Economic impact Assessment of the F2F strategy

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Farm2Fork

- EU “Green Deal”
- SDGs
- Climate Change
- Sustainability
Spaceship Earth: The Carbon Cycle

Source: https://www.nasa.gov/centers/langley/news/researchernews/rn_carboncycle.html
Five major developments: “Clean Meat”

- Animal Welfare
- Environmental Friendly (?)
- Disruptive, but when?
Five major developments: Meat Substitutes

- Taste
- Environment
- Animal Welfare

Redefine meat technology allows to create the complex experience of eating meat - with full control of all cooking properties. Redefine Steak is made from existing, safe, healthy and sustainable ingredients, 0 animals with the closest possible experience to meat.

THE BEYOND BURGER®

BEYOND SAUSAGE®
HOT ITALIAN

BEYOND BEEF®
CRUMIBLES
BEEFY

BEYOND SAUSAGE®
BRAT ORIGINAL
Five major developments: Insects

![Graphs showing comparisons between mealworms, milk, pig, chicken, and beef in terms of Global Warming Potential, energy use, land use, and water use.](image)

**Fig. 10.8** GWP, energy, and land use for the production of 1 kg of protein from mealworms (*T. molitor* and *Z. morio*), milk, and traditional meat sources. WF per unit of protein (L/g) was obtained by dividing the WF per edible ton (m³/t) of mealworm (4341), pig meat (5988), chicken meat (4325), and beef (15,415) by the amount of proteins (g/edible kg) based on Mekonnen and Hoekstra data (2010).

Source: Akhtar and Isman (2018).
Five major developments: Aquaculture

- Salt
- Coastal Protection
- Food Safety
Five major developments: Vertical Farming

- LED - Lightning
- Less pollution
New Opportunities for Agriculture?
Advances in biological sciences

Current and expected integration across biotechnology application (size of arrows indicate quantities)
Regulatory Implications: Model

- Four phases: R&D, Approval, Marketing, Ex-post Liability

- Effect of Regulation on Immediate Investment

Purnhagen and Wesseler (2019).
Policy Environment Important!

- Example: NPBTs
- CJEU decision

Ratio of Benefits over Investment Costs (Hurdle Rate) Justifying Immediate Investment in Gene Editing Technologies

### Table 1. Hurdle rates for different parameter values

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<th>$E(k_1)$</th>
<th>10</th>
<th>5</th>
<th>2.5</th>
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<td>Hurdle rate</td>
<td>14.59</td>
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<table>
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<td>14.59</td>
<td>10.70</td>
<td>8.76</td>
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</tbody>
</table>

Hurdle rate zero approval costs

| 8.66 | 4.88 | 2.99 | 1.86 |

The hurdle rates are calculated applying Eqn (6). Other parameter values are fixed at $\mu = 0.04$, $q = 0.5$, $E(k_i) = 10$ if not otherwise.

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Purnhagen and Wesseler (2019).
Challenges

- Timing: research & innovation
- Monitoring: linking biomass and economic flows
- Business models/Supply Chains
Summary

- F2F not new, but more important -> mind set!

- Economic factors important for impact -> opportunity costs!

- Agriculture: changes and new opportunities -> new supply chains

- Policy: R&D, regulation
Many thanks for your attention!
Resources
