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243. Mapping the Whole-Body Muscle Activity of *Hydra vulgaris*/ **Szymanski, John R.; Yuste, Rafael.** Current Biology. ISSN:0960-9822 11(2019) v.29 p.1807-1817.e3Current Biology

DOI: 10.1016/j.cub.2019.05.012

Link: <http://www.sciencedirect.com/science/article/pii/S0960982219305457>

Abstract: Summary Hydra is a cnidarian polyp with an anatomically simple neuromuscular system that can offer evolutionary insights on the functional design of animal body plans. Using calcium imaging to map the activity of the entire epitheliomuscular system of behaving Hydra, we find seven basic spatiotemporal patterns of muscle activity. Patterns include global and local activation events with widely varying kinetics of initiation and wave-like propagation. The orthogonally oriented endodermal and ectodermal muscle fibers are jointly activated during longitudinal contractions. Individual epitheliomuscular cells can participate in multiple patterns, even with very different kinetics. This cellular multifunctionality could enable the structurally simple epitheliomuscular tissue of basal metazoans to implement a diverse behavioral output.

Keyword: emergence; calcium imaging; animal evolution; basal metazoa; Cnidaria; epithelia; muscle; neural evolution; neuromuscular systems

244. Use of nonlinear mixed models for describing testicular volume growth curve in Nellore bulls/ **Penitente-Filho, Jurandy Mauro; Fonseca e Silva, Fabyano; Guimarães, Simone Eliza Facioni; Miranda Neto, Tamires; da Costa, Eduardo Paulino; Siqueira, Jeanne Broch; Waddington, Bruna; Guimarães, José Domingos.** Theriogenology. ISSN:0093-691X (2019) v.133 p.65-70Theriogenology

DOI: 10.1016/j.theriogenology.2019.04.026

Link: <http://www.sciencedirect.com/science/article/pii/S0093691X1830966X>

Abstract: This study aimed to describe longitudinal testicular volume (TV) data of Nellore bulls by using nonlinear mixed models. Dataset consisted of 2,294 TV measurements from 505 bulls with ages ranging from 563 to 4,307 days. Nine nonlinear models were evaluated: Brody, Gompertz, Hill, Logistic I and II, Meloun, Michaelis-Menten, Mitscherlich and von Bertalanffy. Goodness of fit was evaluated by Akaike's information criterion (AIC), Bayesian information criterion (BIC), adjusted R², percentage of convergence, error sum of squares (ESS), mean absolute deviation (MAD), and average prediction error (APE). These criteria were used to select the best model, then the absolute growth rate (AGR) for TV was estimated by the first derivate of the adjusted model related to time ($\partial Y/\partial t$). The values of adjusted R², ESS, MAD and APE were similar among models. Percentage of convergence was higher for the Logistic I (76.8%), Logistic II (75.5%) and Mitscherlich (78.6%) models, but Logistic I and II showed the lowest values of AIC and BIC, indicating a better fit, so the Logistic I model was chosen for subsequent analyses. The TV growth occurred at a high rate until the inflection point, which was estimated at approximately 22 months of age; it stabilized and reached a plateau at approximately 2,500 days of age. This may suggest that TV is more related to sexual maturity than precocity. Additionally, the Logistic I model was used to estimate the growth curve and the AGR of the testicular length and width. As a result, testicular length increased at a higher rate than testicular width until approximately 1,600 days of age, indicating that the testes become longer with increasing age.

Keyword: Animal breeding; Nellore cattle; Nonlinear models; Testicular growth

245. Genomic evaluation for calf wellness traits in Holstein cattle/ **Gonzalez-Peña, D.; Vukasinovic, N.; Brooker, J.J.; Przybyla, C.A.; DeNise, S.K.**. Journal of Dairy Science. ISSN:0022-0302 3(2019) v.102 p.2319-2329Journal of Dairy Science

DOI: 10.3168/jds.2018-15540

Link: <http://www.sciencedirect.com/science/article/pii/S0022030219300487>

Abstract: ABSTRACT Reducing calf morbidity and mortality is important for attaining financial sustainability and improving animal welfare on commercial dairy operations. Zoetis (Kalamazoo, MI) has developed genomic predictions for calf wellness traits in Holsteins that include calf respiratory disease (RESP; recorded between 0 and 365 d of age), calf scours (DIAR; recorded between 2 and 50 d of age), and calf livability (DEAD; recorded between 2 and 365 d of age). Phenotype and pedigree data were from commercial dairies and provided directly by producers upon obtaining their permission. The number of records ranged from 741,484 for DIAR to 1,926,261 for DEAD. The number of genotyped animals was 325,025. All traits were analyzed using a univariate threshold animal model including fixed effect of year of birth × calving season × region, and random effects of herd × year of birth and animal. A total of 45,425 SNP were used in genomic analyses. Animals genotyped with low-density chips were imputed to the required number of SNP. All analyses were conducted using single-step genomic BLUP implementing the “algorithm for proven and young” (APY) animals designed to accommodate very large numbers of genotypes. Estimated heritabilities were 0.042, 0.045, and 0.060 for RESP, DIAR, and DEAD, respectively. The genomic predicted transmitting abilities ranged between −8.0 and 24.0, −11.5 and 28.5, and −6.5 to 22.8 for RESP, DIAR, and DEAD, respectively. Reliabilities of breeding values were obtained by approximation based on partitioning of a function of reliability into contributions from records, pedigree, and genotypes, where the genotype contribution was approximated using the diagonal value of the genomic relationship matrix. The average reliabilities for the genotyped animals were 41.9, 42.6, and 47.3% for RESP, DIAR, and DEAD, respectively. Estimated genomic predicted transmitting abilities and reliabilities were approximately normally distributed for all analyzed traits. Approximated genetic correlations of calf wellness with Zoetis dairy wellness traits and traits included in the US national genetic evaluation were low to moderate. The results indicate that direct evaluation of calf wellness traits under a genomic threshold model is feasible and offers predictions with average reliabilities comparable to other lowly heritable traits. Genetic selection for calf wellness traits presents a compelling opportunity for dairy producers to help manage herd replacement costs and improve overall profitability.

Keyword: calf livability; calf wellness; genomic predictions; respiratory disease; scours

246. Adolescent Morphine Exposure in Male Rats Alters the Electrophysiological Properties of Locus Coeruleus Neurons of the Male Offspring/ **Pachenari, Narges; Azizi, Hossein; Semnaniann, Saeed.** Neuroscience. ISSN:0306-4522 (2019) v.410 p.108-117Neuroscience

DOI: 10.1016/j.neuroscience.2019.05.009

Link: <http://www.sciencedirect.com/science/article/pii/S0306452219303252>

Abstract: Opioid prescription and illegal use have been soaring, and it has become a global concern. Adolescence, as a critical developmental period, is radically influenced by drug exposure. In the recent decade, transgenerational effects of paternal environmental exposure have been given greater consideration. There is compelling evidence for the effect of paternal drug abuse such as alcohol, cocaine, and nicotine on the offspring; however, a limited number of studies have focused on the paternal effect of opioids during adolescence on progeny. Locus coeruleus (LC) is a

noradrenergic nucleus involved in different brain functions and cognitive processes. The present study aimed to investigate the transgenerational effect of adolescent morphine exposure on electrophysiological properties of LC neurons of the offspring. For this purpose, adolescent male rats received morphine or saline for 10 days between postnatal days 31 and 40, and then after 20 days of washout period, they were mated with naïve female rats. Whole cell patch clamp recordings were performed in current clamp configuration from LC neurons of 14–21-day-old male offspring. The results demonstrated that the decay slope of the action potentials and the amplitude of afterhyperpolarization potential increased in morphine sired animals. Moreover, the duration of action potentials decreased in morphine sired animals. Besides, the coefficient of variation of interspike intervals increased in morphine sired animals compared to the saline sired ones. Overall, the altered electrophysiological properties observed in this study may suggest a functional enhancement of Ca²⁺ activated K⁺ channels in LC neurons of morphine sired animals.

Keyword: adolescence; locus coeruleus; opioids; patch clamp recording; transgenerational effect

247. Evaluation of sodium valproate loaded nanoparticles in acute and chronic pentylenetetrazole induced seizure models/ **Meenu, Meenakshi; Reeta, K.H.; Dinda, Amit Kumar; Kottarath, Sarat Kumar; Gupta, Yogendra Kumar.** Epilepsy Research. ISSN:0920-1211 (2019) v.158 p.106219Epilepsy Research

DOI: 10.1016/j.eplepsyres.2019.106219

Link: <http://www.sciencedirect.com/science/article/pii/S0920121119304401>

Abstract: Background and purpose Efficacy of sodium valproate in epilepsy is limited by its poor blood brain barrier penetration and side effects. Nanoparticles may offer a better drug delivery system to overcome these limitations. This study evaluated the efficacy of sodium valproate encapsulated in nanoparticles in pentylenetetrazole (PTZ) induced acute and kindling models of seizures in male Wistar rats. Methods Poly lactic-co-glycolic acid (PLGA) based, polysorbate 80 stabilized sodium valproate loaded nanoparticles (nano sodium valproate) and rhodamine loaded nanoparticles (RLN) were formulated by double emulsion- solvent evaporation method and characterized for their size, shape, zeta potential and drug loading percentage. RLN was used to demonstrate blood brain barrier (BBB) permeability of nanoparticles. Serum drug levels were estimated using high performance liquid chromatography. The efficacy of standard sodium valproate (300 mg/kg) and nano sodium valproate (~300, ~150 and ~75 mg/kg of sodium valproate) were evaluated in experimental animal models of seizures along with their effects on behavioral and oxidative stress parameters. Drugs were administered 60 min before PTZ in acute model. In the kindling model, drugs were administered every day while PTZ was administered on alternate days 60 min after drug administration. All the study drugs/compounds were administered intraperitoneally. Results RLN were observed to be clustered in cortex which implied that the nanoparticles crossed BBB. Both standard sodium valproate and nano sodium valproate reached therapeutic serum level at 15 min and 1 h, but were undetectable in serum at 24 h. In acute PTZ (60 mg/kg) model, nano sodium valproate (~300 mg/kg of sodium valproate) and standard sodium valproate showed protection against seizures till 6 h and 4 h, respectively. There were significant behavioral impairment and oxidative stress with standard sodium valproate in acute model as compared to nano sodium valproate at 6 h. In kindling model, induced with PTZ (30 mg/kg, every alternate day for 42 days), complete protection from seizures was observed with nano sodium valproate (~150 mg/kg and ~75 mg/kg of sodium valproate) and standard sodium valproate (300 mg/kg). Similarly, significant protection from behavioral impairment and oxidative stress was observed with standard sodium valproate and nano sodium valproate as compared to PTZ. Conclusion When compared to conventional therapy, nano sodium valproate showed protection from seizures at reduced doses and for a longer duration in animal models of epilepsy. This study suggests the potential of nano sodium valproate in the treatment of epilepsy.

