Multilevel Selection

- Selection on interactions among pigs in groups

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Dan Avl

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One pig is affected by other pigs

- **Relationship with phenotypic variation**
- **Classical: maternal effect**

The Principle

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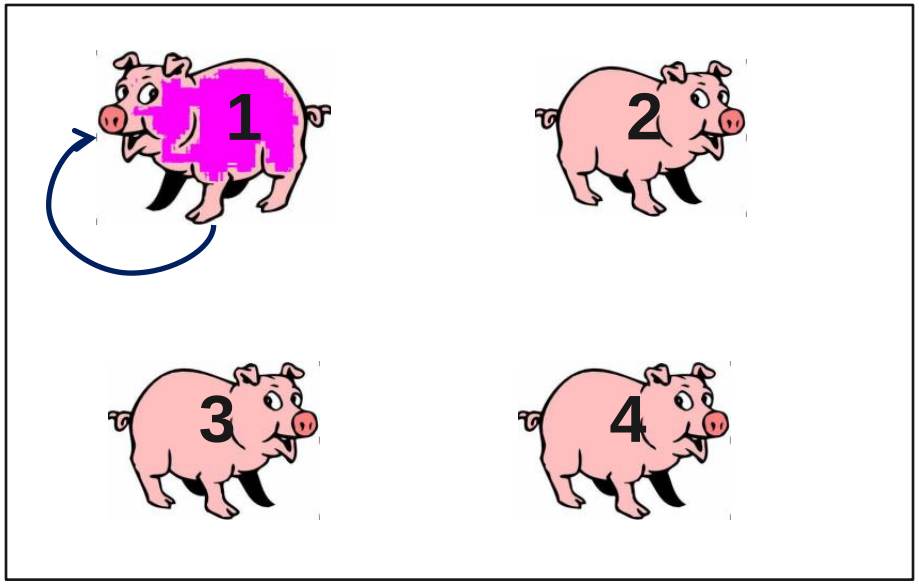
Classical model



- **Trait value (1):**
  - $P_1 = A_{D,1} + E_{D,1}$
- **Breeding value (1):**
  - $BV_1 = A_{D,1}$
- **Heritability:**

$h^2 = Var(A_D)/Var(P)$

The Principle

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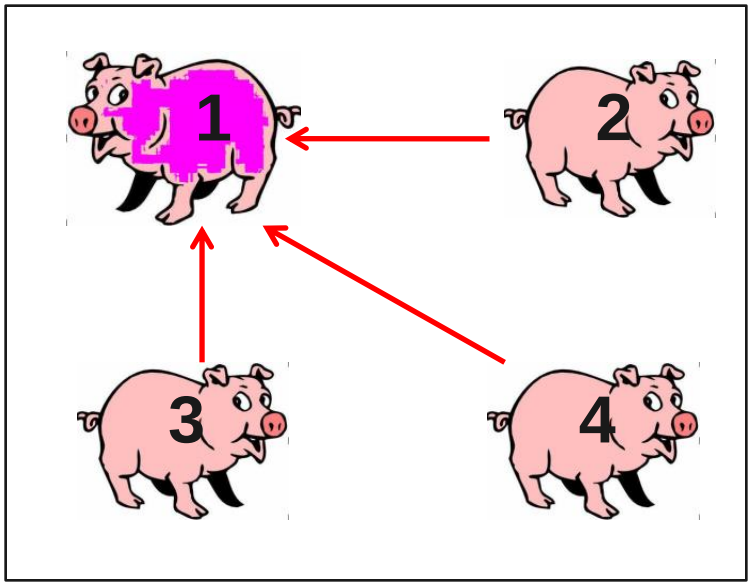
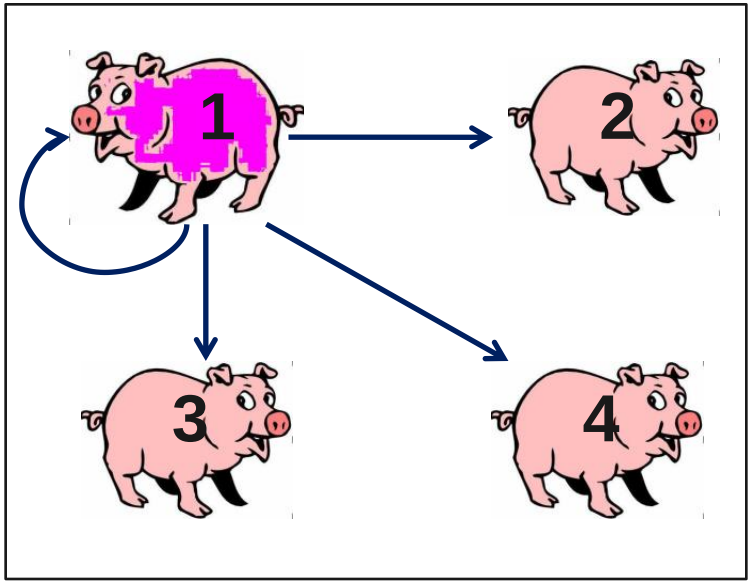
Multilevel model:

- **Trait value (1):**
  $P_1 = A_{D,1} + E_{D,1} + sum(A_{S,2\text{-}4} + E_{S,2\text{-}4})$

