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

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Introduction

- ✓ Sow udder produces the main sources of energy and passive immune protection for piglets: colostrum and milk
- ✓ Access to an early and plentiful supply of colostrum is essential for piglet survival and performance
- ✓ Modern hyperprolific damlines are subjects to an increased udder size, impairing piglet teat access.
- ✓ Genetic selection for increased litter size and lean content, affects sibling competition, increases litter heterogeneity and reduces piglet maturity at birth.

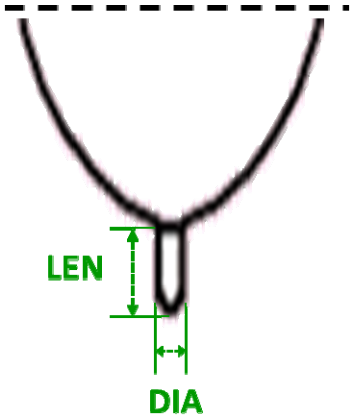
Research Objectives

1) Development of udder conformation measurement methodology (presented BPEX seminar 2013)
2) Sources of variation in udder morphology (presented BPEX seminar 2014)
3) Link between udder morphology & piglet suckling behaviour (presented BPEX seminar 2014)
4) Evaluation of an on-farm method to assess colostrum IgG in sows (presented BPEX seminar 2014)
5) Genetic analysis of udder morphology and colostrum IgG traits

Evaluation Udder Morphology Traits

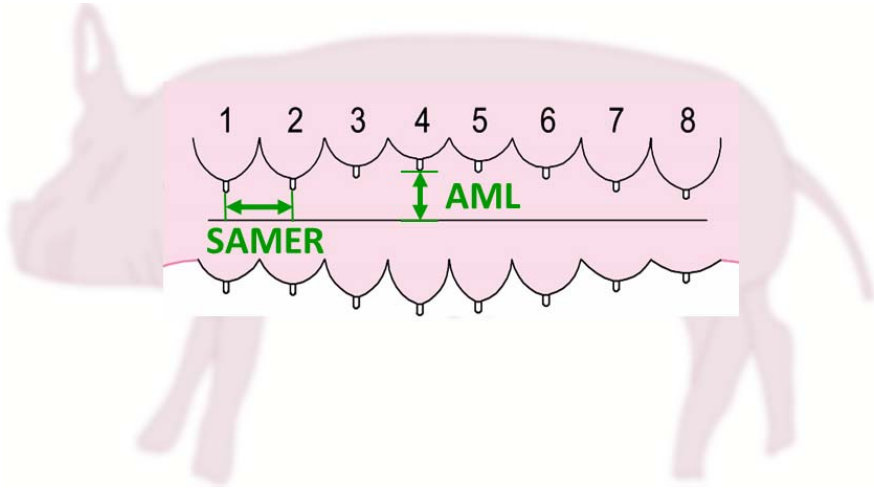
4 MEASUREMENTS (in millimetres):

1) Inter-teat distance within the same row (SAMER)
2) Teats base to the abdominal mid-line (AML)
3) Length (LEN)
4) Diameter (DIA)



3 SCORES

1) Teats orientation (OR)
2) Teats functionality (NoFun)
3) Udder development (dev)



UDDER TRAITS MEASURED:

- Once shortly prior to farrowing
- Lying down posture
- Upper row of teats

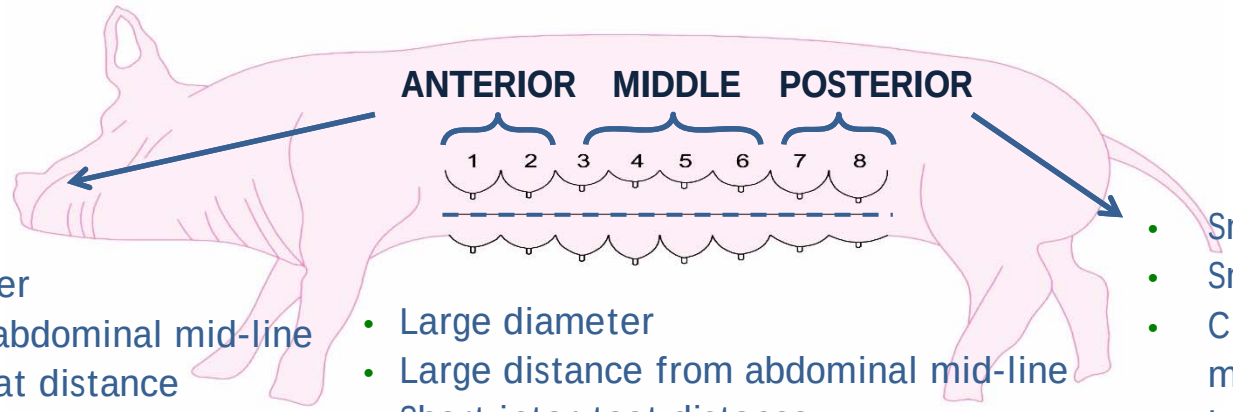
Experiment 2

Sources of variation in udder morphology

OBJECTIVES	Define reasons for variation in udder conformation between sows
METHODS	220 sows; two breeds (110 MEDIAM 110 Large-White X Landrace) of different parities

