Assessing the global biodiversity impact of livestock production

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The global impact of livestock production on biodiversity

**Why** measuring it?

- Livestock have a strong influence on biodiversity
Introduction

The global impact of livestock production on biodiversity

How to measure it?

• LCA Framework

Modeled (linear) relationships

• Indicator Framework

Livestock production

Pressures on biodiversity

State of Biodiversity
Introduction

The global impact of livestock production on biodiversity

How to measure it?

• LCA Framework

Livestock production → Land use → Mean Species Abundance

LCA model → MSA methodology
### Methods

The Mean Species Abundance (MSA, Alkemade et al. 2009)
- Meta analysis: MSA in disturbed vs. undisturbed situations
- MSA values for different land use/intensities
- Applicable at global scale

<table>
<thead>
<tr>
<th>Arable land</th>
<th>Impact on MSA</th>
<th>Grassland</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>Natural grassland</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
<td>Livestock grazing</td>
</tr>
<tr>
<td>Low input agriculture</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Intensive agriculture</td>
<td>0.9</td>
<td>Man-made pasture</td>
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90% loss of MSA compared to the undisturbed habitat
Methods

- We compute an MSA*km² impact of the livestock feeds.
- The impact is allocated where the feed are consumed.

\[ MSA \times km^2 \text{ impact} = \sum_{lu} Area_{lu} \times MSA \text{ impact}_{lu} \]
Results

Global impact of three production systems on MSA
5.7% of a complete loss of MSA

Maximal impact: MSA = 0 on all the global surface
Results

MSA*km² impact / production

Production in t of proteins
Results

MSA*km² impact / production at regional scale

Production in t of proteins
Results

- Great diversity of systems at the pixel scale
- Efficient systems (○) exist all along the intensity range

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Limitations

**Overestimated**
Positive effects of livestock (e.g., permanent grasslands in Europe) not taken into account

**Inaccurate**
Coarse MSA categories
No MSA difference between global regions

**Underestimated**
Other pressures than land use (nonpoint pollution, CC)
• Consider positive effects of livestock on MSA
• Account for other types of pressures
• Reveal the properties of efficient systems, link to more local scales
• Explore synergies and trade-offs between environmental criteria

Livestock production → Pressures on biodiversity → State of Biodiversity
Thank you

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