlic paste (0.3%), and sugar (0.2%). The centesimal composition of the burgers was not altered by levels of licuri cake ($P > 0.05$). However, the inclusion of licuri cake promoted increased linearly between physicochemical characteristics of brightness ($P < 0.05$) and color of meat hamburger, increasing consumer acceptability and appearance of the product. The licuri cake can be added in the diet of beef cattle to the level up to 21% without causing significant changes in the qualitative parameters of the burger.

Key Words: color, confinement, *semimenbranosus*

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1266 (W153) Collagen, cooking losses and shear force of aged meat from Nellore steers fed protected or unprotected linseed oil.
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This work assess the effects of aging times and the inclusion of protected or unprotected linseed oil of rumen degradation on the diet of 21 Nellore steers finished on feedlot on collagen (COL), cooking losses (CL) and shear farce (SF) of *Longissimus* muscle. At the beginning of the experiment, animals had 18 mo of age and 397.74 ± 14.07 kg of BW, and they were kept in individual pens and adapted during 21 d. The diets were composed by 40% corn silage and with no oil addition (73% TDN and 2.9% EE), with in natura linseed oil or with protected linseed oil (76% TDN and 6.1% EE). After 105 d at feedlot, the animals were slaughtered with 522.72 ± 27.99 kg of BW and carcasses were chilled for 24 h. After this period, a section of the *Longissimus* between sixth and 13th ribs was removed and separated in 2.54 cm steaks, which were individually vacuum packed and chilled to 2°C for 1, 7, or 14 d. The amino acid hydroxyproline was quantified to measure the collagen content by spectrophotometer reading at 500 nm; for CL, the steaks were roasted in an electric woven up to 71°C at its geometric center, and the weights before and after cooking were used for the calculation. After 24 h of cooling, six cylinders of 1.27 cm diameter were removed from the steaks to determine the force required to cut across each cylinder using a texturometer, and the average were used to represent the SF. The results were submitted to analysis of variance using mixed models, considering a random block one, and a 3×3 factorial scheme. For COL (0.70 mg/100 g muscle), no differences were found among treatments ($P = 0.5806$), and for the aging times, a quadratic effect ($P = 0.0168$) was observed. An interaction for CL was found ($P = 0.0433$), and its evaluation showed a quadratic effect ($P = 0.0134$) for unprotected linseed oil during aging periods, the remaining variables showed no differences ($P > 0.05$). SF was not influenced by the treatments ($P = 0.2718$) and aging times showed a quadratic effect ($P < 0.0001$) (5.38; 3.35 and 3.34 kgf, for 1, 7, and 14 d, respectively). Meat tenderness is not affected by the addition of linseed oil on the bovine diet, but it is improved by aging up to 14 d. On the other hand, collagen content is increased by aging.

Key Words: *Longissimus*, tenderness, Zebu

1267 (W154) Effect of aging times and inclusion of unprotected or protected linseed oil on the diet of Nellore steers over the color of *Longissimus*.
W. Henrique[*1], L. R. Simonetti[2], T. M. Pivaro[3], V. G. Carvalho[2], E. A. Oliveira[2], C. C. P. D. Paz[1], and A. A. M. Sampaio[2], [1]Instituto de Zootecnia, Sertãozinho, Brazil, [2]Universidade Estadual Paulista "Júlio de Mesquita Filho", Jaboticabal, Brazil, [3]FCAV/UNESP Jaboticabal, Pradópolis, Brazil.

The objective was to evaluate the effects of aging time and the inclusion of unprotected or protected linseed oil from rumen degradation on the diet of 21 Nellore steers, finished at feedlot in individual pens, and their influence over the color aspects of *Longissimus* muscle. At the beginning of the experiment, animals had 18 mo of age and 397.74 ± 14.07 kg of BW and they were kept in adaptation during 21 d. The diets were composed by 40% corn silage and with no oil addition (73% TDN and 2.9% EE), with in natura linseed oil or with protected linseed oil (76% TDN and 6.1% EE). After 105 d at feedlot, the animals were slaughtered with 522.72 ± 27.99 kg of BW and carcasses were chilled for 24 h. After this period, a section of the *Longissimus* between sixth and 13th ribs was removed and separated in 2.54 cm steaks, which were individually vacuum packed and chilled to 2°C for 1, 7 or 14 d. After this processing, in different points of these steaks, we cut a cross-section of muscle for exposure of myoglobin to oxygen for 30 min. Then a colorimeter was used to determine the color of the meat by evaluating the lightness (L*), 0 = black and 100 = white; redness (a*); and yellowness (b*). The results were submitted to analysis of variance using mixed models, considering a random block one, and a 3×3 factorial scheme. No interactions were observed between diets and aging times ($P > 0.05$). For L* (40.84) and b* (14.85), no difference among treatments were found ($P = 0.4145$ and $P = 0.0703$, respectively), and the aging time showed a quadratic effect on both characteristics ($P = 0.0002$ and $P < 0.0001$). The values of a* (16.49) were not affected by diets ($P = 0.3116$) and aging times (linear regression- $P = 0.9565$; quadratic- $P = 0.5068$). Protected or unprotected linseed oil can be used on Nellore steers diet without changing aspects of meat color.