Keyword: Blood brain barrier; Kindling; Sodium valproate; Nanoparticles; PTZ

248. A rotating operant chamber for use with microdialysis/ **Degreef, Bart; Ngo, Khanh T.; Jaquins-Gerstl, Andrea; Weber, Stephen G.** Journal of Neuroscience Methods. ISSN:0165-0270 (2019) v.326 p.108387Journal of Neuroscience Methods

DOI: 10.1016/j.jneumeth.2019.108387

Link: <http://www.sciencedirect.com/science/article/pii/S0165027019302444>

Abstract: Background Recently, the time resolution of microdialysis followed by a chemical separation for quantitative analysis has improved. The advent of faster microdialysis measurements promises to aid in behavioral research on awake animals. However, microdialysis with awake animals generally employs a fluidic commutator (swivel). The swivel's volume is inimical to the time resolution of the measurements. New method Animals can be housed in rotating cages so that the swivel is not required, but rotating operant chambers are not available. Here we describe the design and construction of a rotating operant chamber with microdialysis capability. We modified a rotating cage by adding operant behavior testing components to the side of the bowl-shaped cage. A modular on-board controller facilitates operant component/computer communication. A battery provides power to the controller and the operant components. The battery and controller rotate with the cage, and the controller communicates with the computer wirelessly. Results The rotating operant chamber can be used to train a rat to retrieve a sucrose pellet following a cue. Microdialysis and online liquid chromatography can be used to measure dopamine at one minute intervals while the rat moves freely and interacts with operant behavior testing components. Comparison with existing method(s) We are not aware of one-minute dopamine measurements in awake animals in an operant chamber. Conclusions Rotating cage modifications are straightforward. One-minute observations of striatal dopamine can be accomplished while an animal is awake, moving, and interacting with its surroundings.

Keyword: Dopamine; Conditioning; Cue; Online microdialysis

249. Meta-analysis of some physiologic, metabolic and oxidative responses of sheep exposed to environmental heat stress/ **Belhadj Slimen, Imen; Chniter, Mohamed; Najar, Taha; Ghram, Abdeljelil.** Livestock Science. ISSN:1871-1413 (2019) v.229 p.179-187Livestock Science

DOI: 10.1016/j.livsci.2019.09.026

Link: <http://www.sciencedirect.com/science/article/pii/S1871141319305128>

Abstract: A meta-analysis was performed from 66 references retained from a total of 147 ones. The aim was to study the relationship between the THI and some physiologic, metabolic and oxidative responses in sheep. The effects of the breed, physiological state and heat relieving strategies were investigated as well. PCA, GLM, one nested ANOVA and global correlations were used to assess the fixed effects. Respiration rate, rectal temperature and heart pulse vary significantly in response to THI increase. However, the magnitude of this variance is defined by the breed and the physiological state of the animal. Moreover, Mechanical heat relieving strategies allowed alleviating the drastic effects of hyperthermia on sheep physiologic responses, whereas some nutritional heat abatement strategies increased metabolic heat load and respiration rate. Antioxidant and mineral supplementations were able to protect animals from heat stress. Environmental-induced hyperthermia reduced feed intake, body weight, circulating glucose

and cholesterol levels, and increased lipid and protein catabolism. Significant increase of cortisol hormone was recorded. Indeed, ambient- induced hyperthermia resulted in oxidative stress marked by a decrease of Se contents, enhanced SOD activity, high oxidative stress index, increased protein oxidation, reactive oxygen species production and MDA levels. We report here for the first time that respiration is a second source of free radicals generation in sheep under environmental-induced heat stress. Heat stress disturbs rectal temperature, respiration and heart rates, exacerbates the post absorptive metabolism as well as the antioxidant status of sheep. Therefore, animals increase their maintenance requirements at the expense of production needs, which become not priorities at all.

Keyword: Sheep; Oxidative stress; Metabolism; Meta-analysis; Heat stress

250. Sampling strategies for assessing lameness, injuries, and body condition score on dairy farms/ **Van Os, Jennifer M.C.; Weary, Daniel M.; Costa, Joao H.C.; Hötzel, Maria J.; von Keyserlingk, Marina A.G.**. Journal of Dairy Science. ISSN:0022-0302 9(2019) v.102 p.8290-8304 Journal of Dairy Science

DOI: 10.3168/jds.2018-15134

Link: <http://www.sciencedirect.com/science/article/pii/S0022030219305430>

Abstract: ABSTRACT Our objective was to evaluate how sampling strategies (i.e., how many cows to sample and which animals to include) used in 4 dairy cattle welfare assessment programs affect the classification of dairy farms relative to thresholds of acceptability for animal-based measures. We predicted that classification performance would improve when more cows were sampled and when selecting from all lactating cows versus when some pens were excluded. On 38 freestall farms, we assessed all 12,375 cows for lameness, injuries on the tarsal (hock) and carpal joints, and body condition score and calculated the farm-level prevalence for each measure. Based on approaches used in the industry, we evaluated 6 sampling strategies generated using formulas with precision (d) of 15, 10, or 5% applied to either a single high-producing pen or all lactating cows; an additional sample was included with d = 10% applied to the entire herd, selecting lactating cows in proportion to their representation in the herd. For each sampling strategy, cow records were selected randomly (in 10,000 replicates) to calculate prevalence. The strategy of assessing all cows in the high-producing pen was also compared. Farms were classified as meeting (below) or failing to meet (above) thresholds of $\leq 15\%$ moderate lameness; $\leq 20\%$ moderate carpal or hock injuries; < 10 , < 5 , and $\leq 1\%$ severe lameness; or injuries on the carpus or hock; and < 5 , < 3 , < 1 , or 0% thin cows. For each measure and threshold, we calculated pooled percent agreement, kappa, sensitivity, specificity, and positive and negative predictive value for each sampling strategy using true prevalence as the gold standard for herd classification. Across measures and thresholds, classification performance increased with the number of cows sampled [i.e., when narrower precision values (d = 5 vs. 10 vs. 15%) were used in the sample size calculation]. Because narrower precision values can dramatically increase sample size, assessment programs may need to consider both feasibility and the degree of misclassification they will accept. Applying the formula directly to lactating cows performed better than applying it to the entire herd and then selecting lactating cows in proportion to their representation in the herd. Farm classifications were similar whether cows in the hospital pen were included or excluded from the sample. Selecting all cows from the high-producing pen resulted in classifications similar to when including all lactating cows, suggesting that assessing cows from the high-producing pen may serve as an acceptable proxy for all lactating cows on the farm.

Keyword: animal welfare; animal-based measure; certification program; skin lesion

251. Traditional halal slaughter without stunning versus slaughter with electrical stunning of sheep (*Ovis aries*)/ **Kiran, M.; Naveena, B.M.; Smrutirekha, M.; Baswa Reddy, P.; Rituparna, Banerjee; Praveen Kumar, Y.; Venkatesh, Ch.; Rapole, Srikanth.** Meat Science. ISSN:0309-1740 (2019) v.148 p.127-136Meat Science

DOI: 10.1016/j.meatsci.2018.10.011

Link: <http://www.sciencedirect.com/science/article/pii/S0309174018305254>

Abstract: Thirty Nellore crossbred male sheep (*Ovis aries*) were divided into two groups of 15 animals each and subjected to either pre-slaughter electrical stunning followed by slaughter (ST) or traditional halal slaughter without stunning (NST) to investigate the changes in blood biochemical parameters, meat quality and proteomic profile. Higher ($P < .05$) pH, water holding capacity and Warner-Bratzler shear force were observed in meat from stunned sheep. Quantitative proteomic approach using DIGE was employed to find a panel of protein markers that could differentiate ST and NST muscle proteome. Comparison of muscle proteome of ST and NST samples by 2D-DIGE and MALDI-TOF/TOF MS analysis revealed 46 significant ($P < .05$) differentially expressed proteins. Our analysis revealed changes in the abundance of proteins involved in catalytic, structural, and stress related process. Current study has demonstrated variation meat quality and identified important proteins that correlate with meat texture and pre-slaughter stress in sheep that are slaughtered without and with electrical stunning.

Keyword: Animal welfare; Mass spectrometry; Differential gel electrophoresis; Electrical stunning; Halal slaughter

252. Interactions between the cecal microbiota and non-alcoholic steatohepatitis using laying hens as the model/ **Hamid, H.; Zhang, J.Y.; Li, W.X.; Liu, C.; Li, M.L.; Zhao, L.H.; Ji, C.; Ma, Q.G..** Poultry Science. ISSN:0032-5791 6(2019) v.98 p.2509-2521Poultry Science

DOI: 10.3382/ps/pey596

Link: <http://www.sciencedirect.com/science/article/pii/S0032579119301440>

Abstract: ABSTRACT Chronic liver disease has caused increasing numbers of deaths worldwide. Fatty liver hemorrhagic syndrome, one of the chronic liver diseases in laying hens, has great similarity to non-alcoholic fatty liver disease (NAFLD) in humans. It is characterized by the pathological accumulation of liver fat. Non-invasive techniques are needed for early identification of fibrosis. As primary de novo lipogenesis in the liver of chicken is similar to that of humans, mature chicken is an ideal animal model for the understanding of NAFLD. This study was aimed to evaluate the relationships between gut microbiota and natural chronic liver disease (i.e., non-alcoholic steatohepatitis [NASH] and fibrosis stages) in a well-characterized laying hen population. One hundred 20-wk-old Hy-Line Brown laying hens were used and fed with basal diets until 52 wk of age. At the end of the experiment, birds were killed for sampling blood, liver, and cecal contents, and then classified by liver histology measurement into different groups. We investigated microbial community structure of cecum using 16S rRNA gene sequencing. Subjects in stage 0 fibrosis without NASH were classified as low NAFLD (Group A), subjects in stage 1–2 fibrosis with mild to moderate NASH were defined as low NASH (Group B), and subjects in stage 3 fibrosis were defined as severe NASH (Group C). The abundance of Firmicutes was reduced in Groups B and C ($P < 0.001$), whereas opposite results were observed for the abundance of Bacteroidetes. Additionally, the families Bacteroidaceae, Ruminococcaceae, Lachnospiraceae, and lactobacillae were significantly different between groups of differing fibrosis stages ($P < 0.001$), driven entirely by alterations of Bacteroides and lactobacillus and lachnospiraceae genera ($P < 0.001$), were observed. Results indicated that cecal dysbiosis was linked with the severity of fibrosis and NASH; importantly, increased levels of serum AST, alkaline phosphatase, and uric acid were accompanied with liver fibrosis and NASH severity.

