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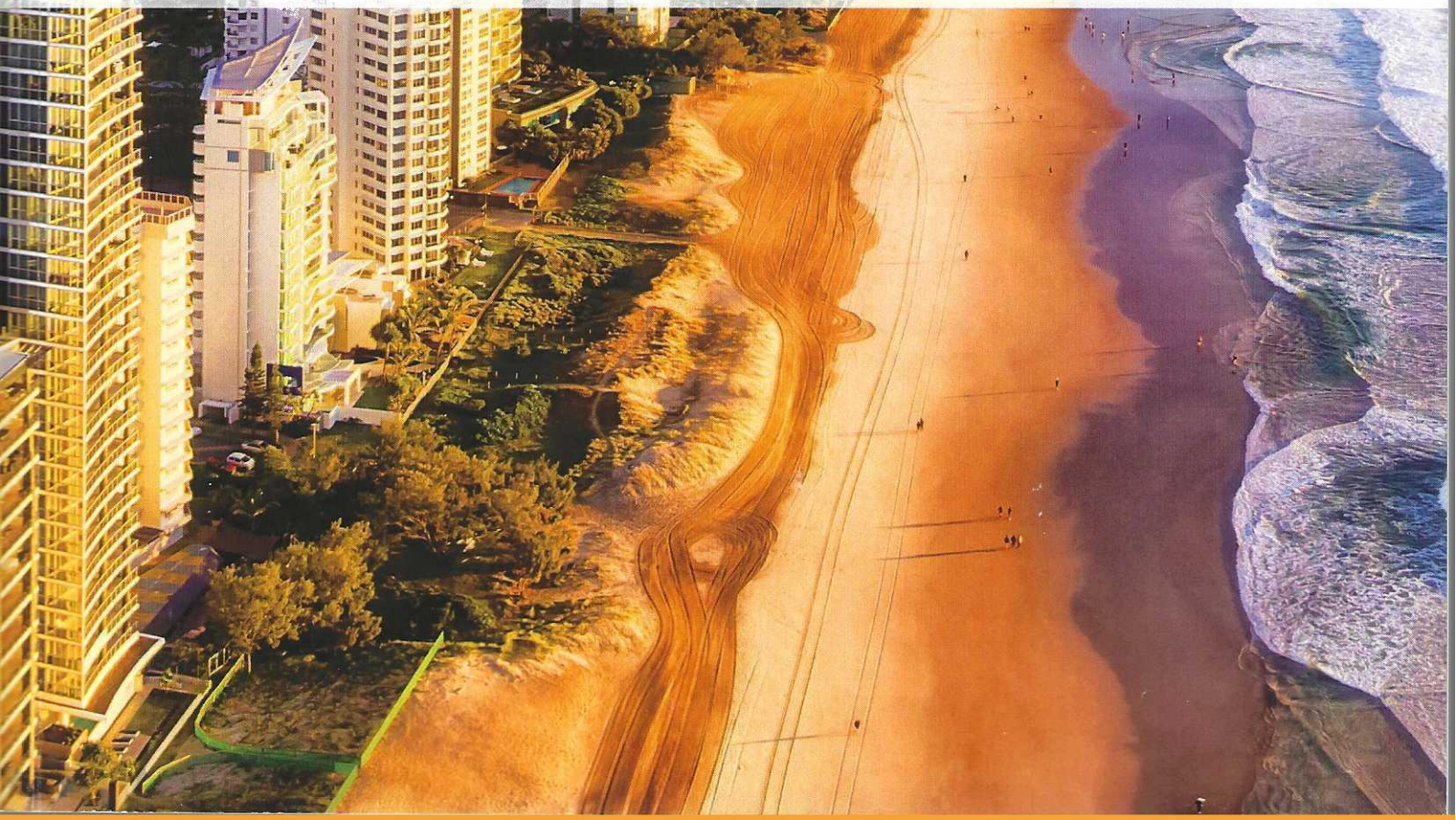

Poster 9: The impact of an agglomerate of dietary sodium diformate and monolaurate on the faecal microbiome of lactating sows

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Introduction

Gut health is increasingly being shown to be effective against intestinal pathogens, a strategy that has only really been made possible through the removal of antibiotic growth promoters in feed. Creating and maintaining a healthy intestinal environment has become essential to productivity and food safety programmes alike[1]. The application of organic acids and their salts to diets for pigs has been studied extensively over decades. They are especially effective in maintaining growth performance since the ban on antibiotic growth promoters came into effect in Europe and this strategy is now applied in many countries worldwide. Numerous trials have demonstrated the mode and magnitude of action of organic acids in feed for pigs and has established effective doses for piglets, fattening pigs and sows, among them the use of diformates[2]. In addition, it is known that monolaurate has a strong antibacterial impact against various Gram-positive bacteria[3], making it a promising candidate as an additive or as an alternative to antibiotics for treatment of different diseases[4]. The gut microbiome, which is also represented to a great extent in the faecal microbiome, is a community of host-associated symbiotic microbes that fulfils several important roles in host metabolism and immune function[5]. Therefore, an increased understanding of the gut microbiota has the potential to have an impact on nutrition, feed efficiency and general health in pig farming[6]. The current study therefore investigates the impact of an agglomerate of sodium diformate and monolaurate on its effect on the faecal microbiome of sows during lactation.

Methods

Multiparous sows on a commercial farm in Australia were fed either a lactation diet, which contained a regular acidifier at 0.8% as control – or a test diet, which contained 1% of a sodium diformate-monolaurate agglomerate (traded as Formi 3G, ADDCON) instead. The diets were fed from the 90th day of gestation until weaning. Faecal samples (n=24) were collected on the 5th day of lactation. The reduction rates (%) of *streptococci* and *clostridia* on their relative abundance of the overall faecal microbiome were measured via the application of New Generation Sequencing (NGS) using Microgenetix. Data were analysed using the t-test and the Wilcoxon-Mann-Whitney test. A significance level of 0.05 was used in all tests.

