

Proteins for the Future

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

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

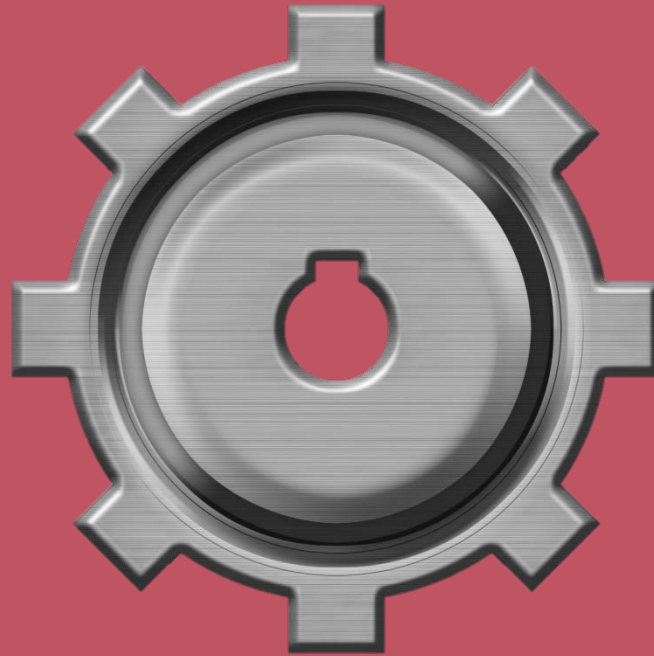
Comparative advantages for agricultural production - simplistic

Starch



Proteins

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

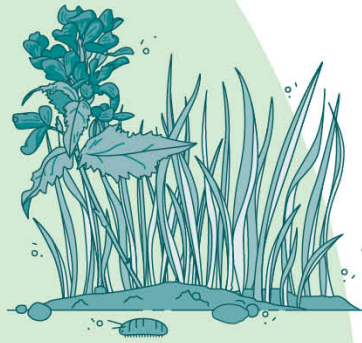
Consensus on environmental and climate footprints of proteins

Vision

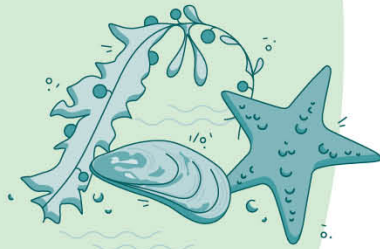
”Within five years alternative Danish protein products with a better environmental and climate footprint can match existing protein products regarding price and quality in key market fields within feed and food.”

How the panel has worked

New proteins from land



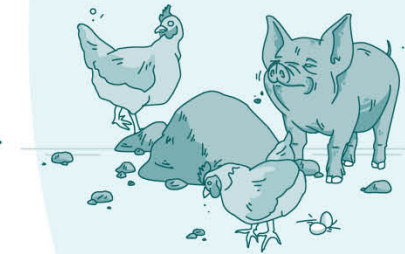
New proteins from sea



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**

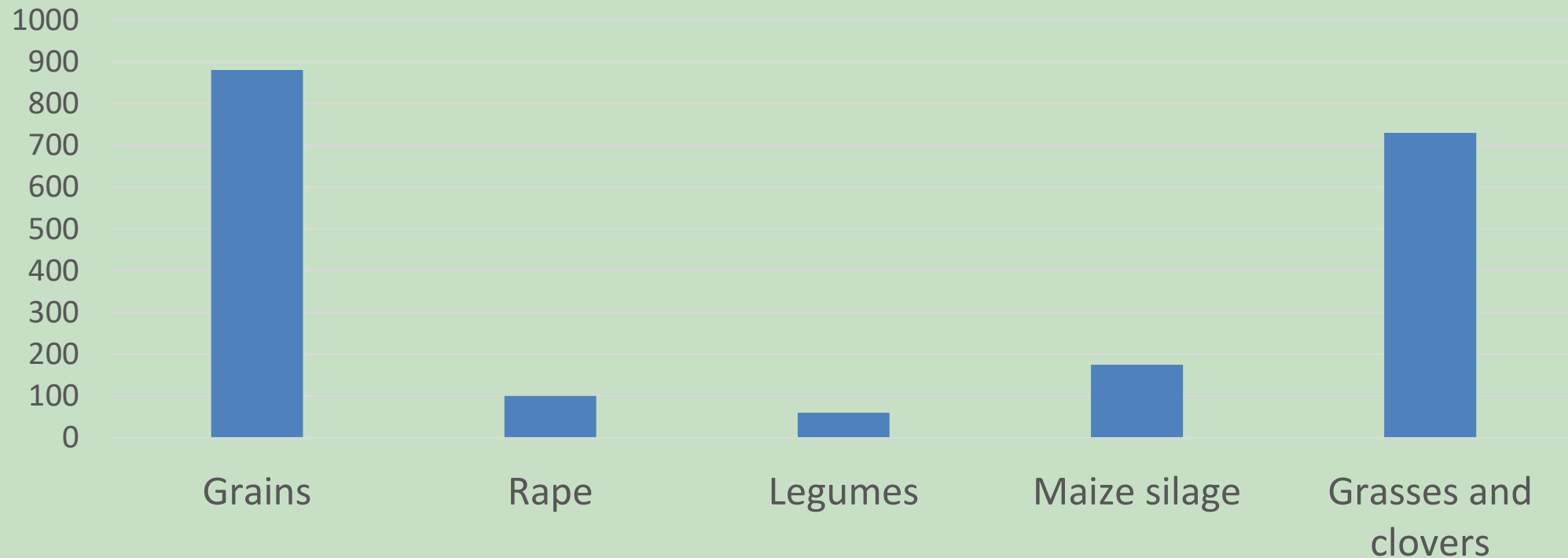
9 protein specific:

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

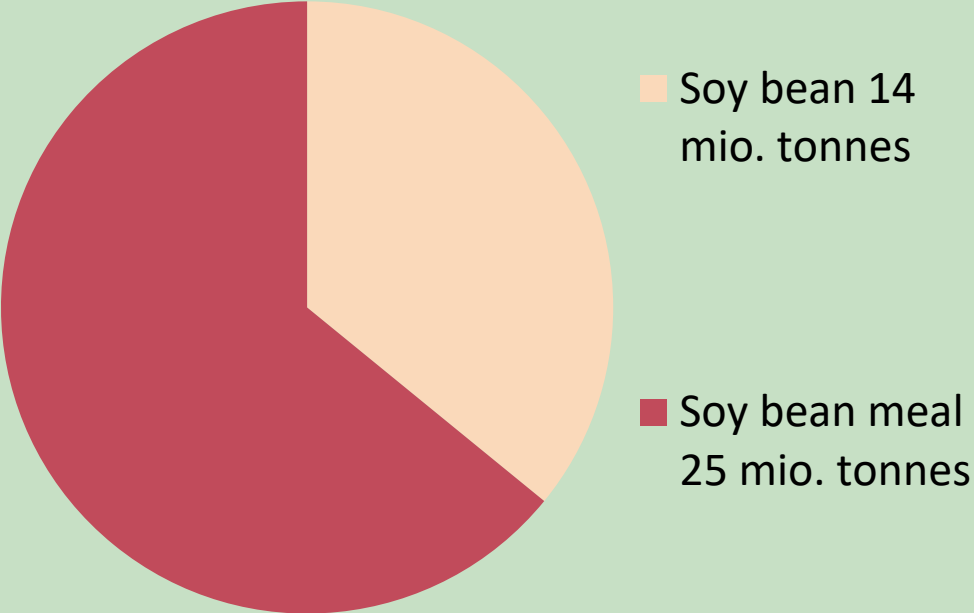
Total import value of organic feed and cereals is more than 100 million Euro in 2017.

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.

