

8. Summary

Moritz Macha: „Influence of a Probiotic *Enterococcus faecium* on Performance and Selected Parameters of the Intestinal Microbiota in Pigs“

In this study the impact of probiotic *Enterococcus faecium* NCIMB 10415 on the intestinal microbiota and the resulting effects on performance and health status of piglets and sows was investigated. A method to detect the probiotic *Enterococcus* within total intestinal enterococci was developed.

20 sows and their litters were divided into two trial groups and kept separately. Piglets were weaned at 28th day of life. Control group received standard diet while probiotic group was fed the same diet supplemented with $1,6 \times 10^6$, $1,7$ and 2×10^5 cells of *E. faecium* NCIMB 10415 per kg feed for sows, suckling and weaned piglets, respectively. Performance of sows was measured in litter size, piglet losses, weaned piglet, weight loss during lactation and average daily feed intake (ADFI). In piglets ADFI and average daily gain (ADG) was determined and gain to feed ratio (G:F) was calculated. Incidence and severity of diarrhea was documented in weaned piglets. Fecal samples of sows were collected 10 days ante partum and 14 days post partum. Feces of piglets was obtained on days 7, 14, 21, 28, 35, 56 and 70, respectively. On days 14, 28, 35 56 five piglets of each group were sacrificed and digesta samples were collected from stomach, jejunum, ileum and colon. A method to enumerate specific cell counts of probiotic bacteria in comparison to total enterococci counts in digesta and feces was developed using colony hybridization technique. Fecal samples were screened for potential pathogenic *E. coli* using multiplex polymerase chain reaction. The influence on bacterial composition in piglet feces was investigated by denaturant gradient gel electrophoresis (DGGE). Amounts of short chain fatty acids (SCFA), lactic acid (LA) and ammonia in digesta as well as colony forming units (CFU) of total anaerobes, lactic acid bacteria, coliforms and enterococci were measured.

Only few differences could be observed between the trial groups after addition of *E. faecium* NCIMB 10415 to pig diets. No influence was detectable on performance parameters of piglets and sows. Diarrhea was significantly reduced in the probiotic group after weaning ($p \leq 0,05$). Ammonia contents were reduced in jejunal digesta in the probiotic group ($p \leq 0,1$) while SCFA and LA concentrations as well as bacterial CFU showed no differences between the trial groups. Probiotic *E. faecium* NCIMB 10415 could be detected in all gut sections and feces of probiotic fed piglets. Direct transmission of the probiotic *enterococcus* from sows to piglets could be demonstrated while specific cell counts in suckling piglets without any feed supplementation already reached similar levels compared to cell counts in digesta and feces of weaned piglets fed probiotic- supplemented diets. Therefore the amount of ingested probiotic apparently did not affect the level of intestinal cell counts of the probiotic as expected. Inci-

dence of potential pathogenic *E. coli* in feces appeared to be reduced in the probiotic group. Soerensen's similarity coefficient showed significant higher similarity in bacterial composition of piglet feces within the probiotic group on day 14 and 56 compared to the control group as determined by DGGE.

With regard to the number of parameters investigated during this trial the addition of probiotic *Enterococcus faecium* NCIMB 10415 induced only few measureable effects on probiotic fed pigs. Nevertheless the intestinal microbiota was affected by this treatment while positive effects on health and performance remained inconsistent.