

Future needs for protein

Recommendations from the Danish Bioeconomy Panel

Det Nationale

BIOØKONOMI

Panel

How is Denmark becoming a frontrunner for bioeconomy?



The global protein challenge

Paris Climate Agreement: $< 2,0^{\circ}\text{C}$

Agriculture crops and cattle ranching drives deforestation, which is associated with the climate change problem

Production of soy outside the EU is associated with sustainability issues

Agriculture production has negative ecosystem effects

How to feed more than 9 billion people in 2050 in a sustainable way?

Increased demand for feed and food proteins

The market response

Demand for "locally" produced protein sources for feed,

In particular for market segments demanding non-GM and/or organic feed (dairy and aquaculture are first movers).

Meat consumption is decreasing in some countries and demand for new plant based proteins is increasing.

The EU protein plan is highly relevant

Comparative advantages for agricultural production - simplistic

Starch



Proteins

Protein

Denmark/North-/Middle-europe*

Demand, Non-GM-protein, more "locally produced" sustainable protein supply

The organic sector

Environment and climate – targeted environment regulation, meeting the climate goals.

Interesting production possibilities – better utilization of bi-flows, alternatives for fallow areas.


Research and development areas

Strengthening and prioritizing

Ministry of Food and Environment, other ministries, universities, food sector , feed sector and the agri-business at farm level are strong partners in the field.

Roadmap for preventing deforestation

Pub. Access 2018/0516/202 - 19/12/2018

 European Commission	
ROADMAP	
<small>Roadmaps aim to inform citizens and stakeholders about the Commission's work in order to allow them to provide feedback and to participate effectively in future consultation activities. Citizens and stakeholders are in particular invited to provide views on the Commission's understanding of the problem and possible solutions and to make available any relevant information that they may have.</small>	
TITLE OF THE INITIATIVE	Communication on stepping up EU Action against Deforestation and Forest Degradation
LEAD DG – RESPONSIBLE UNIT	DG ENVIRONMENT – Unit F3 Multilateral Environmental Cooperation CO-LEAD : DG DEVCO – Unit C2 - Environment, Natural Resources, Water DG AGRI – Unit D4 - Environment, climate change, forestry and bio-economy
LIKELY TYPE OF INITIATIVE	Communication
INDICATIVE PLANNING	Q2 2019
ADDITIONAL INFORMATION	http://ec.europa.eu/environment/forests/deforestation.htm
<small>This Roadmap is provided for information purposes only and its content might change. It does not prejudice the final decision of the Commission on whether this initiative will be pursued or on its final content. All elements of the initiative described by the Roadmap, including its timing, are subject to change.</small>	
A. Context, Problem definition and Subsidiarity Check	
Context	
<p>The problem of deforestation and forest degradation has already been highlighted in the 2008 Commission Communication on deforestation and forest degradation¹. The idea of an EU initiative against deforestation and forest degradation was mooted in 2013 in both the new EU Forest Strategy for forests and the forest-based sector and the 7th Environment Action Programme. The initiative is a response to the persistence of the issue of global deforestation and the increasing awareness of the link between deforestation and agricultural expansion. The EU, as a major importer of agricultural commodities, is part of the problem but can also be part of the solution. The initiative is also a response to some of the findings of the Forest Law Enforcement, Governance and Trade (FLEGT)² Action Plan evaluation of 2016 and the Council conclusions of 2016 on FLEGT, as well as repeated calls from the European Parliament³ to take action.</p> <p>The initiative directly contributes to the objectives of the 2008 Communication on deforestation to support "the aims of halting global forest cover loss by 2030 at the latest and of reducing gross tropical deforestation by at least 50% by 2020 compared to 2008 levels". Among others, the initiative also complements the 'Reducing carbon Emissions from Deforestation and forest Degradation' (REDD+) process. It also contributes to the 2015 "Trade for all" Communication on responsible supply chains, a concept strongly supported by the Council in its 2016 conclusions on the EU and Responsible Global Value Chains. In addition, the European Consensus on Development of 2017 promotes sustainable agriculture and food systems that contribute to halting, preventing and reversing deforestation.</p>	

¹ Including related Council conclusions of 4 December 2008 (16852/08).

² The EU FLEGT Action Plan is a key EU initiative that has major potentials for promoting the halting of deforestation and forest degradation. The Plan (AP) has been in place since 2003, and is a key piece in the EU's efforts to combat illegal logging and related trade, thereby contributing to halting deforestation. The plan includes a package of supply-side and demand-side measures across different pillars, including development cooperation support, promoting trade in legal timber, investment and finance, public procurement, support to private sector initiatives, better implementation of existing legislation and conflict timber.

³ For example, the European Parliament resolution on [transparent and accountable management of natural resources in developing countries: the case of forests \(2018/2003\(INI\)\)](#) of 4 July 2018 or the European Parliament [resolution on palm oil and deforestation of rainforests \(2016/2222\(INI\)\)](#) of 4 April 2017.

Selected from the Roadmap

Problem the initiative aims to tackle

According to the FAO 7,6 million hectares of forest were lost each year between 2010 and 2015, mainly in the tropics. While the rate of deforestation appears to have slowed compared to previous decades, it remains alarmingly high and has been increasing again since 2015.

An FAO report (2016) showed how agricultural expansion for the production of commodities (e.g. soy, beef, palm oil, coffee, cocoa) drives about 80% of all deforestation specifically in the tropical countries, while mining, urbanization and infrastructure are responsible for less than 10 % each.

The EU is indeed among major global importers of a number of specific commodities associated with deforestation, i.e. palm oil (25 % of global imports), soy (15 %), rubber (25 %), beef (41 %), maize (30 %), Cocoa (80%), and coffee (60 %) (china) – big importer

Selected from the Roadmap

Basis for EU Interventions

What does the initiative aim to achieve and how

Possible actions may include:

- Build effective partnerships with producer countries in the tropical domain to support the uptake of sustainable agricultural and forestry practices.

- Strengthen international cooperation with other major consumer countries.



THE DEVELOPMENT OF PLANT PROTEINS IN THE EUROPEAN UNION

OPPORTUNITIES AND CHALLENGES

22 & 23 NOVEMBER 2018 - VIENNA

Commission Report on „The Development of Plant Proteins in the European Union“

Rudolf Mögele, Deputy Director- General,
DG Agricultural and Rural Development, EU Commission

