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403. Screening for neurotoxic potential of 15 flame retardants using freshwater planarians/ **Zhang, Siqi; Ireland, Danielle; Sipes, Nisha S.; Behl, Mamta; Collins, Eva-Maria S.**. Neurotoxicology and Teratology. ISSN:0892-0362 (2019) v.73 p.54-66Neurotoxicology and Teratology

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Link: http://www.sciencedirect.com/science/article/pii/S089203621830165X

Abstract: Asexual freshwater planarians are an attractive invertebrate model for high-throughput neurotoxicity screening, because they possess multiple quantifiable behaviors to assess distinct neuronal functions. Planarians uniquely allow direct comparisons between developing and adult animals to distinguish developmentally selective effects from general neurotoxicity. In this study, we used our automated planarian screening platform to compare the neurotoxicity of 15 flame retardants (FRs), consisting of representative phased-out brominated (BFRs) and replacement organophosphorus FRs (OPFRs). OPFRs have emerged as a proposed safer alternative to BFRs; however, limited information is available on their health effects. We found 11 of the 15 FRs (3/6 BFRs, 7/8 OPFRs, and Firemaster 550) caused adverse effects in both adult and developing planarians with similar nominal lowest-effect-levels for BFRs and OPFRs. This suggests that replacement OPFRs are comparably neurotoxic to the phased-out compounds. BFRs were primarily systemically toxic, whereas OPFRs, except Tris(2-chloroethyl) phosphate, shared a behavioral phenotype in response to noxious heat at sublethal concentrations, indicating specific neurotoxic effects. We found this behavioral phenotype was correlated with cholinesterase inhibition, thus linking behavioral outcomes to molecular targets. By directly comparing effects on adult and developing planarians, we further found that one BFR (3,3′,5,5′-Tetrabromobisphenol A) caused a developmental selective defect. Together, these results demonstrate that our planarian screening platform yields high content data from various behavioral and morphological endpoints, allowing us to distinguish selective neurotoxic effects and effects specific to the developing nervous system. Ten of these 11 bioactive FRs were previously found to be bioactive in other models, including cell culture and alternative animal models (nematodes and zebrafish). This level of concordance across different platforms emphasizes the urgent need for further evaluation of OPFRs in mammalian systems.

Keyword: Alternative animal models; Developmental neurotoxicity; Flame retardants; OPFRs; Planarian; Polybrominated diphenyl ethers

404. Hepato-protective effect of curcumin and silymarin against Eimeria stiedae in experimentally infected rabbits/ **Aboelhadid, Shawky M.; El-Ashram, Saeed; Hassan, Khaled M.; Arafa, Waleed M; Darwish, Ahmed BahaaEldin**. Livestock Science. ISSN:1871-1413 (2019) v.221 p.33-38Livestock Science

DOI: 10.1016/j.livsci.2019.01.011

Link: http://www.sciencedirect.com/science/article/pii/S1871141319300393

Abstract: The aim of the current study was to assess the hepato-protective role of curcumin and silymarin against Eimeria stiedae in experimentally infected rabbits. Thirty-two rabbits were randomly divided into four groups: untreated/uninfected control group (A); untreated/infected control group (B); curcumin-treated/Eimeria-infected group (C); and silymarin-treated/Eimeria-infected group (D). Animals in groups C and D were treated by a daily dose of 200 mg/kg bw and 100 mg/kg bw of curcumin and silymarin, respectively for one week before infection (the herbs were administered for 41 days). One- week post treatment, all groups except group A were infected with 5 × 104

sporulated oocysts of E. stiedae and followed for 34 days post infection. During the 34 days of infection, rabbits were evaluated for clinical, hematological, biochemical, pathological parameters and liver dysfunction profiles. There was no significant difference in mortality rate among the different groups of animals except for the infected group B in which 7 out of 8 rabbits died while in the treated groups C and D, 3 out of 8 died. Infection with E. stiedae significantly reduced the body weight and affected rabbit's health. The average body weight gained of A, B, C and D groups were 929, −62.46, 614 and 448.8 g, respectively. However, significant improvements in general health condition were observed in curcumin- and silymarin-treated groups. No significant differences were detected for the fecal oocyst counts between the treated and untreated groups. Moreover, the liver enzyme profiles ALT, AST and GGT did not show any significant changes in the infected groups. However, ALT level significantly decreased in groups B, C and D. ALT level was accompanied with hyperproteinemia and decreased in albumin content in comparison with the uninfected untreated control group. Moreover, E. stiedae infection induced severe histopathological lesions in the liver of all infected groups. In conclusion, curcumin or silymarin did not protect the liver from E. stiedae infection but mitigated the adverse effect of infection.

Keyword: Curcumin; Rabbits; Liver function; Silymarin

405. A pharmacokinetic model optimized by covariates for propofol target-controlled infusion in dogs/ **Cattai, Andrea; Bizzotto, Roberto; Cagnardi, Petra; Di Cesare, Federica; Franci, Paolo**. Veterinary Anaesthesia and Analgesia. ISSN:1467-2987 5(2019) v.46 p.568-578Veterinary Anaesthesia and Analgesia

DOI: 10.1016/j.vaa.2019.04.009

Link: http://www.sciencedirect.com/science/article/pii/S1467298719301217

Abstract: Objective To develop a population pharmacokinetic model for propofol target-controlled infusion (TCI) in dogs and to evaluate its performance for use in the clinical setting. Study design Prospective clinical study. Animals A group of 40 client-owned dogs undergoing general anaesthesia for magnetic resonance imaging. Methods Propofol was administered to 26 premedicated dogs and arterial blood samples were collected during the infusion and over 240 minutes after terminating the infusion. Propofol concentrations were measured by high-performance liquid chromatography. A population pharmacokinetic analysis was performed using a nonlinear mixed-effects modelling approach, allowing inter- and intra-individual variability estimation and quantitative evaluation of the influence of the following covariates: weight, body condition score, age, size-related age (Age_size), sex, premedication type, size and contrast agent administration. A final model was obtained using a stepwise approach in which individual covariate effects on each pharmacokinetic variable were incorporated. The performance of the developed TCI model was subsequently evaluated while inducing and maintaining anaesthesia in 14 premedicated dogs and assessed by comparing predicted and measured concentrations at specific time points. Results Propofol pharmacokinetics was best described by a three-compartment model. Weight, Age_size, premedication and sex showed significant pharmacokinetic effects. Addition of the significant covariate/variable associations to the final model resulted in a reduction of the objective function value from 285.53 to –22.34. The median values of prediction error and absolute performance error were 3.1% and 28.4%, respectively. Induction targets between 4.0 and 6.5 μg mL–1 allowed intubation within 5.0 ± 0.9 minutes. Anaesthesia was achieved with targets between 3.0 and 6.5 μg mL–1. Mean time to extubation was 9.7 ± 2.6 minutes. All dogs recovered smoothly and without complications. Conclusions and clinical relevance Overall predictive performance of the pharmacokinetic model-driven infusion developed was clinically acceptable for administering propofol to dogs in routine anaesthesia.

Keyword: dog; anaesthesia; pharmacokinetics; population; propofol; target-controlled infusion

406. Pre-slaughter stress and horn status influence physiology and meat quality of young bulls/ **Reiche, A.-M.; Oberson, J.-L.; Silacci, P.; Messadène-Chelali, J.; Hess, H.D.; Dohme-Meier, F.; Dufey, P.-A.; Terlouw, E.M.C.**. Meat Science. ISSN:0309-1740 (2019) v.158 p.107892Meat Science

DOI: 10.1016/j.meatsci.2019.107892

Link: http://www.sciencedirect.com/science/article/pii/S0309174019301743

Abstract: The study used 81 young bulls, half of which were disbudded at 7 weeks of age. The effects of horn status during rearing and of acute physical and emotional stress just before slaughter on the physiological status at slaughter and subsequent meat quality were investigated. Bulls were reared in groups containing i) only bulls with horns, ii) only bulls without horns, or iii) mixed (half with, and half without horns). Bulls of each rearing condition were assigned to one of two slaughter conditions: with limited (LS) or with supplementary stress (SS). LS resulted in lower heart rates, stress hormone concentrations and carcass temperature, whereas SS resulted in faster post mortem pH decline and lower juiciness. Horned bulls from unmixed rearing groups had lower early pm temperature, shorter sarcomeres, and lower tenderness compared to disbudded bulls. Correlations and regression analysis revealed relationships between physiological indicators, mainly heart rate before slaughter, and meat quality, including water-holding capacity and indicators of proteolysis.

Keyword: Animal welfare; Beef cattle; Meat quality; Pre-slaughter stress; Disbudding

407. UCN3 suppresses food intake in coordination with CCK and the CCK2R in Siberian sturgeon (Acipenser baerii)/ **Tang, Ni; Zhang, Xin; Wang, Shuyao; Qi, Jinwen; Tian, Zhengzhi; Wang, Bin; Chen, Hu; Wu, Yuanbing; Wang, Mei; Xu, Shaoqi; Chen, Defang; Li, Zhiqiong**. Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology. ISSN:1095-6433 (2019) v.234 p.106-113Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology

DOI: 10.1016/j.cbpa.2019.04.022

Link: http://www.sciencedirect.com/science/article/pii/S109564331930087X

Abstract: Urocortin-3 (UCN3) as a brain-gut peptide inhibits food intake of animal, but the underlying mechanism is not clear. To explore the appetite mechanism about the action of UCN3 in fish, intraperitoneal injection of UCN3 with CCK8, Lorglumide (CCK1R antagonist) or LY225910 (CCK2R antagonist) were conducted. Siberian sturgeon administrated with UCN3 and CCK8 showed a drastic reduction in food intake. The anorectic effect of UCN3 was significantly blocked by LY225910, but not affected by Lorglumide. Furthermore, LY225910 could effectively reverse appetite factor mRNA expressions, including cck, pyy, cart, npy, ucn3, apelin and nucb2 in the whole brain, stomach and intestinum valvula, but Lorglumide could only partially reverse these effects, suggesting the anorectic effect of UCN3 may be primarily mediated CCK2R in Siberian sturgeon. This study indicates for the first time in fish that UCN3 may inhibit food intake in coordination with CCK and CCK2R.

Keyword: Food intake; Appetite factors; Cholecystokinin; Cholecystokinin receptor; Urocortin-3

408. Population dynamics models based on the transmission mechanism of MCR-1/ **Qu, Leilei; Gao, Xubin; Kang, Baolin; He, Mingfeng; Pan, Qiuhui**. Physica A: Statistical Mechanics and its Applications. ISSN:0378-4371 (2019) v.515 p.310-323Physica A: Statistical Mechanics and its Applications

DOI: 10.1016/j.physa.2018.09.141

Link: http://www.sciencedirect.com/science/article/pii/S0378437118312780

Abstract: Antimicrobial resistance is now considered as one of the most serious global threats to human health in the 21st century. Recently, the discovery of a plasmid-borne colistin resistance gene, mcr-1, in China heralds the emergence of truly pan-drug-resistant bacteria. The gene has been found primarily in Escherichia coli but has also been identified in other members of the Enterobacteriaceae in animal, food, human, and environmental samples on every continent. Until now, the articles published have appeared to fairly use and interpret experimental studies. The aim of our work is to develop mathematic models that quantitatively describe the dynamic of the population of domestic animals and humans. We propose two ordinary differential equation models for the transmission dynamic of mcr-1 gene. The models are analyzed using stability theory of differential equations. Positive equilibrium points of the system are investigated and their stability analyses are carried out. Moreover, the numerical simulations of the proposed model are also represented Our results show that the fraction of animals used for human consumption is the most effective parameters of controlling the spread of mcr-1 gene in comparison with other parameters.

