Relationship between sperm production and boar taint risk of purebred or crossbred entire offspring

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66th EAAP ANNUAL MEETING
31 AUGUST - 4 SEPTEMBER 2015
WARSAW, POLAND

Background

- Genetics is a lever to reduce boar taint
  - Androstenone and skatole are heritable traits
- Boar taint is related to sexual development
  - Strong genetic correlations with sexual steroids

Parois, JAS 2015, 93: 8: 3749-3758

- Selection against boar taint might impact reproduction

Objective

- Study the link between
  - **Sperm production** of Artificial Insemination Center (AIC) boars

    and
  - **Boar taint risk** of their purebred or crossbred **offspring**
    - Thanks to Utopige, a genomic selection program

L. Tusell, C. Larzul

H. Gilbert

S. Schwob

} *EAAP 2015*

Experimental design

100 AIC Pietrain boars

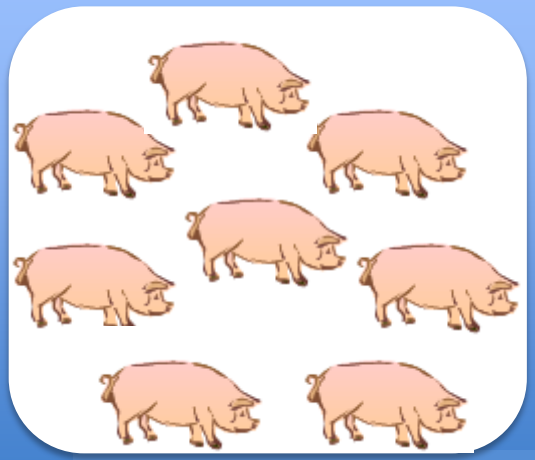
3 varieties : 74 V1 ♂, 10 V2 ♂ and 16 V3 ♂

12 production sites

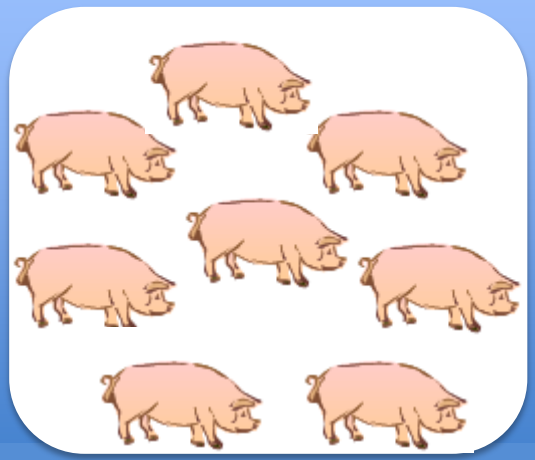
Sperm production data

INRA UETP testing station

7,6 purebred offspring



7,8 crossbred offspring from LW type sows



Entire male slaughtered around 110 kg live weight

Androstenone and skatole quantification
Liquid Chromatography in liquid fats

Semen data analyzes

- Total number of spermatozoa per semen collection
  - Gamma law, GLIMMIX SAS procedure
  - 90 sperm collections per AIC boar on average

Repeated effect
Sire

Random effect
Production site (n=12)

Fixed effects
Season (n=5)
Age class (n=3)
Number of collects in 15d (n=4)

Covariates
Delay between collects
Age at collection (intra age class)

