Improved health, welfare and viability in young pigs: using microorganisms to improve piglet health

Description

Weaning is a critical event in the pig's life cycle, frequently associated with severe enteric infections and it is the ptimary cause for economic loss to pig farmers. Weaning generates a combination of stressful factors such as changes in nutrition, environmental hygiene or temperature, the stress of transport, mixing with unfamiliar animals, etc. These adverse conditions weaken the barrier function of the gut microbiota and favour enteric disorders. A well-structured and diverse gut microbial ecosystem can provide the host with many beneficial functions, as it provides resistance to pathogens, modulates the activation of the gut immune system and enhances robustness to adapt to different environmental changes.

Prebiotics or probiotics can be used to facilitate the adaptation of gut microbiota to weaning and prevent the use of antibiotics. Prebiotics are food components that favour the growth of good microbes in the gut, while probiotics are micro-organisms that are directly given to the animals. Selected microbial strains can be purchased commercially, but natural products can also be used, like whey or hand-made fermented products.

In organic outdoor farms, the occurrence of weaning diarrhoea is lower than in organic indoor farms. We hypothesise that the later age of weaning and the contact with the natural environment can explain the lower diarrhoea incidence in outdoor piglets. Especially, oral contacts with the microbes from the soil and grazing the vegetation could act as natural pre– and probiotics and positively influence piglet microbiota. Inspired by this observation, the use of fermented forest litter diluted in drinking water to improve the gut health of weaning pigs is a strategy presently tested by researchers.

Applicability box

Theme
Pigs
Farm type
Indoor housing with outdoor run
Production stage
Weaners

Welfare Environment Cost

Legislation

- According to EU organic Regulation 2008/889, appropriate preparations of micro-organisms may be used to improve the overall condition of the soil or the availability of nutrients in the soil or in the crops.
- In Annex VI of EU organic Regulation 2008/889 states that enzymes and micro-organisms can be used as feed additives.
- Private organic standards should be consulted before the use of handmade products like fermented forest litter.

On the pasture weaners are exposed to microbes of high diversity, which can improve their gut health.

In indoor farms, the access to an outdoor run does not allow access to living plants and soil, leading to the development of a very different gut microbiota in comparison to piglets raised outdoors.

Relevance for animal welfare

Probiotic supplementation could help confer good intestinal health by stimulating the growth of a healthy microbiota preventing intestinal colonisation of enteric pathogens. *Lactobacillus* is the most commonly used probiotic agent. It produces lactic acid in the gut and reduces gut pH, limiting the growth of opportunistic entero-pathogen bacteria. It also has a positive action on intestinal microflora, immune status, and intestinal morphology.

Relevance for environmental impact

Efficient production is desirable in the context of environmental impacts. By improving the digestibility of nutrients and therefore increased feed efficiency, probiotics can increase growth performances. In addition, the use of *Lactobacillus* or probiotic in general can reduce the necessity of antibiotics. This in turn will reduce antibiotic residues as well as antimicrobial resistant microorganisms in the environment.

Cost and labour

- In general, the technique to use *Lactobacillus* is simple and easy to learn.
- The costs are related to the source of *Lactobacillus*. Manufacturers make selected microbial strains, but natural *Lactobacillus* are inexpensive and often byproducts of food production.
- The costs for fermented forest litter depends on the local price for organic bran and organic sugar. It can be estimated that 100 kg of the product only costs 15–20 Euros (10–15 Euros for 50 kg organic bran plus 5 Euros for organic sugar).

Recommendations

There are several recipes to grow microorganisms, many of them are used by humans to prepare food (e.g. bread, wine, sauerkraut) or feed (silage). Microorganisms are all around us, and it is easy to select and grow natural lactic bacteria. The forest litter offers the best selection of bacteria, fungal hyphae, actinomycetes algae and protozoa.

How to prepare fermented forest litter:

- **1) Collection:** Best seasons are spring and autumn. Only collect humid, rotten leafs without soil contamination.
- **2) Solid mixture:** Mix 1 part of forest litter and 2 parts of organic bran; add 0.08–0.1 part of organic sugar and water to reach a humidity of 40–50 %. Mix until the mixture is homogeneous and moist, but not too wet (it must not lose water). Press firmly in a water- and airtight container, close the container firmly and let the "silage" ferment under anaerobic conditions for at least a month.
- **3) Liquid mixture:** Mix 1 part of solid mixture, 10 parts of water and 0.1 part of organic sugar in a water tank and let it ferment with a aquarium aerator for 2–4 days. Subsequently, the solution can be diluted from 20 to 70 % in water before usage.

The two subsequent fermentations sanitise the product and enriches it with anaerobic microbial strains like *Lactobacillus* and yeasts.

Warning: this preparation is used in several countries for agricultural and zootechnical purposes, but we do not yet have definitive scientific data on its use.

The liquid fermented product of forest litter and bran contains easily 10^9-15^9 lactic bacteria / ml, that may help to improve gut health of weaners.

Further information

- **Barba-Vidal E. et al. (2019)**: Practical aspects of the use of probiotics in pig production: A review. Livestock Science, Volume 223, pp. 84–96 [Link].
- **EU (2008)**: Regulation (EU) 2008/889 – Deatiled rules on organic production and labelling of organic products. At: eur-lex.europa.eu [Link].
- **Leeb C. et al. (2019)**: Effects of three husbandry systems on health, welfare and productivity of organic pigs. Animal, 13:9, pp. 2025–2033 [Link].
- **Rivera J.R. and Hensel J. Editors (2009)**: Manual práctico de agricultura orgánica y panes de piedra. Pereira, Colombia, Corporación Autónoma Regional de Risaralda.

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