Censoring must be accounted for when selecting on social-genetic effects
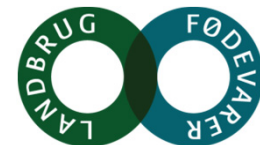
B. Ask, T. Ostersen, M. Henryon, and B. Nielsen*
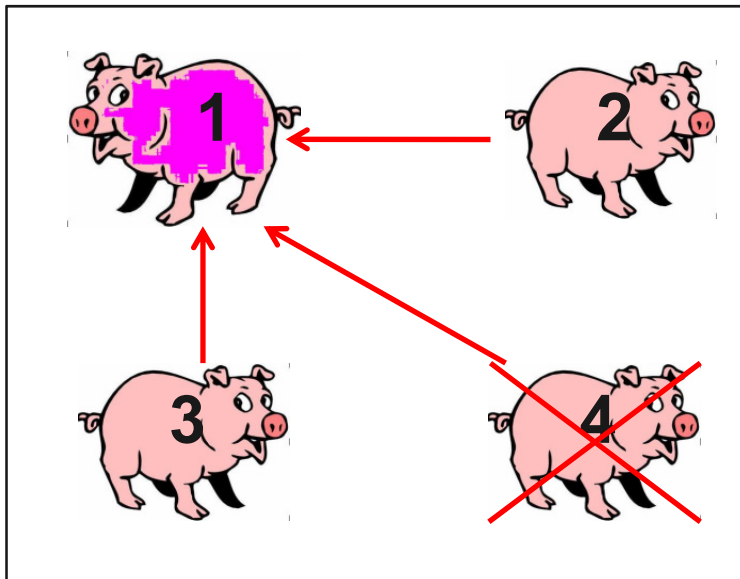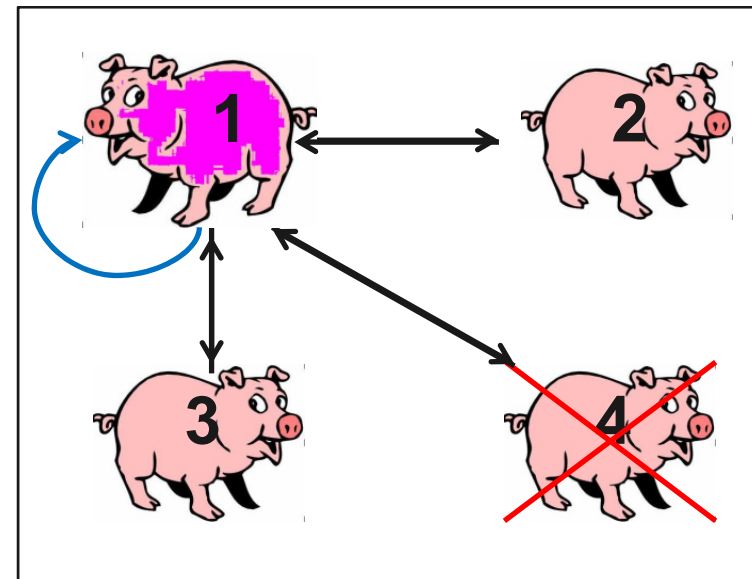
The social-interaction model and censoring

Phenotype

Breeding Value

Censoring due to mortality or involuntary culling

Objective

To investigate the effect of censoring on genetic parameters and predictive ability and how to deal with it

Data

- **ADG and FI**
- **968 groups**
- **Group size 10-14**
- $\bar{a}$: **0.11**

- **~7% censoring**
- **~55% groups with censoring**

- **3 datasets:**

  All)   **All animals and groups included**

  NoCens)   **Excl. dead and culled animals**

  NoCensGr) Excl. groups with dead or culled animals

Models

- **A classical animal model**

$$Y = Xb + Zg + Za + e$$

- **A social-genetic model**

$$Y = Xb + Zg + Za_d + \sum Za_s + e$$

- **A social-genetic model with weighting**

$$Y = Xb + Zg + Za_d + \sum Z^* a_s + e$$

Analysis

- **Genetic parameter estimation (DMU)**

- **Predictive ability**
  - $\hat{P}_{i,cl} = \hat{a}_{i,cl}$
  - $\hat{P}_{i,d} = \hat{a}_{i,d}$
  - $\hat{P}_{i,s} = \sum \hat{a}_{j,s}$
  - $\hat{P}_{i,t} = \hat{a}_{i,d} + \sum \hat{a}_{j,s}$

Genetic Parameters, ADG

- **Significant social effects for ADG**

Data	$\sigma^2_{a,s}$
All	66
NoCens	47
NoCensGr	54

Model	$\sigma^2_{a,d}$	σ^2_e
AM	3381	5855
Social	3492	6047

Genetic Parameters, FI

- **Significant social effects for FI**

Data	$\sigma^2_{a,s}$
All	7
NoCens	5
NoCensGr	1

Model	$\sigma^2_{a,d}$	σ^2_e
AM	116	207
Social	145	208

Predictive Ability, ADG

	AM	All Social
$\widehat{P}_{i,cl}$	1.000	0.804
$\widehat{P}_{i,d}$	0.982	0.864
$\widehat{P}_{i,s}$		
$\widehat{P}_{i,t}$		

Take-home messages

1) Dead/culled animals important for social-genetic effects

2) Weighting does not improve fit with censoring

3) Social-genetic model predicts social-genetic effects best, whereas classical model predicts direct breeding values best.