Mean predicted sperm production for each sire

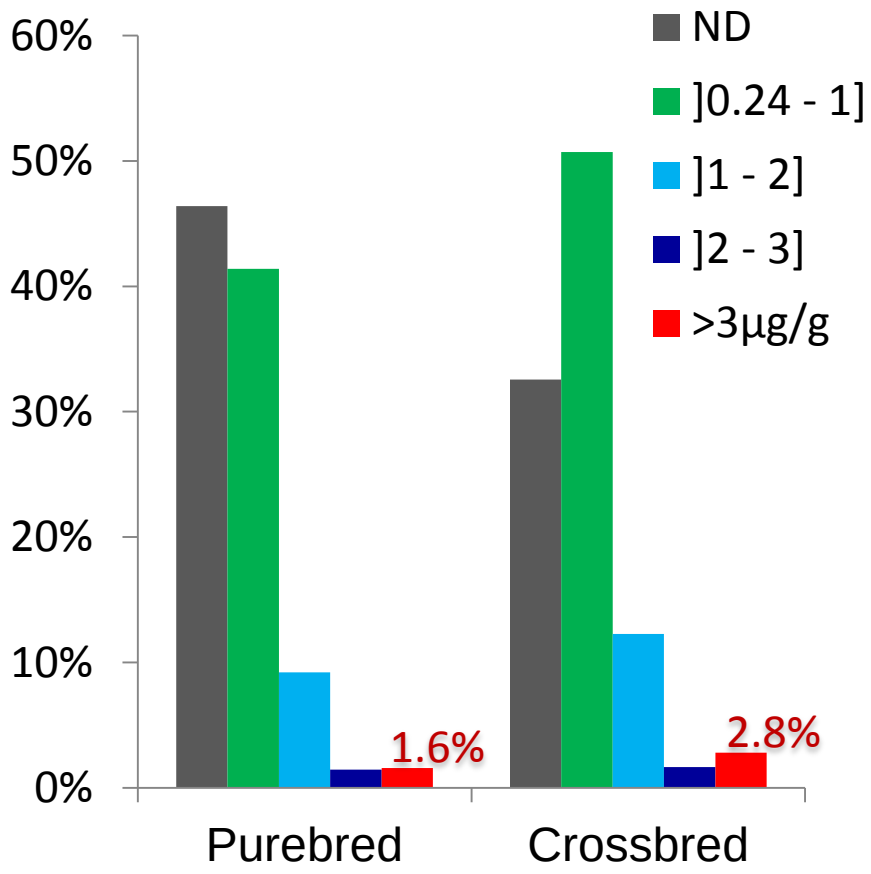
Relation?

Boar taint risk of offspring

Low boar taint odor risk as a whole

Total : 1 544 animals

ANDROSTENONE



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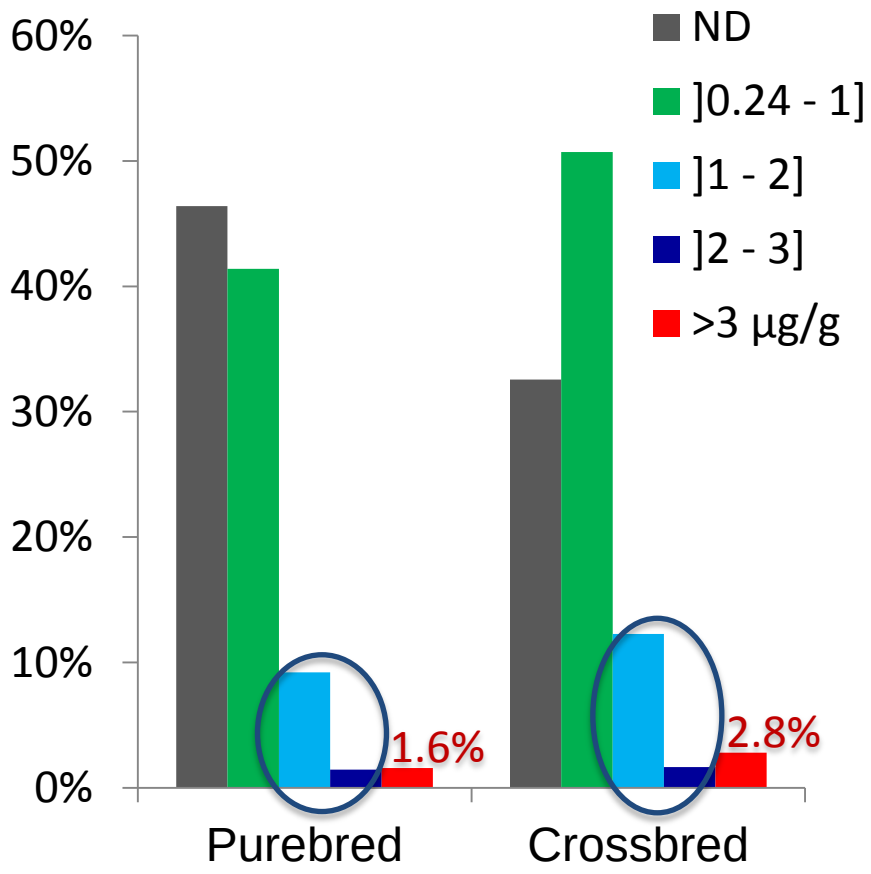