Key Words: cattle, luminosity, meat

1268 (W155) Aging times and inclusion of unprotected or protected linseed oil on Nellore steers diet and its influence on cholesterol and lipid oxidation of the meat. L. R. Simonetti[*1], W. Henrique[2], T. M. Pivaro[3], V. G. Carvalho[2], E. A. Oliveira[2], C. C. P. D. Paz[2], and A. A. M. Sampaio[2], [1]Universidade Estadual Paulista "Júlio de Mesquita Filho", Jaboticabal, Brazil, [2]Instituto de Zootecnia, Sertãozinho, Brazil, [3]FCAV/UNESP Jaboticabal, Pradópolis, Brazil.

The objective was to assess the effects of aging time and the inclusion of unprotected or protected linseed oil from rumen degradation on the diet of 21 Nellore steers, finished at feedlot, over the cholesterol content and lipid oxidation of *Longissimus* muscle. At the beginning of the experiment, animals had 18 mo of age and 397.74 ± 14.07 kg of BW, and they were kept in individual pens and adapted during 21 d. The diets were composed by 40% corn silage and with no oil addition (73% TDN and 2.9% EE), with in natura linseed oil or with protected linseed oil (76% TDN and 6.1% EE). After 105 d of feedlot, the animals were slaughtered with 522.72 ± 27.99 kg of BW and carcasses were chilled for 24 h. After this period, a section of the *Longissimus* between sixth and 13th ribs were removed and sampled as 2.54 cm steaks, individually vacuum packed and chilled to 2°C for 1, 7 or 14 d. For cholesterol content, 10 g of fresh meat were used after each aging time, and the lipid oxidation was obtained by the method based on 2-thiobarbituric acid (TBARS), both using spectrophotometer with 538 nm. The results were submitted to analysis of variance using mixed models, considering a random block one, and a 3×3 factorial scheme. No interactions were observed, cholesterol content was not influenced by diet ($P = 0.5727$) or by aging times (linear regression- $P = 0.5008$, and quadratic- $P = 0.7493$), showing lower levels than those considered normal for the *Longissimus* muscle (36.5 and 33.16 mg/100 g of muscle to diets and times aging, respectively), which is important because of its influence in preventing cardiovascular disease. Lipid oxidation was also not influenced by factors evaluated ($P > 0.005$), and the average was 0.41 mg of malonaldehyde/kg of muscle. Add linseed oil on the diet of Nellore steers does not cause a loss in quality of meat for human consumption, using *in natura* or protected form.

Key Words: *Longissimus*, human health, TBARS

1269 (W156) Effect of aging times and inclusion of unprotected or protected linseed oil from ruminal degradation on the diet of Nellore steers over pH and water holding capacity of meat. L. R. Simonetti[*1], W. Henrique[2], T. M. Pivaro[3], V. G. Carvalho[2], E. A. Oliveira[2], C. C. P. D. Paz[2], and A. A. M. Sampaio[2], [1]Universidade Estadual Paulista Júlio de Mesquita Filho, Jaboticabal, Brazil, [2]Instituto de Zootecnia, Sertãozinho, Brazil, [3]FCAV/UNESP Jaboticabal, Pradópolis, Brazil.