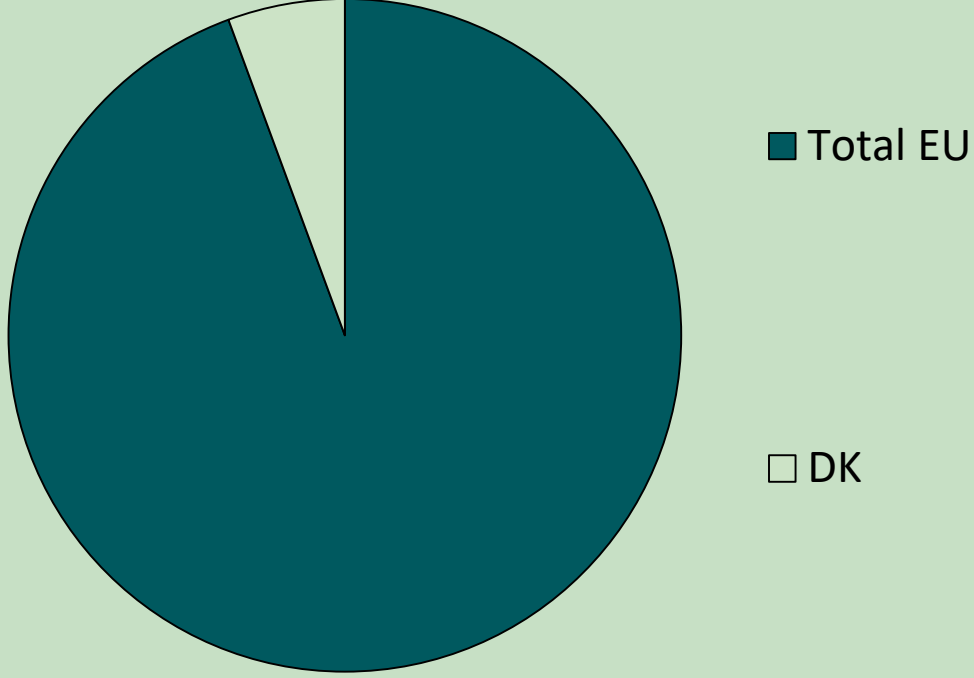
Meeting this demand nationally would increase the need for organic production land by app. 50%.

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

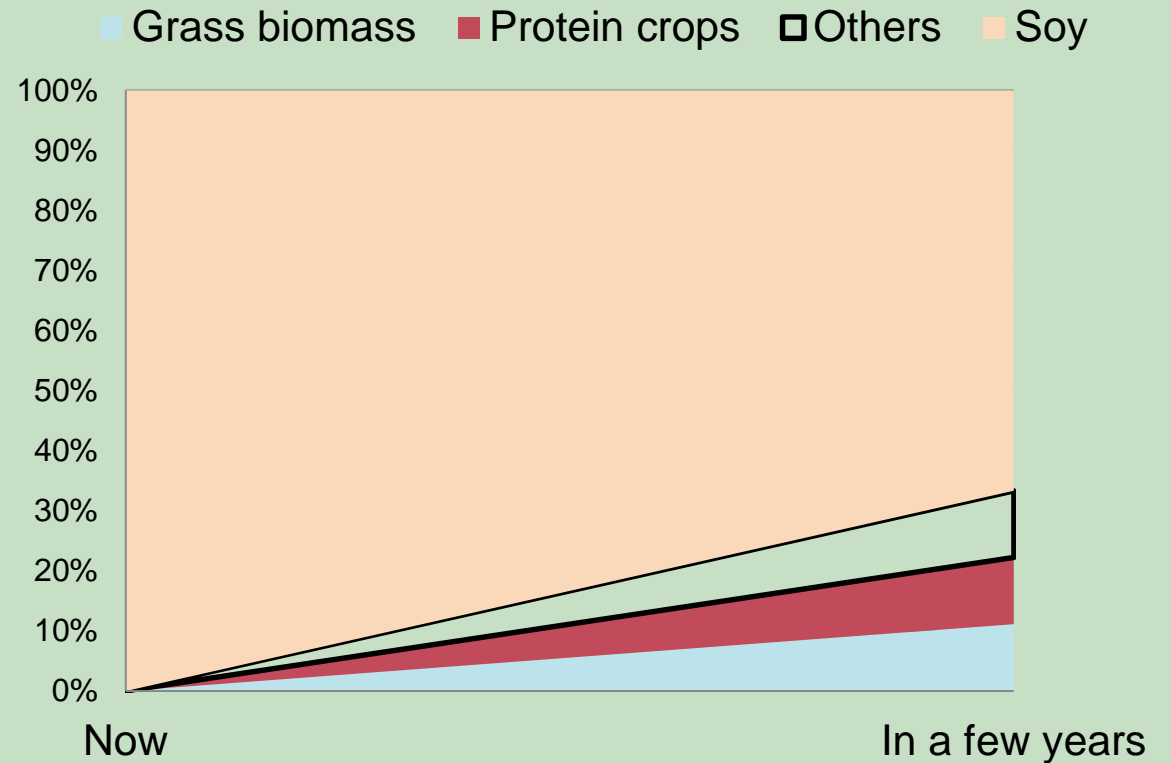


DK Bioeconomy panel: “1/3 of DK soy import could be replaced within a few years”

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

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

How?