Collectively, these data highlight the role of gut-liver axis and associations between the gut microbiota and fibrosis and NASH severity.

Keyword: fibrosis; gut microbiota; dysbiosis; non-alcoholic fatty liver; non-alcoholic steatohepatitis

253. The influence of TRAIL, adiponectin and sclerostin alterations on bone loss in BDL-induced cirrhotic rats and the effect of opioid system blockade/ **Moradi, Mona; Doustimotlagh, Amir Hossein; Dehpour, Ahmad Reza; Rahimi, Nastaran; Golestani, Abolfazl.** Life Sciences. ISSN:0024-3205 (2019) v.233 p.116706Life Sciences

DOI: 10.1016/j.lfs.2019.116706

Link: <http://www.sciencedirect.com/science/article/pii/S0024320519306332>

Abstract: Aims Osteoporosis is a common extra-hepatic complication in patients with chronic liver disease. Tumor necrosis factor related apoptosis-inducing ligand (TRAIL), sex hormones, adiponectin, and sclerostin are involved in the regulation of bone turnover but little is known about their role in the promotion of hepatic osteodystrophy. Endogenous opioids are reported to increase during cholestasis and may influence bone resorption. The purpose of this study was to investigate the circulating levels of these factors and their expression in the femur of bile duct ligated (BDL) rats, to evaluate the biomechanical bone strength, and the effect of naltrexone (NTX). Materials and methods BDL and sham-operated (SO) rats received 10 mg/kg NTX as an opioid-receptors antagonist or saline once daily for 28 days intraperitoneally. Three-point bending test was performed on the right femurs and, plasma bone alkaline phosphatase (BALP), sex hormones, TRAIL, adiponectin, sclerostin, as well as the mRNA expression levels of the latter three proteins, were measured in the femur tissues. Key findings Plasma TRAIL, estrogen, adiponectin, sclerostin and, BALP levels increased in BDL animals when compared to the related controls, whereas testosterone level decreased and NTX reversed these effects significantly. Femur strength decreased in cirrhotic animals and interestingly, blocking opioid-receptors by NTX improved it significantly ($p \leq 0.05$). Significance High levels of TRAIL, adiponectin and, sclerostin after bile duct ligation, suggest that these factors may have some roles in bone loss after cirrhosis. Administration of NTX improved all the mentioned factors except for bone strength. Effect of NTX on bone loss in BDL rats needs more study to clarify.

Keyword: Adiponectin; Bone loss; Cirrhosis; Naltrexone; Sclerostin; TRAIL

254. A selection method of chickens with blue-eggshell and dwarf traits by molecular marker-assisted selection/ **Cui, H.X.; Shen, Q.C.; Zheng, M.Q.; Su, Y.C.; Cai, R.C.; Yu, Y; Yang, X.R.; Chen, Z.W.; Wen, J; Zhao, G.P.** Poultry Science. ISSN:0032-5791 8(2019) v.98 p.3114-3118Poultry Science

DOI: 10.3382/ps/pez069

Link: <http://www.sciencedirect.com/science/article/pii/S0032579119301725>

Abstract: ABSTRACT The blue-eggshell and dwarf traits have an important economic value in poultry production. Using a genetic aggregation-based strategy, the molecular marker-assisted selection technology was jointly used to provide a rapid breeding method for pure strain chickens simultaneously with hens exhibiting the blue-eggshell and dwarf traits. Overall, 80 male dwarf chickens and 1,000 hybrid blue-eggshell hens (F0) were used for the hybridization experiment. Subsequently, the crossing of F1 or F2 chicks was performed in succession. The F1 and F2 chicks were respectively detected by the joint molecular markers of the solute carrier organic anion transporter family, namely,

1B3 (SLCO1B3) and the growth hormone receptor (GHR) genes, which relate to blue-eggshell and dwarf traits. Meanwhile, the selection of blue-eggshell and dwarf phenotypes was used to validate the data obtained by the molecular markers. The results showed that F1 chicks included the heterozygous and wild-type of SLCO1B3, as well as the homozygous (hens) and heterozygous (roosters) of GHR. However, F2 chicks included 3 different genotypes of both SLCO1B3 and GHR. Ultimately, 196 F1 roosters (concurrently with heterozygous genotype of SLCO1B3 and GHR) and 1,073 F1 hens (concurrently with heterozygous genotype of SLCO1B3 and homozygous genotype of GHR) were obtained from the initial 10,040 F1 chicks. Further, 27 F2 roosters and 345 F2 hens, which simultaneously carried the homozygous genotype of SLCO1B3 and GHR, were screened from the initial 6,000 F2 chicks. Data obtained on the blue-eggshell and dwarf phenotypes were consistent with the results by molecular markers. Similarly, the purity verification of the strain obtained through 2 crossing experiments ($F0\sigma \times F2\varphi$ and $F2\sigma \times F2\varphi$) revealed that all chickens had the blue-eggshell and dwarf traits, supporting that the obtained F2 strain was pure. In summary, for the first time, we successfully bred a pure strain chicken with blue-eggshell and dwarf traits by jointly using the molecular markers of the SLCO1B3 and GHR genes. Our study provides a new method for the rapid cultivation of new chicken strains.

Keyword: chicken; blue-eggshell; dwarf; genetic aggregation; molecular marker-assisted breeding

255. Tat-CIAPIN1 inhibits hippocampal neuronal cell damage through the MAPK and apoptotic signaling pathways/ **Yeo, Hyeon Ji; Shin, Min Jea; Yeo, Eun Ji; Choi, Yeon Joo; Kim, Dae Won; Kim, Duk-Soo; Eum, Won Sik; Choi, Soo Young.** Free Radical Biology and Medicine. ISSN:0891-5849 (2019) v.135 p.68-78Free Radical Biology and Medicine

DOI: 10.1016/j.freeradbiomed.2019.02.028

Link: <http://www.sciencedirect.com/science/article/pii/S0891584919301261>

Abstract: Cytokine-induced apoptosis inhibitor 1 (CIAPIN1) protein is widely expressed in the brain and it is known that this protein is involved in cell survival including dopaminergic neuronal cells. Oxidative stress is known as one of the major causes of degenerative diseases including ischemia. In this study, we investigated the effect of CIAPIN1 protein on hippocampal neuronal (HT-22) cell damage induced by hydrogen peroxide (H_2O_2) and in an animal model of ischemia using Tat-CIAPIN1 fusion protein which can transduce into cells. Tat-CIAPIN1 protein transduced into HT-22 cells and significantly inhibited cell death, DNA fragmentation, and reactive oxygen species (ROS) generation. Also, Tat-CIAPIN1 protein enhances cell survival via the regulation of Akt, MAPK, NF- κ B and apoptotic signaling pathways in the H_2O_2 treated cells. In an ischemic animal model, Tat-CIAPIN1 protein transduced into the brain and protected neuronal cell death of hippocampal CA1 region induced by ischemic insult. In conclusion, we demonstrated that Tat-CIAPIN1 protein has protective effects against hippocampal neuronal cell damage induced by ischemic injury, suggesting that Tat-CIAPIN1 protein may provide a potential therapeutic agent for ischemia.

Keyword: Apoptosis; ROS; Ischemia; Protein therapy; Tat-CIAPIN1

256. The Bicuspid Condition of the Aortic Valve Does Not Alter the Incidence of Accessory Coronary Artery Ostia in Syrian Hamsters (*Mesocricetus auratus*)/ **Fernández, M.C.; Soto-Navarrete, M.T.; Durán, A.C.; Sans-Coma, V.; Fernández, B..** Journal of Comparative Pathology. ISSN:0021-9975 (2019) v.166 p.9-16Journal of Comparative Pathology

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Abstract: Summary In man and Syrian hamsters (*Mesocricetus auratus*), the prevalence of anomalies in the origin of the coronary arteries is significantly higher in individuals with bicuspid than with normal aortic valves. In hamsters, the incidence of accessory ostia is similar in individuals with normal and anomalous coronary arteries, all of them possessing a normal (tricuspid) aortic valve. In order to evaluate whether or not the presence of bicuspid aortic valves alters the incidence of accessory ostia, 1,050 hearts from hamsters with bicuspid valves were examined. In 594 of them the coronary arteries were normal. The remaining 456 hearts showed coronary artery anomalies characterized by the absence of any artery arising from the left side of the valve. The incidence of accessory ostia was 3.9% in hamsters with normal coronary arteries and 2.2% in those with anomalous coronary patterns. Overall, 3.1% of the accessory ostia were associated with a septal artery and another 0.2% with a conal artery. These data referring to the bicuspid valves were compared with those already published on normal valves. The results of statistical analyses showed that having a bicuspid aortic valve does not alter the incidence of accessory coronary ostia. In the set of tricuspid and bicuspid valves, the incidence of accessory ostia was significantly lower on the left side than on the right side of the valve. This, together with the fact that in the present animal model the coronary anomalies were characterized by the absence of arteries on the left side of the valve, suggests that the embryonic region corresponding to the left side of the aortic valve primordium is particularly associated with preventing the normal development of coronary vessels.

Keyword: accessory coronary ostium; bicuspid aortic valve; coronary artery anomaly; Syrian hamster

257. Neuroprotective effect of CuATSM on neurotoxin-induced motor neuron loss in an ALS mouse model/ **Kuo, Michael T.H.; Beckman, Joseph S.; Shaw, Christopher A..** *Neurobiology of Disease*. ISSN:0969-9961 (2019) v.130 p.104495 *Neurobiology of Disease*

DOI: 10.1016/j.nbd.2019.104495

Link: <http://www.sciencedirect.com/science/article/pii/S0969996119301500>

Abstract: CuATSM is a PET-imaging agent that has recently received attention for its success in extending the lifespan in animals in several neurodegenerative disease models. In the SOD1G93A model of ALS, CuATSM prolonged mouse longevity far longer than any previously tested therapeutic agents. The mechanism underlying this outcome has not been fully understood, but studies suggest that this copper complex contributes to maintaining copper homeostasis in mitochondria. More specifically for the SOD1 model, the molecule supplies copper back to the SOD1 protein. Additionally, CuATSM demonstrated similar protective effects in various in vivo Parkinson's disease mouse models. In the current pilot study, we utilized a neurodegenerative mouse model of motor neuron degeneration induced by the neurotoxin β -sitosterol β -D-glucoside. In this model, slow but distinct and progressive features of sporadic ALS occur. Treatment with CuATSM kept animal behavioural performance on par with the controls and prevented the extensive motor neuron degeneration and microglia activation seen in the untreated animals. These outcomes support a broader neuroprotective role for CuATSM beyond mutant SOD models of ALS.

