1242 (M154) Proximate composition and physic-chemical characteristics of broiler fed varying levels of honey in their diet. F. Patience Olusola[*1], A. Victor O.[2], O. Bayonle O.[2], and O. Olumuyiwa Jacob[2], *[1]Osun State University, Osogbo, Nigeria, [2]Osun State University, College of Agriculture, Osogbo, Nigeria.*

Heat stress is a major limiting factor in poultry production especially in hot–humid zones of the world. It could cause suffering, death, reduction in feed consumption, could reduces production and growth rate of broiler chicken. To combat this limitation, different anti-stress is used containing vitamins like honey, which is a natural energy booster, with antioxidant, antibacterial properties and act as anti-stress due to it mineral and vitamins composition, e.g, it has about 20.3 mg of calcium, 13.6 mg of phosphorus, 176 mg of potassium, etc. This study evaluate the effect varied level of honey at 0 mL of honey inclusion/kg of feed as treatment 1 (T1), 10 mL of honey/kg of feed as treatment 2 (T2), 20 mL of honey/kg as treatment 3 (T3) and 30 mL of honey/kg of feed as treatment 4 (T4), arranged in a completely randomized design. One hundred and fifty-six d old Gallus domesticus were used and fed with formulated broiler starter and finisher feed for 8 wk and mixed with honey at varied level, while water was given ad libitum. Results shows that for physicochemical parameters, T1 had significant higher ($P < 0.05$) values for Cold shortening, Thermal shortening, Cooking loss and Water-holding capacity than, T2, T3, and T4, respectively. For fresh broiler meat, T2 had the lowest protein content but highest significant values for moisture, ether extract and ash content than T1, T2, and T4, respectively. For boiled broiler meat, T2 (48.75 ± 0.56) had the lower protein content ($P < 0.05$) than T1 (50.60 ± 0.56), T3 (51.00 ± 0.56), and T4 (51.23 ± 0.56), with T4 having same significant value as T1. For grilled broiler meat, T3 had the highest protein content 57.15 ± 0.83 than T2 having the least value of 52.70 ± 0.83. Broiler fed with 20 mLs (T3) and 30 mLs (T4) of honey inclusion in their diet, performed better than T1 (0 mL) and T2 (10 mLs). While Ti proved to have the best physio-chemical parameter compared to other treatments.

Key Words: grilled, boiled, physicochemical, honey and broiler

1243 (M155) Carcass and organ characteristics of broilers fed varying levels of honey. A. Victor Olabisi*, F. Patience Olusola, O. Olumuyiwa Jacob, and O. Kehinde O., *Osun State University, Osogbo, Nigeria.*

The synergestic relationship between Broiler Production and Animal Protein cannot be over emphasised as the later does better by converting feed into the final product, meat. This study has looked in manuvering the kind of feed which is readily available to the birds so as to foster a good feed conversion ratio. The results obtained for carcass characteristics are as presented below. The results showed that there were variation in the figures recorded for the live weight, dead weight, de-feathered weight, full gizzard, flat weight, lungs weight, kidney weight, breast weight among all the treatments. From the study, it was observed that liver weight was highly significant ($P > 0.05$) but numerically birds fed with 20 mL of honey had the highest liver weight followed by birds fed 30 mL of honey and the least weight was in the birds fed 10 mL of honey. The heart weight was significantly ($P > 0.05$) affected by honey, though 20 mLs of honey fed birds had the largest heart weight, but it was not significantly different ($P < 0.05$) from birds fed 30 mLs of honey while birds fed 10 mL of honey had the least heart weight and testis weight has no significant difference ($P < 0.05$) among the treatments. However, birds fed with 20 mL of honey had the highest weight, live weight, dead weight, neck weight, back weight, liver weight, heart weight and trachea weight. The empty crop weight appeared same for all the inclusion at different meals of honey.

Key Words: meat, honey, weight gain

1244 (M156) Ractopamine and immunocastration: Effects on enhanced pork loin. A. F. S. I. de Freitas[*1,2], D. S. Lucas[3], D. A. Fausto[4], S. F. N. Pertile[4], E. F. Delgado[4], N. S. Janzantti[5], and E. T. F. Silveira[6], *[1]UNESP, São José do Rio Preto, São Paulo, Brazil, [2]IFMT, Campo Novo do Parecis, Mato Grosso, Brazil, [3]UFF, Rio de Janeiro, Brazil, [4]ESALQ/USP, Piracicaba, São Paulo, Brazil, [5]UNESP, São José do Rio Preto– São Paulo, Brazil, [6]ITAL, Campinas, São Paulo, Brazil.*