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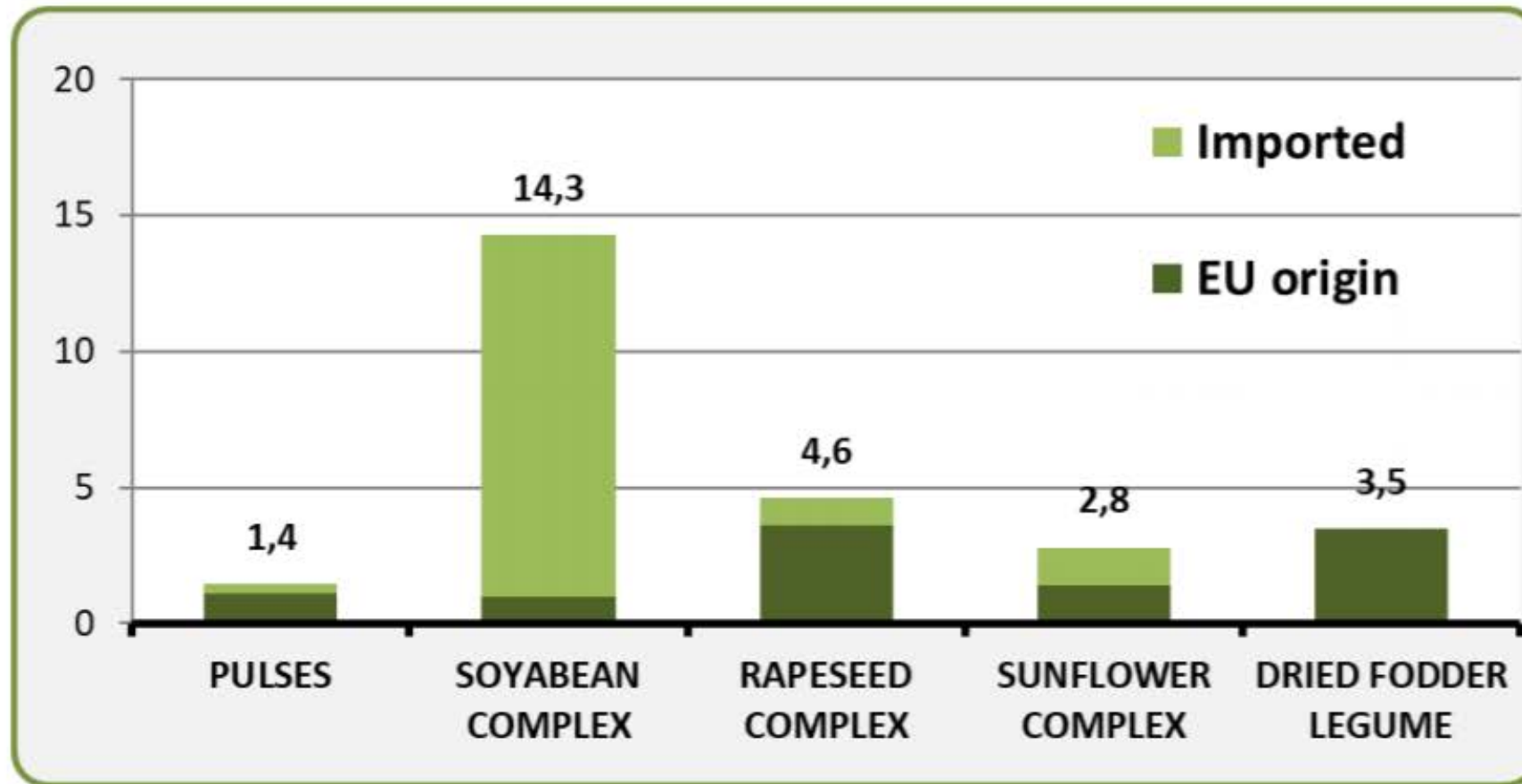
 Federal Ministry
Republic of Austria
Sustainability and Tourism



European
Commission

EU use of protein and their sources

(in million tonnes of crude proteins 2016/17)



Three main market segments for plant proteins

**Conventional
compound
feed**

**Premium
feed**

Food

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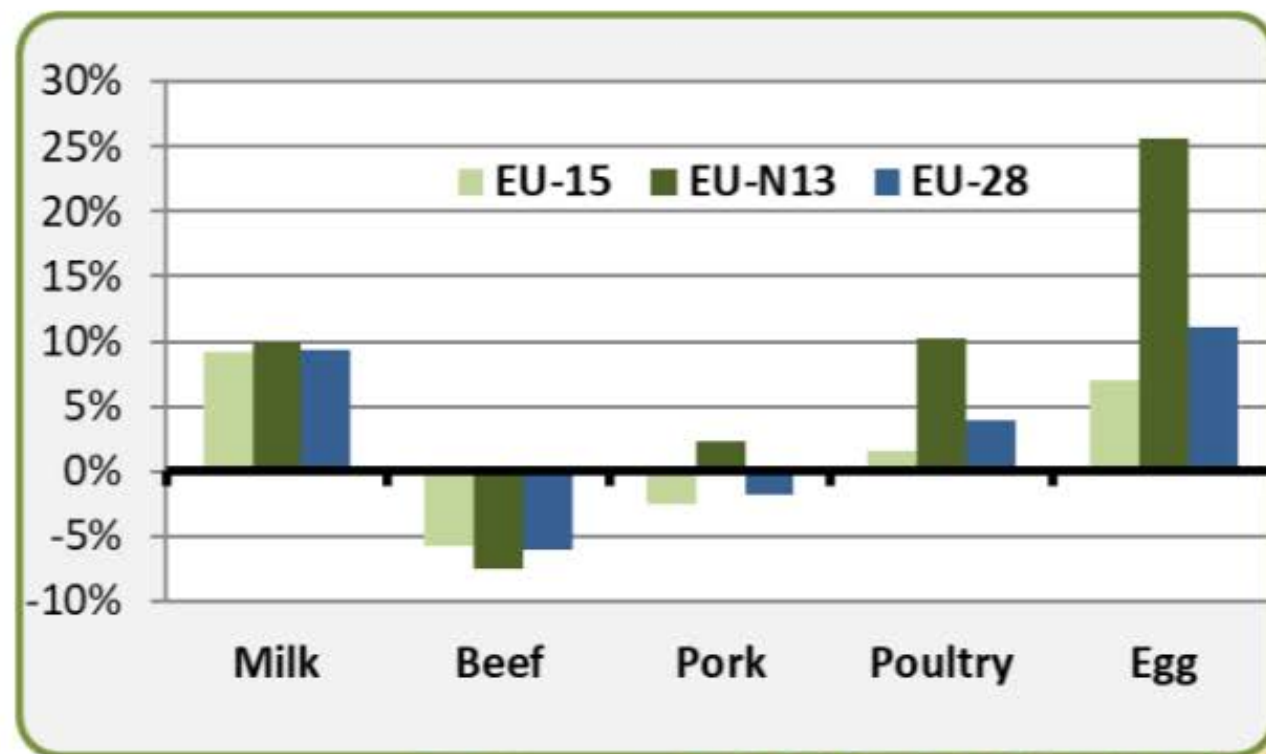
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European
Commission

Conventional Compound Feed

- By far the largest outlet for plant proteins (more than 75%)
- Growth rates for compound feed will slow down, to 0,3% per year until 2030
- Higher growth rates for animal products in Eastern Europe
- Most dynamic sectors are feed for poultry and dairy
- Market mainly price driven
- **Limited prospects for EU-grown protein crops**

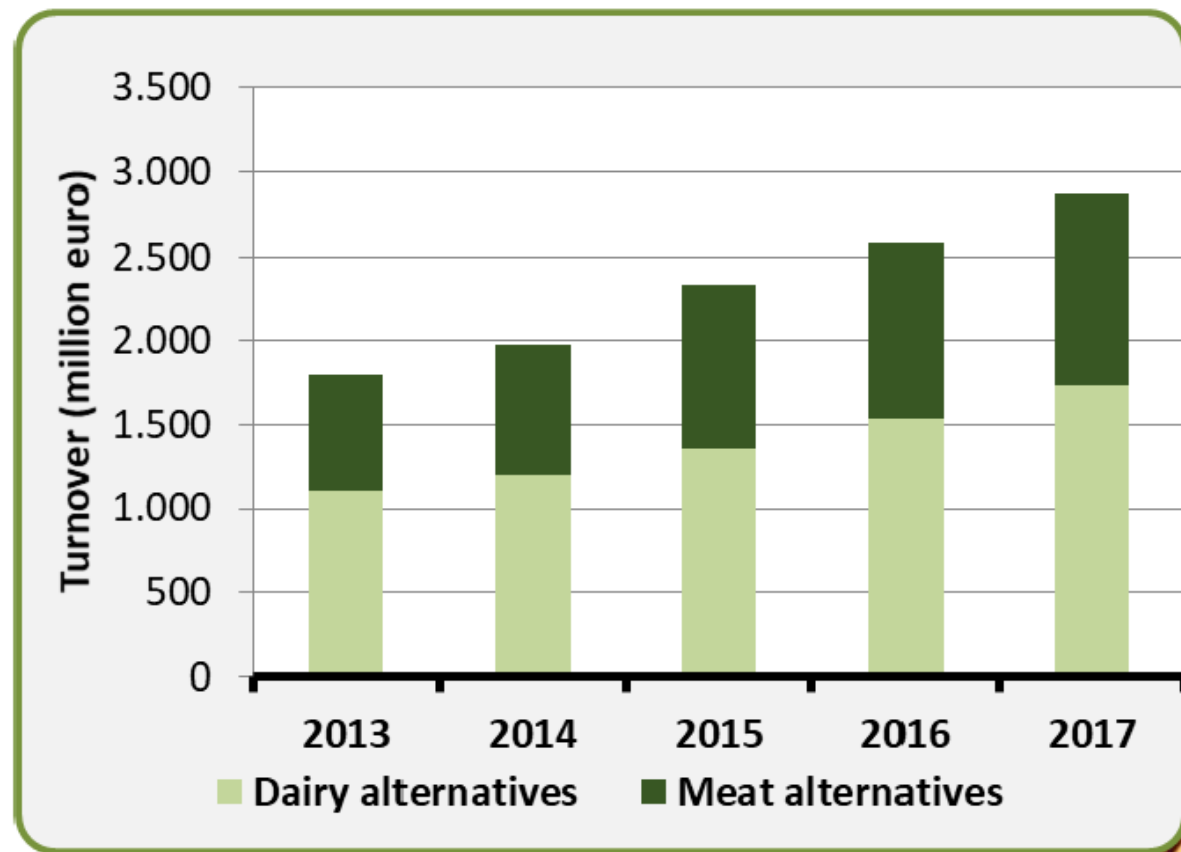


Premium Feed

- Share of **non-GM feed** is growing dynamically (2012 11% in EU, in 2018 ?)
- Also substantial growth rates in **organic production** of animal products, on average 10%
- Shares of organic dairy production surpass 10% in some Member States
- **Main features:** growing demand for sustainably produced animal products, labelling new regional supply chains but also possibility to use of existing supply chains, sourcing issues/year-round availability not ensured