Keyword: Antibiotic resistance; Population dynamics; Mathematic model; Mcr-1; Stability of equilibrium points

409. Synergistic effects of fermented soybean meal and mannan-oligosaccharide on growth performance, digestive functions, and hepatic gene expression in broiler chickens/ **Soumeh, E.A.; Mohebodini, H.; Toghyani, M.; Shabani, A.; Ashayerizadeh, A.; Jazi, V.**. Poultry Science. ISSN:0032-5791 12(2019) v.98 p.6797-6807Poultry Science

DOI: 10.3382/ps/pez409

Link: http://www.sciencedirect.com/science/article/pii/S0032579119579895

Abstract: ABSTRACT This study investigated the effects of fermented soybean meal (FSBM) with or without mannan-oligosaccharide (MOS) prebiotic on growth performance, digestive functions, and hepatic IGF-1 gene expression of broiler chicken. A total of 480 day-old male broiler chickens were fed with 4 experimental diets for 6 wk. Experimental diets included corn-soybean meal diet (CON); corn-soybean meal diet + MOS prebiotic [0.2%, ActiveMOS; Biorigin, Brazile]; corn-FSBM diet [soybean meal (SBM) was totally replaced by FSBM]; and corn-FSBM + MOS prebiotic (MIX). Replacing dietary SBM with FSBM with or without MOS improved body weight gain and feed efficiency for the total grow-out period. However, the addition of MOS to the FSBM diet exhibited a greater body weight gain than other experimental diets. Villus height and villus height to crypt depth of the duodenum and jejunum were increased by feeding FSBM, MOS, and MIX diets. The ileal crude protein and energy digestibilities, as well as the activities of intestinal amylase and protease, and pancreatic protease, were improved by replacing SBM with FSBM, with or without MOS. The concentration of plasma 3-methylhistidine was reduced by FSBM and MOS, and synergistically by their combination. The MOS and FSBM diets upregulated the hepatic IGF-1 gene expression. However, there was an evident synergistic effect of FSBM supplemented with MOS in the upregulation of the hepatic IGF-1 gene expression. The outcomes of the current study indicate the FSBM and MOS had the potential to improve growth performance, hepatic IGF-1 expression, and intestinal morphology of broilers. Overall, the fermented products could be considered as functional feed that exhibits probiotic effects and the synergistic effects of prebiotics added to the fermented feeds may further improve the growth performance and gut health and functionality in broiler chicken.

Keyword: broiler chicken; probiotic; fermented soybean meal; mannan-oligosaccharide; nutrient digestibility

410. Hormonal changes, semen quality and variance in reproductive activity outcomes of post pubertal rabbits fed Moringa oleifera Lam. leaf powder/ **Ajuogu, Peter Kelechi; Mgbere, Osaro O.; Bila, Disere S.; McFarlane, James R.**. Journal of Ethnopharmacology. ISSN:0378-8741 (2019) v.233 p.80-86Journal of Ethnopharmacology

DOI: 10.1016/j.jep.2018.12.036

Link: http://www.sciencedirect.com/science/article/pii/S0378874118326217

Abstract: Ethnopharmacological relevance Moringa oleifera Lam. (Moringaceae) is an important plant based staple food, known for its nutritional and medicinal value and is usually prescribed by herbal practitioners in Nigeria and in other tropical countries for the treatment of male infertility problems and reproductive diseases in females. Although the aphrodisiac properties and fertility enhancement potential in males have been reported, the underlying mechanisms for the activity remain unclear. In this study, we investigated the influence of supplementing the diet with M. oleifera Lam. leaf powder on reproductive hormones and semen quality of New Zealand White (NZW) rabbits. Materials and methods Thirty-two (32) NZW rabbits of 50:50 ratio bucks to does, were randomly distributed to four treatment groups (n = 4 bucks, n = 4 does per group). Graded levels (0, 5, 10 and 15 g/kg) of M. oleifera Lam. leaf powder was incorporated into rabbit growers pellet. The does and bucks were housed separately in hutches and sheltered under the same environmental conditions with free access to their respective treatment diets for a period of 12 weeks. Results In female rabbits, treatment revealed significant ($P < 0.05$) dose-dependent reduction in the concentration of serum FSH, LH and oestrogen. While in contrast the highest dose of leaf powder significantly ($P < 0.05$) increased progesterone and prolactin concentrations remained unaffected. On the other hand, the concentration of FSH and LH in bucks was significantly ($P < 0.05$) increased in treatment groups compared to the control group. Serum testosterone concentrations were significantly lower in the 5 and 10 g/kg treatment groups. Semen volume, sperm count and motility were significantly improved in a dose dependent manner with increasing amounts of M. oleifera Lam. leaf powder in the diet. Conclusions We conclude that M. oleifera Lam. leaf powder supplementation to the diet was more beneficial to male rabbit fertility than the female, where it tended to have a negative impact through the hypothalamic-pituitary-gonadal axis. However, with the varying impact of M. oleifera Lam. leaf powder on the hypothalamic-pituitary-gonadal axis of male and female animals, further investigation is necessary to determine the mechanism through which it operates.

Keyword: Rabbit; Fertility hormones; Lam. leaf; Semen quality

411. Sex differences in memory and intracellular signaling after methamphetamine binge treatment/ **Klambatsen, Anthony; Nygard, Stephanie K.; Chang, Anna J.; Quinones, Vanya; Jenab, Shirzad**. Brain Research. ISSN:0006-8993 (2019) v.1711 p.16-22Brain Research

DOI: 10.1016/j.brainres.2019.01.010

Link: http://www.sciencedirect.com/science/article/pii/S0006899319300162

Abstract: Methamphetamine is a neurotoxic psychostimulant known to cause cell death and terminal degradation of dopaminergic neurons in the striatum concomitant with memory deficits. However, most of the research studies have not examined the influence of sex on these changes. In this study we compared the effects of a binge regimen of methamphetamine (four injections of 4 mg/kg) on male, female, and ovariectomized (OVX) female Sprague-Dawley rats. We show that male and OVX female animals had a deficit in a novel object recognition task, while intact

females did not show this deficit. Neurochemical analysis of the same animals indicated higher levels of FosB protein in caudate-putamen (CPu) and nucleus accumbens (NAc) of the male animals than intact or OVX females. Methamphetamine also increased Bcl-2 protein levels in CPu of all the cohorts. We did not find a significant effect of methamphetamine on the dopamine neuron markers tyrosine hydroxylase (TH) or dopamine transporter (DAT) 7 days after methamphetamine administrations. Our behavioral and neurochemical studies indicate that methamphetamine differentially affects male and female animals and shows sex differences in memory and molecular mechanisms in the striatum of these animals.

Keyword: Sex differences; Methamphetamine; Neurotoxicity

412. Substituting hammermilled Juniperus spp. for chopped alfalfa hay in steer feedlot diets: Growth performance and blood serum chemistry/ **Whitney, Travis Raymond; Sawyer, Jason Eric; Tedeschi, Luis Orlindo; Colombo, Eduardo Antonio**. Livestock Science. ISSN:1871-1413 (2019) v.227 p.1-10Livestock Science

DOI: 10.1016/j.livsci.2019.06.014

Link: http://www.sciencedirect.com/science/article/pii/S1871141319302203

Abstract: A completely randomized design study with two feeding periods was used to evaluate the effects of substituting hammermilled Juniperus spp. for chopped alfalfa in growing steer diets. Steers (n = 44; initial body weight, BW = 343 kg) were fed in a Calan gate system (4 feeders/pen; 11 pens) for 112 days. During Period 1 (days 0 to 69), steers were fed 70% concentrate diets that only differed in roughage composition (juniper replaced 0, 33, 66 or 100% of the alfalfa portion; 0JUN, 33JUN, 66JUN, or 100JUN, respectively). In Period 2 (days 70 to 112), steers were transitioned to a common 90% concentrate diet. During Period 1, treatment × day interactions ($P < 0.001$) were observed for steer BW, average daily gain (ADG), and gain-to-feed ratio (G:F). Within all days, other than day 0, BW linearly decreased ($P \leq 0.01$) as the percentage of juniper increased in the diet. When averaged across Period 1 (treatment × day, $P = 0.64$), DMI linearly decreased ($P < 0.001$) as juniper increased. Steer ADG linearly decreased ($P \leq 0.005$) between days 0 to 14 and d 28 to 42, tended to linearly decrease ($P = 0.09$) between d 14 to 28, and tended to quadratically decrease ($P = 0.07$) between days 42 to 56. Steer G:F linearly decreased ($P < 0.001$) between days 0 to 14 and quadratically decreased ($P = 0.02$) between days 42 to 56. During Period 2, treatment × day interactions ($P \leq 0.04$) were observed for steer BW, DMI, ADG, and G:F. No differences ($P \geq 0.13$) within day were observed for steer DMI, but ADG increased linearly ($P < 0.001$) between days 84 to 98 and tended to increase quadratically ($P = 0.07$) between days 98 to 112 with prior juniper inclusion level. Steer G:F increased linearly ($P = 0.001$) and quadratically ($P = 0.02$) between days 84 to 98 and days 98 to 112, respectively, with prior juniper inclusion level. Overall, serum chemistry did not indicate negative health issues. Collectively, results suggested that while juniper has less dietary energy, replacing 33% of the alfalfa with juniper did not negatively affect steer growth performance and should be considered. Using up to 30% juniper in the diet did not negatively affect animal health; however, under the conditions of this study, supplemental protein would be required when juniper completely replaced alfalfa.

Keyword: Steers; Feedlot diet; Juniper; Secondary metabolites; Serum chemistry

413. Optimized combination of multiple biomarkers to improve diagnostic accuracy in male fertility/ **Park, Yoo-Jin; Pang, Won-Ki; Ryu, Do-Yeal; Song, Won-Hee; Rahman, Md Saidur; Pang, Myung-Geol**. Theriogenology. ISSN:0093-691X (2019) v.139 p.106-112Theriogenology

DOI: 10.1016/j.theriogenology.2019.07.029

Link: http://www.sciencedirect.com/science/article/pii/S0093691X19303395

Abstract: Artificial insemination is the general method of breeding for genetic improvement in offspring. However, almost half of the insemination cases fail to achieve full-term pregnancy, due to male infertility or subfertility. To maximize the success of insemination, accurate semen quality testing is required prior to insemination. Even though basic semen analyses have been used to provide preliminary information, it cannot fully identify the superior or inferior fertility bulls. Therefore, more powerful and easy to use methods for the prediction of male fertility are required, such as proteomic or microarray chips. During past decades, omics approaches have been developed and suggested the numerous fertility-related potential biomarkers. Our previous study identified the fertility related protein markers, enolase1 (ENO1), ATP synthase, H+ transporting, mitochondrial F1 complex, beta subunit (ATP5B), voltage-dependent anion channel 2 (VDAC2), phospholipid hydroperoxide glutathione peroxide (GPx4), and ubiquinol-cytochrome-c reductase complex core protein 2 (UQCRC2) in bovine spermatozoa. In the present study, we perform a marker combination assay using the western blot data of ENO1, ATP5B, VDAC2, GPx4, and UQCRC2 from 20 individual bull semen samples. And then, we identified the predictive ability of these markers for normal (non-return rate (NRR) ≥ 70%) and normal fertility (NRR<70%) in bulls. ENO1, a single protein marker, achieved an area under the curve (AUC) of 0.86 and 90% discriminatory power between normal and below-normal fertility bulls, with 90% sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). Although no meaningful changes existed in overall accuracy (70–85%) to discriminate the normal and below-normal fertility between ENO1 single marker and combined marker panels, multiple marker combination methods using ENO1, VDAC2, GPx4, and UQCRC2 provided absolute sensitivity and NPV, with higher specificity (70%) and PPV (77%). ENO1 can be used as a fertility marker candidate, but there were limitations for providing absolute information about normal and below-normal fertility. Although the combined use of fertility-related markers cannot provide absolute accuracy, it can help in indicating below-normal fertility in bulls. These results may contribute to the maintenance cost in the animal industry, via selection of bulls with inferior fertility.

