Estimation of economical impact of chromosomes translocation on pig production
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• Chromosomal rearrangements.
• Reciprocal translocations.
• Detection.
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• Conclusions
Chromosomal rearrangements
Chromosomal rearrangements

Classification:

Numeric abnormalities:

Structural abnormalities:

- Deletions
- Duplicities
- Inversions
- Translocations

Robertsonian Translocations

Reciprocal Translocations
Reciprocal Translocations. Characteristics

- Interchange of chromosomal segments
- Balanced abnormality, with no losses of genetic material.
- No phenotype alternations.
- Increase the risk of appearance of unbalanced gametes.
- Generates reproductive problems.
- No alternations in ejaculates quality.
Reciprocal Translocations.
Reciprocal Translocations.

Influence on:

- Gametogenesis

- Embryos mortality: prolificity and fertility.
Gametogenesis.

Carrier animal

Meiosis

Recombination
Segregation (2:2; 3:1; 4:0)

Gametes

Normal Gametes

Gametes with balanced translocation

Unbalanced Gametes
Reciprocal Translocations

Embrions mortality: Prolificity and Fertility

- Normal Gamete
  - Normal Embryo
    - Viable

- Balanced Gamete
  - Translocated Balanced Embryo
    - Viable*

- Unbalanced Gamete
  - Unbalanced Embryo
    - Non Viable**

* Viable but carrier of translocations
** Non viable or deformed
Unbalanced Embryos:

- Uncorrect implantation
- Embryo deformity
- Embryo degeneration

EMBRYONARY DEATH

Embrionary death \(\downarrow\) Litter size
Pigs: < 4 Viable embryos \(\rightarrow\) Return estrus

PROLIFICITY ALTERNATION
FERTILITY ALTERNATION
Economical impact of chromosomes translocation on pig production

Detection
Detection

Karyotype Analysis

Metaphase

Classification
Normal Karyotype

RT 1q- ; 11p+

Karyotype Analysis perform by INIA - Department of Animal Reproduction

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Economical impact of chromosomes translocation on pig production

Estimation of Economical Impact
## Estimation of Economical Impact

<table>
<thead>
<tr>
<th>HIPOTESIS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolificity decreases</td>
<td>- 20 %</td>
</tr>
<tr>
<td>Normal Fertility</td>
<td>85 %</td>
</tr>
<tr>
<td>RT Fertility</td>
<td>80 %</td>
</tr>
<tr>
<td>Doses / A.I</td>
<td>2.5</td>
</tr>
<tr>
<td>Litter</td>
<td>50 % boars ; 50 gilts</td>
</tr>
<tr>
<td>% Selection of boars</td>
<td>30 %</td>
</tr>
<tr>
<td>Terminal Boar Price</td>
<td>1,000,00 €</td>
</tr>
<tr>
<td>Piglet Price</td>
<td>35,00 €</td>
</tr>
</tbody>
</table>
Estimation of Economical Impact:

**DAM LINE: GP FEMALE**

Non significant impact. There is no selection of animals with low prolificity. BLUP, EBV System

**DAM LINE: GP MALE**

Non significant impact. There is no selection of animals with low prolificity. BLUP, EBV System.
## Estimation of Economical Impact: SIRE LINE: GP Sow

<table>
<thead>
<tr>
<th></th>
<th>GP Normal</th>
<th>GP rt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piglets / productive life</td>
<td>60</td>
<td>48</td>
</tr>
<tr>
<td>Boars / productive life</td>
<td>30</td>
<td>24</td>
</tr>
<tr>
<td>Selected boars / prod. life</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>€ (1000 € / boar)</td>
<td>9,000</td>
<td>7,000</td>
</tr>
<tr>
<td>Difference</td>
<td></td>
<td>-2,000</td>
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</tbody>
</table>
## Estimation of Economical Impact

### SIRE LINE: GP Boar

<table>
<thead>
<tr>
<th></th>
<th>GP Normal</th>
<th>GP rt</th>
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</thead>
<tbody>
<tr>
<td>Doses/ Year</td>
<td>1.500</td>
<td>1.500</td>
</tr>
<tr>
<td># A.I.</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>Farrowings</td>
<td>510</td>
<td>480</td>
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<tr>
<td>Piglets</td>
<td>5.100</td>
<td>3.840</td>
</tr>
<tr>
<td>Boars</td>
<td>2.550</td>
<td>1.920</td>
</tr>
<tr>
<td>Selected Boars</td>
<td>765</td>
<td>594</td>
</tr>
<tr>
<td>€</td>
<td>765.000</td>
<td>594.000</td>
</tr>
<tr>
<td>Difference</td>
<td>-171.000*</td>
<td></td>
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</tbody>
</table>
Estimation of Economical Impact

<table>
<thead>
<tr>
<th></th>
<th>Terminal Boar</th>
<th>T. Boar RT</th>
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</thead>
<tbody>
<tr>
<td>Doses / Year</td>
<td>1.750</td>
<td>1.750</td>
</tr>
<tr>
<td># A.I.</td>
<td>700</td>
<td>700</td>
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<tr>
<td>Farrowings</td>
<td>595</td>
<td>525</td>
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<tr>
<td>Piglets</td>
<td>5.950</td>
<td>3.150</td>
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<tr>
<td>€</td>
<td>208,250</td>
<td>110,250</td>
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<tr>
<td>Difference</td>
<td></td>
<td><strong>- 98,000</strong></td>
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</table>
Conclusions
Conclusions

Presence of carrier animals with reciprocal translocations is low: 0.5 – 1% of population

Presence of animal with RT causes a decrease of prolificacy 40% average (5 – 100 %)

Detection is carried out by Karyotype Analysis.

Lack of detection on time may cause important economical losses.

Routine practices like elimination of hypo-productive animals and the application of heterospermic insemination, reduce negative effects of possible presence of carrier RT animals.