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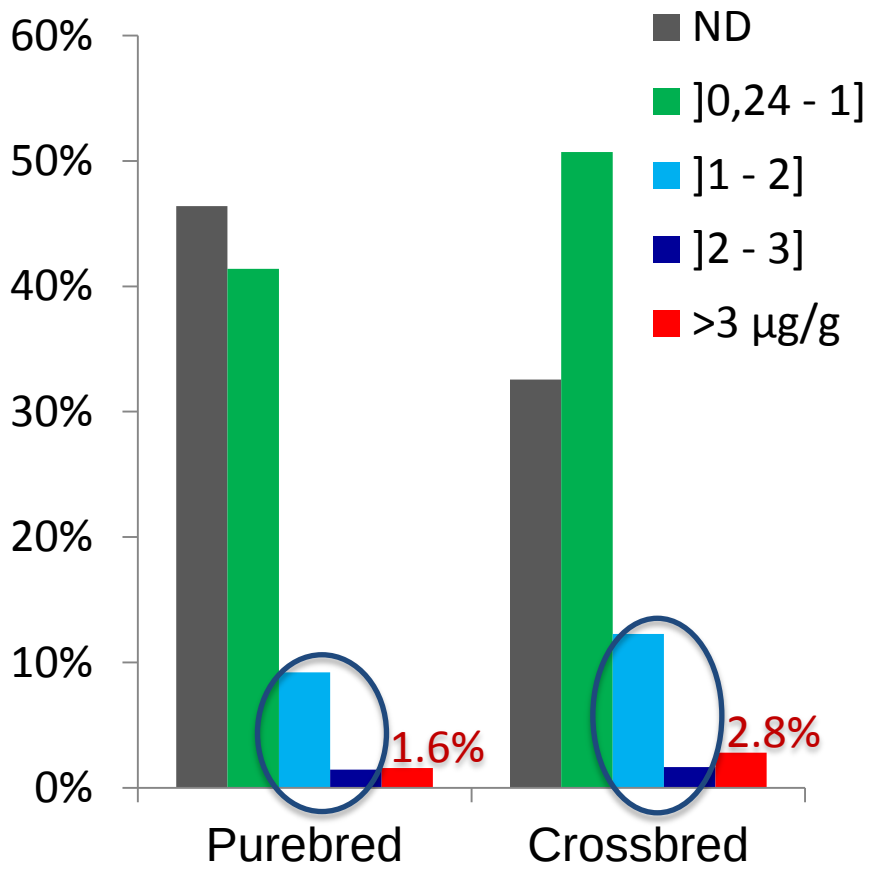