This work assess the effects of aging times and the inclusion of protected or unprotected linseed oil of rumen degradation on diet of 21 Nellore steers, finished at feedlot, over pH and water holding capacity (WHC) of *Longissimus* muscle. At the beginning of the experiment, the animals had 18 mo of age and 397.74 ± 14.07 kg of BW and they were kept in individual pens and adapted during 21 d. The diets were composed by 40% corn silage and with no oil addition (73% TDN and 2.9% EE), with in natura linseed oil or with protected linseed oil (76% TDN and 6.1% EE). After 105 d at feedlot, the animals were slaughtered with 522.72 ± 27.99 kg of BW and carcasses were chilled for 24 h. After this period, a section of the *Longissimus* between sixth and 13th ribs was removed and separated in 2.54-cm steaks, which were individually vacuum packed and chilled to 2°C for 1, 7, or 14 d. The pH was determined using a pHmeter with a penetration electrode and the WHC was obtained by the difference between the weights of the meat samples of approximately 2 g before and after being submitted to pressure of 10 kg for 5 min. The results were submitted to analysis of variance using mixed models, considering a random block one, and a 3×3 factorial scheme. No interactions were observed between diets and aging times ($P > 0.05$). No differences were observed for pH among treatments ($P = 0.9276$) and aging times (linear regression- $P = 0.3454$, and quadratic- $P = 0.3147$), with an average of 5.45 considered normal for beef. The diets did not influence ($P = 0.7500$) the WHC (74.61%), and for aging times, a quadratic effect ($P = 0.0286$) was observed (69.27, 75.88 and 78.68% for 1, 7, and 14 d, respectively). The addition of linseed oil in any form on Nellore steers diet does not alter pH and WHC, however, aged meat for up to 14 d is benefic because it increased the WHC, which influences many other aspects of meat quality, as juiciness.

Key Words: meat quality, *Longissimus*, Zebu

1270 (W157) Aged beef from Nellore young bulls fed crude glycerin in diets with different roughage sources. J. F. Lage[*], A. F. Ribeiro, M. Machado, L. R. Simonetti, E. A. Oliveira, E. E. Dallantonia, and T. T. Berchielli, *Universidade Estadual Paulista Júlio de Mesquita Filho, Jaboticabal, Brazil.*

This trial aimed to evaluate the effects of feeding crude glycerin (CG)- 80% glycerol- included on 10% of DM diet, replacing corn with three roughage sources: corn silage (CS), sugarcane (SC) and sugarcane bagass (SCB) on pH, water holding capacity (WHC), Warner-Bratzler shear force (WBSF) and cooking losses (CKL) of aged beef from Nellore young bulls fed in feedlot. Thirty animals with 416 ± 24.68 kg initial BW were randomly assigned to three treatments, with ten replicates and fed during 90 d in feedlot. Animals were slaughtered at average BW of 550.50 kg BW and all carcasses were refrigerated at 0°C for 24 h. *Longissimus* muscle (LM) section 10 cm thick was removed from the posterior end of the wholesale rib, individually vacuum-packaged and aged for 7 and 14 d at 0 to 2°C. The WHC was measured for the difference between the weights of the sample before and after it was subjected to a pressure of 10 kg for 5 min. Steaks of 2.54 cm were removed and same samples were used to analysis of WBSF and CKL. The experiment was conducted according to a completely randomized design in a factorial arrangement 3 × 3 (three diets x three aging times). Data were analyzed by the PROC PROC MIXED of SAS, and the Tukey test used considering 5% probability. The WHC ($P = 0.68$), WBSF ($P = 0.15$) and CKL ($P = 0.88$) did not differ among diets, however, the beef from animals fed SC had a higher pH values than animals fed other diets ($P < 0.01$). The WHC was not different between beef aged in 7 or 14 d ($P = 0.72$). The pH was higher and CKL was lower ($P = 0.02$) in beef aged for 14 d. The WBSF was lower in d 14 than d 7($P < 0.01$). The use of corn silage, sugarcane or cane bagass in diets with crude glycerin replacing corn in 10% of DM did not affect the tenderness, WHC and CKL, but animals fed sugarcane had beef with higher pH values. The aging time until 14 d reduces the cooking losses and is an effective method to improve the tenderness of beef from Nellore young bulls.

