Improving udder quality traits in sows to aid survival, health and lifetime performance of piglets

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Pre weaning mortality in the UK is 11.5% of which 70% occurs during the first 4 days.

Colostrum intake is the key solution.

Colostrum production decreases after 12 h.

Essential to have a short delay to find a teat and suckle.

A good udder conformation reduces the time to suckle.

Passive immunity

Energy for thermoregulation and body growth

Growth factors for intestinal growth
Objectives

1. Define udder conformation traits measurable in a reliable way (first experiment)

2. Study the link between these traits, colostrum characteristics and piglet performance

3. Identify potential methods to quantify piglet performance and maternal colostrum production

4. Determine on-farm colostrum characteristics:
   1. Colostrum extraction ease
   2. Colostrum quality $\rightarrow$ Immunoglobulin G
Materials and Methods

• Udder traits
  » Measurement
  » Linear score

• Piglet performance
  » Weight gain
  » Serum immunoglobulin G - Immunocrit technique

• Colostrum characteristics
  – Extraction ease
    » Linear score
  – Quality
    » Radial immunodiffusion RID
    » Enzyme-linked immunoassay ELISA
    » Refractometer BRIX
      • Fresh sample
      • Refrigerated sample
      • Frozen sample
Results from the first experiment

• Measures of udder conformation:

  1. are **repeatable** within sow,
  2. do **not differ significantly** between sides in either standing or lying postures,
  3. do **not change** in the days **shortly prior to farrowing**, 
  4. show significant **variability** between sows,
  5. measures which use **anatomical landmarks** as the reference point are more **reliable** than those using the floor of the pen.
Which traits define udder conformation?

- Measurements of distance from the teat base to:
  - Same row (SR)
  - Abdominal mid-line (BL)
  - Teat Length (LEN)
  - Teat Diameter (DIA)

- Linear scoring:
  - Teat orientation
  - Udder damage
  - Udder development

Scores:
- Score 1
- Score 2
- Score 3–4
- Score 5
Piglet Performance
Immunocrit technique

BLOOD SAMPLE
• At 24 hours of age
• Puncture of the ear vein
• Draw blood into a microcapillary tube

LAB TECHNIQUE
• Mix 50 µl of serum with 50 µl of ammonium sulphate
• Centrifuge
• Calculate the ratio of precipitate and supernatant to obtain IgG concentration.

Relationship between Sow colostrum IgG concentration (BRIX) and litter average piglet serum IgG (Immunocrit) (n=10).
Colostrum characteristics
Correlation fresh and frozen sample

Correlation between BRIX of fresh and frozen colostrum samples (n=76), across sampling times (before farrowing n=18, during farrowing n=35, >4h after farrowing n=23)
Colostrum characteristics
Colostrum IgG variation across parity

Relationship between Colostrum IgG concentration (BRIX) and sow parity number (n=76)
Piglet behaviour

Distribution of time elapsed from when the piglet first contacts the udder to suckling.

(First 4 piglets born per sow; n=196).
Next Step

1. Assess how udder conformation changes in consecutive parities of the sow

2. Genetic study on selected traits
   - heritability will be estimated for key udder traits
   - genetic correlations with other maternal selection criteria

Industry focus

- Allow a breeding company to take udder conformation into account
  - Repeatable and reliable methods for gilt selection
- Increase number of weaned piglets
  - Allowing the selection of sows with better nursing capacity
  - Improving colostrum accessibility and quality
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