Amin Sayyari
Veterinarian and PhD Research fellow
Norwegian University of Life Sciences (NMBU)
Department of Production Animal Clinical Sciences
E-mail: amin.sayyari@nmbu.no

STSM Topic: Consequences of chronic exposure to deoxynivalenol - behavioural studies in mice and analysis of physiological effects as a testing model for pigs

Host: Institute of Cellular and Integrative Neurosciences (INCI); University of Strasbourg, France

Tail biting is a common problem in pig farming, which can impair animal health and welfare. TB is a multifactorial disorder. However, poor environment and management can be mentioned as important risk factors for this behavioral disorder (1). Feed contamination is considered as a consequence of poor environment or management. Mycotoxins are one of the most common source of feed contamination.

Mycotoxin-contaminated feed can cause nutritional stress in animals (2). Deoxynivalenol (DON) produced by *Fusarium* fungi is the most commonly detected trichothecenes mycotoxin in cereal grain. Feeding pigs with DON-contaminated feed can cause a verity of dose-dependent symptoms such as vomiting, feed refusal, decreased feed intake, and reduced weight gain (3). In addition, oral exposure to DON was shown to elevate levels of pro-inflammatory cytokines such as interleukin-1b (IL-1b), tumor necrosis factor-a (TNF-a), and interleukin-6 (IL-6), which can cause variety of sickness behavior (4). However, studies on the neurotoxic effects of DON are limited.

Behavioral changes such as feed refusal, hyperactivity, and aggression are mycotoxin-related symptoms, which are reported in pig farming. These changes can result in damaging behavior such as tail, ear and flank biting in pigs. Hence, this present STSM had aim to increase knowledge about effect of DON on CNS by conducting a dose-dependent study of behavioral changes in mice as a testing model for pigs. Following oral exposure with different concentrations of DON in drinking water, standard behavioral tests were performed and clinical signs such as body weight were recorded. In the end of experiment, the mice were euthanized and blood and tissue samples were collected in order to measure DON and its metabolites. Preliminary results from this study reveal that exposed animals showed a degree of unwellness, which are confirmed and quantified by behavioral tests. In addition, results from measuring concentration of DON and its metabolites in brain tissue, and immunohistochemistry studies elucidate the neuropathophysiology of DON-related symptoms.

Through this STSM, I have been trained at Institute of Cellular and Integrative Neurosciences (INCI), which has a special focus on behavioral issues. The training program and research collaboration with this institute gave me the opportunity to expand my practical skills and my network in the field of neuroscience and behavior. In addition, the outcome from this STSM will contribute to generate new knowledge about the etiology of damaging behavior related to mycotoxin-contaminated feed in pigs.

Figure 1. Animal facility

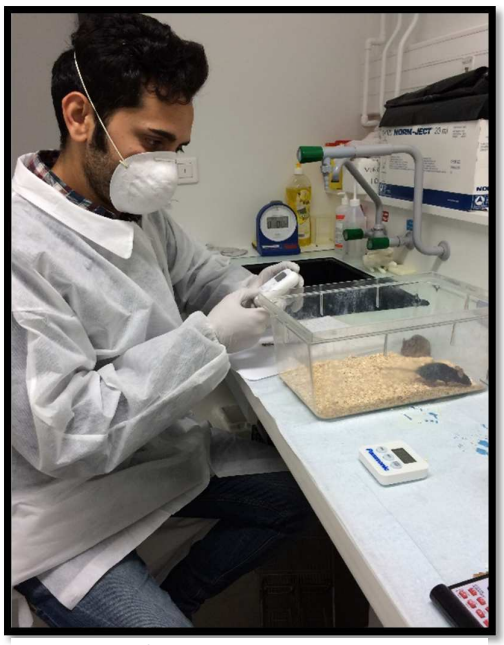

Figure 2. Social Interaction test

References:

1. Smulders D, Hautekiet V, Verbeke G, Geers R. Tail and ear biting lesions in pigs: an epidemiological study. Animal Welfare. 2008;17(1):61-9.
2. Lee IK, Kye YC, Kim G, Kim HW, Gu MJ, Umboh J, et al. Stress, Nutrition, and Intestinal Immune Responses in Pigs - A Review. Asian-Australasian journal of animal sciences. 2016;29(8):1075-82.
3. Sobrova P, Adam V, Vasatkova A, Beklova M, Zeman L, Kizek R. Deoxynivalenol and its toxicity. Interdisciplinary Toxicology. 2010;3(3):94-9.
4. Amuzie CJ, Harkema JR, Pestka JJ. Tissue distribution and proinflammatory cytokine induction by the trichothecene deoxynivalenol in the mouse: Comparison of nasal vs. oral exposure. Toxicology. 2008;248(1):39-44.