Key Words: aging times, glycerol, meat quality

1271 (W158) Effect of aging times on tenderness of five muscles from carcass of Nellore young bulls. L. R. Simonetti[*], J. F. Lage, E. E. Dalanttonia, E. A. Oliveira, M. B. Abra, G. M. Delamagna, L. Maneck Delevatti, and T. T. Berchielli, *Universidade Estadual Paulista Júlio de Mesquita Filho, Jaboticabal, Brazil.*

The objective of this study was to evaluate the aging effects on cooking losses (CKL) and Warner-Bratzler shear force (SF) of five muscles: *biceps femoris* (BF), *gluteus medius* (GM), *longissimus* (LD), *semitendinosus* (ST) and *trapezius thoracis* (TT) of Nellore young bulls fed in feedlot. Fourteen animals at 15 mo of age were confined in individual pens with feeders and drinkers. The diet was consisted of 40% corn silage and 60% concentrate. After 60 d of feedlot, the animals were slaughtered and the carcasses were chilled to 0°C for 24 h. The muscles were removed, cut into steaks of 2.54 cm and individually vacuum packed and chilled to 0 to 2°C for 1, 7, and 14 d postmortem. Steaks 2.54 cm thick were removed and same samples were used to analysis of WBSF and CKL. The experiment was conducted according to a completely randomized design in a 3 × 5 factorial arrangement (3 aging times × 5 muscles) with 14 replicates. The data were analyzed by PROC MIXED of the SAS and the Tukey test considering 5% probability. The interaction between muscles and aging times was significant ($P < 0.01$) to CKL and SF. The greater value for CKL was observed in muscle ST (36.73%) on d 7, being that muscles BF (33.82%) and TT (35.68%) at d 7 did not differ from the ST. Muscle LD (29.65%) on d 7, GM (28.64%, 29.60%) on d 1 and 7, BF (28.42%) on d 1 and TT (28.14%) at d 14 showed smallest values for CKL. The CKL at d 1 compared to d 14 was not different to muscles LD, ST and TT ($P > 0.05$). ST muscle (5.56 kgf) showed the highest values of SF in all aging times ($P < 0.01$). GM muscle (4.03 kgf) and BF (3.73 kgf) was not changed the SF at aging times. The LD muscle had the SH decreased with seven d of aged, not differing from d 14. The smallest SF was obtained for TT (2.96 kgf) in 14 d of aged. The ST muscle not changes the tenderness as an aging time up to 14 d. GM and BF muscles are considered tenderest on the d 1.

Key Words: beef cattle, meat quality, shear force.

1272 (W159) Color and pH of meat aged from Nellore young bulls fed crude glycerin associated with soybean grain in low or high starch diets. M. B. Abra, J. F. Lage[*], L. G. Rossi, L. R. Simonetti, E. A. Oliveira, G. M. Delamagna, E. E. Dalanttonia, V. B. Carvalho, and T. T. Berchielli, *Universidade Estadual Paulista Júlio de Mesquita Filho, Jaboticabal, Brazil.*

This trial aimed to evaluate the meat quality aged in 7 or 14 d from Nellore young bulls fed crude glycerin (CG; 80% of glycerol) associated with soybean grain (SG) in low (LS) or high starch (HS) diets finished in feedlot. Twenty-eight animals that were 20 mo old and 428.57 ± 35.33 kg of initial BW were used in a randomly design in a factorial arrangement 2 × 2 x 2 (LS or HS diets, with or without oil and two aging times) with seven replicates. The diets (40:60) were: 10% of CG in DM diet replacing corn (HS); 10% of CG in DM diet replacing corn plus SG; 10% of CG in DM diet replacing soybean hulls (LS) and 10% of CG in DM diet replacing soybean hulls plus SG. After 140 d of feeding, all animals were slaughtered with a 590.21 ± 52.29 kg of BW. All carcasses were refrigerated at 0°C for approximately 24 h. A boneless *Longissimus* muscle

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(LM) section 10 cm thick was removed from the posterior end of the wholesale rib. The LM was sliced into steaks of 2.54 cm, individually vacuum packaged and chilled at 0 to 2°C for 7 and 14 d. The color reading was conducted using the CIE L*a*b* system. The water holding capacity (WHC) was measured for the difference between the weights of the sample before and after it was subjected to a pressure of 10 kg for 5 min. Data were analyzed by the PROC MIXED of SAS, and the Tukey test used considering 5% probability. There was no interaction ($P > 0.05$) for any of the variables evaluated. Thus, effects were discussed independently. Similar values of lightness (L*), redness (a*), yellowness (b*), pH and WHC were observed for beef from animals fed LS or HS diets. Likewise, the inclusion of SG was not affected the meat quality traits. However, the lightness ($P < 0.01$) and yellowness ($P < 0.01$) was higher in beef aged for 14 d. The crude glycerin (10% of DM) associated with SG in LS or HS diets did not affect the meat quality traits as a pH, WHC and color of Nellore young bulls. The aging time for 14 d increases the lightness and yellowness of beef.