SKATOLE

- Less than 4% > 0.2 µg/g

Global risk

- Global risk=0 **Free of odor**

  Androstenone < 1 µg/g

  and skatole < 0.2 µg/g

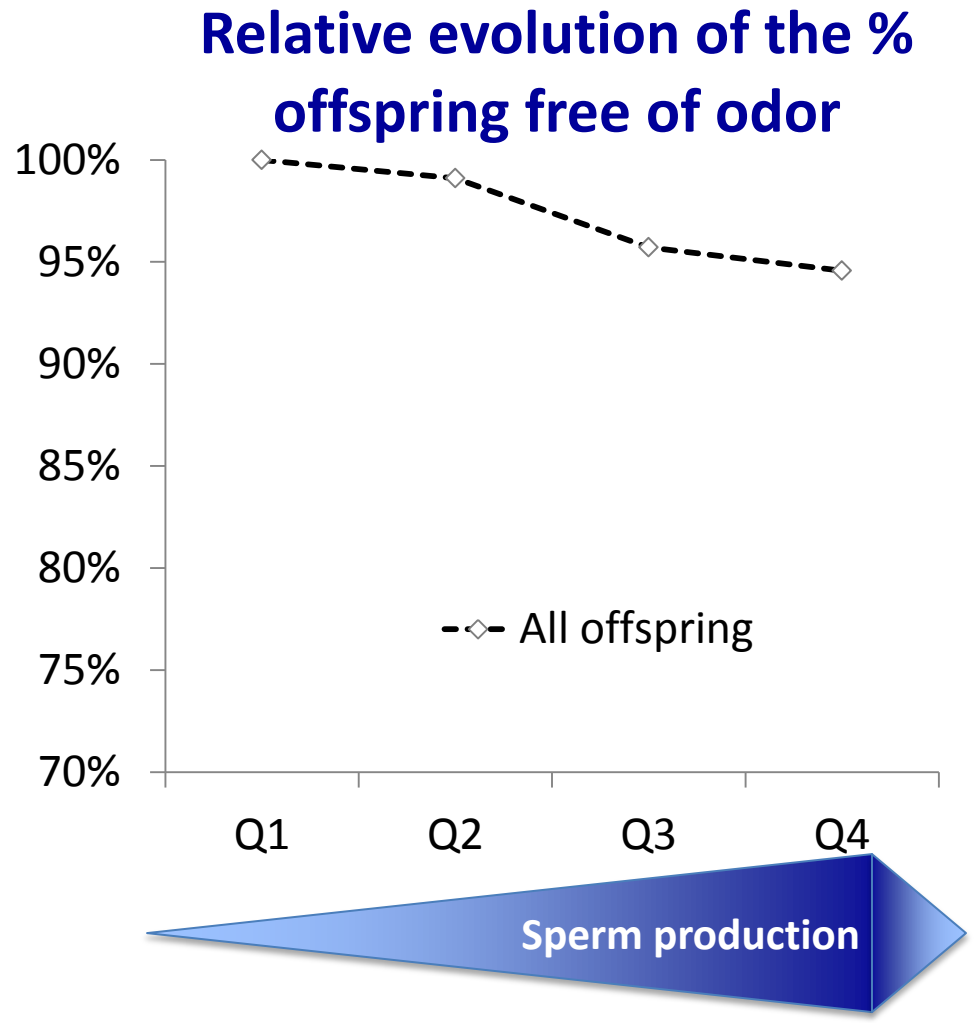
- Global risk≠0 **Potential risk**

  Androstenone ≥ 1 µg/g

  and skatole ≥ 0.2 µg/g

Percentage of odor free offspring (Global Risk=0) as a function of sperm production

- Quartile ranking of the AIC boars / their mean predicted sperm production
  - V1 variety boars



