

## **Sustainable systems for management of the weaner pig through nutrition (NUTWEAN)** (Consolidated executive summary)

**Research Summary.** NUTWEAN's aim was to develop sustainable management systems for weaner pigs through nutrition, without input from antimicrobial growth promoters (AGP), whilst maximising use of home-grown cereals and oilseeds. Nutrition around weaning was modified through exploiting the potential of dietary components to enhance gut health and food intake. Results of NUTWEAN's 10 objectives are summarized below.

- Sodium butyrate, but not inulin, enhanced gut development and improved feed conversion ratio pre-weaning, but without post weaning benefits.
- *In vitro* rheological characterisation may predict small intestinal starch digestibility from cereals *in vivo*. Soft wheat is associated with improved nutritional value in terms of gut environment and nitrogen digestibility.
- Micronisation or extrusion increases nutritional value of wheat. Extrusion may overcome penalties of its endogenous  $\alpha$ -amylase on performance.
- Soluble non-starch, "non-viscous" polysaccharides, like inulin, may be used to minimise post weaning diarrhoea (PWD) whilst maximising performance, especially at high protein levels and increased disease risk.
- Short term use of low protein weaner diets maintained gut health and lowered PWD risk, mainly in young pigs and under disease challenge. The associated small penalty on growth did not affect long term performance.
- Inclusion of formic acid or phytase did not affect performance or gut health, but the latter may be an alternative to use of inorganic phosphorus.
- Micronised whole rapeseed may be included up to 10% in the diet without adversely affecting feed conversion ratio or feed cost per kg gain.
- Outdoor rearing improves gut development and pre- and post-weaning performance, but pre-weaning mortality may be higher. Delayed weaning to 6 weeks of age reduced performance of indoor reared piglets only. Rearing environment did not affect the positive responses to using AGP.
- Under commercial conditions, pigs offered high quality diets (cooked cereals, animal protein sources, extruded wheat), had improved health and performance in the immediate post weaning period only, with no added benefits in the longer term (e.g. until slaughter).

**Expected benefits.** NUTWEAN's expected benefits include: decreased occurrence of PWD, leading to improved health and welfare: increased profits from improved post weaning performance: improved feed efficiency resulting in a decrease in nitrogen output and reduced environmental impact: potential increase in market for UK cereals and oilseeds and decrease in protein imports: reduced environmental burden of minerals and chemical residues, and reduced dependency on antimicrobial agents.

**Knowledge Transfer (present and projected).** NUTWEAN's results have been widely communicated through over 15 refereed and review papers, 25 conference papers, numerous articles in technical magazines, and presentations at industry meetings. Further KT activities are planned, whilst commercial partners have taken up outcomes in their research and diet formulation portfolios. The project demonstrated nutritional and health benefits of cereals and oilseeds in weaner diets. This information will enable the arable and pig sectors to work together to ensure arable farmers supply e.g. wheat of optimum quality for inclusion in pig feeds.