Key Words: glycerol, meat quality, oil

1273 (W160) Effects of excess dietary sulfur on beef carcass characteristics and quality after aging.

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To test the effects of excess dietary S on beef carcass characteristics and quality (color shelf-life, oxidative stability, and sensory attributes), 20 steers (initial BW = 279 ± 60.4 kg) were blocked by BW and assigned randomly to 1) no additional S ($\sim 0.15\%$ S) or 2) high S (0.40% S). Steers grazed fall pastures and were offered corn and soybean meal supplements for 114 d. Steers were moved to the feedlot, remained on prior dietary treatments, and received corn and soybean meal rations for 123 d. Steers were slaughtered at an average BW of 565 ± 38.4 kg. Boneless rib sections were obtained and aged 14 d at 4°C before fabrication into 2.54-cm-thick steaks. Steaks were overwrapped with oxygen permeable film and stored in open-topped, coffin-chest display cases (2.8°C) under continuous warm-white, fluorescent lighting (1600 lx) for 7 d of simulated retail display. Trained panelists ($n = 11$) evaluated raw LM color on d 0, 1, and 7. Instrumental (L*, a*, and b*) color was evaluated on d 0, 1, 4, and 7. Thiobarbituric acid reactive substances (TBARS) were measured on d 0 and 7 from LM cross-sections. Consumer sensory panel ($n = 151$) assessed cooked LM sensory attributes. Steer growth did not differ ($P = 0.58$) between dietary S levels. Dietary S did not affect HCW ($P = 0.50$), dressing percentage ($P = 0.44$), USDA yield grade ($P = 0.56$), LM area ($P = 0.36$), or 12th rib fat thickness ($P = 0.66$). Although TBARS were greater ($P < 0.0001$) on d 7 than 0 of simulated retail display, values did not ($P = 0.19$) differ between dietary S levels. No differences were observed in total color ($P = 0.27$) or percent discoloration ($P = $

0.42); however, LM from steers fed 0.40% S were perceived to display greater worst-point color ($P < 0.05$; treatment × day) on d 1 of simulated retail display. Dietary S did not effect a* ($P = 0.50$), b* ($P = 0.61$), or L* ($P = 0.64$). Furthermore, consumers failed to perceive a difference in tenderness ($P = 0.26$), juiciness ($P = 0.61$), overall impression ($P = 0.37$), beef flavor ($P = 0.40$), or off-flavor ($P = 0.79$) between the two dietary S levels. These results suggest that supplementing beef cattle diets with 0.40% S had no appreciable effects on steer performance or beef carcass characteristics, objective color, oxidative stability, and sensory attributes.

Key Words: beef, quality, sulfur

1274 (W161) Effect of β agonist and immunocastration on meat characteristics Nellore cattle.

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Beta agonists (BAA) have been used to improve feedlot performance and carcass yielding, but some negative effects on meat quality. Immunocastration could be an alternative because increasing fat deposition. Therefore, this work was developed to evaluate the effect of BAA and immunocastration on meat quality traits of feedlot finished Nellore cattle. Ninety-six males (409 ± 50 kg LW; 20 mo old) were divided in two groups, and half of the animals received two doses of immunocastration vaccine (Bopriva) within 30-d interval. Animals were fed during 70 d a common diet containing 76% concentrate and 24% roughage (corn silage). Each of these groups were them splitted in three groups and fed during 30 d: control diet without BAA (CON); CON diet plus 80mg/day zilpaterol hydrochloride (Zilmax) (ZIL); CON diet plus 300mg/day of ractopamine hydrochloride (Optaflexx) (RAC). After 100 d of feeding, animals were slaughtered, and four samples of LM was collected between 12th and 13th ribs and aged for 0, 7, 14 or 21 d. Following aging samples were analyzed for L*, a*, b* color, cooking loss (CL), Warner-Bratzler shear force (WBSF). Data was analyzed as repeated measurements in a block (initial BW) complete randomized design with a 2×3 factorial arrangement, considering sex condition, treatment, ageing period and first and second order interactions as fixed effects. Immunocastrated males showed higher values ($P < 0.001$) of L* (36.4 vs. 33.3), a* (14.9 vs. 13.9) and b* (10.0 vs. 8.1) compared to non-castrated. Sex condition did not affect CL (22.2%) or WBSF (4.1 kg). There was a significant sex x aging period interaction ($P = 0.0053$) for WBSF that, different from expected, non-castrated males showed smaller WBSF than immunocastrated for non-aged (time 0) samples (5.2 vs. 6.3 kg; $P = 0.0131$). There was no sex difference for samples aged for 7, 14, or 21 d (4.4, 3.2 and 3.1 kg). Treatments had no effect on L* (34.9, but treatments