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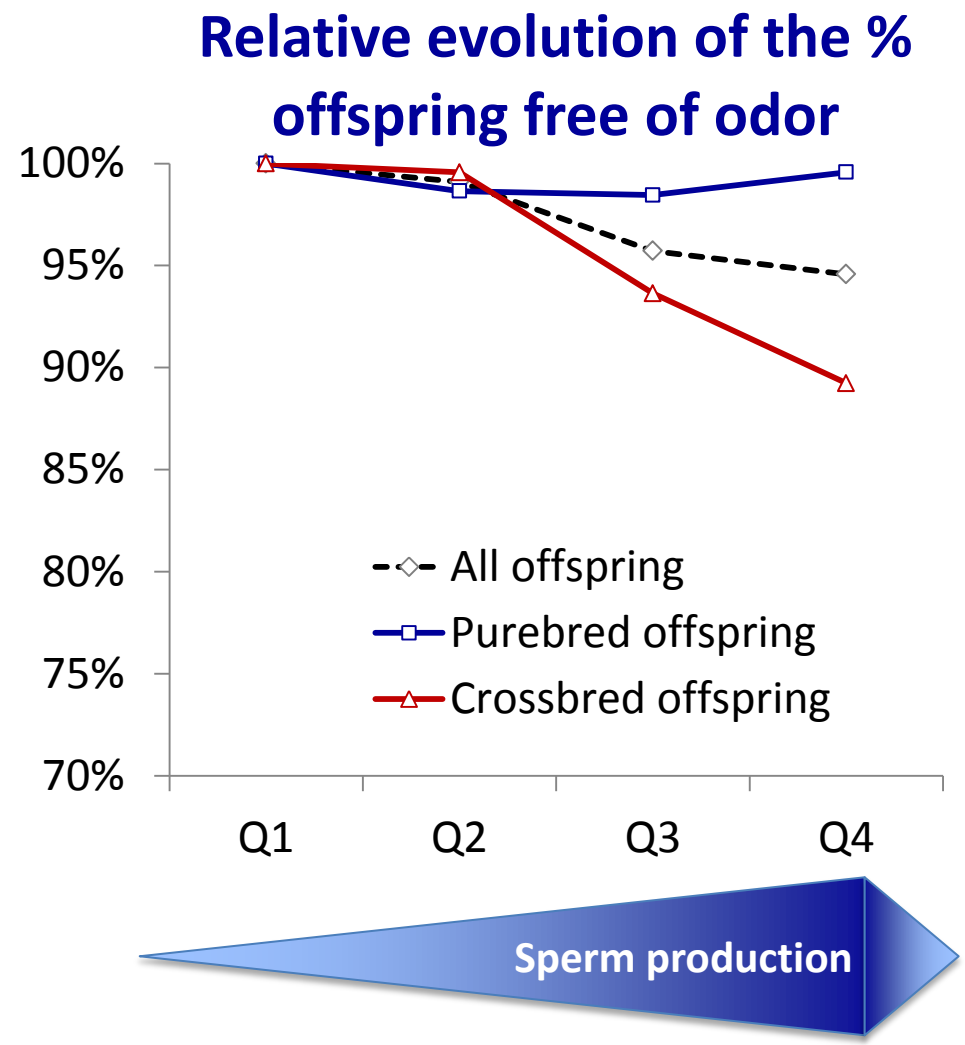
- Quartile ranking of the AIC boars / their mean predicted sperm production
  - V1 variety boars
    - Crossbred Q4-Q1
      -10% odor free
    - Significant Khi-2