Food segment

- Small market with promising prospects: e.g. **dairy and meat alternatives** 11% and 14% per year
- **Pulse-rich diets** become more popular through changing diets (in some Member States)
- The different outlets still status of **niche markets**
- Interest of major food companies and retailers
- Trend driven by flexitarians
- **High profit margins** but need to further build supply chains



Agronomic, environmental and climate benefits of legumes

Benefits:

- Fertilising effect in crop rotation
- Increase yields of following crops
- Improve soil condition
- Break pest cycles
- Positive effects on biodiversity

Challenges:

- Yield variability and yield gaps
- Relatively demanding on agronomic practices (pest and weed control)
- Low agronomic expertise
- Environmental benefits not automatic

Policy instruments and initiatives today

- Main **CAP instruments** supporting protein plants:
Greening: 27 Member States allow legumes on EFA area
Rural development programmes with AECM
- VCS: 16 Member States use VCS in 2019
Research: EIP-AGRI (14 programmes) & Horizon2020 (4 programmes)
- In addition **Member State initiatives**, e.g.
national plans in Germany, France and Poland
- National Policy initiatives closely linked to protein, e.g.
Dutch Food Policy and Danish National Bioeconomy Panel
- **European Soya Declaration**



Conclusions

Main drivers for future development of EU-grown plant proteins:

- Relative competitiveness versus other crops and non-EU plant proteins
- Supply chain development and producer organisations
- Recognition of legume's contribution to environmental and climate targets
- Evolving consumer behaviour and preferences
- Influence of other policies and debates in society (deforestation, SDGs, Renewable Energy Directive, European Bioeconomy Strategy)

Way forward

Five options for further action:

- Use opportunities in proposed future CAP: support Member States in integrating them in strategic plans
- Continue to boost competitiveness through Research and Innovation
- Improve market analysis and transparency
- Promote benefits of plant protein for nutrition, climate and environment
- Increase sharing of knowledge/best practice



Vision

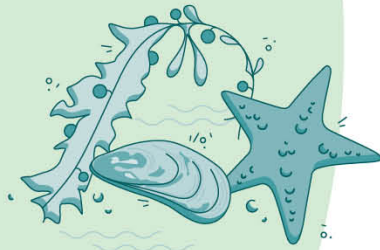
”Within five years alternative Danish protein products with a better environmental and climate footprint can match existing protein products regarding price and quality in key market fields within feed and food.”

How the panel has worked

New proteins from land



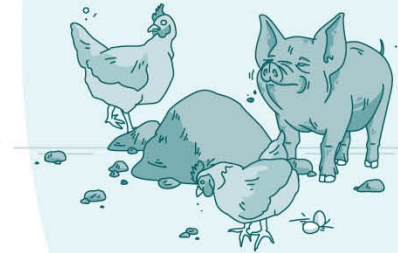
New proteins from sea



New proteins from residual and secondary flows



Food
(such as ingredients for food production and insects)



Feed
(such as protein additives to feed mixtures)



Other products
(such as pharmaceuticals and fertiliser)

Targets

1

Within five years a commercial production of sustainable protein-rich raw materials from landbased production, aquatic sources, and from industrial residual and secondary flows has been established.

2

In a relatively short number of years, close to one third of Denmark's imports of feed proteins has been replaced by feed proteins based on Danish protein sources. Danish produced protein sources must be economically and environmentally sustainable, and the functionality of the products must be at least equal to that of existing products

3

Danish companies have established solid business cases for biorefining of protein-rich land and marine-based biomass and of industrial secondary flows.

4

The Danish market for new protein products for feed and food has increased by more than 50 percent annually, knowledge is available on environmental and climate footprints, and there is transparent traceability

5

There is an ambitious political orientation towards a sustainable bioeconomy in Denmark. Strong partnerships exist for biorefining, among others, and companies have easy access to 13 public and private capital

15 recommendations for national action

6 are on bioeconomy in general:

1. **A bioeconomy strategy**
2. **Coordination of investments in Research, development and Innovation**
3. **More funds to bridge the valley of death**
4. **Incubation and acceleration facilities for SME and start-ups**
5. **Activate venture capital**
6. **Skills and competences**

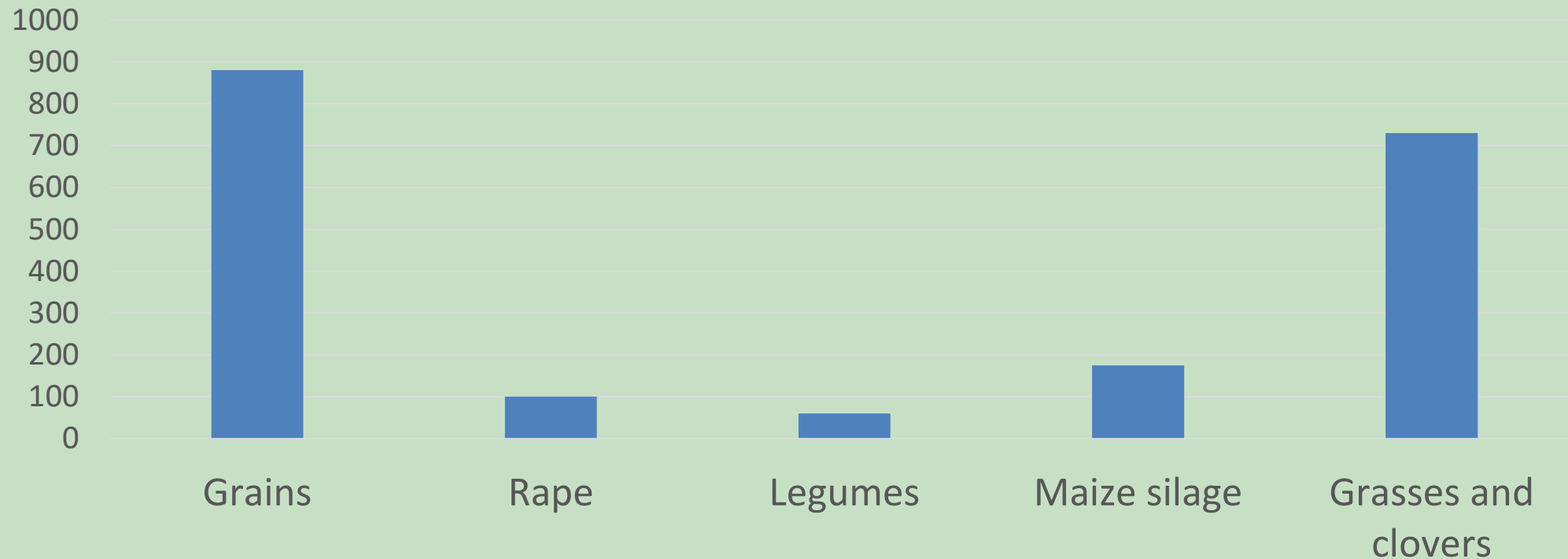
9 protein specific:

