

Revision of current concepts of tannins impact on gastrointestinal tract homeostasis in piglets.

Tannins are commonly considered as anti-nutritional factors in piglets nutrition with attributed negative health effects. On the other hand, certain tannin-containing plant materials are well known for their anti-diarrheal properties, which have been utilized since ancient times in human and veterinary medicine but had been superseded by antibiotics, since discovery of penicillin in 1928 and introduction of antimicrobials in farm animal production since the 1950s. Diarrhea among piglets is one of the most important health conditions in pigs farming. Piglets are susceptible to infection by several enteropathogens, the most important being enterotoxigenic *Escherichia coli*. Decades of extensive antibiotics use in prevention and therapy of infections in animals significantly contributed to spread of antimicrobial resistance, leading to the restrictions on their use in farming. As the consequence, the development of preventive and therapeutic strategies targeted on maintaining piglets gut health, which are based on novel mechanisms, is urgently needed.

Recent advances in analytical methods allow thorough structural characterization of tannins composition, what enables standardized use and precise dosing of plant materials preparations containing hydrolysable and condensed tannins. As the consequence, utilization of their biological properties in animal nutrition with full control of undesirable side effects can be potentially achieved. What is more, studies on interactions with gut microbiota put a new light on metabolism and disposition of tannins offering an opportunity of novel discoveries regarding the mechanisms of their biological activities.

The aim of the submitted proposal is to constructively address the paradigm of the anti-nutritional properties of tannins by verification of the general hypothesis, that specific hydrolysable and condensed tannins contained in purple loosestrife herb and faba bean pods can improve intestinal homeostasis, beneficially influence intestinal microbiota as well as prevent piglets from *E. coli* infections, without expressing negative effects on their health status. In order to verify stated hypothesis, the collaboration between Microbiota Lab (Centre for Preclinical Studies, Medical University of Warsaw) and Institute of Animal Nutrition (Freie Universität Berlin) will be continued, originating from the research conducted by PI within Alexander von Humboldt post doc fellowship. The combination of the expertise and infrastructure of both institutions will allow formation of an interdisciplinary Project Team which will be fully qualified and equipped to answer scientific questions stated in the submitted proposal.

Verification of the stated hypotheses will give an intrinsic insight into mechanisms of health effects of hydrolysable and condensed tannins in piglets, what can potentially lead to change of their perception in the field of animal nutrition. The obtained results can then serve as an initial point for further studies on development of novel, sustainable feed additives dedicated to farm animals being scientifically based alternatives to antibiotics. Taking into consideration the anatomical and morphological similarities between gastrointestinal tract of pigs and humans, the translation of the obtained results to human medicine can be of a great significance in terms of development of effective anti-diarrheal therapeutic strategies originating from reintroduction of historically used medicines.