Sow history features affecting growth and feed intake in finishers

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Introduction

- Sow provides environment to piglets:
  - Prenatal (uterus)

    Effect of sow's feed during pregnancy on piglet muscle development

    (Dwyer *et al.* 1994; Nissen *et al.* 2003; Musser *et al.* 2006)

  - Postnatal (nursing)

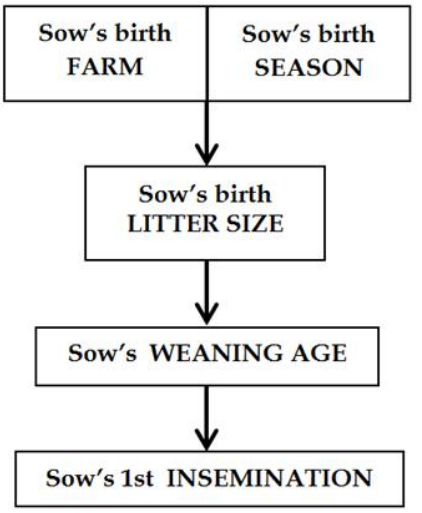
    Effect of sow's body condition on piglet growth

    (Yang *et al.* 1989; Grandinson *et al.* 2005)

Introduction

- Common litter effect:
  - Environment that sow provides to offspring
  - Growth rate: $c^2 = 0.10 - 0.25$
  - Feed intake: $c^2 = 0.07$ and 0.16

Sow history features



Objectives

- Identify sow history features that affect finishers traits:
  - growth rate (GR)
  - feed intake (FI)
- Investigate impact of sow history features on permanent sow (sow^2) and common litter (c^2) effects of finishers traits

Materials

Sows' data:

- 681 crossbred sows
- Sow history features:
  - birth litter size
  - birth farm/season
  - weaning age
  - age at 1st insemination

Finishers' data:

- 17,743 records
- Parents: 604 sires and 681 sows
- Farrow-to-finish farm
- Traits:
  - growth rate (GR) – 17,025 finishers
  - feed intake (FI) – 7,728 fed *ad libitum*

Methods and Results – First objective

- Identify sow history features that affect finishers traits:
  - growth rate (GR)
  - feed intake (FI)

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Methods (First objective)

- Performed with MIXED procedure (SAS)

GR = μ + sow_feature + sex + line + pen_size + compartment + batch + **feeding_strategy** + ***sow*** + ***litter*** + ***group*** + *e*

FI = μ + sow_feature + sex + line + pen_size + compartment + batch + **weight_start** + ***sow*** + ***litter*** + ***group*** + *e*

Significance of sow history features

	Finisher traits	
Sow history features	**GR (g/day)**	**FI (kg/day)**
Weaning age (class)	* * *	
Age at 1st insemination (linear)	*	
Litter size (linear)	* *	* *
Litter size (class)	*	*
Litter size (linear) + Litter size (quadratic)	* *	* * *
Sow's farm/season*Finisher's line	* * *	* * *

***P<0.001; **P<0.05; *P<0.1

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Estimated effects of sow history features

	Finisher traits	
Sow history features	**GR (g/day)**	**FI (g/day)**
Age at 1st insemination (linear) (g/day per day)	0.13	
Litter size (linear) (g/day per piglet)	-1.0	-4.0
Litter size (linear) + Litter size (quadratic) (g/day per piglet^2)	5.0 -0.24	31.1 -1.3

Methods and Results – Second objective

- Investigate impact of sow history features on permanent sow (sow^2) and common litter (c^2) effects of finishers traits

Methods (Second objective)

- Models with significant sow history features reanalyzed using ASReml:

$$\mathbf{y} = \mathbf{Xb} + \mathbf{Za} + \mathbf{Wc} + \mathbf{Vs} + \mathbf{Ug} + \mathbf{e}$$

- Comparison between:
  - **'basic'** model (without sow features)
  - **'all sow features'** model (significant for the trait)

	Finisher traits	
Sow history features	**GR**	**FI**
Weaning age (class)	x	
Age at 1st insemination (linear)	x	
Litter size (linear) + Litter size (quadratic)	x	x
Sow's farm/season *Finisher's line	x	x

Common litter effect

- Estimates ('basic' model):
  - GR – 0.05
  - FI – 0.04
- The c^2 estimates are low
  - In line with Bergsma *et al.* (2008) – model with group effect
- No differences between 'basic' and 'all sow features' models

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Permanent sow effect

- Estimates ('basic' model):
  - GR – 0.02
  - FI – 0.03
- Estimates are small, but in line with literature
- sow^2 for FI decreased to 0.005 in 'all sow features' model
  - Sow features explained whole variance of sow^2

Conclusions

- Sow history features do affect finishers' traits
  - But effects are small
- Investigated sow history features do not predict which sows produce better offspring in finishing stage
- For FI, sow history features almost entirely explained sow^2
- Epigenetic studies interested in impact of sow history features

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Full paper available on-line

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Thank you for you attention!

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