Keyword: Neurodegeneration; Therapeutics; ALS; Amyotrophic lateral sclerosis; Copper homeostasis; CuATSM

258. Symbolic entities in the European Alps: Perception and use of a cultural ecosystem service/ **Rüdisser, Johannes; Schirpke, Uta; Tappeiner, Ulrike.** *Ecosystem Services*. ISSN:2212-0416 (2019) v.39 p.100980 *Ecosystem Services*

DOI: 10.1016/j.ecoser.2019.100980

Link: <http://www.sciencedirect.com/science/article/pii/S2212041618306405>

Abstract: The Alps are a biodiversity hotspot in Europe and are home to many endemic species. Some of these species have a symbolic meaning for people and are an integral part of the Alpine culture. The characteristics and relevance of these symbolic uses are rarely explored from an ecosystem service perspective. As the perception of symbols is prone to individuality and subjectivity, this ecosystem service is difficult to assess. Therefore, we assessed which Alpine species are perceived as symbolic through a multilingual questionnaire, and then spatially mapped their actual use as symbols. We focused on two complementary indicators: (1) the cultural identity of the local population as represented in emblems/coats of arms and (2) the importance of symbols for the tourism sector represented in hotel names. The most commonly mentioned species were the Alpine ibex (42% of the respondents), chamois (17%), marmot (12%), golden eagle (10%), edelweiss (40%), gentian (15%), pine tree (10%) and alpenrose (10%). These species occurred in 12% of the investigated municipality emblems and in hotel names in 470 municipalities (2.8%) throughout the Alps. Our results illustrate the relevance of this currently neglected ecosystem service and delineate a feasible methodology to assess this service in other regions.

Keyword: Animals; Mapping; Cultural identity; Heraldry; Landscapes; Natural heritage; Perception survey; Plants; Regional identity

259. The use of material transfer agreements in academia: A threat to open science or a cooperation tool?/ **Schaeffer, Véronique**. Research Policy. ISSN:0048-7333 9(2019) v.48 p.103824Research Policy

DOI: 10.1016/j.respol.2019.103824

Link: <http://www.sciencedirect.com/science/article/pii/S0048733319301441>

Abstract: The transfer of scientific material and data, which are scientific inputs, is fundamental to knowledge creation dynamics. This transfer is being controlled, more and more, by the use of Material Transfer Agreements (MTAs). Therefore, the effect of MTAs on the dynamic of knowledge creation is an important concern. The aim of this research is to characterise the restrictions imposed by MTAs, and their determinants. We consider MTA diversity based on a comprehensive analysis of the clauses included in 171 MTAs signed by two French universities. We show that the clauses included in MTAs depend on several factors such as kind of material involved, research field, patenting and collection of material. We find that the presence of an industry actor is not associated to more restrictions on publication and intellectual property. We propose a typology of MTAs corresponding to different transfer situations. We discuss the role of MTAs as collaborative tools and the influence of the legal, scientific, political and organisational context.

Keyword: Open science; Academic competition; Material transfer agreement; MTA; Repository; Scientific material sharing

260. Meta-analysis of preclinical studies of mesenchymal stromal cells to treat rheumatoid arthritis/ **Liu, Linan; Wong, Chi W.; Han, Menglu; Farhoodi, Henry P.; Liu, Guangyang; Liu, Yongjun; Liao, Wenbin; Zhao, Weian**. EBioMedicine. ISSN:2352-3964 (2019) v.47 p.563-577EBioMedicine

DOI: 10.1016/j.ebiom.2019.08.073

Link: <http://www.sciencedirect.com/science/article/pii/S235239641930595X>

Abstract: Background This study aims to evaluate the quality of preclinical data, determine the effect sizes, and identify experimental measures that inform efficacy using mesenchymal stromal (or stem) cells (MSC) therapy in animal models of rheumatoid arthritis (RA). Methods Literature searches were performed on MSC preclinical studies to treat RA. MSC treatment effect sizes were determined by the most commonly used outcome measures, including paw thickness, clinical score, and histological score. Findings A total of 48 studies and 94 treatment arms were included, among which 42 studies and 79 treatment arms reported that MSC improved outcomes. The effect sizes of RA treatments using MSC, when compared to the controls, were: paw thickness was ameliorated by 53.6% (95% confidence interval (CI): 26.7% –80.4%), histological score was decreased by 44.9% (95% CI: 33.3% –56.6%), and clinical score was decreased by 29.9% (95% CI: 16.7% –43.0%). Specifically, our results indicated that human umbilical cord derived MSC led to large improvements of the clinical score (–42.1%) and histological score (–51.4%). Interpretation To the best of our knowledge, this meta-analysis is to quantitatively answer whether MSC represent a robust RA treatment in animal models. It suggests that in preclinical studies, MSC have consistently exhibited therapeutic benefits. The findings demonstrate a need for considering variations in different animal models and treatment protocols in future studies using MSC to treat RA in humans to maximise the therapeutic gains in the era of precision medicine. Funds NIH [1DP2CA195763], Baylx Inc.: BI-206512, NINDS/NIH Training Grant [Award# NS082174].

Keyword: Meta-analysis; Rheumatoid arthritis; Clinical trials; Mesenchymal stromal (or stem) cells; MSC; Pre-clinical study

261. Trehalose suppresses cadmium-activated Nrf2 signaling pathway to protect against spleen injury/ **Qu, Kui-Chao; Wang, Zhen-Yong; Tang, Kou-Kou; Zhu, Yi-Song; Fan, Rui-Feng.** Ecotoxicology and Environmental Safety. ISSN:0147-6513 (2019) v.181 p.224-230 Ecotoxicology and Environmental Safety

DOI: 10.1016/j.ecoenv.2019.06.007

Link: <http://www.sciencedirect.com/science/article/pii/S0147651319306359>

Abstract: Cadmium (Cd), as a kind of ubiquitous and highly toxic heavy metal pollutants, has been known to result in immunotoxicity in animals. As a multifunctional bioactivity disaccharide, trehalose (Tre) is characterized by antioxidative, antiapoptotic, and accelerating autophagy. In this study, Sprague-Dawley (SD) rats were fed with cadmium chloride (CdCl₂) and/or Tre to explore the molecular mechanisms of Tre-protected against spleen injury caused by Cd exposure. Firstly, the results showed that Tre partially recovered splenic pathological changes induced by Cd exposure. Secondly, Tre dramatically declined the level of methane dicarboxylic aldehyde (MDA) and elevated the level of total antioxidant capacity (T-AOC) to weaken oxidative stress caused by Cd exposure in spleen tissue. Moreover, the results showed that Tre significantly suppressed Cd-induced the nuclear translocation of nuclear factor erythroid 2-related factor 2 (Nrf2) and up-regulated the protein expression of nuclear Nrf2. Thirdly, Tre remarkably reduced the protein expression of sequestosome 1 (p62/SQSTM1) and microtubule-associated protein light chain 3II (LC-3II) to restore autophagy inhibition induced by Cd exposure. Finally, the results of TUNEL and the expression of apoptosis marker proteins showed that Tre significantly inhibited Cd-induced apoptosis in spleen tissue to exert its protective effects. In summary, the results indicated that Tre modulated Nrf2 signaling pathway, which interacted with apoptosis and autophagy to against Cd-induced spleen injury, providing potential therapeutic strategies for the prevention and treatment of Cd-related immune system diseases.

Keyword: Cadmium; Apoptosis; Autophagy; Nrf2 signaling pathway; Spleen; Trehalose

262. Identification of SNPs and expression patterns of FZD3 gene and its effect on wool traits in Chinese Merino sheep (Xinjiang Type)/ **ZHAO, Bing-ru; FU, Xue-feng; TIAN, Ke-chuan; HUANG, Xi-xia; DI, Jiang; BAI, Yan; XU, Xin-ming; TIAN, Yue-zhen; WU, Wei-wei; ABLAT, Sulayman; ZENG, Wei-dan; HANIKEZI, Tulafu.** Journal of Integrative Agriculture. ISSN:2095-3119 10(2019) v.18 p.2351-2360Journal of Integrative Agriculture

DOI: 10.1016/S2095-3119(19)62735-8

Link: <http://www.sciencedirect.com/science/article/pii/S2095311919627358>

Abstract: As a member of the Frizzled family, Frizzled3 (FZD3) is a receptor of the canonical Wnt signaling pathway and plays a vital role in mammalian hair follicle developmental processes. However, its effects on wool traits are not clear. The objectives of this study were to identify the single nucleotide polymorphisms (SNPs) and the expression patterns of FZD3 gene, and then to determine whether it affected wool traits of Chinese Merino sheep (Xinjiang Type) or not. PCR-single stranded conformational polymorphism (PCR-SSCP) and sequencing were used to identify mutation loci, and general linear model (GLM) with SAS 9.1 was used for the association analysis between wool traits and SNPs. Quantitative real-time PCR (qRT-PCR) was used to investigate FZD3 gene expression levels. The results showed that six exons of FZD3 gene were amplified and two mutation loci were identified in exon 1 (NC_019459.2: g.101771685 T>C (SNP1)) and exon 3 (NC_019459.2: g.101810848, A>C (SNP2)), respectively. Association analysis showed that SNP1 was significantly associated with mean fiber diameter (MFD) ($P=0.04$) and live weight (LW) ($P=0.0004$), SNP2 was significantly associated with greasy fleece weight (GFW) ($P=0.04$). The expression level of FZD3 gene in skin tissues of the superfine wool (SF) group was significantly lower ($P<0.05$) than that of the fine wool (F) group. Moreover, it had a higher expression level ($P<0.01$) in skin tissues than in other tissues of Chinese Merino ewes. While, its expression level had a fluctuant expression in skin tissues at different developmental stages of embryos and born lambs, with the highest expression levels ($P<0.01$) at the 65th day of embryos. Our study revealed the genetic relationship between FZD3 variants and wool traits and two identified SNPs might serve as potential and valuable genetic markers for sheep breeding and lay a molecular genetic foundation for sheep marker-assisted selection (MAS).

