

## FOREWORD

Gastrointestinal disorders immediately after weaning affect growth performance and cause large economic losses in the pig industry in Europe. This critical period has been controlled over decades by using in-feed antibiotics with growth promoter properties. However, their total ban is forecasted at the EU level for January 1st 2006. This implies urgently evaluating alternative solutions and transferring the most efficient ones into practice. The gut microflora, the surrounding epithelial cells and the local immune system are involved in a permanent cross-talk. Each component contributes to the maintenance of gut health through a variety of complex mechanisms, leading to resistance to bacterial colonisation, physiological barrier properties, and appropriate innate and acquired immune responses. Alternative solutions to in-feed antibiotics include new dietary strategies and a huge array of more specific substances. Since it is hardly possible to evaluate each of them *in vivo*, three groups of *in vitro* devices have been exploited to screen such alternatives. Fermentation processes and end-products, known to influence gut health, can be studied in fermentors in order to examine the potential substrates for their fermentability and their possible inclusion in diets, and the changes in the microbial populations in response to these substrates. Various models of intestinal epithelial cell cultures have been set up. They allow providing information on the protective effects of alternative substances in terms of inhibition of adhesion and invasion of pathogens, interference in cell signalling pathways induced by pathogenic bacteria, maintenance of epithelial cell cytoskeleton and inter-cellular tight junction integrity, and finally modulation of the host immune system. The intestinal mucosa is a complex integrated system that can be studied *in vitro* too. It allows studying two properties relevant to gut health - the exchange of actively transported ions and the permeability to inert molecules of various sizes - and the underlying neuro-immuno-endocrine regulatory mechanisms. The scientific basis for using these *in vitro* devices for screening in-feed antibiotic alternatives and highlighting their mechanisms of action, and relevance to practice, are reviewed in the main papers presented at this workshop. Examples of ongoing research in this area in pigs are also provided as short communications.

At the occasion of the publication of the main reports and communications presented at this second workshop, it is my pleasure to thank all the contributors and participants. On behalf of the HEALTHYPIGUT partners, I also acknowledge the European Union for financially supporting this project (No. QLK5-CT2000-00522).

Jean-Paul Lallès  
Project coordinator