Keyword: Bull fertility; Fertility marker; Male fertility prediction; Marker combination

414. Cobalt distribution in the soils of São Miguel Island (Azores): From volcanoes to health effects/ **Linhares, Diana; Pimentel, Adriano; Borges, Cristina; Cruz, José Virgílio; Garcia, Patrícia; dos Santos Rodrigues, Armindo**. Science of The Total Environment. ISSN:0048-9697 (2019) v.684 p.715-721Science of The Total Environment

DOI: 10.1016/j.scitotenv.2019.05.359

Link: http://www.sciencedirect.com/science/article/pii/S004896971932412X

Abstract: Volcanic soils cover only approximately 1% of the Earth's surface, yet they support 10% of the world's population due to their inherent fertility. However, deep magmatic processes may lead to depletion of certain elements in volcanic rocks. The imbalance of essential elements, such as cobalt, in soil parent materials can affect the health of plants and grazing animals and, thus, humans. Within the particular geological context of the Azores, the present study aims to assess cobalt concentration in volcanic soils to predict the risk of cobalt deficiency in animals and humans. Samples from agricultural topsoils and pasture grass were collected in six volcanic regions of São Miguel Island, and their physicochemical properties were measured, including selected transition metal element contents, such as iron, manganese and cobalt. The soil cobalt concentration was below 5 mg/kg in Povoação< Furnas/Congro< Sete Cidades< Fogo and was higher than 10 mg/kg in Picos< Nordeste. Cobalt concentrations were very low in pasture grass. Values below 0.1 mg/kg were observed in Furnas/Congro<Povoação<Fogo<Picos<Sete Cidades, and only the volcanic region of Nordeste had adequate values of cobalt (0.34 ± 0.19 mg/kg) in pasture grass

to fulfill animal needs. The concentrations of iron and manganese were also significantly higher in the two latter volcanic regions. These differences result from the pedogenesis of volcanic rocks with distinct geochemical compositions related to different degrees of magmatic evolution. The results show that there is a significant lack of cobalt in agricultural soils on São Miguel and that it is important to predict the risk of cobalt deprivation due to its significant biological value. Soils deficient in cobalt can reduce plant growth, result in the impairment of vitamin B12 formation in animals, and consequently affect animal and human health.

Keyword: Health; Cobalt; Deficiency; Geology; Risk; Volcanic island

415. Effect of dietary supplementation of palm kernel cake on ovarian and hepatic function in buffalo (Bubalus bubalis)/ **de Souza Nahúm, Benjamim; Saraiva, Naiara Zoccal; Faturi, Cristian; Maciel e Silva, André Guimarães; Lourenço, José de Brito; Sousa, José Silva de; Amaral, João Maria do; de Paula Nogueira, Guilherme; Mingoti, Gisele Zoccal**. Animal Reproduction Science. ISSN:0378-4320 (2019) v.204 p.76-85Animal Reproduction Science

DOI: 10.1016/j.anireprosci.2019.03.007

Link: http://www.sciencedirect.com/science/article/pii/S037843201831090X

Abstract: To determine the optimal inclusion amount of palm kernel cake (PKC) in a buffalo diet, in the present study there was evaluation of the ovarian activity, metabolism and hepatic function of females that were treated to synchronize the time of ovulation. Twenty-four estrous-cyclic and non-lactating Murrah buffalo with a mean age of 5.7 years were supplemented with 0%, 0.25%, 0.5% and 1% of their body weight (BW) with PKC. Animals were subjected to the Ovsynch protocol (beginning of protocol = D0). The ovaries were examined and the blood was collected on D10 (follicular phase) and D17 (luteal phase). Follicular and luteal development and serum progesterone concentrations were not affected by diet ($P > 0.05$). Serum concentrations of cholesterol were greater in animals supplemented with PKC in amounts at 0.5% of BW or less with PKC, regardless of the phase of the estrous cycles when evaluations occurred ($P < 0.05$). Concentrations of HDL-cholesterol were similar ($P > 0.05$) during the follicular and luteal phases. Triglyceride concentrations increased linearly ($P = 0.03$) as percentage of PKC inclusion diets increased during the follicular phase, but were similar in the luteal phase (60.0 mg/dL; $P = 0.51$). Amount of PKC supplementation did not affect the concentrations of alanine aminotransferase, but there was a greater amount of aspartate aminotransferase (AST) and gamma glutamyl transferase (GGT) during both phases of the estrous cycle ($P < 0.05$). Animals supplemented at 1.0% of BW with PKC had greater AST and GGT concentrations than what is recommended for buffalo. The results of the present study indicate PKC supplementation of buffalo diets does not affect the development of the ovarian follicle and corpus luteum nor the peripheral concentration of progesterone, even though there are greater serum concentrations of total cholesterol and triglycerides. Because the amount of PKC supplementation in the present study does not result in hepatic dysfunction when fed at the 0.5% of BW amount, it is suggested that this agro-industrial byproduct of high nutritional value may be a new alternative for dietary supplementation of grazing buffalo.

Keyword: Cholesterol; Buffalo; Liver function; Estrous synchronization; Ovsynch

416. Effects of straw provision, as environmental enrichment, on behavioural indicators of welfare and emotions in pigs reared in an experimental system/ **Marcet-Rius, Míriam; Kalonji, Galice; Cozzi, Alessandro; Bienboire-Frosini, Cécile; Monneret, Philippe; Kowalczyk, Izabela; Teruel, Eva; Codecasa, Elisa; Pageat, Patrick**. Livestock Science. ISSN:1871-1413 (2019) v.221 p.89-94Livestock Science

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Link: http://www.sciencedirect.com/science/article/pii/S1871141319301350

Abstract: The present study aimed to investigate whether straw provision in pigs increases positive emotions, indicated by tail movement, and reduces poor welfare indicators (agonistic and displacement behaviours), including indicators of negative emotions (ear movement). Comparisons between Straw and Control sessions were analysed from video recording for all parameters. 15 mini-pigs participated in a three-week study. Depending on the week, animals were included in Straw or Control sessions. During Straw sessions, pigs were placed in their own pens where straw was introduced and continuously provided for one week. During Control sessions, pigs remained in their pens with no additional stimulus. Pig behaviours were video-recorded four times during each session and scored. Results showed that ear movement frequency was significantly lower in the Straw than in Control session ($p = 0.005$); agonistic behaviour frequency and duration were significantly lower in the Straw than in Control session ($p = 0.013$ and $p = 0.0004$, respectively), and displacement behaviour frequency and duration were significantly lower in the Straw than in Control session ($p < 0.001$ and $p = 0.01$, respectively). Results suggest that straw provision reduces poor welfare but does not modify indicators of positive emotions selected for this study (tail movement frequency and duration). Our study also provides information about potential indicators of welfare, and more precisely, about emotions, which could also be useful to improve animal welfare assessment in pigs, obtaining more information about feasible behavioural indicators which could show the emotional state of the animals.

Keyword: Animal welfare; Ear movement; Pig assessment; Poor welfare; Straw provision; Tail movement

417. 'Real-life' hippocampal-dependent spatial memory impairments in Huntington's disease/ **Glikmann-Johnston, Yifat; Carmichael, Anna M.; Mercieca, Emily-Clare; Stout, Julie C.**. Cortex. ISSN:0010-9452 (2019) v.119 p.46-60Cortex

DOI: 10.1016/j.cortex.2019.04.006

Link: http://www.sciencedirect.com/science/article/pii/S0010945219301650

Abstract: Hippocampal-dependent spatial memory impairments are seen in Huntington's disease animal models. Similar impairments were recently reported in Huntington's disease participants on analogous spatial memory tasks (e.g., virtual Morris Water Maze), however, these tasks do not translate well to the range of functions involved in day-to-day spatial cognition. In this study we examined 'real-life' hippocampal-dependent spatial memory in Huntington's disease participants. We studied premanifest Huntington's disease ($N = 24$), early manifest Huntington's disease ($N = 14$), and matched healthy controls ($N = 33$) with a virtual environment, which demanded spatial memory function on three levels: navigation, object location, and plan drawing. To examine the case for hippocampal-dependent spatial memory more closely, we compared the performance of our Huntington's disease participants to that of a group of temporal lobe epilepsy patients ($N = 30$) who were previously tested on the virtual environment. Spatial memory performance was also compared to two common neuropsychological tests of spatial cognition, the Paired Associates Learning from the Cambridge Neuropsychological Automated Test Battery, and the Rey–Osterrieth Complex Figure Test. People with early manifest Huntington's disease were impaired across all spatial memory tasks. Premanifest Huntington's disease participants were most notably impaired on the object location measure of the virtual environment, which is heavily dependent on hippocampal function, but showed no such impairments on the Paired Associates Learning or the Rey–Osterrieth Complex Figure Test. Object location memory and navigation performance did not differ between people with Huntington's disease and temporal lobe epilepsy. Aligned with studies in Huntington's disease animal models, 'real-life' spatial memory is impaired in people with Huntington's disease prior to clinical diagnosis. This alignment has important implications for testing treatments for Huntington's

disease. From the standpoint of neurodegeneration, the dependence of our spatial memory measures on hippocampal function extends the focus of cognitive assessment research in Huntington's disease beyond its primary pathology within the striato-frontal circuit.