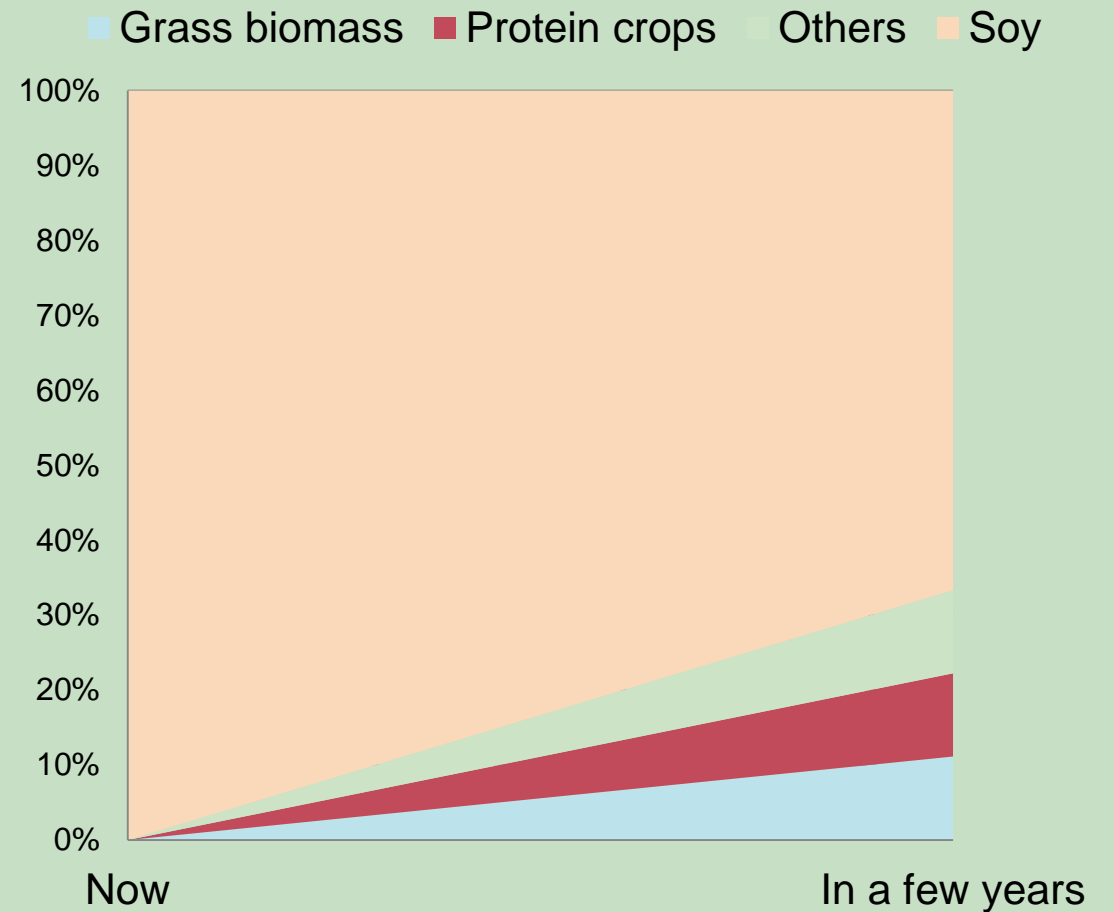


At EU level

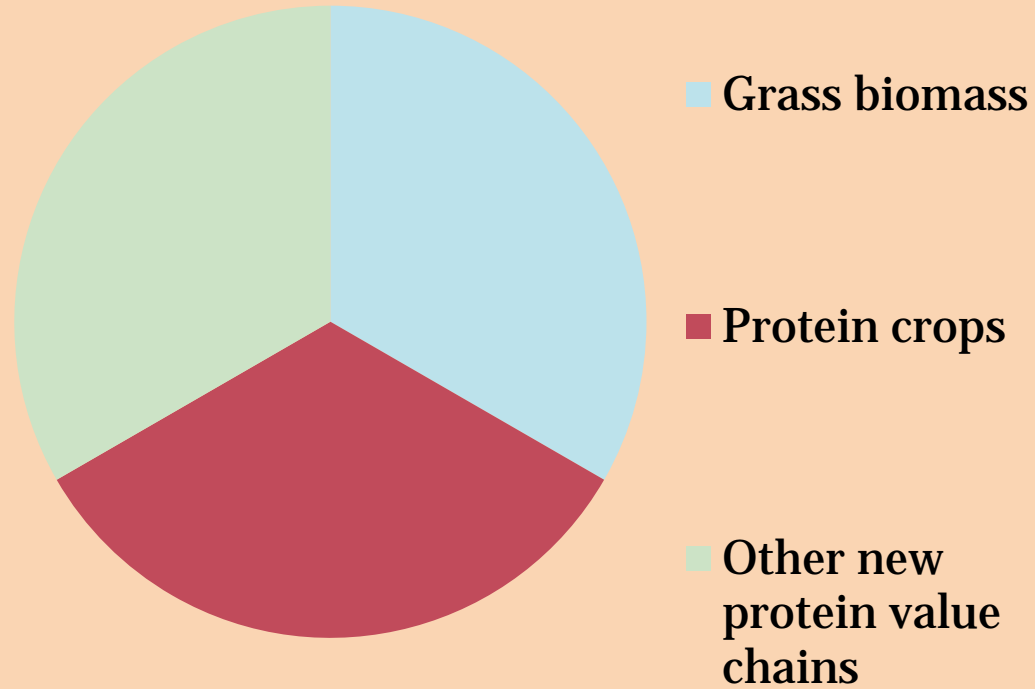
32 mio. tonnes soy total import = 15 mio. tonnes protein