Keyword: association analysis; Chinese Merino sheep (Xinjiang Type); expression pattern; single nucleotide polymorphism (SNP); wool traits

263. Genome-wide association study of equine herpesvirus type 1-induced myeloencephalopathy identifies a significant single nucleotide polymorphism in a platelet-related gene/ **Brosnahan, M.M.; Al Abri, M.A.; Brooks, S.A.; Antczak, D.F.; Osterrieder, N..** The Veterinary Journal. ISSN:1090-0233 (2019) v.245 p.49-54The Veterinary Journal

DOI: 10.1016/j.tvjl.2018.12.013

Link: <http://www.sciencedirect.com/science/article/pii/S1090023318307767>

Abstract: Equine herpesvirus type 1 (EHV-1)-induced myeloencephalopathy (EHM) is a neurologic disease of horses that represents one outcome of infection. The neurologic form of disease occurs in a subset of infected horses when virus-induced endothelial cell damage triggers vasculitis and subsequent ischemic insult to the central nervous system. EHM causes considerable animal suffering and economic loss for the horse industry. Virus polymorphisms have been previously associated with disease outcome but cannot fully explain why only some horses develop EHM. This study investigated the role of host genetics in EHM. DNA samples were collected from 129 horses infected with

EHV-1 (61 that developed EHM and 68 in which disease resolved without the development of neurologic signs) during natural outbreaks or experimental infections. A genome-wide association study (GWAS) was performed to investigate host genetic variations associated with EHM. Genotyping was performed using the Illumina SNP50 and SNP70 arrays and a custom Sequenom array. Mixed linear model (MLM) analysis using a recessive model identified one marker that surpassed the threshold for genome-wide significance ($P < 0.001$) after Bonferroni correction. The marker (BIEC2_946397) is in an intron of the tetraspanin 9 (TSPAN9) gene, which is expressed in endothelial cells and platelets. The GWAS identified a region in the horse genome that is associated with EHM in the sample population and thus warrants further exploration. Understanding the contribution of host genetic variation to the development of EHM will enhance our knowledge of disease pathophysiology, and lead to improved strategies for treating individual cases and managing outbreaks.

Keyword: Virology; Equine; Genome-wide association study; Equine herpesvirus 1

264. TherMouseDuino: An affordable Open-Source temperature control system for functional magnetic resonance imaging experimentation with mice/ **Quiñones, Darío R.; Fernández-Mollá, Luis Miguel; Pacheco-Torres, Jesús; Caramés, José M.; Canals, Santiago; Moratal, David.** Magnetic Resonance Imaging. ISSN:0730-725X (2019) v.58 p.67-75Magnetic Resonance Imaging

DOI: 10.1016/j.mri.2019.01.009

Link: <http://www.sciencedirect.com/science/article/pii/S0730725X18303886>

Abstract: Introduction Functional magnetic resonance imaging (fMRI) is one of the most highly regarded techniques in the neuroimaging field. This technique is based on vascular responses to neuronal activation and is extensively used in clinical and animal research studies. In preclinical settings, fMRI is usually applied to anesthetized animals. However, anesthetics cause alterations, e.g. hypothermia, in the physiology of the animals and this has the potential to disrupt fMRI signals. The current temperature control method involves a technician, as well as monitoring the acquisition MRI sequences, also controlling the temperature of the animal; this is inefficient. Methods In order to avoid hypothermia in anesthetized rodents an Open-Source automatic temperature control device is presented. It takes signals from an intrarectal temperature sensor, as well as signals from a thermal bath, which warms up the body of the animal under study, in order to determine the mathematical model of the thermal response of the animal. Results A Proportional-Integral-Derivative (PID) algorithm, which was discretized in an Arduino microcontroller, was developed to automatically keep stable the body temperature of the animal under study. The PID algorithm has been shown to be accurate in preserving the body temperature of the animal. Conclusion This work presents the TherMouseDuino. It is an Open-Source automatic temperature control system and reduces temperature fluctuations, thus providing robust conditions in which to perform fMRI experiments. Furthermore, our device frees up the technician to focus solely on monitoring the MRI sequences.

Keyword: Mice; Arduino; Anesthetic; BOLD; fMRI; PID

265. Fingolimod (FTY720) improves the functional recovery and myelin preservation of the optic pathway in focal demyelination model of rat optic chiasm/ **Hashemian, Mona; Ghasemi-Kasman, Maryam; Parsian, Hadi; Sadeghi, Farzin.** Brain Research Bulletin. ISSN:0361-9230 (2019) v.153 p.109-121Brain Research Bulletin

DOI: 10.1016/j.brainresbull.2019.08.014

Link: <http://www.sciencedirect.com/science/article/pii/S0361923019303065>

Abstract: It has been shown that fingolimod (FTY720) possesses beneficial effects on remyelination in the central nervous system (CNS). In this study, the effects of FTY720 and sodium valproate (VPA) as histone deacetylase inhibitor (HDAC) on the conductivity of visual signals, extent of demyelination area, glial activation, and expression levels of HDAC1 and S1PR1 have been evaluated in the optic chiasm of lysolecithin (LPC)-induced demyelination model. In order to produce this demyelination model, LPC (1%, 2 μ L) was injected into the rat optic chiasm. Latency of visual waves was measured by visual evoked potential (VEP) recording. The extent of demyelination area and level of glial activation were assessed using immunostaining. Gene expression analysis was performed to evaluate the expression levels of HDAC1, S1PR1, Olig2, and MBP in the optic chiasm. Analysis of electrophysiological data showed that LPC administration increased the latency of visual signals. FTY720 improved the functional recovery of the visual pathway and reduced the level of glial activation in the optic chiasm. FTY720 enhanced myelin repair and up-regulated the expression levels of Olig2 and MBP. Additionally, the expression levels of HDAC1 and S1PR1 were significantly reduced in animals treated with FTY720. In contrast to FTY720 treated animals, administration of VPA could not significantly improve the functional recovery of optic pathway following LPC injection. Cumulatively, the results of the present study demonstrate that FTY720 application improves the functional recovery of the optic pathway by reducing demyelination levels, amelioration of glial activation, and down-regulating of S1PR1 and HDAC1.

Keyword: Lysolecithin; Demyelination; Fingolimod; Histone deacetylase; Visual evoked potential recording

266. Impact of age on host responses to diet-induced obesity: Development of joint damage and metabolic set points/ **Collins, Kelsey H.; MacDonald, Graham Z.; Hart, David A.; Seerattan, Ruth A.; Rios, Jaqueline L.; Reimer, Raylene A.; Herzog, Walter.** Journal of Sport and Health Science. ISSN:2095-2546 (2019) v. p. Journal of Sport and Health Science

DOI: 10.1016/j.jshs.2019.06.004

Link: <http://www.sciencedirect.com/science/article/pii/S2095254619300754>

Abstract: Background Osteoarthritis is one of the leading causes of pain and disability worldwide, and a large percentage of patients with osteoarthritis are individuals who are also obese. In recent years, a series of animal models have demonstrated that obesity-inducing diets can result in synovial joint damage (both with and without the superimposition of trauma), which may be related to changes in percentage of body fat and a series of low-level systemic inflammatory mediators. Of note, there is a disparity between whether the dietary challenges commence at weaning, representing a weanling onset, or at skeletal maturity, representing an adult onset of obesity. We wished to evaluate the effect of the dietary exposure time and the age at which animals are exposed to a high-fat and high-sucrose (HFS) diet to determine whether these factors may result in disparate outcomes, as there is evidence suggesting that these factors result in differential metabolic disturbances. Based on dietary exposure time, we hypothesized that rats fed an HFS diet for 14 weeks from weaning (HFS Weanling) would demonstrate an increase in knee joint damage scores, whereas rats exposed to the HFS diet for 4 weeks, starting at 12 weeks of age (HFS Adult) and rats exposed to a standard chow diet (Chow) would not display an increase in knee joint damage scores. Methods Male Sprague-Dawley rats were fed either an HFS diet for 14 weeks from weaning (HFS Weanling) or an HFS diet for 4 weeks, starting at 12 weeks of age (HFS Adult). At sacrifice, joints were scored using the Modified Mankin Criteria, and serum was analyzed for a defined subset of inflammatory markers (Interleukin-6, leptin, monocyte chemoattractant protein-1, and tumor necrosis factor- α). Results When the HFS Weanling and HFS Adult groups were compared, both groups had a similar percent of body fat, although the HFS Weanling group had a significantly greater body mass than the HFS Adult group. The HFS Weanling and HFS Adult animals had a significant increase in body

mass and percentage of body fat when compared to the Chow group. Although knee joint damage scores were low in all 3 groups, we found, contrary to our hypothesis, that the HFS Adult group had statistically significant greater knee joint damage scores than the Chow and HFS Weanling groups. Furthermore, we observed that the HFS Weanling group did not have significant differences in knee joint damage scores relative to the Chow group. Conclusion These findings indicate that the HFS Weanling animals were better able to cope with the dietary challenge of an HFS diet than the HFS Adult group. Interestingly, when assessing various serum proinflammatory markers, no significant differences were detected between the HFS Adult and HFS Weanling groups. Although details regarding the mechanisms underlying an increase in knee joint damage scores in the HFS Adult group remain to be elucidated, these findings indicate that dietary exposure time maybe less important than the age at which an HFS diet is introduced. Moreover, increases in serum proinflammatory mediators do not appear to be directly linked to knee joint damage scores in the HFS Weanling group animals but may be partially responsible for the observed knee joint damage in the adults over the very short time of exposure to the HFS diet.

Keyword: Adult exposure; High-fat, high-sucrose diet; Rat obesity model; Serum biomarkers; Weanling exposure

267. Cloning and characterization of a novel aspartate/glutamate racemase from the acorn worm *Saccoglossus kowalevskii*/ **Uda, Kouji; Ishizuka, Naoki; Edashige, Yumika; Kikuchi, Arika; Radkov, Atanas D.; Moe, Luke A.** Comparative Biochemistry and Physiology Part B: Biochemistry and Molecular Biology. ISSN:1096-4959 (2019) v.232 p.87-92 Comparative Biochemistry and Physiology Part B: Biochemistry and Molecular Biology

DOI: 10.1016/j.cbpb.2019.03.006

Link: <http://www.sciencedirect.com/science/article/pii/S1096495919300673>

Abstract: Previously, we demonstrated that the animal aspartate racemase (AspR) gene has evolved from the serine racemase (SerR) gene by acquisition of three consecutive serine residues (Ser155-Ser156-Ser157) involved in the strong AspR activity, and this event has occurred independently and frequently during animal evolution. In the present study, we cloned and characterized two mammalian SerR homologous genes from the hemichordate acorn worm (*Saccoglossus kowalevskii*). The enzymes have been identified as an AspR and an aspartate/glutamate racemase (Asp/GluR) on the basis of their kinetic parameters. The *S. kowalevskii* Asp/GluR shows comparable substrate affinity and high catalytic efficiency (k_{cat}/K_m) for both aspartate and glutamate and is the first reported enzyme from animals that can synthesize d-glutamate. Amino acid sequence alignment analysis and site-directed mutagenesis studies have revealed that the amino acid residue at position 156, which is serine in AspR and alanine in Asp/GluR, is associated with binding and recognition of glutamate and aspartate. Phylogenetic analysis suggests that the *S. kowalevskii* AspR gene has evolved from the SerR gene after the divergence of hemichordata and vertebrate lineages by acquisition of the three serine residues at position 155 to 157 as in the case of other animal AspR genes. Furthermore, the *S. kowalevskii* Asp/GluR gene is the result of AspR gene duplication and several amino acid substitutions including that of the 156th serine residue with alanine. The fact that SerR has acquired substrate specificity towards aspartate or glutamate raises the possibility that synthesis of other d-amino acids is carried out by enzymes evolved from SerR.