The consumer is increasingly demanding high quality meat produced under the criteria of respect for the environment and animal welfare. The aim of this study was to evaluate the influence of ractopamine (RAC) in pig diets as well as castration method, physical or immunocastration, on the quality of pork loin. Male pigs were commercial selected Agroceres, AGPIC 337 (initially with $n = 120$ males). In maternity phase (0 to 21 d old) half of the piglets were physically castrated at 5 d postpartum. The males underwent immunocastration (Vivax, Pfizer Animal Health) in two doses of 2 mL, 8 and 4 wk before slaughter. For half of the pigs physically- and immunocastrated, ractopamine was included (RAC, 7.5ppm, Ractosuin, Ourofino Agribusiness) in feed for 21 d (± 2 d) before slaughter. After the slaughter were randomly selected five carcasses of each treatment and removed the *Longissimus dorsi* (LM). The experiment was completely randomized designer ranged in a 2 × 2 factorial with five repetitions. There was no difference ($P > 0.75$) for the meat water content; however, RAC in the diet resulted in more protein ($P < 0.05$) and less ether extract fat ($P < 0.05$) in the muscle, even though there was

no effect on carcass yield. The addition of RAC also resulted in less tender meat ($P < 0.01$) at 24 h postmortem. The meat from the animals fed RAC had higher meat yield by the injection process (enhancement). However, there was no influence of RAC in weight loss by exudation (purge loss) ($P \geq 0.78$) indicating an improvement pork loin juiciness. Immunocastration and RAC had a negative impact while physically castrated males with RAC a positive impact on cooking loss, which favor higher income by providing greater juiciness.

Key Words: swine, castration method, meat quality

1245 (M157) Analysis of porcine myosin heavy chain isoforms by liquid chromatography and mass spectrometry.

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Myosin, a myofibrillar protein in the skeletal muscle, consists of two heavy chains (MHC) and four light chains. Nine MHC isoforms have been observed in muscles of mammalian species, and four MHC isoforms (I/slow, 2a, 2x, and 2b) were recognized in porcine skeletal muscle. MHC is a critical component that determines the metabolic and contractile properties of muscle fibers, which in turn related to meat quality. Therefore, analysis of MHC isoforms expression is important in animal muscles such as porcine and bovine skeletal muscle. However, MHC isoforms from porcine skeletal muscle is complicated due to the similarity in molecular weights among the MHC isoforms (i.e., 223.743, 223.924, 223947, and 224.010 kDa for MHC I/slow, 2a, 2x, and 2b, respectively). We analyzed the porcine MHC isoforms by LC-MS/MS system following SDS-PAGE electrophoresis. The *longissimus dorsi* muscle was taken from each of three commercial pigs (Landrace×Yorkshire×Duroc) for SDS-PAGE electrophoresis and LC-MS/MS analysis (Tempo nano-LC system, Applied Biosystems, CA). A total of 525 unique peptides were identified and compared to each amino acid sequence of the porcine MHC isoforms. We selected four representative peptides that were identical to MHC I/slow, 2a, 2x, and 2b. The peptide identified as TLEDQLSEVKTKEEEHQR corresponds to residues 1253–1270 of MHC 2b, and differs from the other MHC isoforms (TLEDQLSELKSKEEEQQR, TLEDQLSELKTKEEEQQR, and TLEDQMNEHRSKAEETQR for MHC 2a, 2x, and I/slow). MHC 2x was confirmed by the peptide ELEGEVESEQKRNVETVK, which corresponds to residues 1925–1942. MHC I/slow and 2a were also confirmed by the unique peptides DIGTKGLNEE (residues 1926–1935) and TNAACAALDKK (residues 1539–1549), respectively. These types of unique peptides are useful for confirmation of MHC isoforms and could be used as MHC-specific markers for porcine skeletal muscle.

Key Words: myosin heavy chain, porcine skeletal muscle, LC-MS/MS

1246 (M158) Occurrence of dietary unsaturated fatty acids and their biohydrogenation products in muscles of non-ruminating foregut fermenters.