7. **Research and development in raw materials for new protein value chains.**
8. **Recognition of sustainable biomass production in national environmental regulation.**
9. **Improved EU framework conditions for sustainably produced proteins**
10. **Stronger coordination among stakeholders**
11. **Support for research, development, and establishment of biorefineries**
12. **More knowledge about market and consumer demand**
13. **Consensus on environmental and climate footprints of proteins**
14. **Support for nutritional and toxicological studies**
15. **Secure that traceability systems underpin new protein products for food and feed.**

Danish protein supply today

Imported plant protein accounts for 39% of the protein consumption in Danish animal production. 64% of the imported feed protein is derived from soy

National production of protein for feed in mio. kilos:



Protein challenge for the organic sector in Denmark

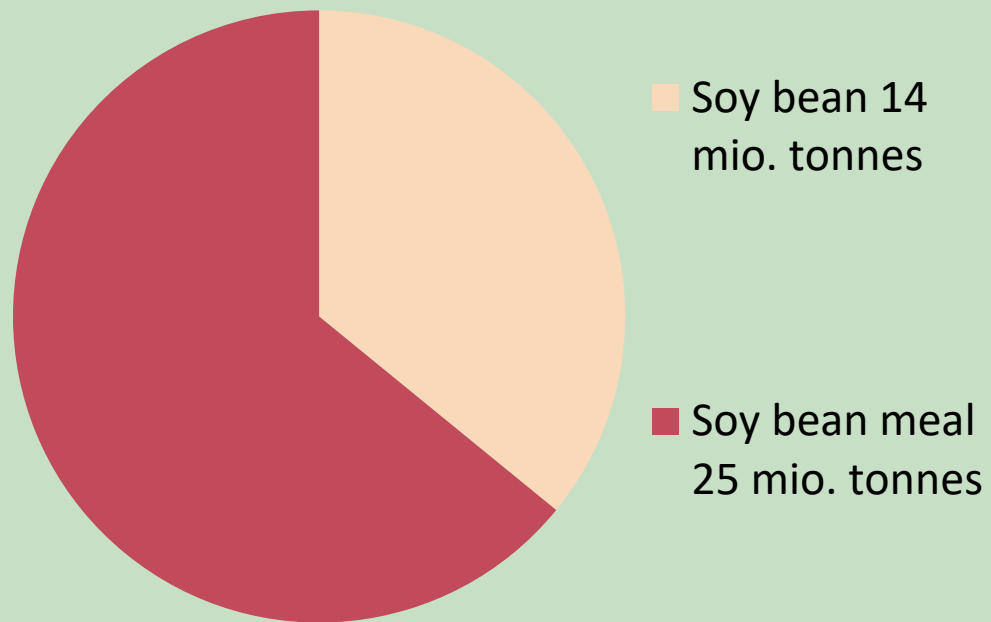
Total import value of organic feed and cereals is more than 100 million Euro in 2017.

This amount corresponds to the total yield from 75-100.000 ha. arable land which is 3-4 % of the total agricultural area in Denmark.

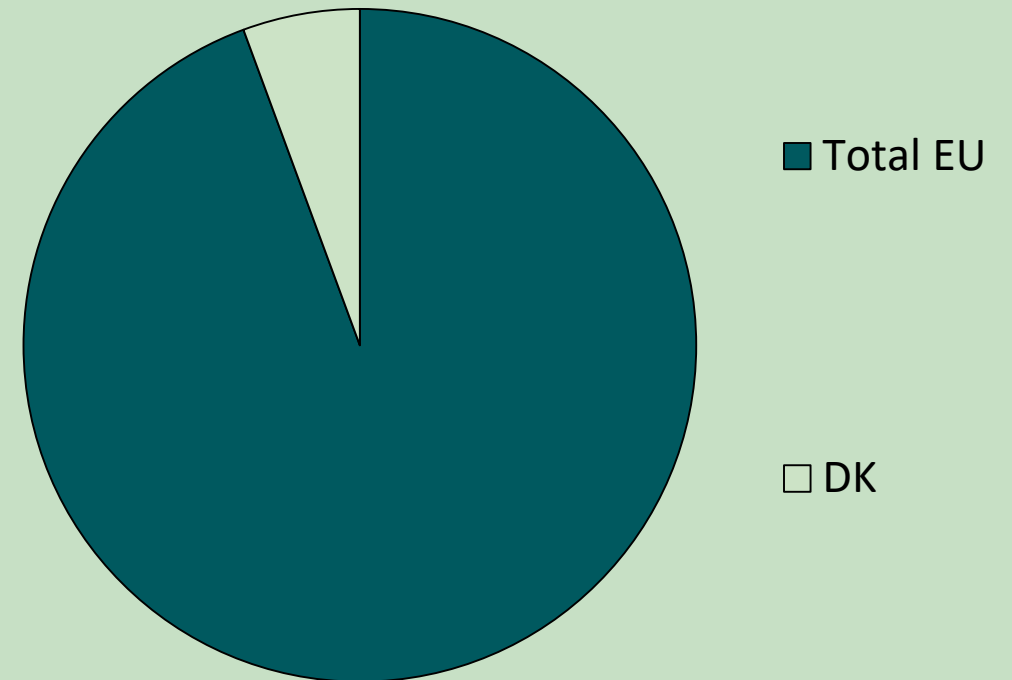
Meeting this demand nationally would increase the need for organic production land by app. 50%.

Total EU soy import – DK share

EU imports of soy – eq. 32 mio.
tonnes soy bean meal



EU imports of soy – eq. 32 mio.
tonnes soy bean meal



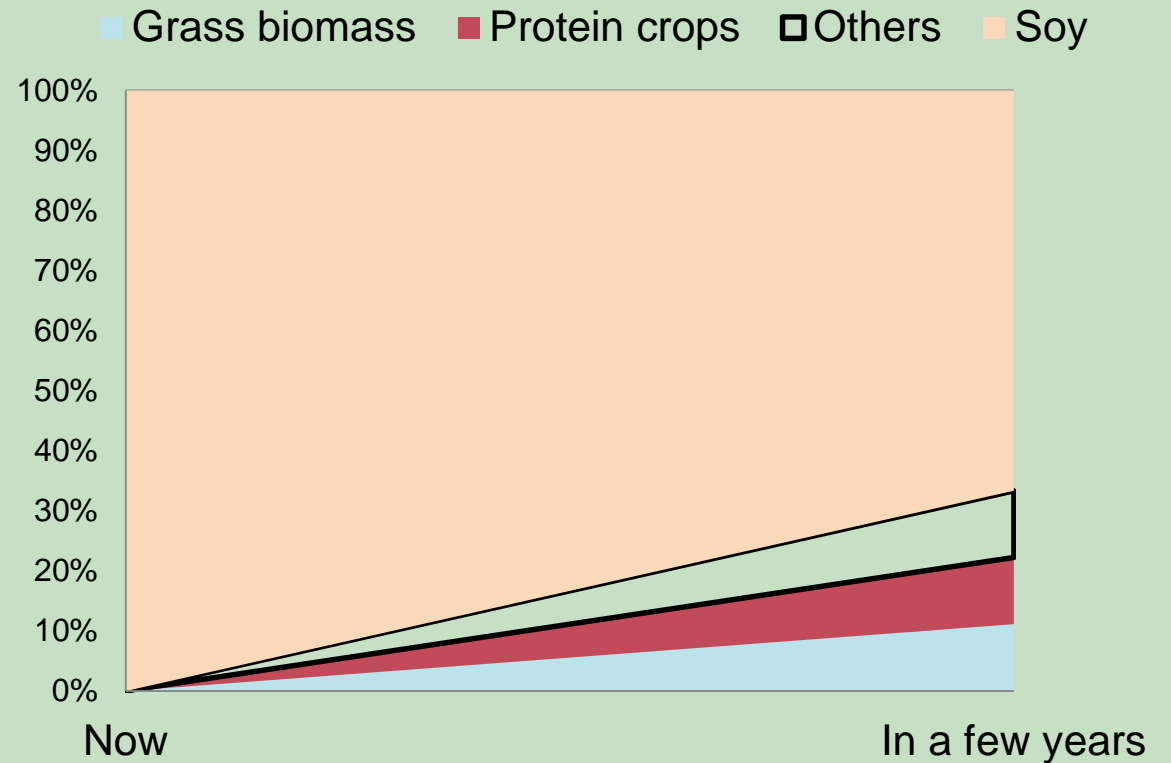
DK Bioeconomy panel:

“1/3 of DK soy import could be replaced within a few years”

1,8 mio. tonnes soy total import = 0,85 mio. tonnes protein

1/3 equal to app. 0,3 mio. tonnes protein

How?