Keyword: -amino acid; -asp; -Glu; Aspartate racemase; Glutamate racemase

268. Perfusion-related changes in intestinal diffusion detected by NMR-MOUSE® monitoring in minipigs/ **Keschenau, Paula R.; Simons, Nina; Klingel, Hanna; Reuter, Silke; Foldenauer, Ann Christina; Vieß, Jochen; Weidener, Dennis;**

Andruszkow, Julia; Blümich, Bernhard; Tolba, René; Jacobs, Michael J.; Kalder, Johannes. Microvascular Research. ISSN:0026-2862 (2019) v.125 p.103876Microvascular Research

DOI: 10.1016/j.mvr.2019.04.006

Link: <http://www.sciencedirect.com/science/article/pii/S0026286219300561>

Abstract: Objective The aim was to investigate perfusion-related changes in the intestinal diffusion assessed by NMR-MOUSE monitoring in minipigs. This was a follow-up study of previous experiments on landrace pigs demonstrating the feasibility of NMR-MOUSE monitoring in large animals. Methods 5 mature female minipigs (mean body weight 50 ± 2 kg) underwent laparotomy with exposition of several small intestinal loops and their feeding vessels. The loops were examined consecutively using NMR-MOUSE monitoring for assessment of intestinal proton diffusion (fast diffusion component [FC] and slow diffusion component [SC]) and oxygen to see monitoring (O2C, LEA Medizintechnik GmbH, Giessen, Germany) for microcirculatory evaluation. Following a baseline measurement on each loop under physiological perfusion, measurements were continued as one of the following main treatments were performed per loop: method 1 – ischemia; method 2 – flow reduction; method 3 – intraluminal glucose followed by ischemia; method 4 – intraluminal glucose followed by flow reduction. Perioperative monitoring was supplemented by blood gas analyses and histopathological assessment of H.E. stained intestinal biopsies. Results The NMR-MOUSE measurement showed a significant difference in the change to baseline values in the FC during flow reduction compared to the other treatments according to the unadjusted (pM2 vs. M1 < 0.0001, pM2 vs. M3 = 0.0005, pM2 vs. M4 = 0.0005) and the adjusted p-values (pM2 vs. M1 < 0.0001, pM2 vs. M3 = 0.0030, pM2 vs. M4 = 0.0030). In the SC, the difference between ischemia and flow reduction was significant according to the unadjusted p-values (pM2 vs. M1 = 0.0397). Whereas the FC showed a trend towards ongoing increase during ischemia but towards ongoing decrease during flow reduction, the SC showed contrary trends. These effects seemed to be attenuated by prior glucose application. According to the results of O2C monitoring, ischemia as well as flow reduction caused a significant decrease of microcirculatory oxygen saturation (inner probe: methods 1–4 and outer probe methods 1, 2: $p < 0.0001$; outer probe: pM2 = 0.0001), velocity (inner probe: pM1 < 0.0001, pM2 = 0.0155, pM3 = 0.0027; outer probe: pM1 < 0.0001, pM2 = 0.0045, pM3 = 0.0047, pM4 = 0.0037) and serosal flow (outer probe, methods 1 and 2: $p < 0.0001$; pM3 = 0.0009, pM4 = 0.0008). The histopathological analysis showed a significant association with time ($p = 0.003$) but not with the experimental method ($p = 0.1386$). Conclusions Intestinal diffusion is affected significantly by perfusion changes in mature minipigs. As shown by NMR-MOUSE monitoring, ischemia and flow reduction have contrary effects on intestinal diffusion and, additionally, the fast and slow diffusion components show opposite trends during each of those pathological perfusion states. Prior intraluminal glucose application seems to attenuate the effects of malperfusion on intestinal diffusion.

Keyword: Animal model; Intestine; Diffusion measurement; Ischemia/reperfusion; NMR; NMR-MOUSE

269. Strong adsorption of Polychlorinated Biphenyls by processed montmorillonite clays: Potential applications as toxin enterosorbents during disasters and floods/ **Wang, Meichen; Safe, Stephen; Hearon, Sara E.; Phillips, Timothy D..** Environmental Pollution. ISSN:0269-7491 (2019) v.255 p.113210Environmental Pollution

DOI: 10.1016/j.envpol.2019.113210

Link: <http://www.sciencedirect.com/science/article/pii/S0269749119335365>

Abstract: Polychlorinated biphenyls (PCBs) have been detected as prevalent environmental contaminants in water, food and biota. Previous studies in vitro have shown that a variety of sorbent materials, including carbon, can sorb PCBs; however, PCB sorbents that can be added to food or drinking water to decrease toxin bioavailability in humans

and animals have not been reported. To address this problem, we have developed broad-acting and highly effective sorbents for PCBs using montmorillonite clays reported to be safe for consumption in animals and humans. In this study, calcium montmorillonite clays were acid processed (APMs) and the interactions of six PCB congeners (PCB 77, 126, 153, 157, 154 and 155) on the surfaces of APMs were characterized. Computational models and isothermal analyses were used to derive surface capacities and affinities, delineate mechanisms and predict the thermodynamics of sorption. To confirm the safety and predict the efficacy of APMs against individual PCBs and common mixtures (Aroclors 1254 and 1260), we have also used a living organism (*Hydra vulgaris*) that is sensitive to toxins. APMs significantly protected hydra against the toxicity of PCBs and Aroclors. This finding was supported by studies showing tight binding; high capacity, affinity, and enthalpy; and a low therapeutic dose.

Keyword: Polychlorinated biphenyls; Adsorption; Aroclors; Hydra assay; Montmorillonite clay

270. Effects of surface type in an uncovered stand-off pad system on comfort and welfare of non-lactating dairy cows during winter/ **Al-Marashdeh, Omar; Cameron, Keith C.; Bryant, Racheal H.; Chen, Ao; McGowan, Briar; Gillé-Perrier, Corentine; Carey, Peter; Chrystal, Jane; Hodge, Simon; Edwards, Grant R..** Applied Animal Behaviour Science. ISSN:0168-1591 (2019) v.211 p.17-24Applied Animal Behaviour Science

DOI: 10.1016/j.applanim.2018.11.001

Link: <http://www.sciencedirect.com/science/article/pii/S0168159118303071>

Abstract: The objective of this study was to investigate the effect of stand-off surface type on cow lying behaviour, cleanliness and lameness. One hundred and sixty Friesian × Jersey crossbreed, pregnant non-lactating dairy cows were blocked into five groups of 32 cows and randomly assigned to one of five treatments. Treatments consisted of cows grazing fodder beet in situ and remaining in the paddock with no stand-off (control), or grazing fodder beet in situ and spending 16 h on a stand-off pad with either a woodchip, round-stones (40–60 mm), sand, or geotextile ‘carpet’ surface. Lying duration, monitored by AfiAct electronic pedometers (AfiMilk, Kibbutz Afikim, Israel), showed cows on stone spent significantly more ($P < 0.001$) time lying (9.5 h) than cows on woodchip (8.4 h), control (8.1 h), and sand (7.6 h), but similar to those on carpet (8.8 h). However, there were fewer ($P < 0.001$) lying bouts (4.6 bouts/d) and longer ($P < 0.001$) bout duration (137 min/bout) for cows on stone than other treatments (average 7 bouts/day and 85 min/bout), which may suggest that cows found standing and sitting on the stone surface uncomfortable. As measured by a cleanliness score, cows on the sand surface were less ($P < 0.001$) clean than cows on other surfaces. Lameness, which was determined by visual scoring, revealed only moderate cases of lameness which tended ($P = 0.059$) to be more prevalent for cows on stone (11.3%) or sand (12.5%), compared with lowest in woodchip (4.0%) or carpet (4.7%), and intermediate in the control treatment (8.8%). The data indicate that sand and the size of stone used are less suitable surfaces than woodchip or carpet for an uncovered winter stand-off pad to meet minimum requirements of animal comfort and welfare. While both the woodchip and carpet surfaces equally met animal welfare standards, the woodchip required less maintenance.

Keyword: Animal welfare; Dairy cattle; Cow lameness; Lying behaviour; Stand-off pad

271. Identification of efficient dairy farms in Greece based on home grown feedstuffs, using the Data Envelopment Analysis method/ **Siafakas, Stavros; Tsiplakou, Eleni; Kotsarinis, Michael; Tsiboukas, Konstantinos; Zervas, George.** Livestock Science. ISSN:1871-1413 (2019) v.222 p.14-20Livestock Science

DOI: 10.1016/j.livsci.2019.02.008

Link: <http://www.sciencedirect.com/science/article/pii/S1871141318306371>

Abstract: The aim of this study was the evaluation of the efficiency of dairy cow farms in Greece using the nonparametric method of Data Envelopment Analysis (DEA). To achieve the aim of this empirical analysis, two basic models were developed: one using the hypothesis of Constant Return to Scale (CRS) and the other using Variable Return to Scale (VRS). The models were output oriented (milk yield) at a constant level of technology and production factors used (nutritional value of procured or home grown animal feed, hours of human labour, value of livestock, average invested capital – including land). The results have shown that 87.2% of the farms in the sample were inefficient with an inefficiency scale between 22.09% and 100% with an average of 82.73% and a standard deviation of 19.90%. It is obvious from the results' analysis that the farms, at the level of inputs used, can increase their output (milk yield), therefore improving their competitiveness.

Keyword: Efficiency; Dairy farms; Data Envelopment Analysis; Home-grown feedstuffs

272. Untargeted gas chromatography–mass spectrometry-based metabolomics analysis of kidney and liver tissue from the Lewis Polycystic Kidney rat/ **Abbiss, Hayley; Maker, Garth L.; Gummer, Joel P.A.; Rawlinson, Catherine; Musk, Gabrielle C.; Fleming, Patricia A.; Phillips, Jacqueline K.; Boyce, Mary C.; Trengove, Robert D.** Journal of Chromatography B. ISSN:1570-0232 (2019) v. p.25-32Journal of Chromatography B

DOI: 10.1016/j.jchromb.2019.04.021

Link: <http://www.sciencedirect.com/science/article/pii/S1570023218318038>

Abstract: Polycystic kidney disease (PKD) encompasses a spectrum of inherited disorders that lead to end-stage renal disease (ESRD). There is no cure for PKD and current treatment options are limited to renal replacement therapy and transplantation. A better understanding of the pathobiology of PKD is needed for the development of new, less invasive treatments. The Lewis Polycystic Kidney (LPK) rat phenotype has been characterized and classified as a model of nephronophthisis (NPHP9, caused by mutation of the Nek8 gene) for which polycystic kidneys are one of the main pathologic features. The aim of this study was to use a GC–MS-based untargeted metabolomics approach to determine key biochemical changes in kidney and liver tissue of the LPK rat. Tissues from 16-week old LPK (n = 10) and Lewis age- and sex-matched control animals (n = 11) were used. Principal component analysis (PCA) distinguished signal corrected metabolite profiles from Lewis and LPK rats for kidney (PC-1 77%) and liver (PC-1 46%) tissue. There were marked differences in the metabolite profiles of the kidney tissues with 122 deconvoluted features significantly different between the LPK and Lewis strains. The metabolite profiles were less marked between strains for liver samples with 30 features significantly different. Five biochemical pathways showed three or more significantly altered metabolites: transcription/translation, arginine and proline metabolism, alpha-linolenic and linoleic acid metabolism, the citric acid cycle, and the urea cycle. The results of this study validate and complement the current literature and are consistent with the understood pathobiology of PKD.

