

Workshop report on green protein transitions

Deliverable 4.7

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Protein transition: towards sustainable plant-based diets

Description

The Protein transition workshop was organized to discuss the need for a transition from mainly animal proteins towards a diet of largely plant-based proteins to ensure food security, food safety and sustainability. The workshop was part of the Pathways to Sustainability conference as one of the parallel sessions organized together with Future Food Utrecht. In this workshop, three speakers with different backgrounds outlined and discussed with participants various aspects of the complexity surrounding the protein transition.

Presentations

1. Azolla as a sustainable new protein source
2. Understanding the transition to plant-based proteins
3. We need to talk about meat

Program

14.00 – 14.10	Welcome & introduction Future Food Utrecht <i>Rens Voesenek – Chairman Future Food Utrecht</i>
14.10 – 14.25	Azolla as a sustainable new protein source <i>Sjef Smeebens – Professor of Molecular Plant Physiology</i>
14.25 – 14.40	Understanding the transition to plant-based proteins <i>Marko Hekkert – Professor of Dynamics of Innovation Systems</i> <i>Maria Tziva –REINVENT researcher</i>
14.40 – 14.55	We need to talk about meat <i>Denise de Ridder – Professor of Health Psychology</i>
14.55 – 15.30	Interactive discussion with the speakers and the public

Participants

Subscribed	91
Poll	51

Azolla as a sustainable new protein source

Presentation summary

Meat consumption has been rising and is expected to continue to rise in the future, but the production of meat heavily impacts climate change, biodiversity loss, and the nitrogen cycle. Domesticating new fast-growing plants could contribute in reducing this impact. *Azolla* is a particularly promising plant, since its rapid growth is not limited by Nitrogen due to a symbiosis with Nitrogen-fixing cyanobacteria in its leaves. In addition, the protein content is 20% with the profile of essential amino acids being comparable to soybean meal. At present *Azolla* has successfully been included as feed for pigs and laying hens, but its inclusion rate is limited to 15% and 10%, respectively. Increasing the fraction of *Azolla* is challenging because the tannins within the plant reduce the digestibility at higher levels.

To reduce the tannin content, plant genome editing tools such as CRISPR could be used to speed up domestication. The tool has already proven itself by replicating the domestication of tomatoes within months instead of millennia. Additionally, the edits are indistinguishable from natural mutations at the genome level unlike older genetic modification tools. If not restricted by regulations, *Azolla* domestication could provide new possibilities for the biobased economy.

Key discussion

New plant genome editing tools could dramatically expand the range of domesticated food, feed, and material crops. However, the public in the EU has a strong bias against GMO and EU regulations are strict at present. Both of these factors could limit the uptake and development of plant genome editing within the EU.

Plot implications

Public attitudes towards GMO will strongly influence the developmental pathway of techniques such as CRISPR in the EU. If these techniques are allowed to further develop, the EU plant biology industry can unlock many novel domesticated species for use in the food, feed, paper and bioplastics industries. However, restricting plant genome editing in the EU will likely not stop development abroad. This could reduce the competitiveness of EU industries leading to shrinking exports and greater dependency on imports.

Plant-based protein transition

Presentation summary

In the Dutch plant-based meat substitutes industry, innovation processes were triggered by early vegetarians and vegans who first called attention to meat consumption and challenged its appropriateness. Because of their strong notions against meat consumption, they also supported the consumption of meat substitute products. This way, they created markets in which consumers were willing to pay expensive prices for early meat substitutes. Already before the 1990s, they had incentivized a small number of firms to offer a few products based on texturing technologies they had acquired from other sectors.

In the following years, increased awareness regarding the climate, environmental and animal suffering impacts of livestock agriculture led to amplified normative contestation around meat in public discourses. This changed the way meat substitution was understood. As the frame of meat substitution evolved from altruistic and ethical considerations to broader sustainability considerations, it resonated with more actor groups and organizations. Accordingly, more actors supported plant-based meat substitutes.

As a result, this led to an increasing availability of financial resources for R&D and a growing market. In turn, it led to increasing experimentation. Firms introduced higher quality products in the market. Renewed supply and marketing reinforced consumer demand further. By 2015, the plant-based meat substitutes industry was experiencing unprecedented growth. It was becoming closely tied to the food sector and there was an increasing trend of incumbents acquiring meat substitute firms.

Overall, these developments highlight the important role of cognitive and normative legitimacy and political activities in the establishment and expansion of innovations. It was through the support of a diverse group of actors that a new norm could emerge of meat substitution with plant-based meat substitutes.

Key discussion

The characteristics of a product determine to an extent if the product uptake can develop as a novel innovation. As established products, beans and lentils are unlikely to follow a similar trajectory as plant-based meat substitutes. However, if a novel way is found to access or simplify lentils and beans, this innovation could be influenced by factors similar to substitutes.

Plot implications

Depending on the assumed cognitive and normative legitimacy combined with certain political activities, certain innovations will follow develop faster and have a higher market penetration while others will fail to be adopted by the majority. Different plots can have different assumptions for innovations in all sectors.

Talking about meat

Presentation summary

Meat consumption appears to be a paradox; people can love animals while at the same time kill and consume them. Eliminating meat consumption could solve this dilemma, but attempts to convince people to reduce meat consumption based on moral principles (i.e. eating meat is evil) can be experienced as coercion or manipulation. This standpoint of moral superiority can result in a backlash from meat eaters. For example, meat eaters are more likely to be annoyed by vegetarians than believe eating meat is unethical compared to vegetarians that dislike the taste of meat. Moralizing could even lead to reinforced feelings of having the right to eat meat.

However, eliminating meat consumption may not be necessary from an environmental impact perspective. In the past decades, meat consumption has doubled. Instead of focusing on eliminating meat, reducing meat consumption rates to levels similar to several decades ago would likely be met with less resistance.

One possibility is to give people opportunities to make decisions based on empathy towards other people instead of feelings of shame or guilt. Such contemplations could particularly focus on the benefits for the next generations, but it also implies that the autonomous decision making of individuals is respected. In particular, the desire to eat meat products should be acknowledged. This desire could be accommodated through plant-based and cultured meat products. These products could prove to be low barrier options that can overcome ignorance, inertia, lack of willpower or feelings of uneasiness towards reducing meat consumption.

Key discussion

Focusing on meat being unethical may lead to deep divisions within society which could limit the consumption shifts necessary to reduce environmental impacts. However, moralizing has also resulted in successfully shifting the moral perspective on practices such as slavery.

Plot implications

Large-scale demand reduction implies a high level of cohesion within society, particularly for consumer goods. Conversely, significantly changing demand may be unfeasible in a more divided society. As a result, the maximum impact and the annual rate changes will differ depending on whether societal cohesion leads to the successful implementation of demand reduction strategies.