

BioValue Annual Meeting
Copenhagen, 13th September 2016

PERSPECTIVES IN UTILISATION OF STRAW

Thorkild Frandsen, Crop & Environment

SEGES

Knowledge Centre for Agriculture

We help farmers develop their business

Focus on close to market solutions



6 business areas



SEGES Dairy & Beef
Research Centre



SEGES Crop &
Environment



SEGES Business Finance
& Management



SEGES Pig Research
Centre

SEGES Horses



SEGES Organic
Farming



GROUP
FUNCTIONS

3 business units



SEGES Academy



SEGES Publishing



SEGES Software

650
employees
in 6 locations

850
million DKK
annual turnover

A limited partnership
company in
**Danish Agriculture
& Food Council**

A part of
Agro Food Park

THE ROLE OF THE FARMERS

Producers of biomass (e.g. feed, food, biofuel)

Buyers of biomass for own business (e.g. feed)

Co-owners of large process plants using biomass (e.g. potato starch factories, biogas plants, dairies, etc.)

- DLG, Arla, KMC, Danish Crown, etc.
- The farmer benefits from the value creation along the chain

THE ROLE OF THE FARMERS

In general: Farmers react quickly to new business opportunities and they are open to try out new ideas!

But they require fast returns on investments!

Presently only very few farmers make profit!

- Capital not available for large investments

THE CASE OF STRAW

Now:

Straw in surplus.
Technology and logistics well known.



Soon:

Increasing demand for straw from many sides.

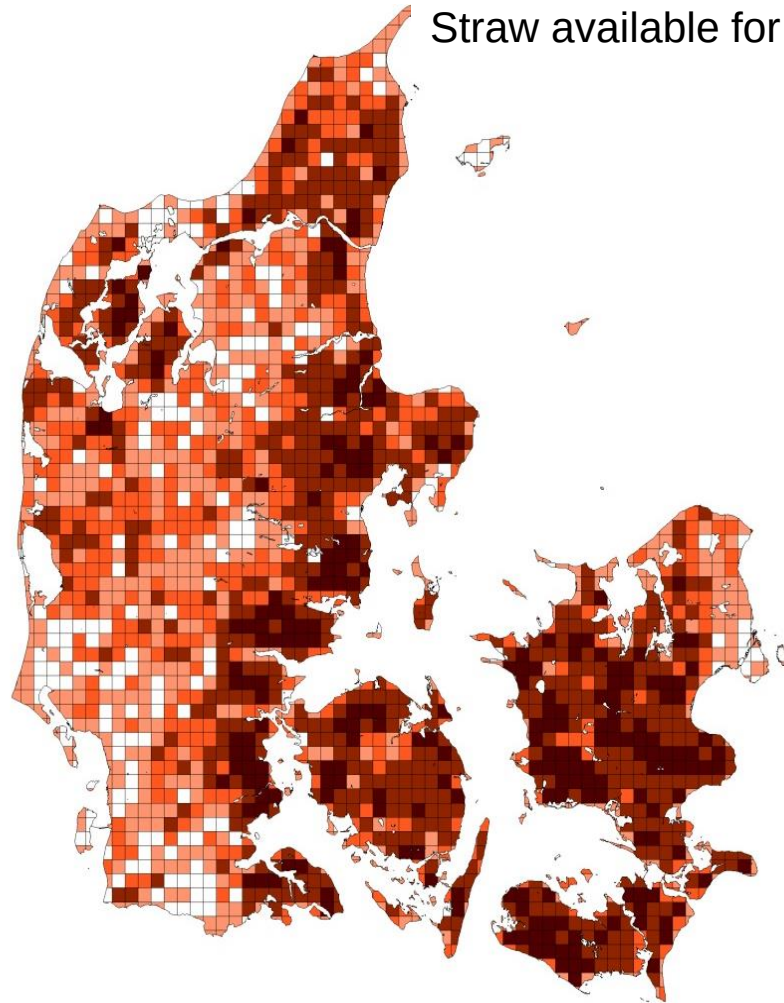
How can straw be a good business for the farmer?

STRAW SURPLUS

2015	Million tons
Straw production (cereal)	5.23
Bedding material	1.54
Feed	0.34
Energy (heat and power)	1.36
<i>Surplus</i>	<i>1.99</i>

SEGES, 2015

Straw available for application outside agriculture (tons TS in 5*5 km)



Surplus especially in the East
Deficit in some parts in the West

FARMER'S CRITERIA WHEN SELLING STRAW

High price!

- Heat and power plants pay around 500 DKK/ton today
- Biogas plants can pay 375-425 DKK/ton based on gas yield, existing technologies and framework conditions

Secure and well-known trading conditions

Acceptable quality criteria

Farmer's transport and storage costs minimised

Synergy effects

BENEFITS OF USING STRAW FOR BIOGAS

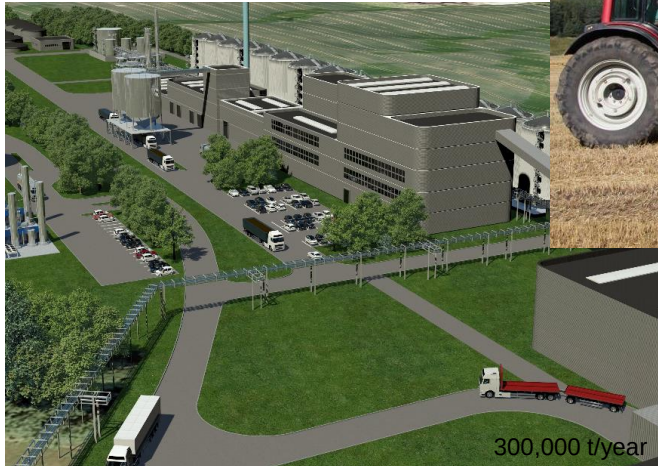
- Boosts energy production in slurry based biogas plants
- Recycling and redistribution of (organic) nutrients
- Recycling of carbon to maintain soil fertility
- Local (short distance) supply of biomass
- Storage and distribution via the gas grid
- Solving the challenge of fuel for heavy transport
- Biogas fits well into a wind-based energy system

Biogas



Where to
utilise the
straw?

Heat and power



2G bioethanol + lignin

Biomass gasification

PERSPECTIVES TOWARDS 2025

Competition for biomass will increase globally

Improved business opportunities for Danish farmers

- Increasing demand leads to increasing prices

Surplus straw will be fully utilised within 5-10 years

How straw will be applied depends on political priorities and resulting framework conditions

PERSPECTIVES TOWARDS 2025

Surplus straw will still be used mainly for energy:

- Heat and power production
- Biogas plants
- Bioethanol production (1-3 plants established in Denmark)

But as refining technologies are developed, tested and optimised high-value components will increasingly be utilised commercially.

Farmers are ready to deliver the biomass!

Thanks for your attention!