Results and discussion

Mean abundance rates of specific pathogenic bacteria are shown in Table 1. The three main effects of the test diet were a significant ($p<0.018$) reduction of the relative abundance of clostridia spp. by 42.2% and of *streptococci* spp. by 42.5% ($p<0.013$), while the number of *streptococci* positive faecal samples dropped significantly ($p<0.002$) by 79.6%.

Table 1. Relative abundance (%) of *clostridia* spp. and *streptococci* spp. in the sow faecal microbiome

Diet	Control	Formi 3G	Difference	P
Clostridia	19.2[a]	11.2[b]	-42.20.	018
Streptococci	3.2[a]	1.8[b]	-42.5	0.013

Conclusion

The addition of the agglomerate of sodium diformate and monolaurate caused a significant improvement of the health status of sows, based on their faecal microbiome. The impact against the Gram-positive *streptococci* is especially noteworthy. This is in full agreement with earlier trials in Europe[7,8]. The combined inclusion of diformate and monolaurate may therefore not only provide a healthy gut in sows but might furthermore support a pork production chain with reduced zoonotic pathogen pressure. This will additionally help antibiotic reduction initiatives.

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Acidifier and microbiome in sows

The impact of an agglomerate of dietary sodium diformate and monolaurate on the faecal microbiome of lactating sows

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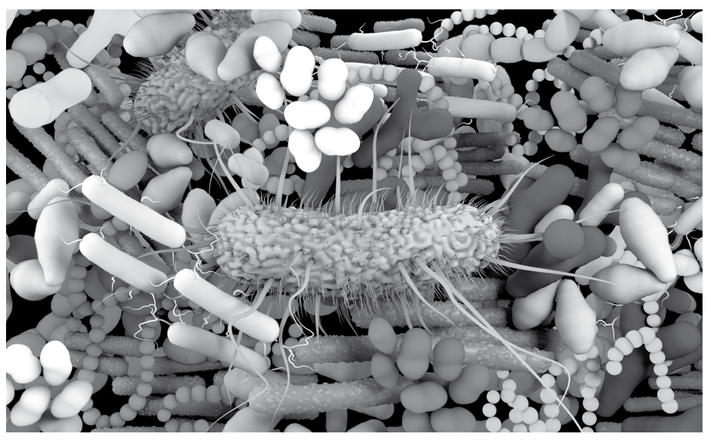
Introduction

Gut health is increasingly being shown to be an important strategy against intestinal pathogens in livestock. It is an area that is continuing to grow in importance in the face of an ever-increasing focus on anti-microbial stewardship in both humans and livestock. Creating and maintaining a healthy intestinal environment has become essential to productivity and food safety programmes alike. The gut microbiome, which is also represented to a great extent in the faecal microbiome, is a community of host associated symbiotic microbes that fulfil several important roles in host metabolism and immune function. Therefore, an increased understanding of the gut microbiota has the potential to have an impact on nutrition, feed efficiency and general health in pig farming. Organic acids play an important role in creating and maintaining a healthy intestinal environment and numerous trials have demonstrated not only the mode and magnitude of action in swine but also effective doses for piglets, fattening pigs and sows. Among the organic acids, diformates have been shown to be particularly effective. In addition, it has been shown that monolaurate has a strong antibacterial impact against various Gram-positive bacteria, making it a promising candidate as an additive or as an alternative to antibiotics for the treatment of different diseases. Therefore, the current study investigates the effect and impact of an agglomerate of sodium diformate and monolaurate on the sow faecal microbiome during lactation.

Materials and methods

Multiparous sows on a commercial farm in Australia were fed either a lactation diet, which contained a regular acidifier at 0.8% as control – or a test diet, which contained 1% of a sodium diformate-monolaurate agglomerate (traded as Formi 3G, ADDCON / Apiam) instead. The diets were fed from the 90th day of gestation until weaning. Faecal samples (n=24) were collected on the 5th day of lactation. The reduction rates (%) of streptococci and clostridia on their relative abundance of the overall faecal microbiome were measured via the application of New Generation Sequencing (NGS) using Microgenetix. Data were analysed using the t-test and the Wilcoxon-Mann-Whitney test. A significance level of 0.05 was used in all tests.



Results and discussion

Mean abundance rates of specific pathogenic bacteria are shown in Table 1. The three main effects of the test diet were a significant ($p<0.018$) reduction of the relative abundance of clostridia spp. by 42.2% and of streptococci spp. by 42.5% ($p<0.013$), while the number of streptococci

Table 1: Relative abundance (%) of clostridia spp. and streptococci spp. in the sow faecal microbiome

Diet	Control	FORMI 3G	Difference (%)	P-level
Clostridia	19.2^{a}	11.2^{b}	-42.2	P=0.018
Streptococci	3.2^{a}	1.8^{b}	-42.5	P=0.013

Means in a row not sharing the same superscript are significantly different

The addition of the agglomerate of sodium diformate and monolaurate caused a significant improvement of the health status of sows, based on their faecal microbiome. The impact against the Gram-positive streptococci is especially noteworthy. This is in full agreement with earlier trials in Europe. The combined inclusion of diformate and monolaurate may therefore not only provide a healthy gut in sows but has also the potential to assist in the control of Streptococcus spp. and Clostridial spp. infections in suckling piglets. This will additionally help antibiotic reduction initiatives.

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