Valuing leftover streams through livestock: impact of livestock system and productivity

O. van Hal¹, H.H.E. van Zanten¹, C. Schader², A. Muller² W.J.J. Gerrits³, S. de Vries³ and I.J.M. de Boer¹

¹Animal Production Systems group, ²Research institute of Organic Agriculture (FiBL), ³Animal Nutrition group

Background

- Livestock can contribute to global nutrition security by converting leftover streams* into animal sourced food
- Not all leftover streams (waste) are currently allowed to be fed to livestock
- Converting low quality leftover streams requires low productive animals

Objective

Identify the combination of livestock systems and productivity levels that optimally convert leftover streams into animal protein.

Methodology

Optimisation model:

- Maximise animal protein output
- Feeding only leftover streams available in EU28
- Using 5 livestock systems with 3 productivity levels.

Results

<table>
<thead>
<tr>
<th>Production Restrictions</th>
<th>Total</th>
<th>Milk</th>
<th>Meat</th>
<th>Pork</th>
<th>Poultry</th>
<th>Bovine</th>
<th>Eggs</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>39</td>
<td>32</td>
<td>6</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Simple</td>
<td>33</td>
<td>12</td>
<td>18</td>
<td>2</td>
<td>5</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Complex</td>
<td>26</td>
<td>11</td>
<td>12</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Animal protein production

None restrictions

39 g/cap/day, mostly from dairy production, high compared to previous studies (7 - 31 g/cap/day), due to:

- High assumed availability of leftover streams
- Inclusion of grassland situated on arable land

Simple or Complex restrictions

Reduced to 33 and 26 g/cap/day due to:

- Use of less efficient livestock systems
- Part of grass unused to meet production restrictions

Essential nutrient provision

None restrictions

69% of daily recommended intake of protein

>100% of daily recommended intake vitamin B12 and calcium

Simple or Complex restrictions

Zinc and iron provision increase under Simple restrictions

All other nutrient provision reduced

Food waste utilisation

Food waste utilisation is of major influence when aiming to maintain consumption patterns

Societal impact of my research

- Reduced consumption of animal source food and changed farming practices are needed to feed the growing world population.
- Legalisation of feeding food waste is needed to produce resource efficient monogastric livestock.

Conclusions

Optimal use of leftover streams fulfils 2/3 of our need for protein, but requires a shift towards lower productive dairy cattle.

Maintaining consumption patterns reduces availability of protein.

Scenarios:

- Production restrictions to meet current consumption pattern
  - None: no restrictions
  - Simple: restrictions to the amount of meat, milk and eggs
  - Complex: additional restrictions on meat origin
  - Food waste utilisation as feed (0-100%)

Contact: olie.vanhal@wur.nl
+ 31 (0)317 484626

*Leftover streams are defined as products unsuitable or undesired for human consumption