Realising
Our Future

Ollscoil Teicneolaíochta an Oirdheiscirt
South East Technological University

Sow feed additive to increase progeny carcass weight

Background

In commercial pig production, feed contributes up to 70 % of total production costs. Such costs can be further compounded by poor feed conversion caused by sub-optimal nutrition, infection, stress and sub-optimal weight gain. This very often necessitates costly dietary supplementation on a per animal basis. Furthermore, the EU prohibition of routine in-feed antibiotic use and supplementation with pharmacological levels of zinc oxide necessitates the development of alternative sustainable treatments and strategies to support the development of a healthy piglet intestinal microbiota and optimal gut health. The availability of a clean-label sow feed additive that promotes robust and durable piglet growth would mean a significant increase in the output of saleable meat for commercial pig producers.

Technology Description

Research undertaken by South East Technological University (SETU) and Teagasc Moorepark in Ireland has demonstrated that a microbial strain, when fed to transition and lactating sows, significantly increased offspring carcass weight.

A feed supplementation trial involving 24 pregnant sows and 144 of their offspring compared the effects of this microbial feed additive on progeny growth when administered daily to the sow over a 6-week period (last 14 days of gestation and the 28 days of lactation) against a control treatment (un-supplemented lactation/gestation diet). Sows and offspring from both groups were continuously monitored, with faecal, blood, colostrum and milk samples collected from sows, and faecal, gut digesta, gut tissue and blood samples collected from offspring at intervals from birth to slaughter. Supplemented sows produced colostrum with a higher protein content and altered microbiota. Piglets born to sows fed the additive demonstrated faecal shedding of the strain while suckling, demonstrating transfer of the microbial additive from sow to offspring. Offspring from supplemented sows also exhibited the following benefits:

Fig. 1 Duodenal histology

- Numerical reduction in pre-weaning mortality (15.6 vs 10.1 %).
- Increased villous height in small intestine at day 8 post-weaning ($P<0.05$; Fig. 1)
- Better feed conversion ratio (FCR) for first 14 days post-weaning ($P<0.001$)
- Increased pig live-weight at day 105 and 127 post-weaning ($P<0.05$) and a 3.5 kg increase in carcass weight at slaughter ($P<0.05$, Fig 2.)
- Increased ileal abundance of polysaccharide-fermenting and/or butyrate-producing bacteria at day 8 post-weaning; increased abundance of faecal *Lactobacillus* during finishing period.

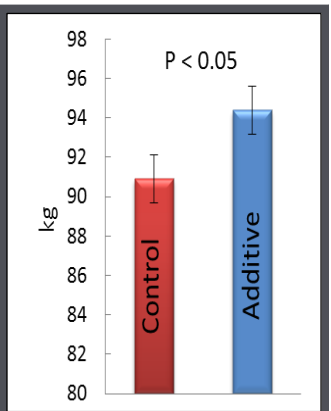

Fig. 2 Carcass weight

In vitro tests and interrogation of whole genome sequence data, conducted in line with European Food Safety Authority (EFSA) guidance, revealed no safety concerns. In addition, the microbial strain has been successfully **spray dried and** a feed additive product has been developed. Following spray drying, the strain tolerates temperatures as high as those experienced during feed pelleting. Stability studies also demonstrate good survival during powder storage at both 4 °C and room temperature, and at room temperature in a sow vitamin and mineral pre-mixture.

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Opportunity

Sow treatment with this feed additive improved FCR of offspring by 0.17 of an FCR unit during the first 14 days post-weaning. This is a good indicator of improved gut health at this critical period that has been shown to correlate with increased lifetime growth. The 3.5 kg heavier carcass weight, at the same slaughter age, achieved by pigs from the maternally supplemented sows represents a financial gain of €5.74 per pig using a 5-year (2018-2022) average pig meat price of €1.64/kg carcass. Based on the fact that a sow produces an average of 28.1 piglets/year, this amounts to €161.29 increase in the output value per sow per year. For a typical 500-sow unit, this equates to an economic benefit of €80,647 a year.

Commercial Opportunity

These data suggest that considerable savings can be made when this microbial strain is fed to sows for 6 weeks (2 weeks prior to farrowing and 4 weeks post-farrowing). Competing products are supplemented to sows for the full reproductive cycle. Based on a test price of €10/tonne of feed, if adopting a 6-week administration period, for every €1 spent on the supplement, a farmer could expect a return of €32.68, and if fed for the full reproductive cycle, the return would be €12.04 for each €1 spent on the supplement.

Further/Ongoing Work

These data provide sound evidence of an improved FCR in the early post-weaning period and increased carcass weight at target slaughter age in offspring from sows fed this microbial supplement. Possible mechanisms of action are improved colostrum quality in sows, increased small intestinal absorptive capacity/gut health in offspring early post-weaning and improved gastrointestinal microbiota composition in the early post-weaning and finishing periods. The development of a qPCR assay to facilitate tracking of the strain in feed and in the gastrointestinal tract is underway. Currently, our work is focusing on finalising commercial-scale efficacy, scale-up of the manufacturing process and product stability/shelf-life studies in line with market, business and regulatory requirements. It is desirable that such development work be conducted in conjunction with a commercial partner. To this end, expressions of interest from commercial feed additive entities are invited at this stage.

IP Status

The intellectual property outlined above is the subject of a patent application (filing no. EP20162860.9, PCT/EP2021/056425) filed on 12/03/2020 (priority date 13/03/2021). Further prosecution of this patent or alternative IP protection strategies will be considered in the context of commercial licensee requirements.

Contact

For further information relating to this technology, please contact:

Technology Transfer Manager: Mr. Sudeepth Nair, Technology Transfer Office, South East Technological University, Cork Road, Waterford, Ireland. **Tel:** +353 (0)51 845591; **Email:** TTO.WD@setu.ie; **Web:** www.setu.ie/Research/

Principal Investigators: Prof Gillian Gardiner, South East Technological University; gillian.gardiner@setu.ie
Dr Peadar Lawlor, Teagasc, Moorepark; peadar.lawlor@teagasc.ie

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