1/3 equal to 5 mio. tonnes protein

How?

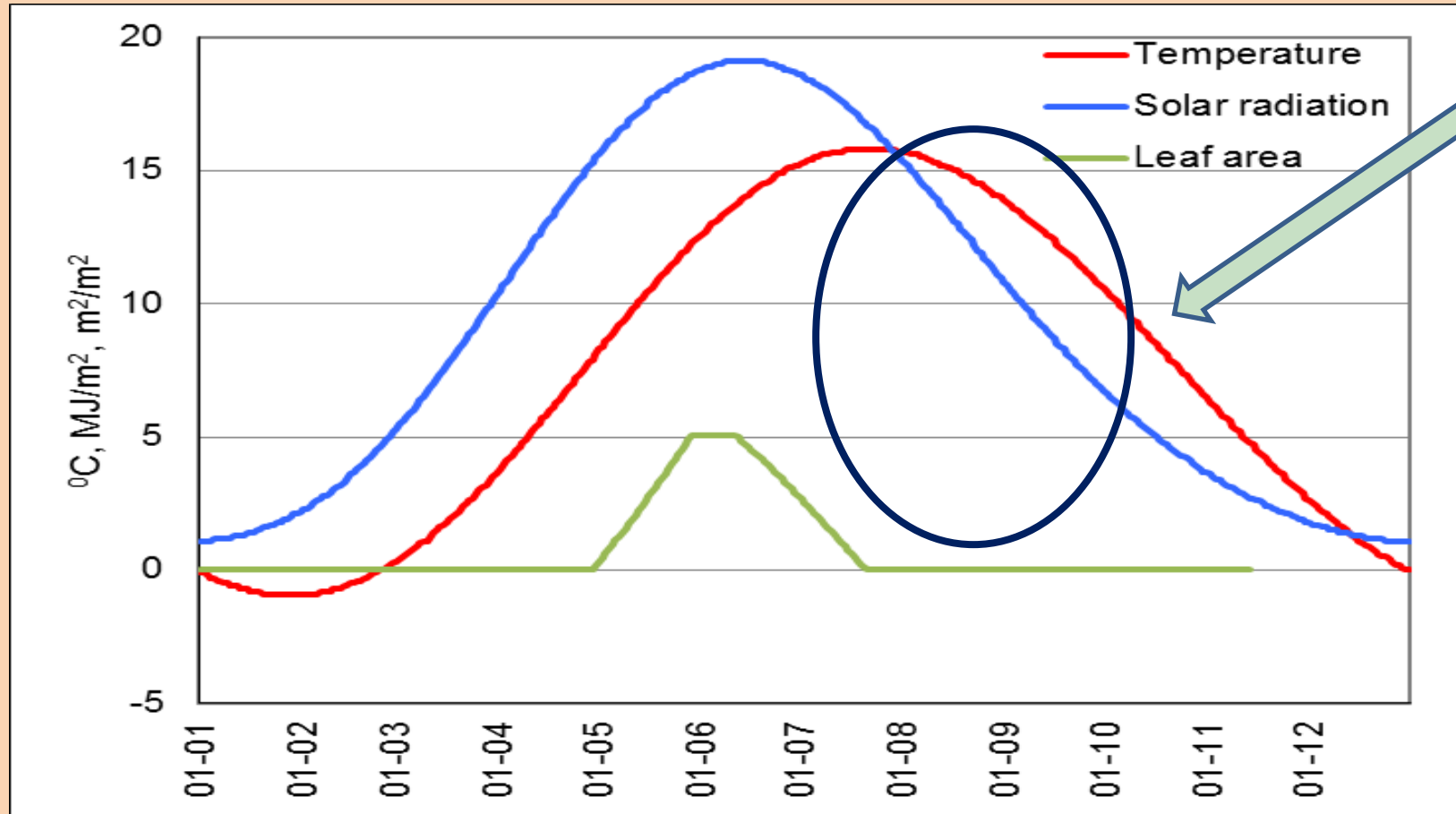


Three development tracks



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*

DK Public-Private-Partnership – plant research



CROP INNOVATION DENMARK
- from genes to seeds



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. ...

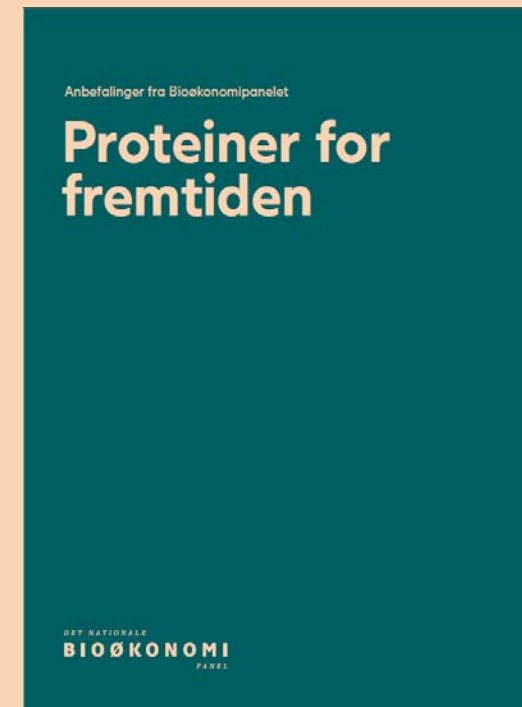
Supported by the Danish Innovation Foundation