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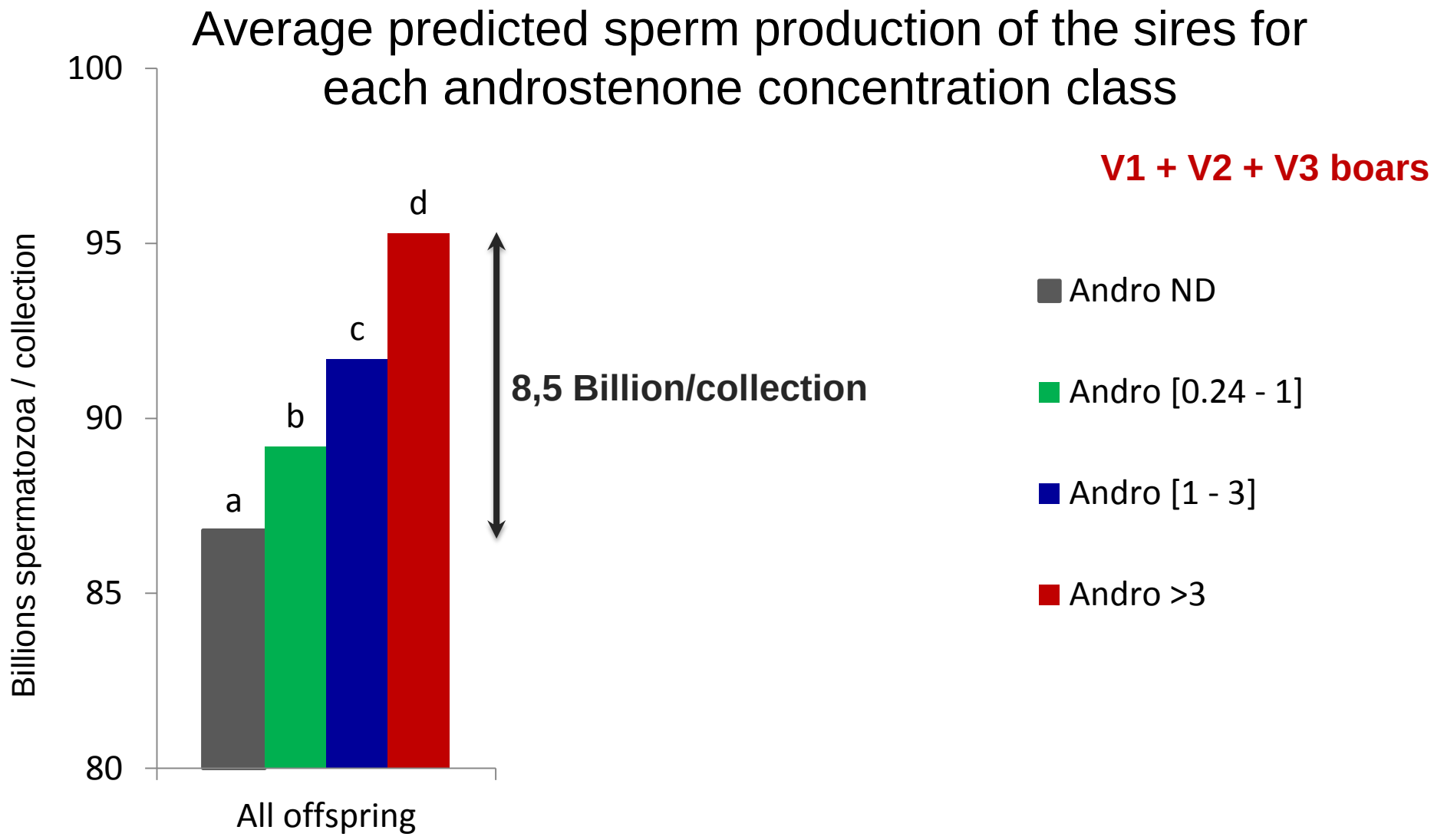
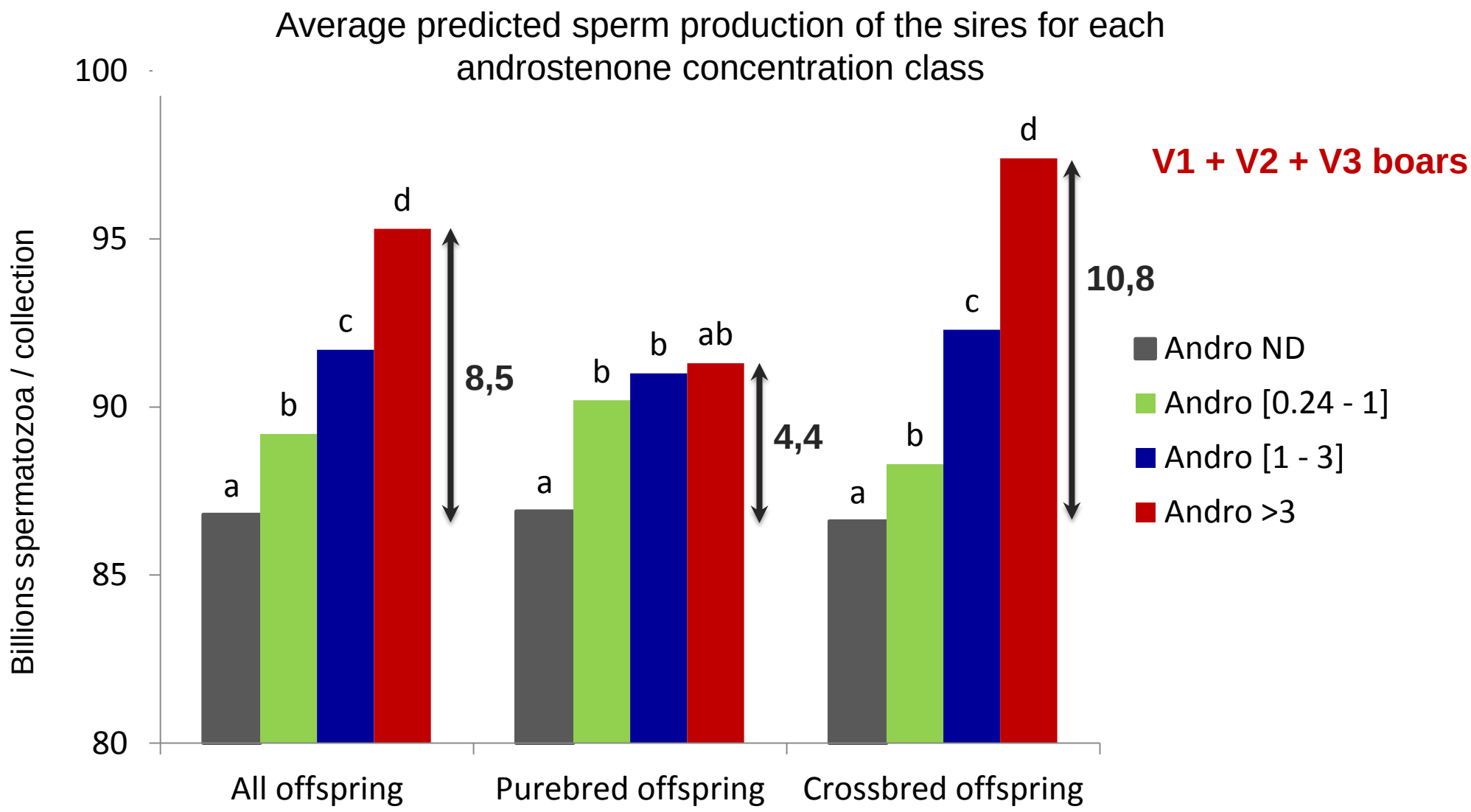
    - Significant Khi-2
  - Three Pietrain varieties
    - Same trends
    - Greater differences
    - Crossbred Q4-Q1 -25% odor free
  - V2 and V3 Pietrain varieties alone
    - Non significant Khi-2: lack of power?