Keyword: Animal models; Clinical trials; Cognitive assessment; Premanifest; Temporal lobe

418. Oral glutamine supplementation attenuates inflammation and oxidative stress-mediated skeletal muscle protein content degradation in immobilized rats: Role of 70 kDa heat shock protein/ **Petry, Éder Ricardo; Dresch, Diego de Freitas; Carvalho, Clarice; Medeiros, Patricia Calçada; Rosa, Tatiana Gomes; de Oliveira, Cleverson Morais; Martins, Leo Anderson Meira; Schemitt, Elizangêla; Bona, Silvia; Guma, Fátima Costa Rodrigues; Marroni, Norma**. Free Radical Biology and Medicine. ISSN:0891-5849 (2019) v.145 p.87-102Free Radical Biology and Medicine

DOI: 10.1016/j.freeradbiomed.2019.08.033

Link: http://www.sciencedirect.com/science/article/pii/S0891584919309335

Abstract: Skeletal muscle disuse results in myofibrillar atrophy and protein degradation, via inflammatory and oxidative stress-mediated NF-kB signaling pathway activation. Nutritional interventions, such as l-glutamine (GLN) supplementation have shown antioxidant properties and cytoprotective effects through the modulation on the 70-kDa heat shock protein (HSP70) expression. However, these GLN-mediated effects on cell signaling pathways and biochemical mechanisms that control the myofibrillar protein content degradation in muscle disuse situations are poorly known yet. This study investigated the effects of oral GLN plus l-alanine (ALA; GLN + ALA-solution) supplementation, either in their free or dipeptide (L-alanyl-l-glutamine-DIP) form, on GLN-glutathione (GSH) axis and cytoprotection mediated by HSP70 protein expression in the slow-twitch soleus and fast-twitch gastrocnemius skeletal muscle of rats submitted to 14-days of hindlimb immobilization-induced disuse muscle atrophy. Forty-eight Wistar rats were distributed into 6 groups: hindlimb immobilized (IMOB group) and hindlimb immobilized orally supplemented with either GLN (1 g kg−1) plus ALA (0.61 g kg−1) (GLN + ALA-IMOB group) or 1.49 g kg−1 of DIP (DIP-IMOB group) and; no-immobilized (CTRL) and no-immobilized supplemented GLN + ALA and DIP baselines groups. All animals, including CTRL and IMOB rats (water), were supplemented via intragastric gavage for 14 days, concomitantly to immobilization period. Plasma and muscle GLN levels, lipid (thiobarbituric acid reactive substances-TBARS) and protein (carbonyl) peroxidation, erythrocyte concentration of reduced GSH and GSH disulfide (GSSG), plasma and muscle pro-inflammatory TNF-α levels, muscle IKKα/β-NF-kB signaling pathway and, the myofibrillar protein content (MPC) were measured. The MPC was significantly lower in IMOB rats, compared to CTRL, GLN + ALA, and DIP animals ($p < 0.05$). This finding was associated with reduced plasma and muscle GLN concentration, equally in IMOB animals. Conversely, both GLN + ALA and DIP supplementation restored plasma and muscle GLN levels, which equilibrated GSH and intracellular redox status (GSSG/GSH ratio) in erythrocytes and skeletal muscle even as, increased muscle HSP70 protein expression; attenuating oxidative stress and TNF-α-mediated NF-kB pathway activation, fact that reverberated on reduction of MPC degradation in GLN + ALA-IMOB and DIP-IMOB animals ($p < 0.05$). In conclusion, the findings shown herein support the oral GLN + ALA and DIP supplementations as a therapeutic and effective nutritional alternative to attenuate the deleterious effects of the skeletal muscle protein degradation induced by muscle disuse.

Keyword: Glutamine supplementation; GSH; Hindlimb immobilization; HSP70; Muscle atrophy; Muscle protein content degradation

419. Meta-analysis of Toxoplasma gondii in pigs intended for human consumption in Mainland China/ **Zhang, Xiao-Xuan; Ren, Wei-Xin; Tan, Qi-Dong; Hou, Guangyu; Fei, Yu-Chao; Zhao, Li-Juan; Zhao, Quan; Sun, Dongbo**. Acta Tropica. ISSN:0001-706X (2019) v.198 p.105081Acta Tropica

DOI: 10.1016/j.actatropica.2019.105081

Link: http://www.sciencedirect.com/science/article/pii/S0001706X18309422

Abstract: Toxoplasma gondii, is one of the most important foodborne zoonotic pathogens, which can infect virtually all warm-blooded animals, including pigs, and causes severe illness in congenitally infected infants and even death in patients with AIDS. Pigs (Sus scrofa) are one of the most important intermediate hosts of T. gondii, and human transmission occurs through consumption of raw or poorly cooked pork. In this systematic review and meta-analysis, we searched Chongqing VIP, Wanfang, Chinese Web of Knowledge, PubMed, and ScienceDirect databases for published papers regarding Toxoplasma infection in pigs in China, from inception to Oct 29, 2017. Search strings included whether they reported the samples of more than 30 pigs and provided information that allowed us to establish the prevalence of Toxoplasma infection. Moreover, we excluded repeated studies, reviews, other host studies, as well as studies with inconsistent data, incomplete information, those that only provided prevalence data, and those outside of Mainland China. We extracted the numbers of pigs with Toxoplasma infection from the obtained studies, and calculated the pooled prevalence of Toxoplasma infection in the pigs using a random-effects model. The data of 44 articles (including data on 46,723 pigs) were compliant with the standards. The pooled prevalence of T. gondii infection in pigs in China was 29% (95% CI 24–34), with 25% (95% CI 18–32) in pigs sampled before 2010 and 28% (95% CI 21–36) in pigs sampled in 2010 or later. The pooled prevalence of T. gondii in pigs from Northeast China (20%, 95% CI 14–26) was significantly lower than those from other regions (North China: 40%, 95% CI 32–47; Northwest China: 32%, 95% CI 13–51; East China: 30%, 95% CI 20–41; and South China: 35%, 95% CI 26–45; Central China: 23%, 95% CI 14–31; Southwest China: 33%, 95% CI 15–52). The estimated pooled prevalence of T. gondii infection was 36% (95% CI 25–47, 8,018/21,892) in pigs tested by ELISA, 24% (95% CI 19–28, 4,304/18,608) in pigs examined by IHA, and 19% (95% CI 8–31, 1,041/6,223) in pigs detected by other methods. Moreover, 1202 of 7470 piglets were detected as T. gondii-positive, and the prevalence (17%) was lower than that in fattening pigs (25%, OR = 1.28), sows (34%, OR = 2.13), and breeding boars (35%, OR = 2.46). Our findings suggested that toxoplasmosis is common in pigs in Mainland China. It is necessary to monitor the prevalence of T. gondii in pigs, and powerful and effective regulatory measures should be undertaken to reduce human exposure to T. gondii via the consumption of pork.

Keyword: Prevalence; Pig; China; Odds ratio

420. Docosahexaenoic acid enrichment of layer hen tissues and eggs through dietary supplementation with heterotrophically grown Aurantiochytrium limacinum/ **Moran, C.A.; Morlacchini, M.; Keegan, J.D.; Rutz, F.; Fusconi, G.**. Journal of Applied Poultry Research. ISSN:1056-6171 (2019) v. p.Journal of Applied Poultry Research

DOI: 10.1016/j.japr.2019.10.002

Link: http://www.sciencedirect.com/science/article/pii/S1056617119311109

Abstract: Summary Omega-3 fatty acids play an important role in various aspects of human health, but many people do not consume them in sufficient quantities, resulting in deficiencies in some populations. The enrichment of commonly consumed foods with omega-3 fatty acids has been proposed to address this deficit. Feeding omega-3–rich ingredients to animals can enrich their products, increasing the consumption by the population without requiring any major dietary changes. Eggs can be enriched to a high degree, and currently, omega-3–enriched eggs are widely

available. Oftentimes, a missed opportunity for the poultry industry is in valorizing the spent hen. In this short-term study, a docosahexaenoic acid (DHA)–rich protist was fed to layer hens at three different inclusion levels to determine the degree of enrichment observed in the eggs and concomitantly in the breast, thigh, liver, and kidney. The addition of the protist ingredient had no negative impact on the bird health or performance. Significant increases in egg DHA concentration were observed, with 60, 164, 259, and 410 mg DHA/100g of egg collected from birds supplemented with the DHA-rich protist at a rate of 0, 0.5, 1, and 2.5% of the diet, respectively. This enrichment could increase the value of spent hen meat when used in the production of human and companion animal food as DHA-enriched products can be sold for a premium. Moreover, this enriched spent hen meat could potentially be used as a partial substitute for less-sustainable sources of dietary omega-3 including fish meal and fish oil.

Keyword: layer; DHA; algae; EPA; omega-3

421. Modulation of neuroplasticity-related targets following stress-induced acute escape deficit/ **Benatti, C.; Radighieri, G.; Alboni, S.; Blom, J.M.C.; Brunello, N.; Tascedda, F.**. Behavioural Brain Research. ISSN:0166-4328 (2019) v.364 p.140-148Behavioural Brain Research

DOI: 10.1016/j.bbr.2019.02.023

Link: http://www.sciencedirect.com/science/article/pii/S0166432818317005

Abstract: Understanding resilience is a major challenge to improve current pharmacological therapies aimed at complementing psychological-based approaches of stress-related disorders. In particular, resilience is a multi-factorial construct where the complex network of molecular events that drive the process still needs to be resolved. Here, we exploit the acute escape deficit model, an animal model based on exposure to acute unavoidable stress followed by an escape test, to define vulnerable and resilient phenotypes in rats. Hippocampus and prefrontal cortex (PFC), two of the brain areas most involved in the stress response, were analysed for gene expression at two different time points (3 and 24 h) after the escape test. Total Brain-Derived Neurotrophic Factor (BDNF) was highly responsive in the PFC at 24-h after the escape test, while expression of BDNF transcript IV increased in the hippocampus of resistant animals 3 h post-test. Expression of memory enhancers like Neuronal PAS Domain Protein 4 (Npas4) and Activity-regulated cytoskeleton-associated protein (Arc) decreased in a time- and region-dependent fashion in both behavioural phenotypes. Also, the memory inhibitor Protein Phosphatase 1 (Ppp1ca) was increased in the hippocampus of resilient rats at 3 h post-test. Given the importance of neurotrophic factors and synaptic plasticity-related genes for the development of appropriate coping strategies, our data contribute to an additional step forward in the comprehension of the psychobiology of stress and resiliency.

Keyword: Stress; Hippocampus; Resilience; Prefrontal cortex; Acute escape deficit; Transcriptional effect

422. A novel pH-responsive quaternary ammonium chitosan-liposome nanoparticles for periodontal treatment/ **Hu, Fang; Zhou, Zhongzheng; Xu, Quanchen; Fan, Chun; Wang, Lei; Ren, Hao; Xu, Shuo; Ji, Qiuxia; Chen, Xiguang**. International Journal of Biological Macromolecules. ISSN:0141-8130 (2019) v.129 p.1113-1119International Journal of Biological Macromolecules

DOI: 10.1016/j.ijbiomac.2018.09.057

Link: http://www.sciencedirect.com/science/article/pii/S0141813017350791

Abstract: The aim of this study was to evaluate the antibacterial activity and cytocompatibility of novel pH-activated nanoparticles (NPs) in vitro and in vivo. The NPs were synthesized from a quaternary ammonium chitosan, i.e., N,N,N-trimethyl chitosan, a liposome, and doxycycline (TMC-Lip-DOX NPs). The cytocompatibility of the NPs was evaluated. The TMC-Lip-DOX NPs achieved superb inhibition of free mixed bacteria and biofilm formation. They also showed excellent biocompatibility with human periodontal ligament fibroblasts. Animal experiments showed that the NPs strongly inhibited biofilm formation and prevented alveolar bone absorption in vivo. All the results indicate that the TMC-Lip-DOX NPs have good potential for use in the treatment of periodontal and other inflammatory diseases.

