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Swine plasma immunoglobulins for prevention and treatment of post-weaning diarrhoea: Optimizing stability towards gut conditions

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Brief description of research area:

A common problem in swine production is diarrhoea in newly weaned piglets, and huge quantities of antibiotics go to treat post-weaning diarrhoeas in piglets. The use of antibiotics can lead to the development of multi- and fully resistant bacteria, which consequently pose a great threat to human health. Therefore, sustainable alternatives for treating post-weaning diarrhoea without using antibiotics are in demand. Swine that are old (and big) enough for slaughter have during their upbringing been challenged by many different pathogens and thus have developed immunity towards these pathogens, which include pathogen-specific immunoglobulins (antibodies). We hypothesize that by harvesting natural immunoglobulins from porcine blood plasma, a waste product from swine slaughter, and feeding these immunoglobulins to the piglets this can subsequently (by passive immunisation) prevent and treat post-weaning diarrhoea.

Our challenge is to find a suitable method for stabilising the immunoglobulins for oral provision in order for the immunoglobulins to pass as unharmed as possible through the digestive system and still retaining their anti-pathogenic properties.

What we know:

It is possible to multimerise immunoglobulins, which results in an advantage when binding to their respective antigens in comparison to the non-multimerised immunoglobulins, but too high degree of multimerisation abates immunoglobulin reactivity. Unfortunately, a preliminary study showed that multimerisation destabilises the immunoglobulins. On the other hand, proteolytical resistance correlates with increased immunoglobulin concentration.

What we need:

To investigate the effect of increasing the concentration of multimerised immunoglobulins on proteolytical resistance.

To investigate multimerised immunoglobulins' ability in inhibiting microbial (E. coli) adhesion on relevant matrices, such intestinal villi and/or intestinal cell lines.

A toxicological study on (if any) adverse side effects occurs when enteral providing immunoglobulins to piglets.