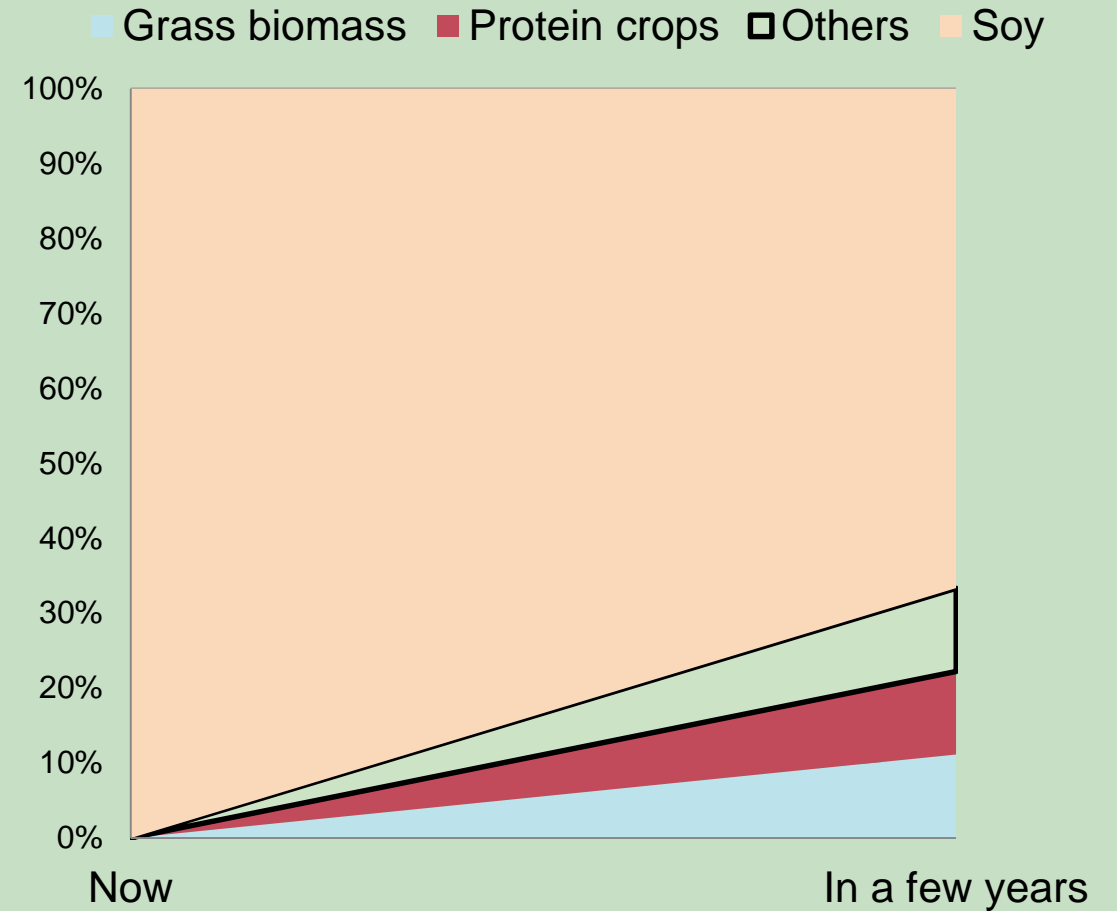


At EU level

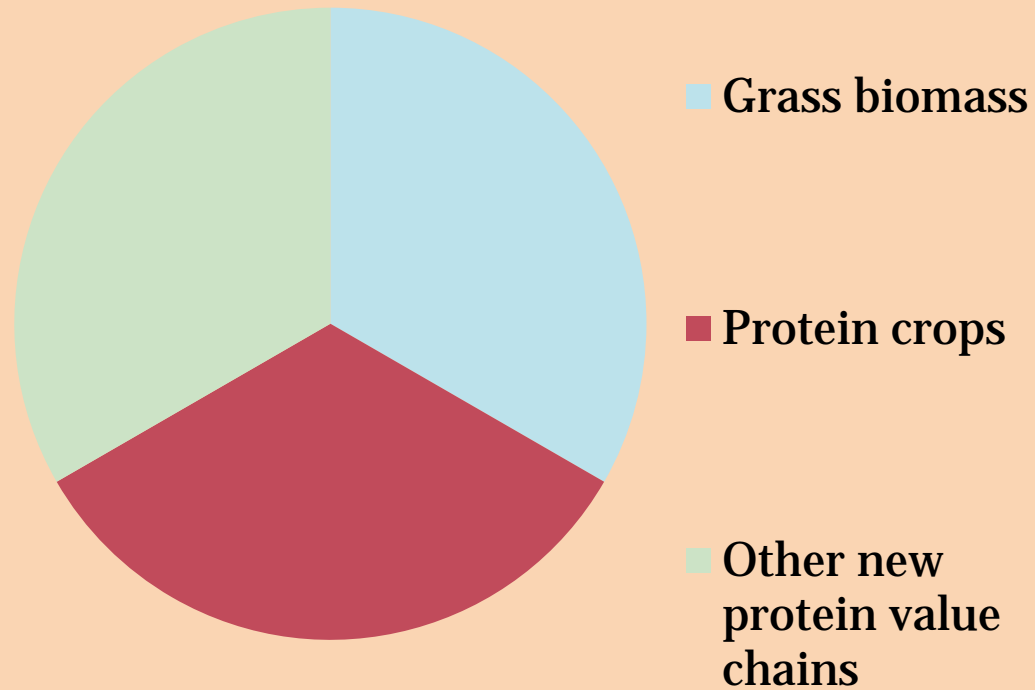
**32 mio. tonnes soy total
import = 15 mio. tonnes
protein**

**1/3 equal to 5 mio. tonnes
protein**

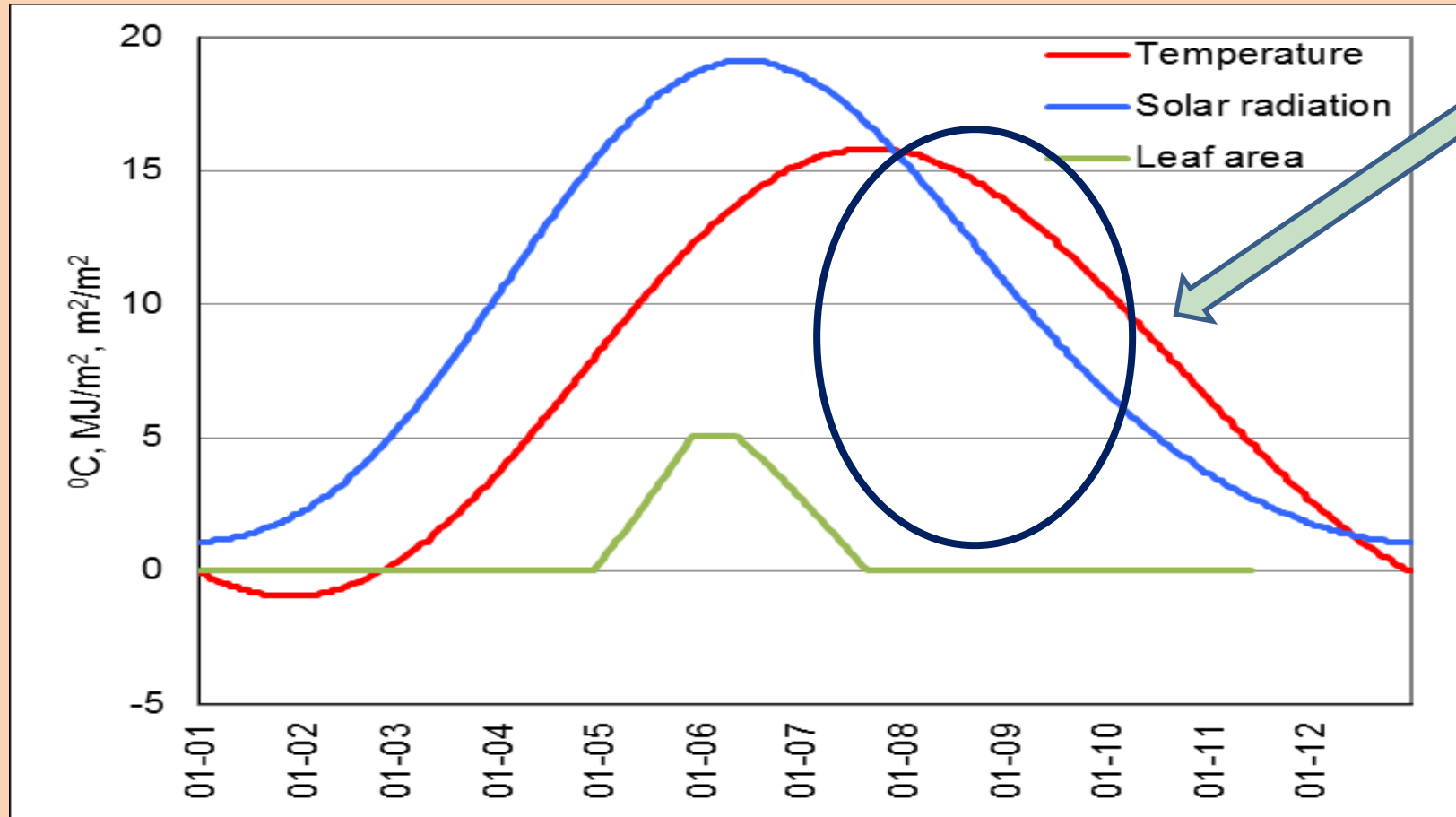
How?