Keyword: Mass spectrometry; Gas chromatography; Metabolomics; Nephronophthisis; Polycystic kidney disease

273. Differences in plasmatic butyrylcholinesterases (BChE) values between Pacific and Caribbean populations of terciopelo (*Bothrops asper*) in Costa Rica/ **Arguedas, Randall; Gómez, Aarón; Alcázar, Paloma; Chacón, Danilo; Corrales, Greivin; Barquero, Marco D.** Heliyon. ISSN:2405-8440 10(2019) v.5 p.e02620Heliyon

DOI: 10.1016/j.heliyon.2019.e02620

Link: <http://www.sciencedirect.com/science/article/pii/S2405844019362802>

Abstract: The terciopelo (*Bothrops asper*) inhabits human-modified environments such as agricultural areas, becoming more prone to be exposed to organophosphate insecticides. These chemicals can inhibit plasmatic butyrylcholinesterases (BChE) activity in *B. asper*. Caribbean and Pacific populations of *B. asper* belong to two divergent lineages that exhibit robust genetic partitioning; however, differences across variants in biochemistry and hematology have not yet been examined, especially in BChE variations. This study aims to evaluate the differences of BChE plasmatic values, hematology parameters, and some biochemical analytes as biomarkers in the presence of organophosphates between the Pacific and Caribbean population of *B. asper* in Costa Rica. A total of 89 snakes (41 Pacific and 48 Caribbean) were used, and hematology parameter, albumin, aspartate aminotransferase (AST), total protein and BChEs were evaluated. Differences in hemoglobin content, thrombocytes, white cell count, AST, and BChE values were found between both variants. Intrinsic genetic factors might influence the variation found in BChE and AST values in the snakes sampled from both variants; moreover, understanding this variation in BChE and AST values across the *B. asper*'s distribution can be useful in future ecotoxicology, biomonitoring, genetic and other clinical/health studies.

Keyword: Hematology; Organophosphates; Toxicology; Veterinary medicine; Animal behavior; Biochemistry; Ecology; Environmental toxicology; Esterase; Snakes; Wildlife ecology

274. Bayesian estimation of sensitivity and specificity of a PCR method to detect *Coxiella burnetii* in milk and vaginal secretions in sheep and goat samples/ **Abiri, Zeinab; Khalili, Mohammad; Kostoulas, Polycronis; Sharifi, Hamid; Rad, Mehrnaz; Babaei, Homayoon.** Journal of Dairy Science. ISSN:0022-0302 6(2019) v.102 p.4954-4959 Journal of Dairy Science

DOI: 10.3168/jds.2018-15233

Link: <http://www.sciencedirect.com/science/article/pii/S0022030219303534>

Abstract: ABSTRACT *Coxiella burnetii* is a gram-negative and polymorphic rod bacterium that causes Q fever, a common zoonotic disease distributed worldwide. Widespread occurrences of the disease outbreaks indicate the importance of coordinated animal and human health efforts to control these outbreaks. Different tests are available to determine the *C. burnetii* infection status of a flock, but false negative responses may occur, as infectious animals can shed bacteria in milk intermittently, especially during an asymptomatic infection. In this study, a Bayesian latent class model was implemented to estimate the sensitivity (Se) and specificity (Sp) of a PCR method for the detection of *C. burnetii* in milk samples (PCRM) and vaginal swabs (PCRV) from Iranian sheep and goats. A nested PCR assay was conducted to detect infected animals among 170 milk samples and 170 vaginal swabs from goat flocks and 170 milk samples and 170 vaginal swabs from sheep flocks. We implemented a Bayesian latent class model to estimate the Se and Sp of a PCR method for the detection of *C. burnetii* in milk samples and vaginal swabs from sheep and goats. Estimations were based on the cross-classified results of PCRM and PCRV from the sheep and goat subpopulations. Positivity was 17.6 and 33.5%, respectively, for PCRM and PCRV samples among sheep. In goats, the apparent prevalence was 32.9 and 56.4% in PCRM and PCRV samples testing positive, respectively. This indicated the lower sensitivity of PCRM. The Se of PCRV was significantly higher than Se of PCRM, which corresponded to a higher rate of vaginal-positive, milk-negative PCR samples. In contrast, Sp of PCRV was lower than Sp of PCRM, representing the higher false-positive rate of vaginal swabs. The PCRV outperformed PCRM in terms of identifying latently infected sheep and goats; however, neither method could identify all latently infected sheep and goats, thus the combination

is recommended to maximize our ability to identify infected animals. The true prevalence of *C. burnetii* infection was higher in Iranian goats than sheep.

Keyword: PCR; sensitivity; Bayesian estimation; specificity

275. Effect of slow-release urea microencapsulated in beeswax and its inclusion in ruminant diets/ **de B. Carvalho, A.; da Silva, A.L.; de A. Silva, A.M.; Netto, A.J.; de Medeiros, T.T.B.; Araújo Filho, J.M.; da S. Agostini, D.L.; de Oliveira, D.L.V.; Mazzetto, S.E.; Kotzebue, L.R.V.; Oliveira, J.R.; Oliveira, R.L.; Bezerra, L.R.** Small Ruminant Research. ISSN:0921-4488 (2019) v.179 p.56-63Small Ruminant Research

DOI: 10.1016/j.smallrumres.2019.09.005

Link: <http://www.sciencedirect.com/science/article/pii/S0921448819301610>

Abstract: The objective of this study was to evaluate the effects of including slow-release urea microencapsulated in beeswax in the diet of adult sheep on intake, digestibility, and nitrogen (N) balance. Two microencapsulated system formulations were developed with ratios (wt/wt) of 1:2 (UME1:2) and 1:2 + sulfur (UME1:2+S) between the core (urea) and encapsulant (beeswax). The UME1:2 formulation had greater yield values, microencapsulation efficiency and thermal stability than UME1:2+S. The most efficient formulation (UME1:2) was added to the diet of twenty-four uncastrated male sheep, adult, crossbred Santa Inês, 9 months old with an average body weight of 28.2 kg ± 0.6 kg. The experimental arrangement was a completely randomized design in which the animals were distributed into four treatments that included different levels of urea microencapsulated in beeswax, UME1:2 without S (0, 1.5, 3.0 and 4.5% in total dry matter (DM)), and six replicates in a total experimental period of 19 days, with 14 days for adaptation. The inclusion of urea microencapsulated in beeswax did not affect ($P > 0.05$) DM, crude protein, ether extract, ash, total carbohydrate or crude energy intake or digestibility. In addition, the nonfibrous carbohydrate (NFC), neutral detergent fiber (NDF), and acid detergent fiber (ADF) intake, N intake, N excretion (urinary and fecal), N absorbed, N retained, N retention/N intake and N retained/N absorbed were not affected ($P > 0.05$) by the inclusion of urea microencapsulated in beeswax. However, there was a linear increase in NDF ($P = 0.031$) and ADF ($P = 0.004$) digestibility as the inclusion level of encapsulated urea increased from 0 to 4.5%. The NFC digestibility showed a quadratic increase ($P < 0.001$) with the greatest digestibility at 3.0% microencapsulated urea. Beeswax was shown to be an efficient microencapsulant to obtain microparticles containing urea, and the formulation of UME1:2 without the addition of S is recommended since it showed better yield and efficiency than the formulation with S. The inclusion of up to 4.5% urea microencapsulated in the lipid matrix of beeswax is recommended to improve NDF and ADF digestibility without affecting intake and N balance.

Keyword: Intake; Nitrogen balance; Microspheres; N-NH

276. Secondary particles formed from the exhaust of vehicles using ethanol-gasoline blends increase the production of pulmonary and cardiac reactive oxygen species and induce pulmonary inflammation/ **da Silva, Talita Dias; Barnabé, Viviani; Ricci-Vitor, Ana Laura; Papapostolou, Vasileios; Tagle, Matias; Henriquez, Andres; Lawrence, Joy; Ferguson, Stephen; Wolfson, J. Mikhail; Koutrakis, Petros; Oyola, Pedro; Ferreira, Celso; de Abreu, Luiz Carlos; Mon.** Environmental Research. ISSN:0013-9351 (2019) v.177 p.108661Environmental Research

DOI: 10.1016/j.envres.2019.108661

Link: <http://www.sciencedirect.com/science/article/pii/S001393511930458X>

Abstract: Background Ethanol vehicles release exhaust gases that contribute to the formation of secondary organic aerosols (SOA). Objective To determine in vivo toxicity resulting from exposure to SOA derived from vehicles using different ethanol-gasoline blends (E0, E10, E22, E85W, E85S, E100). Methods Exhaust emissions from vehicles using ethanol blends were delivered to a photochemical chamber and reacted to produce SOA. The aerosol samples were collected on filters, extracted, and dispersed in an aqueous solutions and intratracheally instilled into Sprague Dawley rats in doses of 700 µg/0.2 ml. After 45 min and 4 h pulmonary and cardiac chemiluminescence (CL) was measured to estimate the amount of reactive oxygen species (ROS) produced in the lungs and heart. Inflammation was measured by differential cell count in bronchoalveolar lavages (BAL). Results Statistically and biologically significant differences in response to secondary particles from the different fuel formulations were detected. Compared to the control group, animals exposed to SOA from gasoline (E0) showed a significantly higher average CL in the lungs at 45 min. The highest CL averages in the heart were observed in the groups exposed to SOA from E10 and pure ethanol (E100) at 45 min. BAL of animals exposed to SOA from E0 and E85S had a significant increased number of macrophages at 45 min. BAL neutrophil count was increased in the groups exposed to E85S (45 min) and E0 (4 h). Animals exposed to E0 and E85W had increased BAL lymphocyte count compared to the control and the other exposed groups. Discussion Our results suggest that SOA generated by gasoline (E0), followed by ethanol blends E85S and E85W, substantially induce oxidative stress measured by ROS generation and pulmonary inflammation measured by the recruitment of white blood cells in BAL.