Keyword: Histopathology; Animal model; Nanoparticles; Doxycycline; Periodontitis; Plaque biofilm

423. Effects of once- versus twice-a-day feeding of pasteurized milk supplemented with yeast-derived feed additives on growth and health in female dairy calves/ **Saldana, D.J.; Jones, C.M.; Gehman, A.M.; Heinrichs, A.J.**. Journal of Dairy Science. ISSN:0022-0302 4(2019) v.102 p.3654-3660Journal of Dairy Science

DOI: 10.3168/jds.2018-15695

Link: http://www.sciencedirect.com/science/article/pii/S0022030219301717

Abstract: ABSTRACT The objective of this study was to compare the effects of feeding preweaning dairy calves pasteurized milk once or twice a day with or without a combination of yeast-derived products. Holstein heifer calves (n = 48) from The Pennsylvania State University dairy herd were fed 3.8 L of colostrum in 1 feeding and randomly assigned to 1 of 4 treatments (once-a-day milk feeding with or without live yeast culture and mannan-rich fraction and twice-a-day milk feeding with or without live yeast culture and mannan-rich fraction). All calves were fed 6 L of milk daily. Weekly growth measurements and blood samples were taken 3 h after the morning milk feeding for all animals. Growth measurement included body weight, hip width, and withers height. Calf starter refusal was recorded weekly, and a sample was taken to determine dry matter intake. Daily health scores were recorded for each calf using a standard scoring system. Intake, growth measurements, haptoglobin, and health scores data were analyzed using repeated measures analysis with calf included as a random variable. Preweaning average daily gain was 553.4 and 512.1 g/d for calves fed milk once and twice a day, respectively, and we found no difference between treatments. Preweaning calf starter intake was 242.3 and 198.7 g/d for calves fed milk once and twice a day, respectively, and we found no treatment differences. Preweaning calf starter intake was 224.3 and 216.6 g/d for calves fed yeast and without yeast, respectively. Withers height and hip width were similar in calves fed milk either once or twice a day; however, calves fed yeast tended to have greater withers height and hip width than control calves. Haptoglobin concentration as a measure of stress had least squares means of 4.0 and 9.5 ± 3.5 μg/mL for calves fed milk once or twice a day, respectively, and we found no difference among treatments. Scours score and total daily score were similar for calves fed milk once or twice a day. These results suggest that feeding milk once a day can be successfully applied to a calf feeding system and that yeast products may improve structural growth.

Keyword: dairy calf; feeding frequency; yeast culture

424. Synthesis Paper: Targeted Livestock Grazing: Prescription for Healthy Rangelands/ **Bailey, Derek W.; Mosley, Jeffrey C.; Estell, Richard E.; Cibils, Andres F.; Horney, Marc; Hendrickson, John R.; Walker, John W.; Launchbaugh, Karen L.; Burritt, Elizabeth A.**. Rangeland Ecology & Management. ISSN:1550-7424 6(2019) v.72 p.865-877Rangeland Ecology & Management

DOI: 10.1016/j.rama.2019.06.003

Link: http://www.sciencedirect.com/science/article/pii/S1550742419300399

Abstract: Targeted livestock grazing is a proven tool for manipulating rangeland vegetation, and current knowledge about targeted livestock grazing is extensive and expanding rapidly. Targeted grazing prescriptions optimize the timing, frequency, intensity, and selectivity of grazing (or browsing) in combinations that purposely exert grazing/browsing pressure on specific plant species or portions of the landscape. Targeted grazing differs from traditional grazing management in that the goal of targeted grazing is to apply defoliation or trampling to achieve specific vegetation management objectives, whereas the goal of traditional livestock grazing management is generally the production of livestock commodities. A shared aim of targeted livestock grazing and traditional grazing management is to sustain healthy soils, flora, fauna, and water resources that, in turn, can sustain natural ecological processes (e.g., nutrient cycle, water cycle, energy flow). Targeted grazing prescriptions integrate knowledge of plant ecology, livestock nutrition, and livestock foraging behavior. Livestock can be focused on target areas through fencing, herding, or supplement placement. Although practices can be developed to minimize the impact of toxins contained in target plants, the welfare of the animals used in targeted grazing must be a priority. Monitoring is needed to determine if targeted grazing is successful and to refine techniques to improve efficacy and efficiency. Examples of previous research studies and approaches are presented to highlight the ecological benefits that can be achieved when targeted grazing is applied properly. These cases include ways to suppress invasive plants and ways to enhance wildlife habitat and biodiversity. Future research should address the potential to select more adapted and effective livestock for targeted grazing and the associated animal welfare concerns with this practice. Targeted livestock grazing provides land managers a viable alternative to mechanical, chemical, and prescribed fire treatments to manipulate rangeland vegetation.

Keyword: focused grazing; livestock; prescriptive grazing; rangelands; targeted grazing; vegetation manipulation

425. Vitamin E modifies high-fat diet-induced reduction of seizure threshold in rats: Role of oxidative stress/ **Alzoubi, Karem H.; Hasan, Zuhair A.; Khabour, Omar F.; Mayyas, Fadia A.; Al Yacoub, Omar N.; Banihani, Saleem A.; Alomari, Mahmoud A.; Alrabadi, Nasr NS**. Physiology & Behavior. ISSN:0031-9384 (2019) v.206 p.200-205Physiology & Behavior

DOI: 10.1016/j.physbeh.2019.04.011

Link: http://www.sciencedirect.com/science/article/pii/S0031938418312101

Abstract: There is increasing evidence that oxidative stress is a causal factor in different neurodegenerative disorders such as Alzheimer's disease and epilepsy. High-fat diet (HFD) has been shown to induce oxidative stress and neuronal damage that may increase susceptibility to seizures. The present study was undertaken to investigate the relationships between vitamin E, a potent antioxidant, HFD, and chemically induced seizures, using the PTZ seizure model in rats. Animals were randomly assigned into four groups: control, HFD, vitamin E (Vit E), and high-fat diet with vitamin E (HFD + Vit E) group. Vitamin E and/or HFD were administered to animals for 6 weeks. Thereafter, PTZ seizure threshold was measured in control and treated rats, and different brain regions were analyzed for levels of oxidative stress biomarkers. Current results revealed a significant reduction in PTZ seizure threshold in rats consuming HFD, which could be prevented by vitamin E supplement. Alongside, vitamin E supplement prevented HFD induced changes in oxidative stress biomarkers and capacity enzymes. Therefore, current results suggest that prolonged consumption of HFD increases susceptibility to PTZ induced seizures, which may be related to HFD induced oxidative stress. This increase in the PTZ susceptibility could be prevented by the administration of vitamin E, probably through its antioxidant effect, particularly at the brain hippocampal region.

Keyword: Vitamin E; Oxidative stress; Rats; High-fat diet; Seizure; PTZ

426. Effects of dietary graded levels of cinnamon essential oil and its combination with bamboo leaf flavonoid on immune function, antioxidative ability and intestinal microbiota of broilers/ **YANG, Yun-feng; ZHAO, Lu-lu; SHAO, Yu-xin; LIAO, Xiu-dong; ZHANG, Li-yang; LU, Lin; LUO, Xu-gang**. Journal of Integrative Agriculture. ISSN:2095-3119 9(2019) v.18 p.2123-2132Journal of Integrative Agriculture

DOI: 10.1016/S2095-3119(19)62566-9

Link: http://www.sciencedirect.com/science/article/pii/S2095311919625669

Abstract: Cinnamon essential oil (CEO) and its combination with bamboo leaf flavonoid (BLF) have been shown to exhibit an additive antibacterial effect in vitro, but their functions in broilers were not clear. An experiment was conducted to investigate the effects of dietary graded levels of CEO and its combination with BLF on the growth performance, immune responses, antioxidative ability, and intestinal morphology and microbiota of broilers fed a corn-soybean meal basal diet. A total of 576 1-d-old Arbor Acres commercial male broilers were randomly allotted to 9 treatments with 8 replicates of 8 birds each in a completely randomized design. Birds were fed on a basal corn-soybean meal diet (control, without plant extracts and antibiotics), or the basal diet supplemented with 50 mg of aureomycin kg−1, 50, 100, 200, 400, or 800 mg of CEO kg−1, a combination of 100 mg of CEO and 16.7 mg of BLF kg−1, or a combination of 200 mg of CEO kg−1 and 33.3 mg of BLF kg−1 for 42 d. Dietary treatment affected (P<0.05) the serum immune globulin M (IgM) contents on d 42, liver malondialdehyde (MDA) contents on d 21, duodenal crypt depth on d 42, relative abundance of Lactobacillus in the cecal contents on d 21, and relative abundances of Escherichia coli and Bifidobacterium in the cecal contents on d 42, but had no effect (P>0.16) on all other measured indices. The addition of 400 mg of CEO kg−1 or a combination of 200 mg CEO kg−1 and 33.3 mg BLF kg−1 increased (P<0.02) serum IgM contents on d 42. Dietary supplementation with 100 or 200 mg CEO kg−1, or 50 mg aureomycin kg−1 decreased (P<0.003) liver MDA contents on d 21. In addition, the supplement of 100 mg CEO kg−1 increased (P<0.002) the Lactobacillus relative abundance in caecum on d 21 and Bifidobacterium relative abundance in caecum on d 42, and decreased (P<0.0001) E. coli relative abundance in caecum on d 42. The results indicated that dietary supplementation with CEO, an alternative to aureomycin, improved the immune status, antioxidantative ability and cecal microbiota of broilers, and dietary supplementation with the combinations of CEO and BLF did not exhibit further effects. Dietary supplementation with 100 mg CEO kg−1 is beneficial for broilers fed a corn-soybean meal basal diet.

Keyword: broilers; immune responses; antioxidative ability; cecal microbiota; intestinal morphology; plant extracts

427. Evidence of dramatic sterility in F1 male hybrid catfish [male Clarias gariepinus (Burchell, 1822) × female C. macrocephalus (Günther, 1864)] resulting from the failure of homologous chromosome pairing in meiosis I/ **Ponjarat, Jatupong; Singchat, Worapong; Monkheang, Pansa; Suntronpong, Aorarat; Tawichasri, Panupong; Sillapaprayoon, Siwapech; Ogawa, Satoshi; Muangmai, Narongrit; Baicharoen, Sudarath; Peyachoknagul, Surin; Parhar, Ishwar; Na-Nakorn, Uthairat; Srikulnat**. Aquaculture. ISSN:0044-8486 (2019) v.505 p.84-91Aquaculture

DOI: 10.1016/j.aquaculture.2019.02.035

Link: http://www.sciencedirect.com/science/article/pii/S0044848618321318

Abstract: Sterile hybrid animals exhibit spermatogenic disruptions with a decreased number and/or malformation of mature sperm. F1 hybrid catfish (2n = 55) is an important cultured fish derived from male North African catfish [Clarias gariepinus (Burchell, 1822); 2n = 56] and female bighead catfish [C. macrocephalus (Günther, 1864); 2n = 54]; they are sterile with gametogenic failure in males. Despite the generality of this phenomenon, the spermatogenic phenotype has not been well described and a comprehensive understanding of the genetic basis of the disruption remains elusive. Our observations in the F1 male hybrid showed abnormal morphology of testes with small size, while meiotic configuration indicated that meiosis succeeded in the early pachytene stage but failed to progress beyond the diplotene-diakinesis stage in primary spermatocytes. This suggests the presence of a number of degenerated spermatocytes. Histological examination recorded no postmeiotic cells and spermatozoa in F1 male hybrid testes. A high frequency of apoptotic testicular cells was also present in the F1 male hybrid, as shown by histochemical results for activated Caspase-3 and TUNEL assays. Low expression levels of Caspase-3, p53 and MCL1 (isoform 2), which activate pro-apoptotic signals in the development process, were also observed in both parental species, but significantly high expression levels were observed in the F1 male hybrid. By contrast, the level of BCL2 expression was very low in the F1 male hybrid, supporting the state of apoptosis as BCL2 inhibits the actions of pro-apoptotic proteins. These results collectively suggest that sterility in male hybrids is caused by spermatogenic disruptions in the pachytene stage, resulting from the failure of homologous chromosome pairing due to chromosomal incompatibility between parental genomes, and subsequent elimination by apoptosis leading to spermatogenic breakdown in the F1 male hybrid.