- **Total Breeding value (1) :**
  $TBV_1 = A_{T,1} = A_{D,1} + (n\text{-}1)*A_{S,1}$

- **Heritability**
  $T^2 = Var(A_T)/Var(P)$





Examples of Results in Pigs

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- **Growth:**
  - Chen et al. (2008): h^2: 0.13-0.28, T^2: 0.38-0.96
  - Bergsma et al. (2008): h^2=0.25, T^2=0.71
- **Backfat:**
  - Bergsma et al. (2008): h^2=0.36, T^2=0.41
- **Feed intake:**
  - Bergsma et al. (2008): h^2=0.18, T^2=0.70

First Results DanAvl

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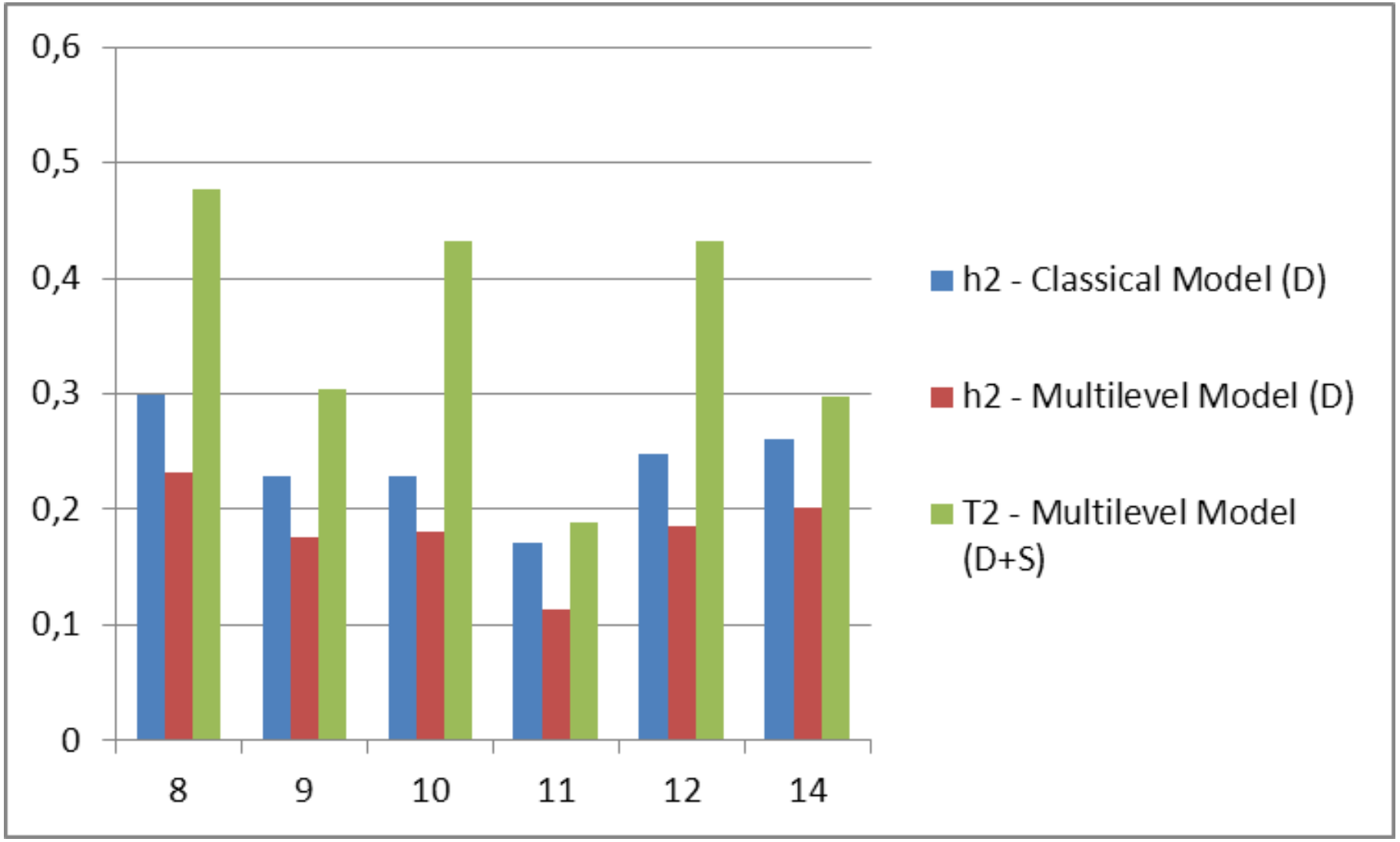

Data, Design, and Modelling Issues

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- **Data**
  - Unknown pigs
  - Mixed breeds
  - Herds chosen
  - Removals
- **Design**
  - # groups, groupsize, relationship
- **Modelling Issues**
  - Non-genetic social effects
  - Variable groupsize

Ideas for Future Projects

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- Other slaugther pig traits (e.g. survival, tail biting?)
- Sow level (e.g. fertility traits)
- Use of group measurements (e.g. feed intake)
- Integration of multilevel selection and genomic selection
- Integration of multilevel selection and EVA
- “Social” genotype-genotype interactions