Keyword: Inflammation; Particulate matter; Bioethanol; Bronchoalveolar; Chemiluminescence

277. Cows eat grass, don't they? Contrasting sociotechnical imaginaries of the role of grazing in the UK and Irish dairy sectors/ **Shortall, Orla**. Journal of Rural Studies. ISSN:0743-0167 (2019) v.72 p.45-57Journal of Rural Studies

DOI: 10.1016/j.jrurstud.2019.10.004

Link: <http://www.sciencedirect.com/science/article/pii/S0743016719303237>

Abstract: The role of grazing in dairy farming has become increasingly contentious. Dairy farming is still widely identified with imagery of cows grazing on grass, but grazing is a declining practice in Europe. The UK and Ireland make for interesting case studies to explore the politics of grazing as both countries are seen to have suitable conditions for supporting grazing but their dairy systems are very different. This paper explores the sociotechnical imaginaries of a high welfare, environmentally sustainable and economically viable dairy farming in the UK and Ireland, as described by key industry, academic, non-governmental organisation and government stakeholders in both countries. Document analysis and interviews with key UK and Irish stakeholders revealed different sociotechnical imaginaries within and between countries. The dominant imaginary in Ireland was of a unified low cost grass based production system seen as high welfare because animals have access to pasture and inherently natural and environmentally sustainable. The dominant sociotechnical imaginary in the UK by contrast is that no system is better, but the success of a system depends on quality management and stock keeping. The paper shows how the sociotechnical imaginaries are co-created by policy, market conditions and commitments to particular conceptions of economic viability, high welfare and sustainability. The different sociotechnical imaginaries can also be seen to pose a challenge to the other to the extent that science is held up as producing objective and value free truths about the best form of dairy production.

Keyword:

278. Potential impact and mitigation measures of pump irrigation projects on Lake Tana and its environs, Ethiopia/
Mequanent, Dagnew; Mingist, Minwelet. Heliyon. ISSN:2405-8440 12(2019) v.5 p.e03052Heliyon

DOI: 10.1016/j.heliyon.2019.e03052

Link: <http://www.sciencedirect.com/science/article/pii/S2405844019367118>

Abstract: Environmental Impact of pump irrigation projects from Lake Tana (Megech - Seraba, Tana Asrate, Tana Mekonta, Tana Wenjeta, and Tana Zegie) was studied from July 2018 to February 2019. Interactions between project activities and environmental parameters were also done by a matrix, and quantitative and qualitative analysis. As a result, identified positive impacts are new job creation, the opportunity to promote traditional agriculture and income increase, whereas land, fisheries and wetland degradation, pollution, deforestation and wildlife, inefficient water use, the decline in soil fertility, erosion, sedimentation, small aquatic animal death, and cumulative impacts are negative ones. Mitigation measures for these impacts to reduce their effects to the minimum level and recommendations have been proposed so that the execution of the projects becomes a success without harming or with the least negative effect on the environment.

Keyword: Environment; Environmental science; Sustainability; Alleviation; Effect; Threats

279. Directional preferences of dogs' changes in the presence of a bar magnet: Educational experiments in Israel/
Yosef, Reuven; Raz, Michal; Ben-Baruch, Niv; Shmueli, Liel; Kosicki, Jakub Z.; Fraczak, Martyna; Tryjanowski, Piotr. Journal of Veterinary Behavior. ISSN:1558-7878 (2019) v. p.Journal of Veterinary Behavior

DOI: 10.1016/j.jveb.2019.10.003

Link: <http://www.sciencedirect.com/science/article/pii/S1558787819300978>

Abstract: A lot of animals detect and then align their body axis with respect to the Earth's magnetic field lines (MF). This behavior was also presented for territory marking dogs. We collected data on directional preferences of dogs under different MF conditions and analyzed the data using circular statistics. Dogs excreted with the body aligned along the North–South axis, but when exposed to small bar magnets, significantly changed their directional positions. The study suggests that dogs are able to recognize MF. Additional value of this research is that the data were collected by local high school students, which required collaboration with teachers and their parents. We think that this idea has great potential and can be developed at a global scale and to become a citizen-science project involving other high school pupils and their families.

Keyword: education; dog; magnetic alignment; magnetic field; magnetoreception

280. Invited review: Examining farmers' personalities and attitudes as possible risk factors for dairy cattle health, welfare, productivity, and farm management: A systematic scoping review/ **Adler, F.; Christley, R.; Campe, A..** Journal of Dairy Science. ISSN:0022-0302 5(2019) v.102 p.3805-3824Journal of Dairy Science

DOI: 10.3168/jds.2018-15037

Link: <http://www.sciencedirect.com/science/article/pii/S0022030219302103>

Abstract: ABSTRACT We aimed to determine how research regarding farmers' personalities and attitudes as risk factors is reported (methodological approaches to assessing, extracting, and processing data and analyzing risk factors) and to explore evidence for the effect of farmers' attitudes and personalities on dairy cattle health, welfare, productivity, and management. Therefore, we conducted a systematic review of studies on personality and attitude as risk factors for dairy cattle health, welfare, productivity, and farm management. Database searches captured 1,144 records, and 38 were finally included in the review. Thirty-three manuscripts assessed farmers' attitudes, 1 assessed their personalities, and 4 assessed both as risk factors. These potential risk factors were checked for relationships with more than 50 different outcome variables regarding farm management (17 manuscripts), animal health (13 manuscripts), animal productivity (11 manuscripts), and animal welfare (4 manuscripts). The approaches to assessing risk factors and processing and interpreting data varied greatly; thus, drawing conclusions regarding the effects of attitude and personality as risk factors is impeded because manuscripts are difficult to compare. Our findings highlight the need for harmonization of attitudes and personality assessments in future research. Furthermore, researchers should carefully consider which depth of detail to apply when planning and evaluating related research. Nevertheless, results highlight the importance of the effect of personality and attitude on outcomes. Farmers' personality and attitudes are associated with dairy cattle health, welfare, productivity, and management. In general, attitudes indicating higher degrees of technical knowledge, affection with problems, perceived responsibility, perception of control of a situation, a better human-animal relationship, or a positive evaluation of the benefits of management decisions tended to affect outcomes in a beneficial way. "Agreeableness" and "conscientiousness" were shown to promote better farm performance, whereas "neuroticism" had a negative effect. Therefore, further research on attitude and personality and their consideration by professionals and decision-makers within the dairy sector and politics is strongly recommended. This might provide the chance to better understand the needs of dairy farmers and therefore develop tailored advice and support strategies to improve both satisfactory and constructive cooperation.

Keyword: attitude; personality; dairy; risk factor

281. Atrazine induces necroptosis by miR-181-5p targeting inflammation and glycometabolism in carp lymphocytes/
Cui, Yuan; Yin, Kai; Gong, Yingzheng; Qu, Yingying; Liu, Honggui; Lin, Hongjin. Fish & Shellfish Immunology.
ISSN:1050-4648 (2019) v.94 p.730-738Fish & Shellfish Immunology

DOI: 10.1016/j.fsi.2019.09.068

Link: <http://www.sciencedirect.com/science/article/pii/S1050464819309520>

Abstract: Atrazine (ATR) causes environmental problems and damages the health of fish and aquatic animals. MicroRNAs (miRNAs) play important roles in immune regulation. However, the immunotoxicity mechanism of ATR in fish lymphocytes and the role of miRNA in this process remain unclear. To further study these mechanisms, spleen lymphocytes were exposed to 20, 40 and 60 µg/ml ATR for 18 h. Fluorescence staining and flow cytometry showed that the number of necrotic lymphocytes increased after ATR exposure. Compared with the control group, the mRNA expression of miR-181-5p was inhibited and the mRNA levels of TNF-α and HK2 were increased after ATR exposure. Additionally, the NF-κB inflammatory pathway and the levels of glycometabolism-related genes were upregulated. These results suggest that ATR induces inflammation and elevates glycometabolism in lymphocytes. We further found that the mRNA levels of receptor-interacting serine-threonine kinase 1 (RIP1), receptor-interacting serine-threonine kinase 3 (RIP3), mixed lineage kinase domain-like pseudokinase (MLKL), cylindromatosis (CYLD) and Fas-Associated protein with Death Domain (FADD) and the protein levels of RIP3 and MLKL in the treatment groups were significantly increased compared to those in control group, suggesting that ATR causes lymphocyte necroptosis. We conclude that miR-181-5p plays a key role in necroptosis in carp lymphocytes exposed to ATR by downregulating the

expression of HK and TNF- α , which increases the level of glycometabolism and induces the inflammatory response, respectively.

Keyword: Inflammation; Atrazine; Glycometabolism; miR-181–5p; Necroptosis

282. Effects of traditional fishing techniques on internal organ regeneration, physiology, and biochemistry in the tropical sea cucumber *Stichopus horrens*/ **Charan-Dixon, Hannah; Goldstien, Sharyn J.; Vanderhaven, Beth J.; Halafihi, Tuikolongahau; Tuiano, Tonga Latu; Gaw, Sally; Glover, Chris N.** Journal of Experimental Marine Biology and Ecology. ISSN:0022-0981 (2019) v.510 p.15-22Journal of Experimental Marine Biology and Ecology

DOI: 10.1016/j.jembe.2018.09.007

Link: <http://www.sciencedirect.com/science/article/pii/S0022098117306354>

Abstract: The sea cucumber *Stichopus horrens* is an important resource in the Kingdom of Tonga. Domestically, there are two fisheries; one at a commercial scale and one for subsistence purposes. Both fisheries involve harvesting all viscera (digestive tract, gonads and respiratory tree) through a lateral body wall incision, although only the digestive tract and gonads are consumed. Under the right conditions the sea cucumber can survive organ harvest and regenerate the viscera. This study investigated the biochemical and physiological consequences of organ regeneration by comparing sham (longitudinal body wall incision without organ removal) and excised (internal tissues removed after incision) sea cucumbers to control (handled but not incised) animals. Biochemical measurements of lactate, glucose, and glycogen showed that body wall energy reserves were depleted in both sham and excised animals relative to controls at the Day 10 measurement. The presence of an energy substrate depletion in sham animals indicated an effect related to loss of body wall integrity, rather than internal organ regeneration. Although the regeneration of digestive and respiratory organs was rapid, oxygen consumption rate and ammonia excretion rate were unchanged in excised and sham animals relative to controls. These data suggest that *S. horrens* can survive the internal organ harvest associated with subsistence fishing and regenerate excised tissues rapidly. However, this comes at an energetic cost that is likely to affect growth and reproduction. Fisheries management measures such as the implementation of a minimum rest period between harvests may promote the sustainability of this important fishery.

Keyword: Energy; Metabolism; Sea cucumber; Regeneration costs; Subsistence fishery

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