Keyword: Apoptosis; Hybrid catfish; Meiosis I; Pachytene; Sterility

428. Comparative transcriptome analysis reveals the different roles between hepatopancreas and intestine of Litopenaeus vannamei in immune response to aflatoxin B1 (AFB1) challenge/ **Wang, Yilong; Wang, Baojie; Liu, Mei; Jiang, Keyong; Wang, Mengqiang; Wang, Lei**. Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology. ISSN:1532-0456 (2019) v.222 p.1-10Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology

DOI: 10.1016/j.cbpc.2019.04.006

Link: http://www.sciencedirect.com/science/article/pii/S1532045619301413

Abstract: Aflatoxin B1 (AFB1) is a mycotoxin mainly produced by Aspergillus flavus and Aspergillus parasiticus contaminating food, feed ingredients and products of animal origin. In mammals, this toxin causes widespread organ-specific damage; it is immunotoxicity and could promote hepatotoxicity, alter intestinal functions and so on. In this study, we conducted transcriptome and histomorphology analyses of hepatopancreas and intestinal in Litopenaeus vannamei (L. vannamei) challenged with AFB1. Totally 12,014 and 1387 differentially expression genes (DEGs) were identified in the hepatopancreas and intestine, respectively. In hepatopancreas, a total of 1995 DEGs were mainly annotated and grouped into 18 processes or pathways related to animal immune system. With respect to intestine, a total of 152 DEGs were mainly annotated to 7 processes or pathways related to animal immune system. Meanwhile, we determined the relative mRNA expression of several crucial representative immune genes including Toll, immune deficiency (IMD), prophenoloxidase (proPO), Rab and glutathione S-transferase (GST) in the hepatopancreas and intestines of shrimp at 3-, 6-, 12-, 18-, 24- and 30-d after challenged by AFB1. Exposure to AFB1 increased mortality, decrease weight gain rate, severely destroyed the histomorphology of hepatopancreas and intestine, and resulted in the damaged of immune system of shrimp. The present data reveals the different roles between hepatopancreas and intestine of L. vannamei in immune response to AFB1 challenge, and provides insight into the molecular basis of the relationship between hepatopancreas and intestinal immunity during either homeostasis or inflammation.

Keyword: Aflatoxin B1; Hepatopancreas; Innate immune system; Intestinal

429. In vivo safety profile and biodistribution of GMP-manufactured human skin-derived ABCB5-positive mesenchymal stromal cells for use in clinical trials/ **Tappenbeck, Nils; Schröder, Hannes M.; Niebergall-Roth, Elke; Hassinger, Fathema; Dehio, Ulf; Dieter, Kathrin; Kraft, Korinna; Kerstan, Andreas; Esterlechner, Jasmina; Frank, Natasha Y.; Scharffetter-Kochanek, Karin; Murphy, George F.; Orgill, Dennis P.;**. Cytotherapy. ISSN:1465-3249 5(2019) v.21 p.546-560Cytotherapy

DOI: 10.1016/j.jcyt.2018.12.005

Link: http://www.sciencedirect.com/science/article/pii/S1465324918307230

Abstract: Background aims Human dermal ABCB5-expressing mesenchymal stromal cells (ABCB5+ MSCs) represent a promising candidate for stem cell–based therapy of various currently uncurable diseases in several fields of regenerative medicine. We have developed and validated a method to isolate, from human skin samples, and expand ABCB5+ MSCs that meet the guideline criteria of the International Society for Cellular Therapy. We are able to process these cells into a Good Manufacturing Practice–conforming, MSC-based advanced-therapy medicinal product. Methods To support the development of ABCB5+ MSCs for potential therapeutic topical, intramuscular and intravenous administration, we have tested our product in a series of Good Laboratory Practice–compliant nonclinical in-vivo studies addressing all relevant aspects of biosafety, including potential long-term persistence and proliferation, distribution to nontarget tissues, differentiation into undesired cell types, ectopic tissue formation, tumor formation and local tissue reaction. Results (i) Subcutaneous application of 1 × 107 ABCB5+ MSCs/animal and intravenous application of 2 × 106 ABCB5+ MSCs/animal, respectively, to immunocompromised mice did not result in safety-relevant biodistribution, persistence or proliferation of the cells; (ii) three monthly subcutaneous injections of ABCB5+ MSCs at doses ranging from 1 × 105 to 1 × 107 cells/animal and three biweekly intravenous injections of 2 × 106 ABCB5+ MSCs/animal, respectively, to immunocompromised mice were nontoxic and revealed no tumorigenic potential; and (iii) intramuscular injection of 5 × 106 ABCB5+ MSCs/animal to immunocompromised mice was locally well tolerated. Discussion The present preclinical in vivo data demonstrate the local and systemic safety and tolerability of a novel advanced-therapy medicinal product based on human skin-derived ABCB5+ MSCs.

Keyword: MSC; ABCB5; biodistribution; GMP; persistence; safety; stem cells; stromal cells; toxicity; tumorigenicity

430. Changes in the cecal microbiota of laying hens during heat stress is mainly associated with reduced feed intake/ **Xing, Shuang; Wang, Xuejie; Diao, Huajie; Zhang, Minhong; Zhou, Ying; Feng, Jinghai**. Poultry Science. ISSN:0032-5791 11(2019) v.98 p.5257-5264Poultry Science

DOI: 10.3382/ps/pez440

Link: http://www.sciencedirect.com/science/article/pii/S003257911945726X

Abstract: ABSTRACT The aim of the present study was to examine the effect of high temperature on the cecal microbiota of laying hens and analyze the correlation between variation in feed intake, body temperature, and the relative abundance of specific bacterial genera. Two hundred and sixteen 28-wk-old Hy-Line laying hens were randomly divided into 3 groups with 6 replicates and raised in 3 controlled climate chambers. Birds were allocated to either a thermoneutral group (TC, 21 ± 1°C, ad libitum), high cyclic temperature group (HT, 29–35°C, ad libitum), or a pair-feeding group (PF, 21 ± 1°C, pair-feeding on the daily feed intake of HT hens) for 4 wk. There was no

significant difference in diversity estimators of laying hens between the HT and TC or PF groups (P > 0.05). Principal component analysis (PCoA) based on unweighted UniFrac distance showed that the HT group did not form a distinct cluster that was clearly separated from the PF group, but was separated from the TC group. Similarity analysis (ANOSIM) confirmed that the TC group was significantly different from the HT (R = 0.259, P = 0.020) and the PF (R = 0.348, P = 0.011) groups, but the HT group was similar with the PF group (R = 0.107, P = 0.153). In addition, there was a significant correlation between feed intake and principal coordinate 1 (PC1) in PCoA (R = −0.494, P = 0.037), but no correlation between core temperature and PC1 (R = 0.025, P = 0.923). Linear discriminant analysis identified 15 genera that discriminated between the HT and TC groups (score ≥2). Among these, the feed intake was significantly related with the relative abundance of 10 genera, however, the core temperature was only significantly correlated with one specific genus. In conclusion, a high cyclic temperature of 29–35°C had significant effects on microbial composition and structure of laying hens, which was mainly related with decreased feed intake.

Keyword: feed intake; cecal microbiota; high temperature; laying hen

431. Field-testing a single-dose immunocontraceptive in free-ranging male capybara (Hydrochoerus hydrochaeris): Evaluation of effects on reproductive physiology, secondary sexual characteristics, and agonistic behavior/ **Rosenfield, Derek A.; Nichi, Marcilio; Losano, João D.A.; Kawai, Giulia; Leite, Roberta F.; Acosta, Alfredo J.; Baquero, Oswaldo Santos; Pizzutto, Cristiane Schilbach**. Animal Reproduction Science. ISSN:0378-4320 (2019) v.209 p.106148Animal Reproduction Science

DOI: 10.1016/j.anireprosci.2019.106148

Link: http://www.sciencedirect.com/science/article/pii/S0378432019302878

Abstract: Controlling wildlife populations to mitigate human-wildlife conflicts and the spread of zoonotic diseases is an ever-growing necessity. The objective of this study was to evaluate a single-dose anti-gonadotropin-releasing hormone vaccine (GonaCon, USDA/NWRC, Fort Collins, CO, USA) as a non-lethal alternative for population control in free-ranging, synanthropic male capybara. In addition to infertility efficacy of this treatment, potential effects on the alpha male's secondary sexual characteristics and agonist behavior need to be assessed because any alterations in these factors could lead to population management failure. The treatment group (n = 3) received 1 mL of the anti-GnRH vaccine, intramuscularly, and the control group (n = 2) a 1 mL sham vaccine. Reproductive behavior and social group dynamics were monitored for 30 days prior to inoculation (June 2017) with continuous observations occurring during the study period. Antifertility effects were assessed by conducting exams of testicular morphology, semen characteristics, and histological analysis (after 270 days via hemi-gonadectomy). Compared to the control group, the testicles of the treated males had severe atrophy (P < 0.05), oligozoospermia and greater numbers of sperm cells in a static developmental phase. Courtship and agonistic alpha male behavior were not altered, and the group's social integrity was maintained. Results indicate there was 100% infertility in capybara males, observed throughout the study period of 18 months, and equally important, the male's alpha characteristics were not affected by the treatment, which is imperative for successful capybara population control efforts.

Keyword: Agonistic behavior; Anti-fertility; GonaCon; Immunocontraception; Male capybara; Population control

432. Comparison of PCR-RFLP and PFGE for determining the clonality of Brucella isolates from human and livestock specimens/ **Bahmani, Nasrin; Mirnejad, Reza; Arabestani, Mohammad Reza; Mohajerie, Parviz; Hashemi, Seyed**

Hamid; Karami, Manoochehr; Alikhani, Mohammad Yousef. Saudi Journal of Biological Sciences. ISSN:1319-562X 2(2019) v.26 p.256-262Saudi Journal of Biological Sciences

DOI: 10.1016/j.sjbs.2017.08.017

Link: http://www.sciencedirect.com/science/article/pii/S1319562X17302218

Abstract: Brucellosis is an important zoonotic disease caused by different species of genus Brucella that are pathogenic for humans and a variety of animals. Accurate detection of Brucella spp. infection is important for control of disease. The aim of this study was to comparison of molecular genotyping of Brucella strains by Pulsed-field gel electrophoresis (PFGE) and polymerase chain reaction -Restriction Fragment Length Polymorphism (PCR-RFLP) techniques. Twenty- seven Brucella spp. were isolated from human and animal samples. The isolates identified by conventional microbiological methods and confirmed using PCR for amplification of omp2a gene. Molecular typing of Brucella strains carried out by PCR-RFLP after PstI and PFGE of chromosomal DNA after XbaI enzyme digestion. The omp2a gene PCR Products with different patterns of PCR-RFLP were sequenced. The omp2a gene amplification of all human and animal Brucella isolates were positive for 1100bp fragment. By PCR-RFLP analysis two genotypes/patterns for human isolates and four genotypes for animal isolates were obtained. In PFGE analysis totally, 7 common clones/clusters and 3 single clones were obtained. The results of this study showed the PFGE method is the more reliable and useful assay for molecular typing of Brucella strains and is more preferred to PCR-RFLP in determination of genetic similarity among human and animal Brucella isolates. The presented data showed PCR-RFLP analysis was not able to differentiate between B. melitensis biovars and vaccine strain.

