

## PROJECT REVIEW

<b>NAME:</b>	<b>Agnese Balzani</b>	<b>Full Time</b>	<b>Final Year</b>
<b>INSTITUTE:</b>	<b>Newcastle University</b>		
<b>TITLE:</b>	<b>Improving udder quality traits in sows to aid survival and performance of piglets</b>		

### OVERALL AIM:

The overall aim of this research project was to develop and extend the knowledge on sow udder morphology and colostrum quality to aid survival and performance of piglets. The initial objectives of this research were to define a methodology to describe udder morphology (1), to study the sources of variation in the morphology (2) and its relationship with piglet teat preferences (3). A further aim was to assess colostrum quality (IgG) using a quick on-farm method (4), and the final objective was to estimate the heritability ( $h^2$ ) of udder morphology and colostrum traits (5).

### KEY MILESTONES:

	<b>TARGET DATE:</b>	<b>ACHIEVED DATE:</b>
Scientific review and current knowledge on piglet mortality causes, colostrum composition, and udder traits in sows	March 13	May 13
Scoring system for udder conformation developed	March 13	March 13
Investigation of the main udder trait variation causes, of the relationship between udder and piglet suckling behaviour and of on-farm colostrum quality evaluation	August 13	March 14
Report on the heritability of udder quality traits and interaction with other important traits	October 15	October 15
Presentation to relevant scientific societies and communication to relevant stakeholders		When results were available
Submission of PhD Thesis	October 15	October 15

### KEY ACHIEVEMENTS:

Feasible sow udder trait measurements were identified as teat length and diameter, the distance between the teats and the abdominal mid-line, and the inter-teat distance within the same row. Teats oriented perpendicular or not perpendicular to the udder can be recorded using a score system, as can teat functionality, and degree of udder development. Measurements can be recorded on a day shortly prior to farrowing, from one row of teats when the sow is in a lying down posture, using a retractable ruler and a calliper for the diameter.

- Teats located in the anterior and posterior part of the udder have small length; small diameter, long inter teat distance within the same row and they are close to the abdominal mid-line compared with the teats located in the middle part of the udder. These were positive characteristics for teat accessibility by newborn piglets.
- First parity sows had smaller udder dimensions than multiparous sows. Meidam sows had better udder traits in respect of the distance between the teats and the abdominal midline, and the teat length, compared with Large White X Landrace sows.
- Heavier litters at birth were correlated with larger udder dimensions, measured as inter-teat distance within the same row, teat distance from the abdominal mid line and udder development score. Moreover, litter size at birth was positively correlated with larger udder dimensions. This could be explained by the evidence that litter size at birth is associated with milk production.
- Neonatal piglets first suckled from teats located in the posterior and anterior part of the udder. The latency from first udder contact to suckling was affected by the piglet birth order, was shorter when the neonates were born in a litter with low incidence of stillborn piglets and from a sow with an induced farrowing. Moreover there was a tendency for piglets born from a multiparous sow and in a big litter size to have a longer latency to find a teat and suckle once they had made the first contact with the udder.
- The Brix refractometer can be used as an on-farm method to assess IgG concentration in swine colostrum, with a positive correlation between Brix percentage and the gold standard radial immunodiffusion values. The results in this investigation demonstrated that the method is highly repeatable and that storage

temperature and duration do not affect the Brix IgG assessment. Colostrum concentration changed by four hours after the birth of the first piglet, and so sampling time needs to be taken into account as IgG concentration decreased significantly. The Brix refractometer is durable and affordable, expertise is not necessary and the calibration process is simple, making it a very practical farm tool.

- Heritability estimates of udder quality traits (morphology and colostrum IgG) found in this study were moderate to high. Genotypic and phenotypic correlations between different udder quality traits were high between teat dimensions (length and diameter), diameter was high correlated also with udder size (inter-teat distance within the same row, teat distance from the abdominal mid-line and udder development score). Udder dimensions were also correlated. Colostrum IgG was genetically correlated with inter-teat distance within the same row.
- Positive genetic correlations were recorded between average daily gain in gilt testing and teat length and teat distance from the abdominal mid-line, also between total number of teats, teat diameter and back fat thickness at end of gilt test period. A negative genetic correlation was recorded between the latter and udder development score.
- The inter-teat distance within the same row was negatively genetically correlated with the number of stillborn piglets and positively with the number of born alive. In contrast, the distance from the abdominal midline was negatively genetically correlated with the number born alive and positively with stillborn.
- Overall conclusions are that the evaluation methodology developed in this research was suitable to carry out a large sample size study to define udder quality traits. Udder quality traits should be included in the breeding goal for damlines and weighted appropriately with other important traits in the breeding objectives to enhance piglet survival and performance.

### **BENEFIT TO LEVY PAYERS:**

Piglet mortality is a major source of financial loss to the British industry. Currently ~1.5 million liveborn piglets annually do not survive until weaning, and this number is likely to increase as genetic changes in prolificacy reach production herds. Since the overhead cost of sow feeding and maintenance is essentially unchanged by litter size, the more piglets that are reared the greater the biological and financial efficiency of the enterprise, and the lower the environmental footprint of pig meat production. It has been estimated that a 5% reduction in total piglet mortality will reduce cost of production by ~3p/kg carcass. It is also necessary to proactively address the issue of piglet mortality to pre-empt adverse publicity for the industry. The importance of the acquisition of passive immunity in the first 24h of life for subsequent lifetime health and performance makes this a key contributory factor in raising the health status of the British herd, a key BPEX objective, and to improve overall farm profitability. It has been estimated that the combined effect of a 50g increase in DLWG, a 0.1 reduction in FCR and a 1% reduction in post weaning mortality, which might easily be realised through improved health, will together reduce cost of production by ~5.5p/kg carcass.

<b>SUPERVISOR(S):</b>	<b>FUNDERS:</b>	<b>DATED:</b>
Professor Sandra Edwards Professor Heather Cordell	AHDB Pork	28/10/15