RESULTS

- **Teat pair position** had an effect on udder morphology



- Small length
- Small diameter
- Close to the abdominal mid-line
- Long inter teat distance

- Large diameter
- Large distance from abdominal mid-line
- Short inter teat distance

- Small length
- Small diameter
- Close to the abdominal mid-line
- Long inter teat distance

- First parity sows had smaller udder dimension (SAMAER, LEN and DIA) than multiparous
- MEIDAM had a smaller and more uniform udder than Large-White X Landrace

Experiment 3

Link between udder morphology & piglet behaviour

OBJECTIVES	Study the link between udder morphology and newborn piglet suckling behaviour
METHODS	75 sows of different parity & 377 piglets
MATERIAL	Udder traits. Piglet birth weight, vitality score, birth interval, time elapsed from birth to udder contact & from udder contact to suckling

RESULTS

- The latency to suckle from birth was significantly shorter on the posterior teats compared with the middle ones.
- Heavier and larger litters at birth were correlated with a larger SAMER and AML
- Birth weight and vitality score did not have an effect on the time elapsed from birth to suckling – maternal characteristics important.

SUMMARY

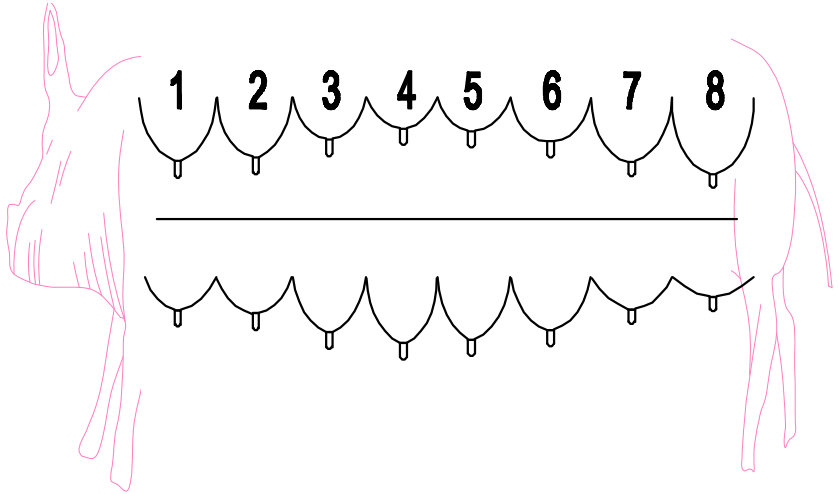


FIG1: Actual udder morphology mean values

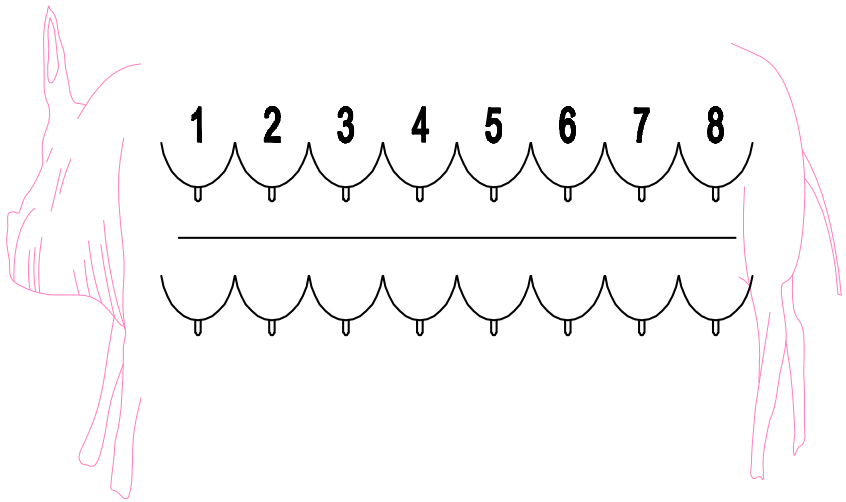


FIG2: Desirable udder morphology based on piglet behaviour

ANTERIOR & POSTERIOR TEATS

- Small length
- Small diameter
- Close to the abdominal mid-line
- Long inter teat distance

AN IDEAL UDDER:

- At least 12 functional teats
- Placed eqi-distant from one another
- Small length and diameter
- Close to the abdominal mid-line

Experiment 5

On-Farm colostrum IgG methodology

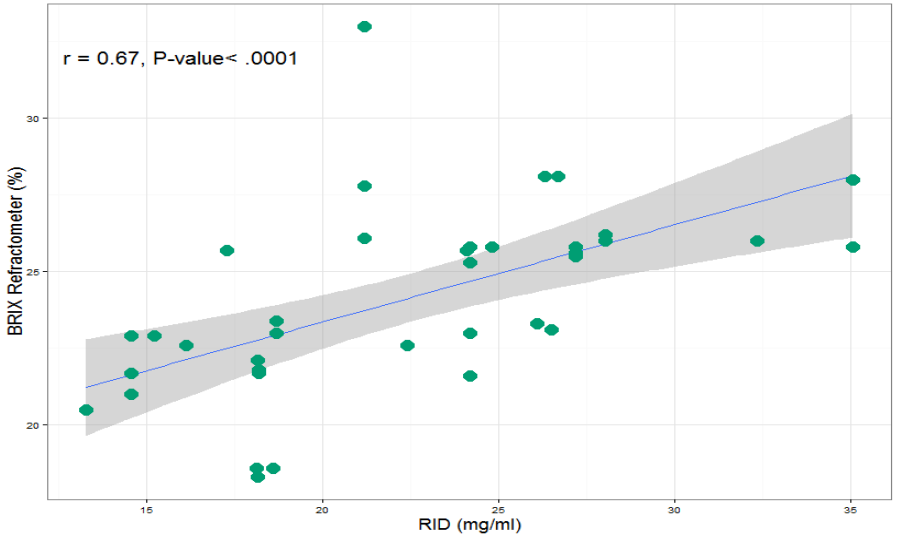
OBJECTIVES	Evaluation of Brix refractometer to assess colostrum quality
METHODS	Colostrum sample of sows of different parity, collected when freely available.

Hypothesis	Analytical method	Tested hypothesis	P-value
BRIX repeatability	BRIX	High repeatability r= 0.99	< .0001
Refrigerated at 24-48-72h	BRIX	No differences	> .05
Storage temperature	BRIX	No differences	> .05
Brix-RID correlation	BRIX & RID	Positive correlation r= 0. 67	< .001
Sampling time	BRIX & RID	4h after farrowing lower IgG	< .05

VS

BRIX Refractometer

Agar plate Radial immunodiffusion RID



Experiment 6

Genetic analysis

AIM	Asses Heritability of udder morphology traits and colostrum IgG
METHODS	1100 MEIDAM sows
MATERIAL	Measurements of udder morphology & Brix percentage of colostrum.

RESULTS

Trait	MEAN± SD	CI	h^2	SE
SAMER (mm)	104.5 ± 14.45	1.88	**0.37**	0.06
AML (mm)	61.2 ± 10.88	1.42	**0.22**	0.04
LEN (mm)	16.1 ± 3.00	0.24	**0.46**	0.04
DIA (mm)	10.5 ± 1.70	0.12	**0.53**	0.02
COLOSTRUM (%)	25.5 ± 3.50	0.28	**0.35**	0.07

Experiment 6

Genetic correlation

- Positive correlations with sow productive traits:
  - Sow ADG during gilt test and LEN & AML
  - Sow Back fat off test and DIA & total teat number

- Positive correlations with sow reproductive traits:
  - Sow gestation length and total teat number
  - Sow milking ability and total teat number
  - Pre-weaning mortality (number of pigs born alive but dead before 10 days) and DIA, SAMER & DEV

- Negative correlations with sow reproductive traits:
  - Sow gestation length and colostrum and udder development
  - Total number of piglet born alive & AML
  - Sow milking ability and DIA, AML, SAMER, OR & NoFun
  - Pre-weaning mortality and total teat number

CONCLUSIONS AND IMPLICATIONS (1)

- MEIDAM sows had a smaller & more uniform udder than Large White x Landrace
- Breed, parity and teat pair position influence udder morphology

This might influence teat accessibility for piglets and early suckling

- Piglet suckling behavior is influenced by the location of the teat
- Litter performance is influenced by udder morphology
- Colostrum quality can be estimated using an cheap and easy device

CONCLUSIONS AND IMPLICATIONS (2)

Genetic analysis shows a high to moderate heritability for udder traits.

Considering their economic importance, udder morphology and colostrum quality traits should be included in the breeding goal and weighted appropriately with other important traits to enhance optimal genetic progress.

- Repeatable and reliable methods for sow selection
- **Increased number of weaned piglets**
- Selection of sows with better nursing **capacity**
- **Improved colostrum accessibility and quality**

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Newcastle University

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Thanks for your attention