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Muscles of ruminants contain higher proportions of saturated fatty acids (SFA) and monounsatured FA, but lower proportions of polyunsaturated FA (PUFA), than those of monogastric herbivores, which is considered unfavourable for human health. This is explained by an almost complete microbial biohydrogenation (saturation) of dietary PUFA in the rumen before reaching the site of FA absorption, the small intestine. The objective was to investigate whether the muscles of non-ruminating foregut fermenter contain more PUFA and more biohydrogenation products than those of ruminants, due to their shorter passage times and thus incomplete biohydrogenation of C18 PUFA in the forestomach. The studied intermediates formed during biohydrogenation were *cis*-9, *trans*-11 C18:2 conjugated linoleic acid (CLA) and *trans*-11 C18:1 vaccenic acid (TVA). The study species included Bennett wallabies (*Macropus rufogriseus*, $n = 12$) and collared peccaries (*Pecari tajacu*, $n = 10$). Wallabies were free-ranging on grass pastures. Peccaries were maintained on a zoo diet (75% apples, carrots; 25% hay, bread). *Biceps femoris* muscles were sampled from carcasses. Fatty acid methyl esters were separated on a Supelcowax–10 column and the isomers of C18:1 on a Varian column after split injection in a HP 6890 gas chromatograph. The ratio of SFA:PUFA in muscles of wallaby and peccary was with 0.6 and 1.6, respectively, lower than in domestic ruminants (> 4) and in domestic pigs (2.6). In wallaby muscles, the concentration of TVA plus CLA was with 8% of total fatty acids (tFA) higher than in ruminants (2.6% tFA), with a TVA:-CLA ratio of 3.7 (ruminants: 2.1). In peccary muscles, CLA and TVA were not detectable (< 0.1% tFA), which therefore resembled the domestic pig. In conclusion, the results indicate that muscles of non-ruminating foregut fermenters are less saturated than those of ruminants and pigs. However, occurrence of *trans*-fatty acids was not uniform for the studied non-ruminating foregut fermenters, which may be related to differences in diet, microbial population and endogenous desaturation.

Key Words: *trans*-fatty acids, wallaby, peccary

1247 (M159) Effects of amino acid supplementation of reduced crude protein (RCP) diets on fatty acid compositions of subcutaneous fat and muscle. A. N. Young*, J. K. Apple, J. W. Yancey, T. M. Johnson, T. C. Tsai, and C. V. Maxwell, *Dep. of Animal Science, University of Arkansas Division of Agriculture, Fayetteville.*

Barrows and gilts ($n = 210$/gender) were used to test the effects of crystalline AA supplementation of reduced CP diets on fatty acid composition of the LM and s.c. fat from the jowl from growing-finishing swine. Pigs were blocked by BW, and pens (6 pigs/pen) within each block and gender were assigned randomly to either corn-SBM diets (C) devoid of crystalline LYS and formulated to 95% SID AA requirements or 1 of 4 RCP diets (CP and crystalline LYS levels for the dietary treatments during each are presented in the accompanying table, 1247). During the last 3-wk feeding phase, 10 mg/kg of Paylean were included in all diets. Jowls and a subsample of whole pork loins (2 loins/pen) were captured during carcass fabrication, and the LM and s.c. fat from each jowl was freeze-dried for determination of fatty acid composition. The LM from barrows had greater ($P < 0.001$) proportions of SFA than the LM from gilts, whereas LM MUFA content increased in the LM of barrows but decreased in the LM of gilts with decreasing dietary CP (linear RCP × gender, $P = 0.037$). Conversely, LM PUFA composition increased in gilts and decreased in barrows with decreasing dietary CP (linear RCP × gender, $P = 0.056$). Jowl fat from barrows had more ($P = 0.008$) SFA and less ($P < 0.001$) PUFA than jowl fat from gilts, whereas the proportions of SFA– particularly palmitic and stearic acids– and PUFA– specifically linoleic acid– in jowl s.c. fat decreased (linear, $P \leq 0.019$) with decreasing dietary CP. Also, weight percentages of all MUFA, especially oleic acid, increased (linear, $P < 0.001$) as dietary CP was reduced in the diet. Results indicate that the fatty acid composition of pork lean and fat were altered by reducing dietary CP, and the pattern of increased MUFA composition of jowl s.c. fat may imply enhanced de novo synthesis in pigs fed RCP diets supplemented with crystalline AA.

Key Words: fatty acid composition, reduced CP, swine

Table 1247. CP (added LYS) of experimental diets for each feeding phase (% as fed)

Phase	C	RCP1	RCP2	RCP3	RCP4
1	23.70	21.61 (0.19)	19.58 (0.37)	17.61 (0.56)	15.72 (0.75)
2	21.53	19.46 (0.18)	17.44 (0.36)	15.49 (0.54)	13.61 (0.71)
3	18.97	17.34 (0.15)	15.75 (0.29)	14.16 (0.44)	12.68 (0.59)
4	17.66	16.30 (0.13)	14.96 (0.24)	13.64 (0.36)	12.37 (0.48)
5	20.24	18.60 (0.15)	17.01 (0.30)	15.44 (0.45)	13.93 (0.60)

1248 (M160) Postmortem pH evolution in four muscles and onset, state and resolution of rigor mortis of guinea pigs (*Cavia porcellus*) carcass. D. Núñez-Valle[1], L. P. Cevallos-Velastegui[1], A. Morales-delaNuez[2], N. Castro[3], A. Argüello[3], and D. Sánchez Macías[*1], *[1]Agroindustrial Engineering, Universidad Nacional de Chimborazo, Riobamba, Ecuador, [2]Facultad de Ciencia Pecuarias, Escuela Superior Politécnica de Chimborazo, Riobamba, Ecuador, [3]Dep. of Animal Science, Universidad de Las Palmas de Gran Canaria, Arucas, Las Palmas, Spain.*

