Feed restriction reduces IgA levels and modifies the ileal cytokine expressions in growing rabbits

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Health management in rabbit breeding

Drug supplementation

Post weaning digestive troubles

↑ Mortality
↓ Growth

Economic losses

Alternative: Modification of the feeding strategies

↑ Mortality
↓ Growth

FEED RESTRICTION

= Interesting alternative
↓ Mortality
↓ Morbidity
But how does feed restriction actually work?

Reduced quantitative intake

Reduced Energy intake

Was is the trigger?

Gut Microbiota

Immune System

And on what does it act?

Gut Physiology
Our experimental design

2x2 factorial design:

2 feeding levels: *Ad libitum* vs Restricted at 75% of the AL intake (FR)

2 levels of dietary digestible energy: 9.08MJ/kg vs 10.13MJ/kg

<table>
<thead>
<tr>
<th>Energy</th>
<th>Feeding level</th>
<th>Chemical composition (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Energy (LE)</td>
<td><em>Ad libitum</em></td>
<td>Low Energy</td>
</tr>
<tr>
<td></td>
<td>(9.08MJ/kg)</td>
<td>14.7</td>
</tr>
<tr>
<td></td>
<td>Restricted</td>
<td>10.2</td>
</tr>
<tr>
<td>High Energy (HE)</td>
<td><em>Ad libitum</em></td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>(10.13MJ/kg)</td>
<td>17.6</td>
</tr>
<tr>
<td></td>
<td>Restricted</td>
<td>22.7</td>
</tr>
<tr>
<td></td>
<td>Low Energy</td>
<td>9.08</td>
</tr>
<tr>
<td></td>
<td>High Energy</td>
<td></td>
</tr>
</tbody>
</table>
Our experimental design

Samplings and measurements:
- Feces $\rightarrow$ IgA levels
- Blood $\rightarrow$ IgA/IgG/anti-OVA IgG levels
- Ileal tissue $\rightarrow$ Cytokine expression

$\rightarrow$ Evaluation at local and systemic levels
Feed restriction AND energy restriction penalize the secretion of fecal IgA

But which is most important? Quantity or quality of the diet?
Local immunity: Total fecal IgA levels

The reduction in fecal IgA levels follows the reduction in digestible energy intake
Cytokine expression in the ileum

Moderate effect of feed restriction on the ileal cytokine expressions
And at the systemic level?

Total plasmatic IgA levels

- Plasmatic response delayed in time compared to the gut immune response
And at the systemic level?

**Plasmatic IgG levels**

- No effect of our treatments on the total plasmatic IgG levels

But...

**Anti OVA IgG levels**

- Reduced vaccinal response with feed restriction
- Immunological memory could be compromised by feed restriction
Conclusions and perspectives

1/ Fecal IgA levels are highly correlated to the digestible energy intake
2/ Plasmatic response to FR and dietary energy content is delayed in time compared to the gut immune response
3/ Immunological memory seems compromised by feed restriction
4/ Feed restriction only moderately modulates the inflammatory response

What’s next?

- How can we correlate these apparent negative effects on the immune system with the beneficial effects of FR upon health?

- Can we link the changes in immune response to changed in gut flora?
Thank you for your attention

And thank you to my team and scientific partners

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