Impact of dietary energy content and feed level on the digestive efficiency in growing rabbit

Christelle KNUDSEN, Sylvie COMBES, Christophe BRIENS, Joël DUPERRAY, Gwenaël REBOURS, Jean-Marc SALAÜN, Angélique TRAVEL, Delphine WEISSMAN et Thierry GIDENNE
Context and objectives in rabbit breeding

- Drug supplementation
- Post weaning digestive troubles
- Mortality
- Growth
- Economic losses

Alternative: Modification of the feeding strategies

- FEED RESTRICTION
  - An interest in health:
    - Mortality
    - Morbidity
  - A better feed efficiency
    - growth
    - slaughter yield

Objective: Optimize the feeding strategies in order to compensate for the reduced growth induced by feed restriction
Our experimental context

Our aim: Optimize the feeding strategies through the use of a high energy diet

Increase the level of ingested dietary energy while maintaining a quantitative restriction.

Evaluate the effects of this diet on fecal digestibility.

48 Animals in individual metabolism cages

2x2 factorial design: 2 feeding levels (*Ad libitum* vs Restricted at 75% of the AL intake)
2 levels of dietary digestible energy (9.08MJ/kg vs 10.13MJ/kg).

### Feeding level

<table>
<thead>
<tr>
<th>Energy</th>
<th>Control (CE) (9.08MJ/kg)</th>
<th>High Energy (HE) (10.13MJ/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad libitum</td>
<td><strong>CE100</strong></td>
<td><strong>HE100</strong></td>
</tr>
<tr>
<td>Restricted</td>
<td><strong>CE75</strong></td>
<td><strong>HE75</strong></td>
</tr>
</tbody>
</table>

### Chemical composition (%)

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>High Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude protein (N X 6.25)</td>
<td>14.7</td>
<td>16.0</td>
</tr>
<tr>
<td>Starch</td>
<td>10.2</td>
<td>11.8</td>
</tr>
<tr>
<td>Crude fat</td>
<td>2.8</td>
<td>3.7</td>
</tr>
<tr>
<td>Crude fiber</td>
<td>17.6</td>
<td>17.1</td>
</tr>
<tr>
<td>Acid detergent fibre (ADF)</td>
<td>22.7</td>
<td>21.8</td>
</tr>
<tr>
<td>Gross energy (MJ/Kg)</td>
<td>16.15</td>
<td>16.57</td>
</tr>
</tbody>
</table>
Experimental protocol

Feed restriction vs *Ad libitum* feeding

**Fecal sample collection over 2 periods**

**Feed restriction:**
- Feed consumption of AL groups monitored from the weaning
- Amount of feed distributed to the restricted animals readjusted according to the feed consumption of the AL groups
Results: Feed intake

First fecal collection (42-46d)
CE75 = 68% CE100
HE75 = 68% HE100

Second fecal collection (70-74d)

**Total period of feed restriction:**
HE < CE * -9%

CE75 = 73% CE100
HE75 = 74% HE100

**AL feeding period:**
HE < CE *** -10%
75 > 100 *** +12%

CE75 = 110% CE100
HE75 = 114% HE100
Results: Digestibility during feed restriction (42-46d of age)

- **Organic matter**
  - CE100: +6.1pts
  - CE75: +5.3pts
  - HE100: +2.6pts
  - HE75: +3.8pts

- **Crude protein**
  - CE100: +4.7pts
  - CE75: +5.4pts
  - HE100: +3.8pts
  - HE75: +5.4pts
Results: Digestibility during feed restriction (42-46d of age)

Energy digestibility

Dietary digestible energy levels:
- CE100: 9.09MJ/kg
- CE75: 9.54MJ/kg
- HE100: 10.24MJ/kg
- HE75: 11.14MJ/kg

No energy pair-feeding of CE100 and HE75 animals
Results: Digestibility during feed restriction (42-46d of age)

During feed restriction: High energy > Control and 75 > 100 for all measured nutrients (***)
Effect of feed restriction increased in HE group (interaction between feeding level and diet) for all measured nutrients except crude protein and NDF.
Results: Digestibility when returning AL (70-74d of age)\textsuperscript{8}

### Organic matter

- **NS** +5.0 pts

### Crude Protein

- **NS** +3.4 pts
When returning to AL feeding: HE > CE BUT no effect of previous feeding level

Quick adaptation of the animals to a new feeding level
Conclusions and perspectives of our study

Digestibility ↗ with the use of a high energy diet regardless of the feeding level:
+6.1 for OM, +4.7 for proteins, +6.1 for ADF

Digestibility ↗ by feed restriction +3.8 for OM, +5.4 for proteins, +5.9 for ADF
BUT fast adaptation to an Ad libitum feeding

Effect of feed restriction increased with a high energy feed for OM, Energy and ADF.

What’s next?
- Measurements of dietary DE for the Ad libitum period
- Correlation with growth, health and slaughter yield parameters.
- Correlation with caecal characteristics (pH, VFA, NH3, microbiota,...)
Thank you for your attention

And thank you to my team and scientific partners

Particularly: Patrick AYMARD, Elodie BALMISSE, Carole BANNELIER, Jean-Marie BONNEMERE, Anne-Marie DEBRUSSE, David LABATUT, Lilian LELOUTRE, Michel MOULIS, Anne Laure REAU, Sophie REYS and François RICHARD.