Keyword: PCR; Brucellosis; RFLP; Molecular typing

433. Validation of alternative behavioral observation methods in young broiler chickens/ **Ross, L.; Cressman, M.D.; Cramer, M.C.; Pairis-Garcia, M.D.**. Poultry Science. ISSN:0032-5791 12(2019) v.98 p.6225-6231Poultry Science

DOI: 10.3382/ps/pez475

Link: http://www.sciencedirect.com/science/article/pii/S0032579119579275

Abstract: ABSTRACT Continuous sampling provides the most complete data set for behavioral research; however, it often requires a prohibitive investment of time and labor. The objectives of this study were to validate behavioral observation methods of young broiler chickens using 1) 7 scan sampling intervals (0.5, 1, 3, 5, 10, 15, and 30 min) and 2) an automated tracking software program (EthoVision XT 14) compared to continuous behavioral observation, considered the gold standard for behavior observation. Ten 19-day-old Ross 708 broiler cockerels were included in this study. All behavior was video recorded over an 8-h period, and data were collected using a continuous sampling methodology. The same video files were utilized for analysis for scan sampling and automated tracking software analysis. For both analyses, the following criteria were used to identify which method accurately reflected the true duration and frequency for each behavior, as determined by continuous observation: $R2 \geq 0.9$, slope was not different from 1 ($P > 0.05$), and intercept was not different from 0 ($P > 0.05$). Active, eating, drinking, and maintenance behaviors were accurately estimated with 0.5-min scan sample intervals. Active, inactive, eating, and maintenance behaviors were accurately estimated with 1-min scan sample intervals. Inactive behavior was accurately estimated with 5-min scan sample intervals. The remainder of sampling intervals examined did not provide accurate estimates, and no scan sampling interval accurately estimated the number of behavior bouts. The automated tracking software was able to accurately detect true duration of inactive behavior but was unable to accurately detect activity. The results of this study suggest that high-frequency behaviors can be accurately observed with instantaneous scan

sampling up to 1-min intervals. Automated tracking software can accurately identify inactivity in young broiler chickens, but further behavior identification will require refinement.

Keyword: broiler; behavior; scan sampling; tracking software; validation

434. Adjustments in compound defensive strategies in response to variation in predation risk/ **Sirot, Etienne**. Animal Behaviour. ISSN:0003-3472 (2019) v.147 p.53-60Animal Behaviour

DOI: 10.1016/j.anbehav.2018.10.023

Link: http://www.sciencedirect.com/science/article/pii/S0003347218303324

Abstract: Predation risk varies between populations and fluctuates with time. Using a theoretical approach, I studied how differences in this predation regime may influence allocation to antipredator defence in a foraging prey. I considered a set of two complementary defensive tactics, namely, the possibility for the prey to shorten its activity periods, to reduce exposure to predatory attacks and sacrifice some of its foraging time to vigilance, to get a better chance of escaping when under attack. The model reveals relatively complex behavioural adaptations, with important consequences for the energy balance of the animal. In particular, a hierarchy emerges between the two levels of decisions and, as a consequence, the two types of defensive tactics do not respond in a uniform way to changes in environmental conditions. Animals living in relatively safe habitats are thus expected to devote all their time to foraging and adjust their vigilance to the level of risk they endure, while animals living in more dangerous places are expected to adjust the length of their foraging periods to the prevailing level of risk. If the level of risk varies, the animals will avoid being active during infrequent, or particularly deadly, high-risk periods. If these periods become more frequent, or less dangerous, the animals will be fully active, and adjust their vigilance, during low-risk periods, and only partially active during high-risk periods. Finally, when dangerous periods further increase in length or decrease in intensity, the animals will use all available foraging time, and adjust their vigilance during both low- and high-risk periods to the predation regime. Antipredator strategies must then be perceived as a set of behavioural decisions, not only connected to one another, but also embedded within one another, which mediate energy transfers between three consecutive trophic levels.

Keyword: antipredator behaviour; predation; risk allocation; trophic cascades; vigilance

435. A carotenoid oxygenase is responsible for muscle coloration in scallop/ **Li, Xue; Wang, Shuyue; Xun, Xiaogang; Zhang, Mengran; Wang, Shi; Li, Hengde; Zhao, Liang; Fu, Qiang; Wang, Huizhen; Li, Tingting; Lian, Shanshan; Xing, Qiang; Li, Xu; Wu, Wei; Zhang, Lingling; Hu, Xiaoli; Bao, Zhenmin**. Biochimica et Biophysica Acta (BBA) - Molecular and Cell Biology of Lipids. ISSN:1388-1981 7(2019) v.1864 p.966-975Biochimica et Biophysica Acta (BBA) - Molecular and Cell Biology of Lipids

DOI: 10.1016/j.bbalip.2019.03.003

Link: http://www.sciencedirect.com/science/article/pii/S138819811930040X

Abstract: As lipid microconstituents mainly of plant origin, carotenoids are essential nutrients for humans and animals, and carotenoid coloration represents an important meat quality parameter for many farmed animals. Currently, the mechanism of carotenoid bioavailability in animals is largely unknown mainly due to the limited approaches applied, the shortage of suitable model systems and the restricted taxonomic focus. The mollusk Yesso

scallop (Patinopecten yessoensis) possessing orange adductor muscle with carotenoid deposition, provides a unique opportunity to research the mechanism underlying carotenoid utilization in animals. Herein, through family construction and analysis, we found that carotenoid coloration in scallop muscle is inherited as a recessive Mendelian trait. Using a combination of genomic approaches, we mapped this trait onto chromosome 8, where PyBCO-like 1 encoding carotenoid oxygenase was the only differentially expressed gene between the white and orange muscles (FDR = 2.75E-21), with 11.28-fold downregulation in the orange muscle. Further functional assays showed that PyBCO-like 1 is capable of degrading β-carotene, and inhibiting PyBCO-like 1 expression in the white muscle resulted in muscle coloration and carotenoid deposition. In the hepatopancreas, which is the organ for digestion and absorption, neither the scallop carotenoid concentration nor PyBCO-like 1 expression were significantly different between the two scallops. These results indicate that carotenoids could be taken up in both white- and orange-muscle scallops and then degraded by PyBCO-like 1 in the white muscle. Our data suggest that PyBCO-like 1 is the essential gene for carotenoid metabolism in scallop muscle, and its downregulation leads to carotenoid deposition and muscle coloration.

Keyword: Muscle; Carotenoid coloration; Fine mapping; Scallop

436. Irreplaceable socioeconomic value of wild meat extraction to local food security in rural Amazonia/ **Nunes, André Valle; Peres, Carlos A.; Constantino, Pedro de Araujo Lima; Santos, Bráulio A.; Fischer, Erich**. Biological Conservation. ISSN:0006-3207 (2019) v.236 p.171-179Biological Conservation

DOI: 10.1016/j.biocon.2019.05.010

Link: http://www.sciencedirect.com/science/article/pii/S0006320719300370

Abstract: Wild vertebrates play a decisive role in the subsistence economy of human populations worldwide. The food security value of wild-meat extracted from natural ecosystems remains poorly quantified. Here, we provide an economic valuation of the nutritional and monetary benefits of year-round wild-meat hunting across a large trinational region of southwestern Amazonia using data from indigenous and non-indigenous settlements from 30 sites. We then build scenarios to explore whether three ubiquitous sources of regional-scale household income (i.e. wage labour, horticultural revenues from manioc flour production and the harvest of Brazil-nuts) could match the purchase costs of alternative meat demand to meet domestic consumption of animal protein should game stocks collapse for any reason. We also considered a fourth valuation scenario in terms of game meat substitution with bovine beef. We conservatively estimate a total annual consumption of ~1431.8 tons of undressed animal carcasses, equivalent to a mean per-capita meat consumption of 54.75 kg person−1 yr−1, or ~10.9 kg of animal protein person−1 yr−1. This overall consumption of terrestrial wildlife meat provides US$7.875 million yr−1 across the study region. However, household income levels were too low to enable transitions into domestic livestock consumption indicating low adaptation capacity to alternative animal protein; replacement purchases of domestic meat would amount to 90% of aggregate annual wages, 194% of overall income from manioc flour, and 67% of all Brazil-nuts collected. Complete beef replacement by the population in this region would require further inputs of US$2.658 million yr−1 and the conversion of 4310 ha of Amazonian forests into pasture. Our results emphasize the extraordinarily valuable and irreplaceable role of wild meat in the food security of tropical forest dwellers. Proposing consumption of alternative sources of animal protein for monetarily deprived forest dwellers is clearly an unrealistic, if not environmentally-damaging, strategy. Conservation scientists, wildlife biologists and policy makers should therefore prioritize adding value to standing forests by managing sustainable wild-meat offtake from natural ecosystems.

Keyword: Ecosystem services; Bushmeat harvest; Household income; Protein consumption; Rainforest; Wildlife conservation

437. Genetic characterization of tick-borne pathogens in ticks infesting cattle and sheep from three South African provinces/ **Guo, Huanping; Adjou Moumouni, Paul Franck; Thekisoe, Oriel; Gao, Yang; Liu, Mingming; Li, Jixu; Galon, Eloiza May; Efstratiou, Artemis; Wang, Guanbo; Jirapattharasate, Charoonluk; Ringo, Aaron Edmond; Mtshali, Khethiwe; Inoue, Noboru; Suzuki, Hiroshi; Xu**. Ticks and Tick-borne Diseases. ISSN:1877-959X 4(2019) v.10 p.875-882Ticks and Tick-borne Diseases

DOI: 10.1016/j.ttbdis.2019.04.008

Link: http://www.sciencedirect.com/science/article/pii/S1877959X18304357

Abstract: Ticks are involved in the transmission of many public health and veterinary important pathogens. Although tick-borne pathogens are widely distributed in South Africa, information on tick-pathogen relationship needs to be updated particularly using modern molecular techniques. This study used PCR and sequencing to confirm the identity of the tick species collected from cattle and sheep from KwaZulu-Natal, Free State and Eastern Cape. Furthermore, presence of Babesia spp., Theileria spp., Anaplasma marginale, Rickettsia spp., Ehrlichia ruminantium and Coxiella burnetii was detected from tick DNA using species-specific PCR or nested PCRs. The study samples consisted of 390 adult ticks (male and female) which were pooled according to species, host animal and sampling site (three ticks per pool) for DNA extraction. The PCR results revealed that out of 130 tick DNA pools, 30 (23.1%) were positive for at least one pathogen. The most frequent pathogen was C. burnetii (9.2%), followed by Rickettsia spp. (7.7%), A. marginale (3.8%), T. mutans (3.1%), T. taurotragi (2.3%) and E. ruminantium (1.5%). The highest prevalence of pathogens was observed in ticks collected from cattle in Eastern Cape (16/42) and the lowest was in ticks obtained from sheep in Free State (1/21). Infected ticks were identified as Rhipicephalus evertsi evertsi (n = 13), R. appendiculatus (n = 3), R. decoloratus (n = 7) and Amblyomma hebraeum (n = 7). Coinfection with two pathogens was found in 21% of pathogen-positive pools. Analysis of Theileria taurotragi 18S rRNA, T. mutans 18S rRNA, C. burnetii htpB, Rickettsia spp. gltA, Rickettsia spp. ompA, E. ruminantium pCS20 and A. marginale Msp5 sequences showed that the pathogens detected in this study were genetically related to isolates previously reported in Africa. These findings provide important information on distribution of ticks and tick-borne pathogens of ruminants and will contribute in the formulation of future control strategies in South Africa.

