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ORAL COMMUNICATIONS

"DRINK AND SLEEP LIKE A FISH"- GOLDFISH AS A BEHAVIOR MODEL TO STUDY PHARMACEUTICAL EFFECTS IN FRESHWATER ECOSYSTEMS

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Behavior is a mechanism through which organisms react to internal and external stimuli to best cope with challenges in an ever-changing environment. The study of animal behavior patterns in response to environmental stress/threats, is relatively new and unexplored. The aim of this study is to offer a modest contribution in explaining the effects of pharmaceutical pollutants found in freshwater ecosystems, using the behavior patterns and physiology of *Carassius auratus*. Behavior changes were evaluated through swimming patterns, opercular and pectoral response, and rheological aggressivity. Animals were exposed for 5 weeks to water (as control), ethanol (0.25 and 1%, v/v), fluoxetine (100 µg/l) and caffeine (50 mg/l) and their short-term responses recorded. The video was analyses using the open-sourced software program Track3D and EthoVision XT, which objectively quantified swimming and social behaviors. In all treatments, fish shown significantly ($p<0.01$) high level of stress, aggressivity and hyperactivity, compared to control. It was interesting the fact that for each pollutant, fish exhibited different swimming patterns, beside the normal. These changes in the nervous system such as stressed behavior, irregular swimming patterns, hyperactivity and aggression, are consequences of pharmaceutical pollution in freshwater bodies and as such they can be used as suitable early physiological response biomarkers to environmental stress. Monitoring of altered behavior is a great early indicator of water pollution, which can easily be applied in the best aquaculture and fishery practices.

TRANSITION FROM LATE LACTATION TO DRY PERIOD CAUSED SHIFTS IN METABOLICALLY ACTIVE RUMEN MICROBIOTA OF COWS REVEALED BY RNA BASED AMPLICON SEQUENCING

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This study aimed at monitoring Italian Simmental cows during 2 different physiological stages/dietary treatments, to observe possible modifications in their metabolically active rumen bacterial, archaeal and protozoal communities. Six lactating cows with close days in gestation were selected for this study. The experiment was divided into 2 collection periods: late lactation (248-332 DIM) and dry period (2-52 days before calving). During each period, single rumen fluid sample was collected with an esophageal probe from each cow, fed a specific total mixed ration (TMR) at least for 14 days prior to collection. RNA was extracted in duplicates and used as a template for cDNA synthesis, that was further amplified by PCR using gene specific primers. For bacteria and archaea, V3-V4 region of 16S rRNA genes, and for eukaryotes, V9 region of 18S rRNA genes were amplified, followed by sequencing using 300bp paired-end Illumina Miseq platform. In addition, the total protozoa No., and motility were also recorded using compound microscope. The transition from late lactation to dry period caused significant modifications in the commonly detected rumen bacterial phyla (*Bacteroidetes* & *Proteobacteria*), protozoal phyla (*Ciliophora* & *Amoebozoa*), and archaeal genera (*vadinCA11*, *Methanobrevibacter* & Unclassified *Methanomassiliicoccaceae)*. In conclusion, dry period diet increased the protozoa No., and motility, and resulted in higher abundance of methanogenic microorganisms. This study has potential implication for microbial programming process in future, by controlled feeding managements in early life that persist in later life, thereby reducing methanogenic microorganisms and improving animal health and production.

GRACILARIA GRACILIS: A POWERFUL PRODUCT FROM SUSTAINABLE AQUACULTURE

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Algal species of the genus *Gracilaria* Greville (Gracilariaceae, Rhodophyta) being the main source of agar are of relevant economic importance. The increasing demand of agar have increased and encouraged studies on different agarophites species. Among these, one of the most interesting in term of agar yield and quality is *Gracilaria gracilis* (Stackhouse) Steentoft, Irvine & Farnham. Our study demonstrates the various characteristics of this alga thanks to different experiments. Growth potential of *G. gracilis* has been established in natural environment using two different culture methods: the square frames and the "reste" one. Results showed significant differences between the two culture methods with the "reste" with higher efficiency both for Daily Growth Rate (DGR=4.56±1.19 kg m^{-2}) and Biomass (Y=0.96±0.27 kg m^{-2}), defining an innovative method for seaweed culture. Then, the "reste" method has been used to assess "biofiltering" potential and growth of *G. gracilis* in aquaculture plant wastewater. While quite positive results regarding growth during the experimental period have been obtained the most interesting ones were related to reduction of dissolved "nutrients" as NO_2, NO_3, NH_4, PO_4 in water. Finally, the exploitability of *G. gracilis* as potential immunestimulants in *Danio rerio* (zebrafish) feed formulation has been established. As results upregulation of both antioxidant enzymes gene expression (CAT and SOD) and mucosal immune parameters (Total Ig, Total protein and ALP activity) in fishes fed on diet supplemented with *Gracilaria* powder were detected. Results obtained lead to the conclusion that *G. gracilis* could represents a very interesting organism to be applied in Integrated Multi Trophic Aquaculture procedures, being product exploitable as source of agar, feed supplement and others, derived from environmental friendly aquaculture.

CHANGES EVOKED BY THE INDUCTION OF SYNTHETIC TORPOR ON THE GUT MICROBIOTA IN THE RAT

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