Three development tracks



Grain crops utilize only a part of the growing season



Potential for increase in biomass production - Perennial grasses?

Source: Uffe Jørgensen, Aarhus University

Track 1

**Perennial grasses/clovers
– an efficient utilisation
of arable land**



Track 2

**New faba bean varieties for
Danish production of protein**



Track 3

**Other new protein value chains; eg.
Starfish, mussels, insects and
seaweed**



Danish protein supply in the future

Track	Biomass	Hectares	Volume of protein (t)	Barriers
1	Grasses and clovers	100.000	100.000	Low TRL*, protein quality
2	Legumes	100.000	100.000	Plant breeding
3	Seaweed, starfish and mussels	-	15.000	Low TRL lack of areas for production sites
	Microbes, bacteria and insects	-	25.000	Regulation, low TRL
	Blood	-	10.000	Cost of handling and processing
	Sidestreams from oil, flour, mash and starch	-	50.000	Low TRL
			300.000	

* = Technology Readiness Level

CID: Public-Private-Partnership – plant research



Example:
Research project on new faba bean varieties.

NORFAB: Protein for the Northern Hemisphere

Like other EU countries Denmark is a net importer of protein, mainly soybean-meal from US and South America.

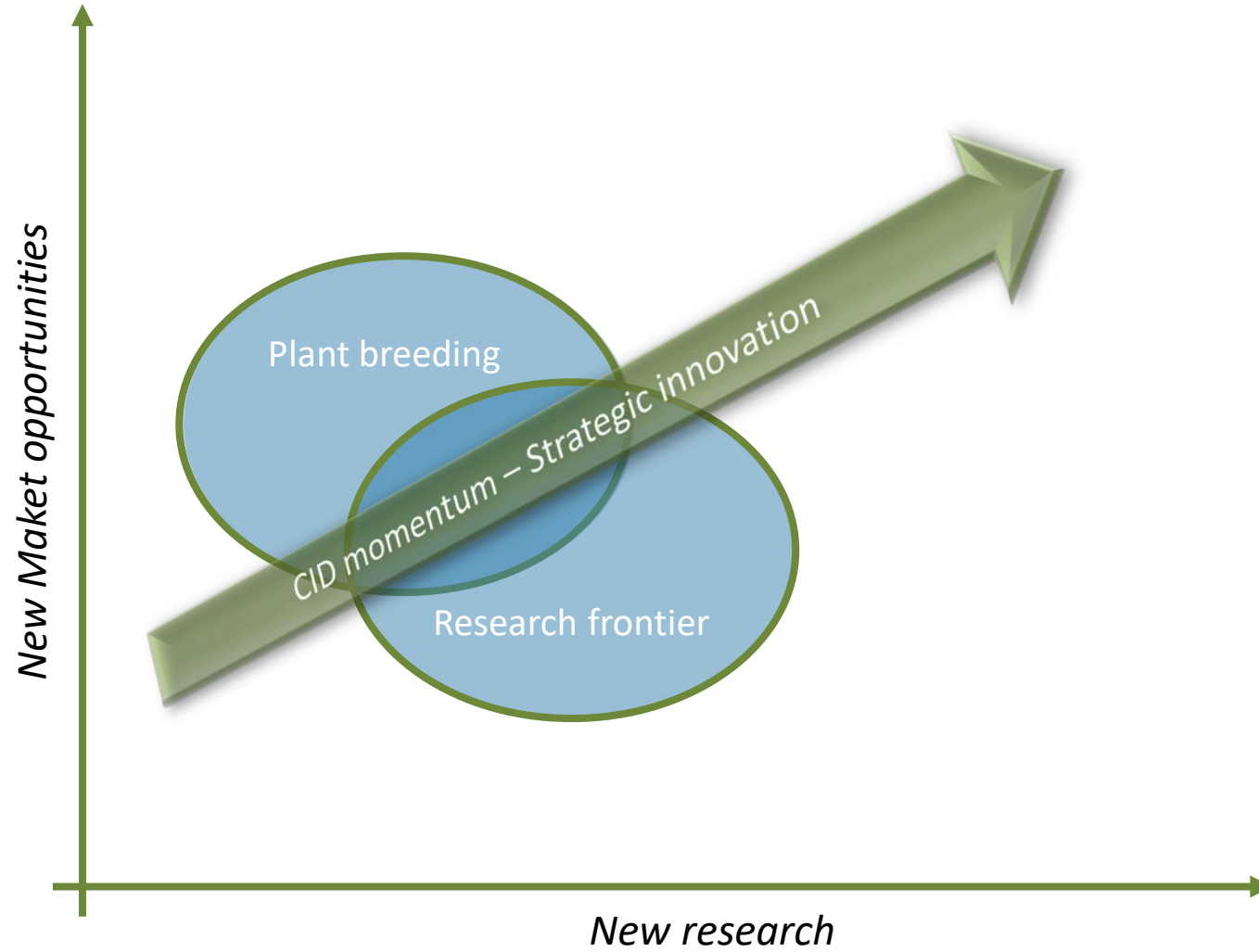
The imported protein is crucial for sustaining a large livestock production and also represents an important food ingredient.

The challenge is to increase domestic protein production and maintain global competitiveness while improving agricultural diversity and sustainability. ...

Supported by the Danish Innovation Foundation



CID in a nutshell



Vision

”...Accelerate breeding progress to solving challenges in plant production....”

Mission

”...Prioritize, Coordinate and launching new activities...”

CID's Vision:
Danske planteforskningsmiljøer skal præstere forskning på højt internationalt niveau, der finder direkte anvendelse i forædlingssektoren og åbner nye fremtidige forretningsområder. I krydsfeltet mellem offentlig og privat forskning og innovation genereres ny anvendelig viden og værktøjer, som:

- Accelererer forædlingsfremskridtet med henblik på at løse udfordringer i planteproduktionen
- Øger danske planteforædlingsvirksomheders konkurrenceevne
- Stimulerer og fremmer erhvervsrettet forskning i verdensklasse
- Imødekommer nye trends i bioøkonomien

Dette vil føre til, at danske forædlingsvirksomheder er verdensførende med hensyn til at forædle afgrøder, der:

- Giver højere og mere stabilt udbytte
- Er mere robuste, og har et reduceret behov for input af pesticider og har bedre næringsstofudnyttelse
- Er sundere og af højere kvalitet til foder, fødevarer og nonfoodformål
- Er tilpasset fremtidens produktionsforhold under ændrede klimaforhold.