Keyword: Sheep; Cattle; South Africa; Tick species; Tick-borne pathogens

438. Benzalkonium chloride in an orthodontic adhesive: Its effect on rat enamel demineralization using color-based image analysis/ **Torres-Garcia, Maria Lourdes; Llavore, Lotus D.; Bungay, Alice; Sarol, Jesus D.; Pineda, Riza Rae; Peñas, Kristofer delas**. American Journal of Orthodontics and Dentofacial Orthopedics. ISSN:0889-5406 1(2019) v.155 p.88-97American Journal of Orthodontics and Dentofacial Orthopedics

DOI: 10.1016/j.ajodo.2018.03.016

Link: http://www.sciencedirect.com/science/article/pii/S0889540618308254

Abstract: Introduction The aim of this study was to determine the effect of an orthodontic bonding adhesive containing benzalkonium chloride (BAC) on enamel demineralization. Methods: Eighteen female Sprague-Dawley rats, aged 8 to 10 weeks, were inoculated with Streptococcus sobrinus for 5 days. The animals were randomly divided

into the control, non-BAC, and BAC groups. The 6 animals in each group did not receive any brackets, received brackets on the maxillary left first molars bonded with conventional adhesive, or received brackets on the maxillary left and right first molars bonded with adhesive incorporated with 0.25% and 0.75% BAC (wt/wt), respectively. After 7 weeks, the maxillae were soaked in murexide stain to observe the surface area (mm2) and percentages of enamel demineralization on the palatal, mesial, buccal, and occlusal surfaces of the maxillary molars using color-based image analysis. Results The non-BAC and BAC groups exhibited greater enamel demineralization compared with the control group. The surface areas and percentages of enamel demineralization in the BAC group were less compared with the non-BAC group. Less enamel demineralization was noted in the animals treated with 0.75% BAC compared with those given 0.25% BAC in all areas; however, these differences were not great enough to attain statistical significance at the 0.05 level. Conclusions The addition of BAC to an orthodontic composite has the potential to reduce the amount and percentage of enamel demineralization. In addition to being an antibacterial agent, BAC may also have an anticariogenic effect. Increased sample sizes and testing of more concentrations of BAC are recommended.

Keyword:

439. Distinct healing pattern of maxillary sinus augmentation using the vitroceramic Biosilicate®: Study in rabbits/ **Thompson, Francis Cazzeli; Matsumoto, Mariza Akemi; Biguetti, Claudia Cristina; Rennó, Ana Claudia Muniz; de Andrade Holgado, Leandro; Santiago Junior, Joel Ferreira; Munerato, Marcelo Salles; Saraiva, Patrícia Pinto**. Materials Science and Engineering: C. ISSN:0928-4931 (2019) v.99 p.726-734Materials Science and Engineering: C

DOI: 10.1016/j.msec.2019.02.011

Link: http://www.sciencedirect.com/science/article/pii/S0928493117337244

Abstract: Objectives To follow healing process of augmented maxillary sinus in rabbits analyzing the histological pattern of bone tissue formation, along with the osteogenic activity and vascularization using a bioactive vitroceramic in comparison to deproteinized bovine bone associated or not with autogenous bone graft. Design Forty five male adult New Zealand rabbits, 5 months of age, mean weight of 4 Kg, underwent bilateral sinus augmentation surgeries to be divided in five groups: G – (Control) particulate autogenous bone graft (AG), BO - deproteinized bovine bone, BO+G - deproteinized bovine bone + AG, BSi –vitroceramic, and BSi + G – vitroceramic +AG. After 15, 45 and 90 days, all animals were euthanized for specimen's removal to be analyzed under light microscopy, histomorphometry, and immunohistochemistry for Runx2 and VEGF labeling. Results G, BO and BO+G groups healed uneventfully, allowing the formation of mature remodeling bone at day 90, regarding the association of AG with the biomaterial. On the other hand, BSi and BSi + G groups showed an important cellular reaction and granulation/fibrous tissue formation from the first to the last period of observation. Runx-2 and VEGF immunolabeling were coherent with this result. However, histomorphometry did not reveal significant differences considering new bone formation. Conclusions Reconstructed maxillary sinuses using Biosilicate® permitted satisfactory new bone formation in comparison to the deproteinized bovine bone and AG. However, the presence of granulation/fibrous tissue and inflammatory cells associated to the degrading biomaterial indicate that further studies should be careful performed considering the immunological aspect of this new biomaterial.

Keyword: Animal model; Biomaterials; Wound healing; Sinus floor elevation; Vitroceramic

440. Genome-wide identification, evolution of ATF/CREB family and their expression in Nile tilapia/ **Wang, Xiao-Shuang; Zhang, Shuai; Xu, Zhen; Zheng, Shu-Qing; Long, Juan; Wang, De-Shou**. Comparative Biochemistry and

Physiology Part B: Biochemistry and Molecular Biology. ISSN:1096-4959 (2019) v.237 p.110324Comparative Biochemistry and Physiology Part B: Biochemistry and Molecular Biology

DOI: 10.1016/j.cbpb.2019.110324

Link: http://www.sciencedirect.com/science/article/pii/S1096495919302830

Abstract: The ATF/CREB family of transcription factors represents a large group of basic region-leucine zipper (bZip) proteins that regulate diverse cellular responses. Here we carried out a comprehensive analysis of ATF/CREB family members in 22 representative animal species. The family probably originated from the early diverging metazoan and significantly expanded in vertebrates due to multiple whole genome duplication. Duplicates of atf6 were derived from 2R, and duplicates of creb1, crem, jdp2, creb5, atf4, atf5 and atf7 were products of 3R. We also isolated 21 ATF/CREBs, belonging to 6 subfamilies from Nile tilapia. Based on transcriptome data, most members were found to be dominantly expressed in the head kidney, heart, brain and testis. Some ATF/CREBs displayed sexual dimorphic expression in gonad at 5, 90 and 180 dah (days after hatching), but not at 30 dah. creb1a and atf4a were found to be expressed mainly in phase I and II oocytes of the ovary; while creb1b and atf4b mainly in spermatogenic cells of the testis, indicating divergence of duplicated genes from 3R which suggested neofunctionalization or subfunctionalization in gonad. This is the first genome-wide screening and evolutionary analysis of ATF/CREB family in different animals, particularly in teleosts. The expression analysis of this family in tilapia gonad provided a fundamental clue for understanding their important roles in sex differentiation and gonadal development in teleosts.

Keyword: Evolution; ATF/CREB family; Duplication; Gonad; Temporal and spatial expression profiles

441. Natural severe fever with thrombocytopenia syndrome virus infection in domestic cats in Japan/ **Matsuu, Aya; Momoi, Yasuyuki; Nishiguchi, Akihiro; Noguchi, Keita; Yabuki, Mihoko; Hamakubo, Emu; Take, Maho; Maeda, Ken**. Veterinary Microbiology. ISSN:0378-1135 (2019) v.236 p.108346Veterinary Microbiology

DOI: 10.1016/j.vetmic.2019.06.019

Link: http://www.sciencedirect.com/science/article/pii/S0378113519305176

Abstract: Severe fever with thrombocytopenia syndrome (SFTS) is a recently discovered emerging infectious disease. A zoonotic disease with a high fatality rate in human beings, clinical information on SFTS virus (SFTSV) infection in animals is important. Since 2017, we have diagnosed 24 client-owned cats living in western Japan with SFTS, by genetic and serological testing. In this study, we characterized the clinical features of SFTS in cats and their associated risk factors, by evaluating the clinical parameters retrospectively. A phylogenetic analysis on SFTSV was also conducted. There were no obvious tendencies in age or sex, outdoor cats were commonly at risk of SFTSV infection. All infected cats showed acute onset of clinical signs including anorexia and lethargy, while 68.2% of the cats showed fever and 41.7% showed vomiting. The case fatality rate was 62.5%. Thrombocytopenia, leukopenia, and elevated serum total bilirubin, serum amyloid A, and creatinine phosphokinase concentration were the characteristic findings in the first clinical blood examination. Phylogenic analysis revealed that regional clustered viruses infect both humans and cats. For pet owners and animal hospitals, SFTS in small animals could be an important public health issue.

Keyword: Domestic cat; Emerging disease; Severe fever with thrombocytopenia syndrome

442. Protocatechuic acid improved growth performance, meat quality, and intestinal health of Chinese yellow-feathered broilers/ **Wang, Yibing; Wang, Yuanyuan; Wang, Baikui; Mei, Xiaoqiang; Jiang, Shouqun; Li, Weifen**. Poultry Science. ISSN:0032-5791 8(2019) v.98 p.3138-3149Poultry Science

DOI: 10.3382/ps/pez124

Link: http://www.sciencedirect.com/science/article/pii/S0032579119301750

Abstract: ABSTRACT The aim of this study was to investigate the effect of protocatechuic acid (PCA) on the growth performance, meat quality, and intestinal health of Chinese yellow-feathered broilers. Growing broilers were fed the basal diet or diets supplemented with 300 or 600 mg/kg PCA, or 200 mg/kg enramycin for 52 D. We found that addition of 300 mg/kg PCA significantly increased body weight, live weight, and carcass weight and decreased the feed to gain ratio of broilers; PCA improved meat quality through reducing shear force, and increasing a* (relative redness) and decreasing b* (relative yellowness) at 24 h after slaughter. The activities of alkaline phosphatase and diamine oxidase in plasma were significantly decreased by administration of 300 mg/kg PCA; PCA also significantly increased total antioxidant capability and decreased malondialdehyde content and activity of xanthine oxidase in liver. Meanwhile, it enhanced activities of total superoxide dismutase, glutathione s-transferase, and glutathione peroxidase in the jejunal mucosa. Interleukin-10 and transforming growth factor-β were significantly increased in jejunal mucosa and plasma of 300 mg/kg PCA diet group, whereas interluekin-2 and interferon-γ dropped dramatically. Moreover, relative expression of apoptosis-related genes decreased in liver, whereas that of intestinal barrier-related and immunity-related genes increased in jejunum. Furthermore, 300 mg/kg PCA treatment significantly changed α-diversity and structure of the cecal microflora in broilers, with increasing relative abundance of Firmicutes and Actinobacteria while reducing Bacteroidetes and Proteobacteria. These results indicated that PCA improved the feed efficiency, growth performance, meat quality of broilers, and antioxidant capacity. It also enhanced intestinal immune function and improved the structure of intestinal flora to favor improved intestinal health in Chinese yellow-feathered broilers.

Keyword: broiler; meat quality; antibiotic status; intestinal health; protocatechuic acid

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