The effect of pH on meat quality is a subject that has been deeply investigated extensively in meat science, and there is a wealth of qualitative knowledge. In the same way, rigor mortis is one of the most important physicochemical changes in skeletal muscles occurring at a relatively earlier postmortem period and then maintaining for a certain period, which results in an increasing toughness of meat. No information exists in the literature about the pH evolution or instauration and resolution of rigor mortis in guinea pig. The objective of this work was to determine the postmortem evolution of pH in four different muscles of guinea pig, as well as to establish the rigor mortis instauration, rigor state and its resolution. Forty-eight guinea pigs, randomly selected from the same production system were divided into four groups of 12 animals as follows: 3-mo-old female, 3-mo-old male, 12-mo-old female, and 12-mo-old male. Four muscles, *longissimus dorsii* (LD*), quadriceps femoris* (QF), *triceps braquii* (TB), and *psoas major* (PM), were used to measure pH at 15, 30, 45 min, each hour from 1 to 12, 15, 18, 21, and 24 h postmortem. These muscles were selected because of energy metabolism described in other species, which PM displays the lowest and LD the highest anaerobic capacity. Analysis of variance with repeated measures was conducted to test the significance of the two variables muscle and time postmortem. Splitting the data was used to check the effect of age or sex. Least squares means were calculated and considered significantly different if $P < 0.05$. pH started near 7 in LD and TB, followed by QF, and PM had the lower pH value at 15 min postmortem. pH decreased during the experimental time until 5 h in TB and QF, and 6 h in LD and PM. However, pH decline rate was slower for PM, being higher after 6 h than the other muscles. After 12 to 15 h postmortem, pH values increased slightly. Rigor mortis was onset after 5 to 6 h postmortem. After rigor onset, the muscle undergoes a longer period of rigor state, which was resolved after 13 to 15 h postmortem. No differences were found regardless sex or age. In conclusion, authors recommend at least 15 h of chilling for guinea pigs carcass, until the rigor mortis was resolved.

Key Words: guinea pig, pH, rigor mortis

1249 (M161) Water holding capacity and cooking losses of different muscles of guinea pigs (Cavia porcellus). L. P. Cevallos-Velastegui[1], D. Núñez Valle[1], A. Morales-delaNuez[2], N. Castro[3], A. Argüello[3], and D. Sánchez Macías[*1], *[1]Agroindustrial Engineering, Universidad Nacional de Chimborazo, Riobamba, Ecuador, [2]Facultad de Ciencia Pecuarias, Escuela Superior Politécnica de Chimborazo, Riobamba, Ecuador, [3]Dep. of Animal Science, Universidad de Las Palmas de Gran Canaria, Arucas, Las Palmas, Spain.*

It is well-known that aging produces changes in meat characteristics. Meat quality depends on organoleptic properties (color, texture, flavor and juiciness) which are related to zootechnical characteristics (breed, age, sex) or anatomical characteristics such as type of muscle. The main objetive of this study was to describe the water holding capacity and cooking losses of ten different muscles of guinea pig after chilling for 12 h at 4°C. Forty eight guinea pigs randomly selected from the same production system were divided into four groups of 12 animals as follows: 3-mo-old female, 3-mo-old male, 12-mo-old female, and 12-mo-old male. Ten muscles were excised after 12 h postmortem: *longissimus dorsii, quadriceps femoris, triceps braquii, psoas major, biceps femoris, semimembranosus, semitendinosus, gracilis, gluteal,* and *gastrocnemio*. Water-holding capacity (WHC) was measure using 0.3 g of muscle between two papers with 1 kg of weight during 10 min. Vacuum packaged muscle was introduced in a 70°C water bath for 30 min, and cooking losses (CL) were measured. A two-way analysis of variance was conducted to test the significance of the two fixed variables muscle and age or sex. Least squares means were calculated and considered significantly different if $P < 0.05$. With regard to WHC, *triceps braquii, psoas major,* and *gracilis* showed the lower values, while *gastrocnemio* had the higher values. *Quadriceps femoris* displayed similar values than *longissimus dorsii*. The 12-mo-old animals had lower WHC than 3-mo-old guinea pigs. However, when we compare data splitting male and female, it is possible to observe that female guinea pigs lost more water than males at 3 mo of age. With regard to CL, *longissimus dorsi*, *gastrocnemio, quadriceps femoris* and *biceps femoris* had similar CL values, while the higher values corresponded to *triceps braquii* and *gracilis*. It was also observed that male guinea pigs had higher values of CL than female animals; these differences were more clearly observed in 3-mo-old animals.

Key Words: guinea pig, water holding capacity, cooking losses