Mission:

CID vil skabe videnskabelig og kommerciel merværdi i partneres forsknings- og udviklingsaktiviteter. Dette realiseres gennem:

- Prioritering, koordinering og iværksættelse af relevante initiativer
- Tilvejebringelse af den nødvendige funding
- Udnyttelse af faglige og infrastrukturelle synergier
- Uddannelse, kompetenceopbygning og internationalisering
- Prioritering af planteforædlingsforskning som en del af løsningen på udfordringer i jordbruget og samfundet

CID 2023 Strategy



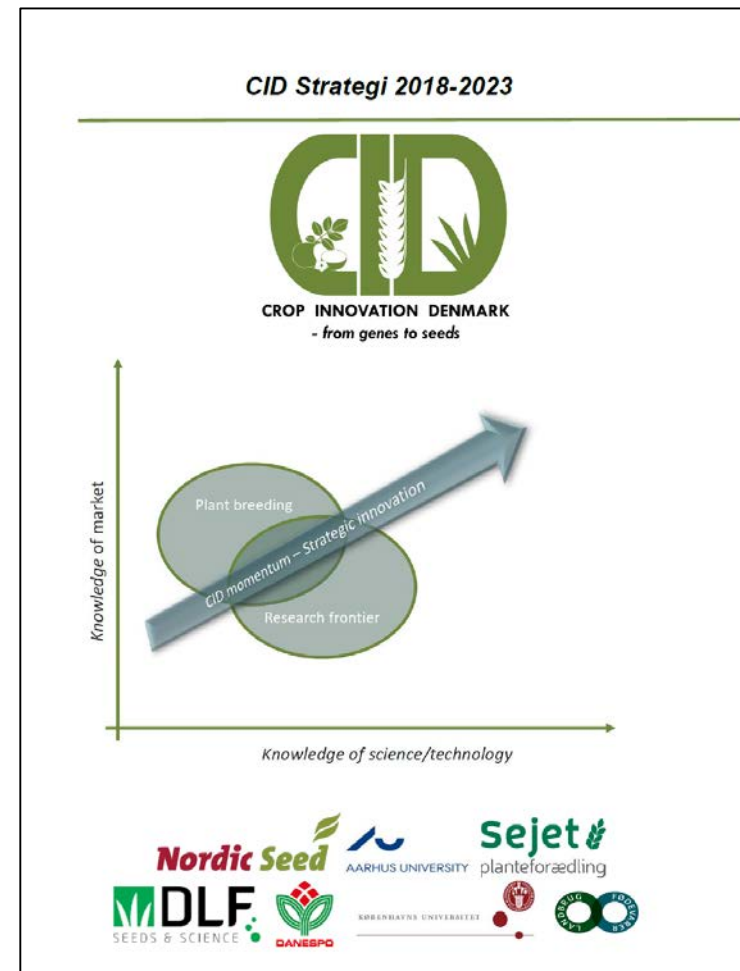
Det vil CID de kommende år

Stimulate the development of new improved crops and varieties focusing on **improved climate, environmental, quality and productivity** effects in plant production.

Strategic platforms :

- Root research
- Genomic selection,
- Protein crops
- Precession breeding

CID cooperation must be further developed so that we in **Denmark** are among the **best in the world** for **collaboration between companies** and **knowledge institutions**.

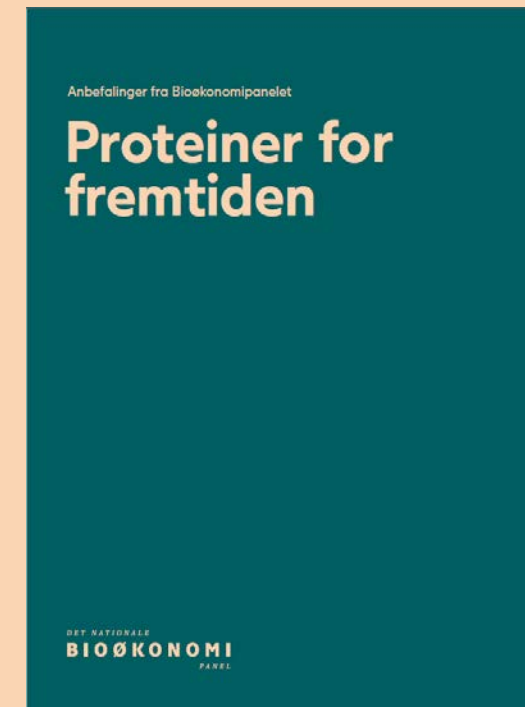
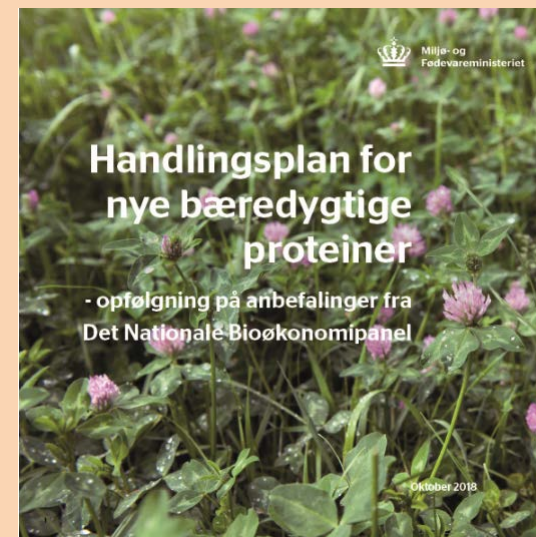


NEW Public-Private-Partnership

DANISH PROTEIN INNOVATION

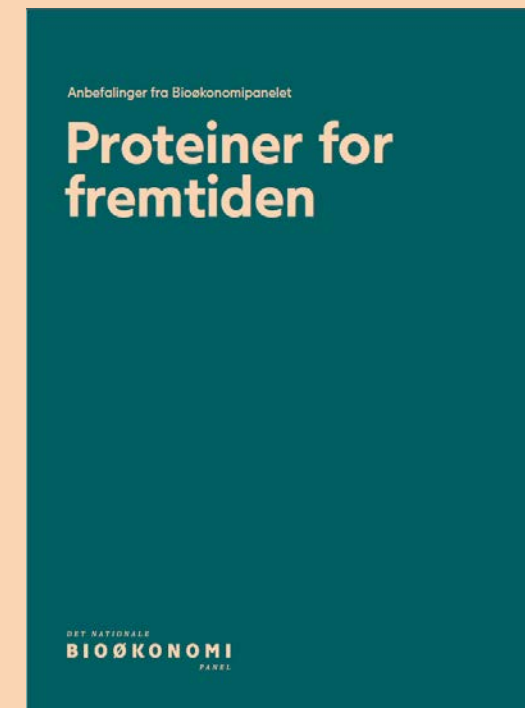
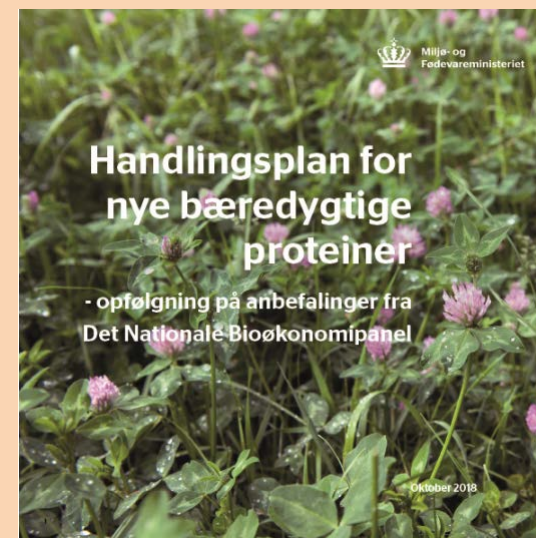
The aims:

- Coordinated research initiatives within new protein value-chains
- The first goal is to produce feed protein for pigs and poultry from grass in big scale
- Initiative based on national recommendations