CON and RAC showed higher a* values (14.8 and 14.6) than ZIL (13.7; $P < 0.05$). CON had higher b* value than ZIL (9.5 vs. 8.6; $P = 0.0271$), but they did not differ from RAC (9.0). CL was not significantly affected by treatments. The WBSF was greater for ZIL (4.4 kg) than to RAC (4.0 kg) and CON (3.8) treatments. Sex condition affects meat color but has no impact on CL or WBSF. Use of BAA alter color attributes and WBSF of meat from Nellore cattle.

Key Words: feedlot, color, maturation

1275 (W162) The use of bioelectrical impedance analysis to predict carcass composition in calf-fed Holstein steers.

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The beef industry relies heavily on subjective evaluation of beef carcasses to quantify carcass composition. Bioelectrical Impedance Analysis may offer the ability to objectively quantify carcass composition in a rapid, repeatable manner and more accurately determine composition of cattle fed growth promotants. Thus, bioelectrical impedance analysis was utilized to estimate the percentage of salable red meat yield (SRMY), fat trim (FT), and bone (BONE) within Holstein ($n = 110$) carcasses supplemented zilpaterol hydrochloride (ZH) or not supplemented (CON). Following a 36-h chilling period, bioelectrical impedance analysis was conducted by placing source and detector electrodes in the semimembranosus muscle posterior to the aitch bone and in the intercostal muscles between the first and third ribs to attain measures of electrical resistance (Rs) and electrical reactance (Xc). Additional measurements of hot carcass weight (HCW), carcass temperature (TEMP), electrode gap (EGAP) were collected to calculate measurements of impedance (I), resistive density (RsD), reactive density (XcD), resistive volume (RsVOL), and reactive volume (XcVOL). Upon completion of measurements, carcasses were subsequently fabricated into subprimal yield components reflective of industry standards (max. fat depth $\leq$ 6mm). Dependent variables of SRMY (52.26 to 67.72%), FAT (10.39 to 29.35%) and BONE (12.03 to 23.11%) were used in multiple linear regression equations. Estimates were calculated via STEPWISE regression methods in SAS (SAS 9.3, SAS Institute, Cary, NC). Predictive models for FT included variables of XcD, TEMP, RsD and EGAP accounted for 72 and 81% ($R^2 = 0.72$ and 0.81) of the variation in CON and ZH cattle, respectively. Moreover, predictive models for BONE included variables of Xc and HCW accounted for 43 and 58% ($R^2 = 0.43$ and 0.58) of the variation in CON and ZH cattle. Percentage of SRMY used variables RsD and XcD and accounted for 54 and 70% ($R^2 = 0.54$ and 0.70) of the variation in CON and ZH cattle, respectively. These results suggest that bioelectrical impedance analysis may serve as a reliable objective measure of carcass composition for concentrate fed Holstein steers.

Key Words: Holstein, impedance, composition

1276 (W163) Increasing levels of sodium benzoate affect myosin heavy chain type expression in cultured bovine satellite cells.

