Performance of rabbit does and litters kept collectively with different management systems or individually

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Group housing in commercial rabbits (European Parliament, 2017):

- Social interactions & increased space
- Animal-friendly systems demanded by public opinion

In reproducing females... Continuous-group systems!!!

- Injuries and chronic stress
- Impaired doe & litter productive performance

Szendrő & McNitt (2012), Hoy & Matics (2016), Szendrő et al. (2016)
Background

- **Semi-group (part-time) housing:**
  - Isolation from 1-3 d before to 12-18 d after kindling
  - Better performance than continuous systems (Szendrő et al., 2016)
  - Few studies vs. individual cages with heterogeneous results

- **... AGGRESSION at re-grouping is not solved...**
  - Several strategies (hiding places, straw, territory, sprayed odours, etc.)
  - ...without success
    - (Andrist et al., 2012; Rommers et al., 2014; Buijs et al., 2015; Gerencsér et al., 2018)
Objective

To assess the effects of housing (individual vs. part-time) and group management on doe and kit performance throughout one reproductive cycle.
Material and Methods

- Farm of the University of Padova

- Animals: 60 crossbred multiparous pregnant rabbit does

- Housing:
  a) 12 Individual pens (0.5 m²; 0.5 m width x 1.0 m length); 12 does
  b) 12 Collective pens (2 m²; 4 contiguous pens); 48 does
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- Plastic-slatted floor
- Feeder
- Automatic nipple drinker
- Removable nest box
- Controlled lactation (19 d)
Group management outline

Kindling (0 d)  Weaning (33 d)

Pregnancy

-8 d to -2 d  -2 d to +2 d  +2 d to +33 d

Group housing  Individual  Group housing

Individual  Group housing

-2 d to +12 d  +12 d to +33 d

Early re-grouping (E, 6 pens)  Late re-grouping (L, 6 pens)

Stable (6 pens: 3 E & 3L)  Variable (6 pens: 3 E & 3L)
Performance recordings

☑ Doe performance at kindling and during the cycle:
  • Number and weight of total kits and kits born alive
  • Doe body weight, milk production and feed intake

☑ Litter and kit performance from standardization until weaning:
  • Litter size and weight, litter weight gain and individual kit weight
Statistical analysis

SAS software (2013)

1) With all data:
   - PROC MIXED
   - Model: Housing system + Pen (random)

2) With collective data:
   - PROC MIXED
   - Model: Re-grouping time + Group composition + Interactions + Pen (random)
### Results: Housing system

<table>
<thead>
<tr>
<th>Doe performance</th>
<th>Individual</th>
<th>Collective</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litter size (born alive) (n)</td>
<td>11.3</td>
<td>11.7</td>
<td>n.s.</td>
</tr>
<tr>
<td>Litter weight (born alive) (g)</td>
<td>652</td>
<td>693</td>
<td>n.s.</td>
</tr>
<tr>
<td>Doe weight (at weaning) (g)</td>
<td>4572</td>
<td>4428</td>
<td>n.s.</td>
</tr>
<tr>
<td>Milk production 3-12 d (g/d)</td>
<td>226</td>
<td>209</td>
<td>0.08</td>
</tr>
<tr>
<td>Milk production 12-19 d (g/d)</td>
<td>307</td>
<td>288</td>
<td>n.s.</td>
</tr>
<tr>
<td>Feed intake 3-19 d (g/d)</td>
<td>398</td>
<td>380</td>
<td>n.s.</td>
</tr>
<tr>
<td>Feed intake 19-33 d (g/d)</td>
<td>712</td>
<td>655</td>
<td>0.01</td>
</tr>
</tbody>
</table>
## Results: Housing system

<table>
<thead>
<tr>
<th>Kit performance</th>
<th>Individual</th>
<th>Collective</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litter weight gain 3-19 d</td>
<td>142</td>
<td>131</td>
<td>0.05</td>
</tr>
<tr>
<td>Litter size at 19 d, n</td>
<td>9.0</td>
<td>8.9</td>
<td>n.s.</td>
</tr>
<tr>
<td>Litter weight at 19 d, g</td>
<td>2914</td>
<td>2741</td>
<td>0.08</td>
</tr>
<tr>
<td>Litter weight gain 19-33 d</td>
<td>357</td>
<td>324</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Litter size at 33 d, n</td>
<td>8.9</td>
<td>8.8</td>
<td>n.s.</td>
</tr>
<tr>
<td>Litter weight at 33 d, g</td>
<td>7916</td>
<td>7281</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Weaned kits at 33 d, n</td>
<td>8.8</td>
<td>8.9</td>
<td>n.s.</td>
</tr>
<tr>
<td>Weaned kits at 33 d, g</td>
<td>887</td>
<td>864</td>
<td>n.s.</td>
</tr>
</tbody>
</table>
## Results: Group management

<table>
<thead>
<tr>
<th>Doe &amp; kit performance</th>
<th>Early (2 d)</th>
<th>Late (12 d)</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk production 3-12 d (g/d)</td>
<td>204</td>
<td>214</td>
<td>n.s.</td>
</tr>
<tr>
<td>Milk production 12-19 d (g/d)</td>
<td>289</td>
<td>291</td>
<td>n.s.</td>
</tr>
<tr>
<td>Weaned kits at 33 d, n</td>
<td>8.8</td>
<td>8.8</td>
<td>n.s.</td>
</tr>
<tr>
<td>Weaned kits at 33 d, g</td>
<td>847</td>
<td>851</td>
<td>n.s.</td>
</tr>
</tbody>
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## Results: Group management

### Doe & kit performance

<table>
<thead>
<tr>
<th></th>
<th>Stable</th>
<th>Variable</th>
<th>P</th>
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<tr>
<td>Milk production 3-12 d (g/d)</td>
<td>213</td>
<td>205</td>
<td>n.s.</td>
</tr>
<tr>
<td>Milk production 12-19 d (g/d)</td>
<td>300</td>
<td>280</td>
<td>n.s.</td>
</tr>
<tr>
<td>Weaned kits at 33 d, n</td>
<td>8.7</td>
<td>8.8</td>
<td>n.s.</td>
</tr>
<tr>
<td>Weaned kits at 33 d, g</td>
<td>851</td>
<td>829</td>
<td>n.s.</td>
</tr>
</tbody>
</table>
Results: Group management

Interaction re-grouping time × group composition ($P < 0.10$)

Milk production 3-19 d (g/d)

- Early-Stable
- Early-Variable
- Late-Stable
- Late-Variable
Results: Group management

Interaction re-grouping time × group composition ($P < 0.10$)

- No differences at weaning
Conclusions

- Part-time group housing impaired litter performance compared to individual
- Re-grouping time and group composition showed weak effects
- Behavioral data are under analysis, but with present results (limited animal number and one reproductive cycle)

Implementation on commercial farms not yet feasible
Thank you

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