Danish Protein Innovation

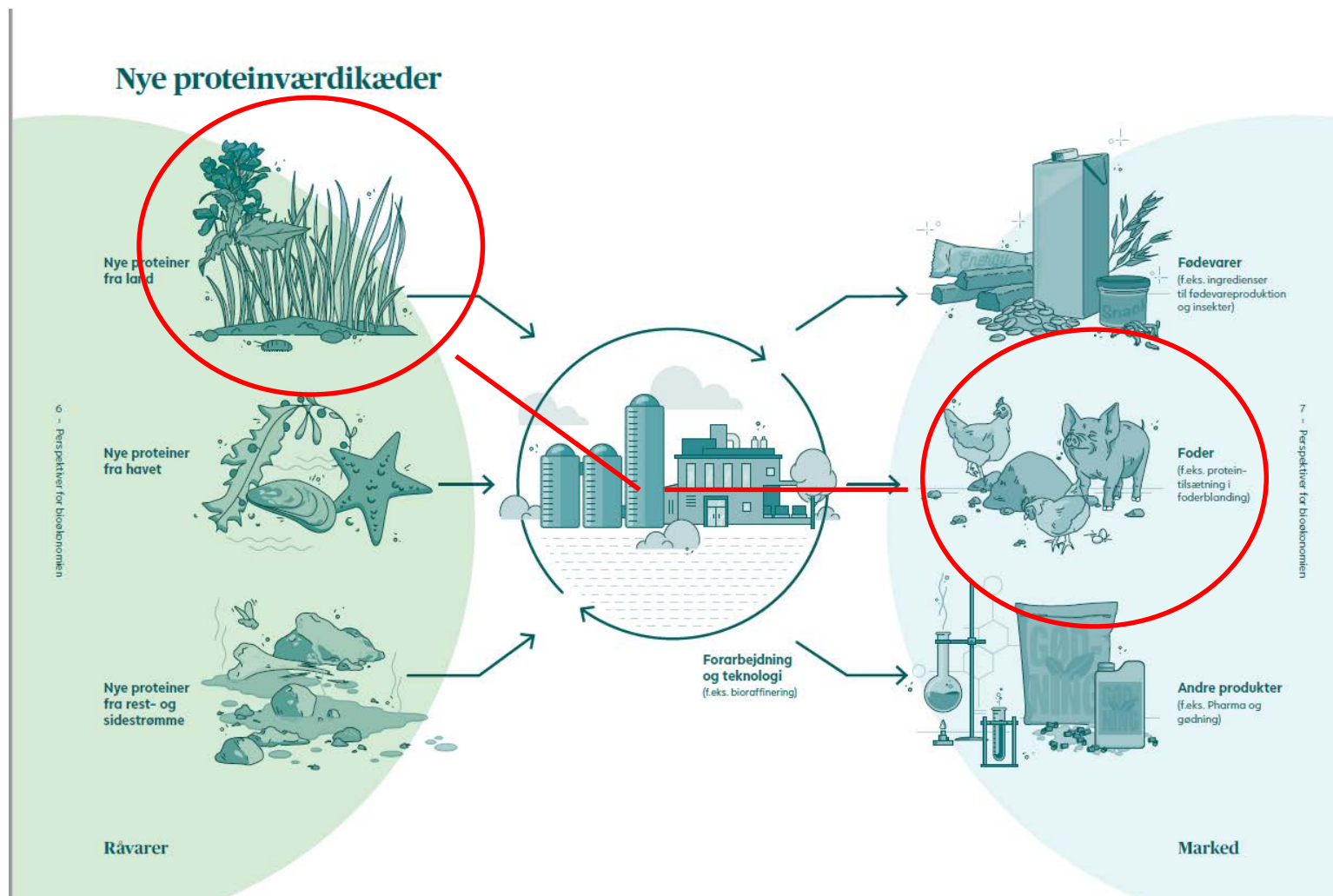
DPI's purpose is to promote and coordinate research and innovation to increase market-based and sustainable Danish production of protein for food and feed.



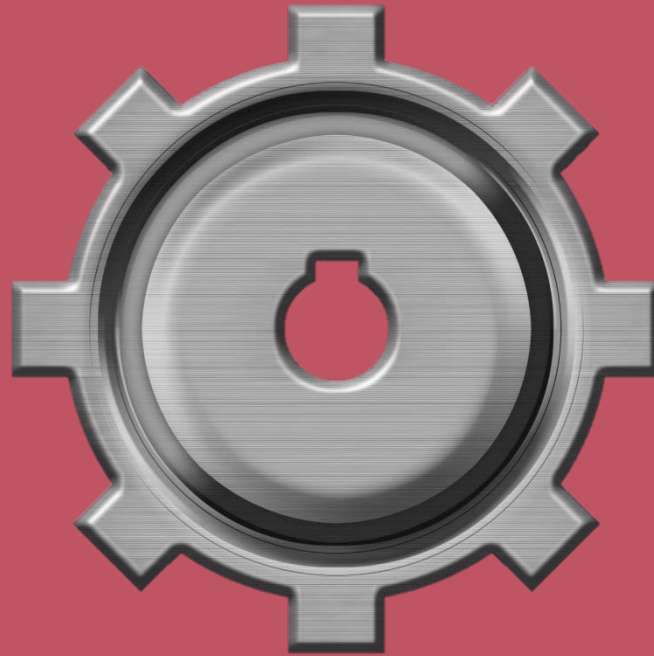
The DPI board



FOCUS



Action at EU – the right toolbox exists



**Europe's
Common
Agricultural
Policy
CAP**

Further Action at EU level Needed

Credit for production of biomass with positive environmental and climate effects

Flexible rules for perennial grass areas

Smooth regulation for approval of new proteins

High priority of bioeconomy in Horizon Europe for R&D (e.g. plant breeding/protein crops) and establishment of biorefineries

Consensus on environmental and climate footprinting methods for proteins

CAP support (top up) for production of protein crops

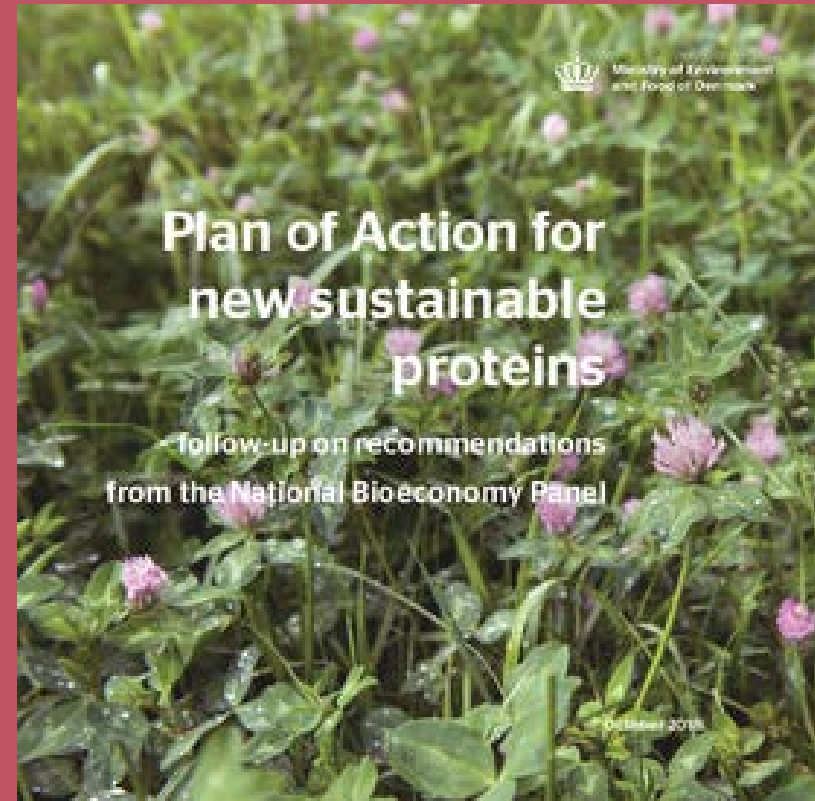
**Minister for
Environment
and Food**

**Jakob Ellemann
Jensen**

**15/3- 2019
DAKOFO Annual
General Meeting**



Thank you



www.mfvm.dk/miljoe/det-nationale-biooekonomipanel