Average sperm production of the sires per androstenone class



Average sperm production of the sires per androstenone class



Conclusions

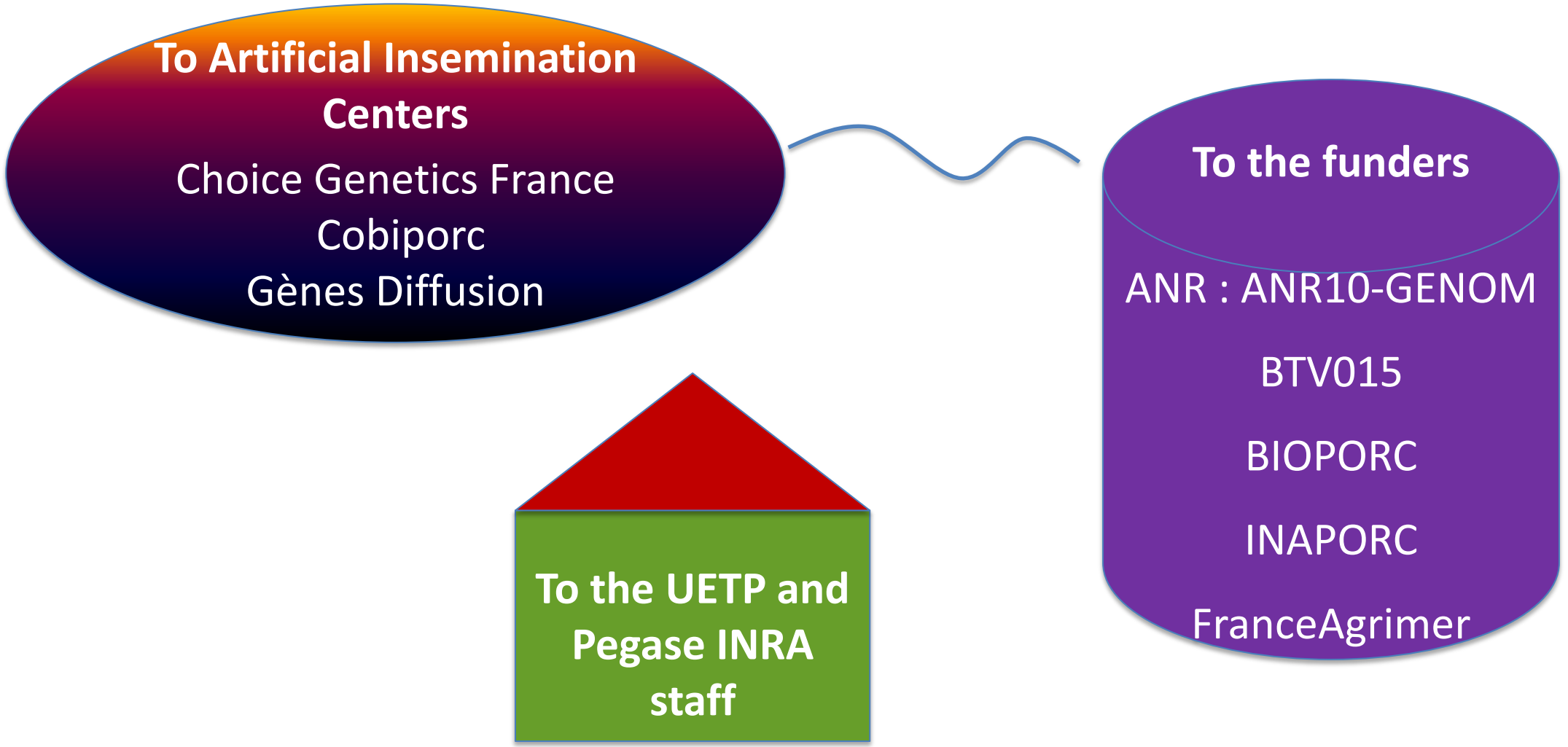
- In an experiment with a low boar taint risk as a whole
- A relation between sperm production of the sires and the risk of odor of the offspring has been shown
  - Sires with higher sperm productivity have less offspring free of boar taint odor than sires with lower sperm productivity
  - Sires of offspring with high androstenone contents produce more spermatozoa than sires of offspring with low or undetectable contents

Conclusions

- Relation found with the 3 Pietrain varieties and with the V1 alone
  - But not with V2 et V3 Pietrain varieties alone (smaller sample size)
- Effects are more pronounced on crossbred offspring than on purebred offspring

- Selection against odorous compounds might negatively impact boar sperm production if reproduction traits are not included in the breeding goal
  - In some populations like the V1 Pietrain variety
- We will go on studying the link between boar taint and sperm production in the frame of a new research program

Acknowledgments



Thank you for your attention

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