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



Further Action at EU level Needed

Credit for production of biomass with positive environmental and climate effects

Flexible rules for perennial grass areas

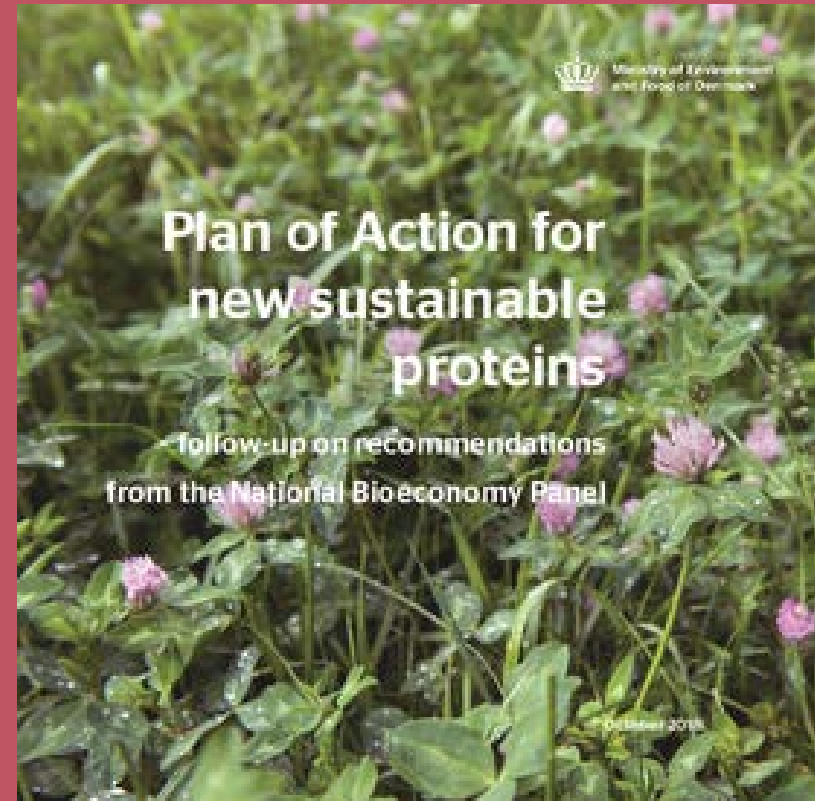
Smooth regulation for approval of new proteins

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

Thank you



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