Parameters of AI boars and predicted correlated responses of selection against boar taint

Rob Bergsma , Egbert Knol
& Hanneke Feitsma

58th EAAP Dublin
August 26 th - 29th 2007

Bond van Varkens KI Verenigingen

Institute for Pig Genetics

IPG

Introduction

- Genetic parameters for semen production traits are not often estimated:
  - not of interest for direct selection, only culling
  - AI responsible for only 3% cost price of piglet
  - availability of data
- Nevertheless useful:
  - production efficiency, especially repeatability
  - correlated response (boar taint)

Outline

- Semen production traits
  - Data collection
  - Material description
  - (genetic) Parameters
- Boar taint
  - Genetic parameters
- Genetic correlations

Material semen production

- Data on ejaculates of 4 AI centre's, represented by “Dutch Association of Co-operative Pig AI Centres”
- 1 TOPIGS sire line
- 56,548 ejaculates of 805 ♂♂
  (70 ejaculates / ♂)
- Ejaculates from November 2002 – June 2007
- ASReml 2.00 (Gilmour et al., 2002)

Semen production traits

Trait	n	$\bar{x}$	σ	min.	max.
Volume (ml)	54,450	253	85	1	610
Concentration (10^6/ml)	54,328	340	141	36	1,188
Production (10^9/ejaculate)	54,254	81	32	0	303
Motility (fresh)	53,503	7.41	0.70	1.0	9.55
Semen longevity (Δ motility)	31,484	-0.50	0.75	-7.0	1.0

Other traits of importance

Trait	$\bar{x}$
Volume (ml)	253
Concentration (10^6/ml)	340
Production (10^9/ejaculate)	81
Motility (fresh)	7.41
Semen longevity (Δ motility)	-0.50

	$\bar{x}$	min	max.
Age at mounting (months)	21.2	8	59
Mounting interval (days)	5.8	0	57
Semen examination interval (hours)	52.5	11	168

Genetic parameters semen production traits

	h^2	r^2
Volume (ml)	0.17 ± 0.04	0.35 ± 0.02
Concentration (10^6/ml)	0.26 ± 0.04	0.42 ± 0.02
Production (10^9/ejaculate)	0.17 ± 0.04	0.34 ± 0.02
Motility (fresh)	0.20 ± 0.05	0.44 ± 0.02
Semen longevity (Δ motility)	0.04 ± 0.01	0.10 ± 0.01

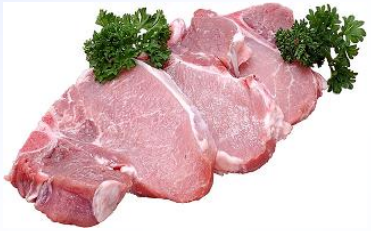
Conclusions on semen production

- The knowledge on repeatability of semen production characteristics (c)(sh)ould be used to optimize semen production at AI facilities
- Demonstrates usefulness of consequent data collection
- Genetic parameters found are in general lower compared to review of Ford et al. (Genetic Variation in Sperm Production, ICPR 2005, Rolduc)

Material and methods boar taint

- 1,369 boars (half-sibs) from 45 fathers
- TOPIGS boar line from one farm
- Slaughtered at 124 ±12 kg live weight
- Fat samples from neck region for levels of androstenone, skatole and indole
- Determination of skatole and indole by HPLC (method of CCL Nutricontrol)
- Determination of androstenone by ELISA (method of Andresen and Dahl)
- Log-transformation of data

Boar taint characteristics



Trait	n	$\bar{x}$	σ	min.	max.
Androstenon µg.g^{-1}	1,340	1.57	1.39	0	10.1
Skatol µg.kg^{-1}	1,351	75	81	6	928
Indol µg.kg^{-1}	1,348	50	56	8	678

Heritabilities and genetic correlations for boar taint

	Ln(and)	Ln(ska)	Ln(ind)
Ln(androstenon)	**0.75 ± 0.09**	0.43 ± 0.12	0.52 ± 0.12
Ln(skatol)		**0.44 ± 0.08**	0.81 ± 0.07
Ln(indol)			**0.32 ± 0.07**

Genetic correlations semen production traits and boar taint

	Volume	Concentr.	Production	Motility	Longevity
Androst.	0.18 ± 0.20	-0.22 ± 0.18	-0.27 ± 0.20	0.32 ± 0.20	0.11 ± 0.24
Skatol	0.21 ± 0.21	0.01 ± 0.19	0.22 ± 0.21	**-0.44 ± 0.21**	**-0.85 ± 0.21**
Indol	0.24 ± 0.22	-0.19 ± 0.21	-0.08 ± 0.23	-0.15 ± 0.25	-0.49 ± 0.27

Conclusions

- Heritabilities show ample opportunities for selection against androstenon, skatol and indol
- High standard errors on genetic correlations due to lacking common observations
- The impact of selection against boar taint on male fertility characteristics will not be very high, since genetic correlations were low or even positive

Any questions ?