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Sodium benzoate is used by commercial bakers to increase tolerance in yeast to calcium propionate, a mold inhibitor. Yeast cell wall is produced during the production of yeast extract from primary grown bakers yeast. While this primary grown yeast is washed before yeast cell wall is produced from the culture, some residual sodium benzoate may be retained. Due to increasing interest in feeding yeast cell wall to feedlot cattle, the present study was conducted to examine the effects of sodium benzoate on bovine muscle satellite cells (BSC). Cultured BSC were grown to confluence and treated with increasing levels of sodium benzoate added to the differentiation media, a negative control, 0.001 μM, 0.01 μM, 0.1 μM, 1 μM, 10 μM, and 100 μM, with four wells per dose. The cells were allowed to differentiate for 48 h and then harvested for RNA and protein analysis. The 1 μM dose increased ($P < 0.05$) the gene expression of AMPKα compared with the 0.001 μM dose and tended ($P < 0.10$) to be greater than the 0.01 μM dose. The 0.1 μM dose tended ($P < 0.10$) to have a greater expression of the AMPKα gene compared with the 0.001 μM dose. Concentrations IGF-1 mRNA were greater in the 0.1 μM dose compared with the control ($P < 0.05$). Among the cultures receiving sodium benzoate, there was a numerical increase of myosin heavy chain (MHC) type I gene expression as concentration of sodium benzoate increased, with the 10 μM and 100 μM doses having greater ($P < 0.05$) gene expression than the control, 0.001 μM, and 0.01 μM doses. The 0.001 μM dose tended ($P < 0.10$) to have a lower abundance of MHC type I mRNA than the 0.1 μM and 1 μM doses. The 100 μM dose had a greater expression of MHC type IIA than the control, 0.001 μM, and 0.01 μM doses ($P < 0.05$). The 10 μM and 100 μM doses had greater ($P < 0.05$) levels of MHC type IIX mRNA compared with the control, 0.001 μM, and 0.01 μM doses. The 0.01 μM dose had a greater ($P < 0.05$) concentration of AMPKα protein than the 10 μM and 100 μM doses. These results indicated sodium benzoate could induce MHC type I expression in cultured BSC.

Key Words: benzoate, myosin, satellite cells

1277 (W164) Surgical castration and immunocastration improve cuts yield of high market value from animals crossbred Aberdeen Angus x Nellore. A. D. Moreira[1], F. D. Resende[2], G. R. Siqueira[3], J. M. B. Benatti[1], M. H. Moretti[4], J. A. Alves Neto[1], B. S. Lima[1], J. F. Lage*[1], G. Z. Miguel[5], P. H. Gonçalves[6], and F. D. Santos[6], *¹Universidade Estadual Paulista, Jaboticabal, Brazil, ²Agência Paulista de Tecnologia dos Agronegócios, Colina, Brazil, ³APTA-Polo Regional Alta Mogiana, Colina, Brazil, ⁴UNESP-FCAV, Jaboticabal, Brazil, ⁵Universidade do Estado de Mato Grosso, Pontes e Lacerda, Brazil, ⁶Centro Universitário da Fundação Educacional de Barretos, Brazil.*

This trial aimed to evaluate the effect of castration methods (surgical or immunological) on percentage of main cuts from hindquarter of beef cattle raised in pasture. Thirty animals 1/2 Angus × 1/2 Nellore with 233.0 ± 38.2 kg of initial BW and 8 mo of age were fed in pasture of *Brachiaria brizantha* cv. Marandu receiving 3 g/kg BW/day of proteic-energetic supplement (25% crude protein and 60% of total digestible nutrients). Animals were supplemented for 356 d (20 d for adaptation and 336 d of experimental period (July 21, 2011, to July 11, 2012). The treatments comprised 10 replicates: non-castrated animals (NC); surgical castrated (SC) and immuno-castrated (IC). The surgical castration was realized on last day of adaptation period and the immunocastration was realized with Bopriva (anti-GnRH) being applied on the first day, 84 and 237 d after beginning of the experiment. The animals were slaughtered and all carcasses were chilled at 0°C for 24 h. After slaughter were recorded the carcass weight (CW; hot and cold) and carcass shrink loss (CSL). Cuts from left carcass (Rib Eye, Striploin Back Chain, Rump Heart, RumpCap e Tenderloin Chain) were removed and weighed. These cuts are considered of high market value in Brazil. Data were analyzed (randomly design) by the PROC MIXED of SAS and the Fisher test used considering 10% probability. Animals NC had greater final hot CW (281.8 kg; $P < 0.001$) and cold CW (278.3 kg; $P < 0.001$) than those animals SC and IC. However, the castration methods did not affect the hot and cold DP ($P > 0.10$). Animals NC had higher CSL (1.26%; $P = 0.024$) than those animals SC (0.76%) and IC (0.87%). Animals castrated showed greater hindquarter yield (47.8%; $P = 0.003$) than animals NC (46.3%). The total weight (sum of all cuts evaluated) in relation the total weight of hindquarter was not affect by castration methods ($P > 0.10$). However, when these sum of all cuts were realized in relation to cold CW had greater percentage these cuts of hindquarter from both animals castrated than animals NC ($P = 0.049$). A greater commercial cuts yield from hindquarter in the carcass is profitable in a beef cattle market. The castration methods evaluated in the animals produces carcass with greater commercial cuts yield from hindquarter in relation to cold carcass weight.

Key Words: anti-GnRH, commercial cuts, yield carcass

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