PhD Project Title: Hepato-protective action of Indian Medicinal Herbs - explanation of molecular biological mechanism on pig model.

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4. **Disciplines within project will be realized (basic and supplementary):** agriculture science (specialization: Veterinary Medicine (Animal nutrition, metabolomics, nutrigenomics)

The aim of proposed PhD project is to investigate the porcine liver functioning based on transcriptomic and proteomic profiling in context to effects of ***Andrographis paniculata*** bioactive components as food-derived supplement. This Indian herb is a famous therapeutic supplement for treatment various infections and in particular hepatic disorders. ***Andrographis paniculata*** regulate liver metabolism inducing hepatoprotective and hepatostimulating activities. Still there is lack of comprehensive information about changes in gene and protein expression caused by this herb. The molecular mechanism of this action is poorly understood. Additionally, planed PhD studies are aimed to characterise dose dependent influence of this herb on pig health and performance traits. Furthermore, pig is a good animal model, especially useful to mimic human liver metabolism. The proposed PhD research will focus on the effect of selective feeding of healthy and unhealthy nutrients diets supplemented with ***Andrographis paniculata*** on the hepatic genes expression, on transcriptome and proteome level. As a study materials two pig breeds: namely Polish Landrace and Duroc will be investigated. Bioinformatics approach assume to perform complex system analysis combining transcriptome and proteome what allows deep explanation of gene expression regulation by ***Andrographis paniculata***. The proposed PhD project hypothesis is that unhealthy nutrients (saturated fatty acids, and carbohydrates) diets affects the liver genes expression activity reflected on transcriptome and proteome level. Moreover we assume that two divergent pig breeds Polish Landrace and Duroc, allow to point out basic similar changes in gene expression and breed/phenotype specific response for herbal treatment.
This study will answer the following questions:
1. What is the physiological state hepatic gene and protein expression profiling in Polish Landrace and Duroc pigs?
2. How does hepatic gene and protein expression profiling in Polish Landrace and Duroc pigs after weaning?
3. Does transcriptome/proteome profiling analysis on pig liver significantly affect the hepatic expression crucial genes and proteins which could be used as biomarkers of health status?

In this PhD project, the expected investigated results will allow us to identify not only the large diet and breed specific set of RNA-seq and proteomics data, but also allow us to detect the biomarkers of healthy metabolic status of liver important for pig performance traits. Moreover, it will also allow the explanation on molecular level how ***Andrographis paniculata*** improve the liver metabolism, and how it is similar or different according to healthy/unhealthy diets. The expected investigated results will also allow us to characterize the biological mechanisms as indicators/biomarkers for early liver metabolic disturbance in order to help in diagnose the development of the metabolic disorders such as obesity, cardiovascular diseases, and diabetes.