

Innovationscenter
for Økologisk Landbrug

New bedding solutions in organic production

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Agenda

- Why look for new bedding solutions?
- Requirements for new bedding solutions
- Alternatives to be investigated
 - Straw pellets
 - Elephant grass
 - Compost and willow
 - Hemp
 - Reed canary grass
- Summing up



Why look for new bedding solutions?

Years with lack of supply, for example:

- 2018: drought
- 2023: drought in May and rain in July

Great year-to-year variation in yield (40% - 130% of expected*)

2023 --> farmers struggling with supply!

*Source: [Halmsituationen — DanskHalm](#) 23.09.2024



Why look for new bedding solutions?

Organic sector commitments, cattle:

- 50% of straw used on organic cattle farms must be organic (1/1-2023)
- Goal: reach 100% organic straw
- Continuous evaluation of supply
- No other bedding types included

Organic sector commitments, pigs:

- 50% of straw used must be organic (1/1-2021)
- From the harvest 2022 farmers must hold proof of amount of organic and non-organic used straw



Why look for new bedding solutions?

Competition for straw

- Energy sector
 - Cogeneration plants buying straw
- Biogas industry
 - Straw should be used in the stable before going to biogas
- Current prices
 - Organic straw: 1,20 kr./kg (1,83 SEK/kg)
 - Non-organic straw: 1 kr./kg (1,52 SEK/kg)

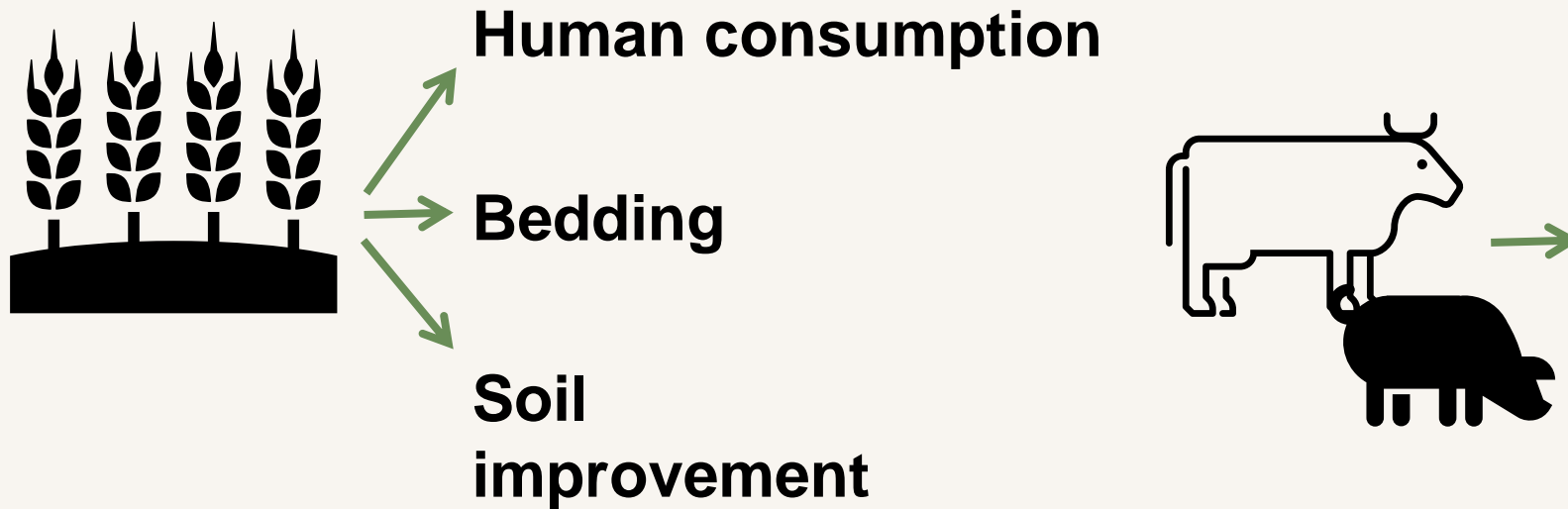
→ Lowering risk of lacking bedding



Photo: Erik Fog

Requirements for new bedding solutions

Bedding must be more than just bedding



- Human consumption
- Bi-product
- Suitable in crop rotation
- "Easy to handle crop"
- Environmental benefits
- Biodiversity enhancing
- ...

Requirements for new bedding solutions

Bedding solutions should be used in the stable at first and then:

- Biogas
- Manure and soil improvement
- ...



Alternatives

the Innovation center has worked with so far

Oat straw pellets

- Organic oat straw is available
- Pelleting enhance the qualities

Processing:

- Heated to 70-100 °C
- Increased absorbancy*
 - Processed = 4-5 liters of water/kg pellets
 - Non-processed = 2,5-3,3 liters of water/kg straw
- Increased hygiene
 - Killing of potential pathogens
- Higher density and lower volume
 - Moving straw, e.g., East- to West Denmark

*Based on literature and Literature study in DLBR Dansk Økologi 2020



Oat straw pellets – trial on a Danish organic dairy farm

- Deep bedded cubicle
- Cubicles with mattress (water)
- Deep liter area

Focus on cow comfort, handleability and performance in different stable types



Photo: Ann-Sofie Krogh Andreassen

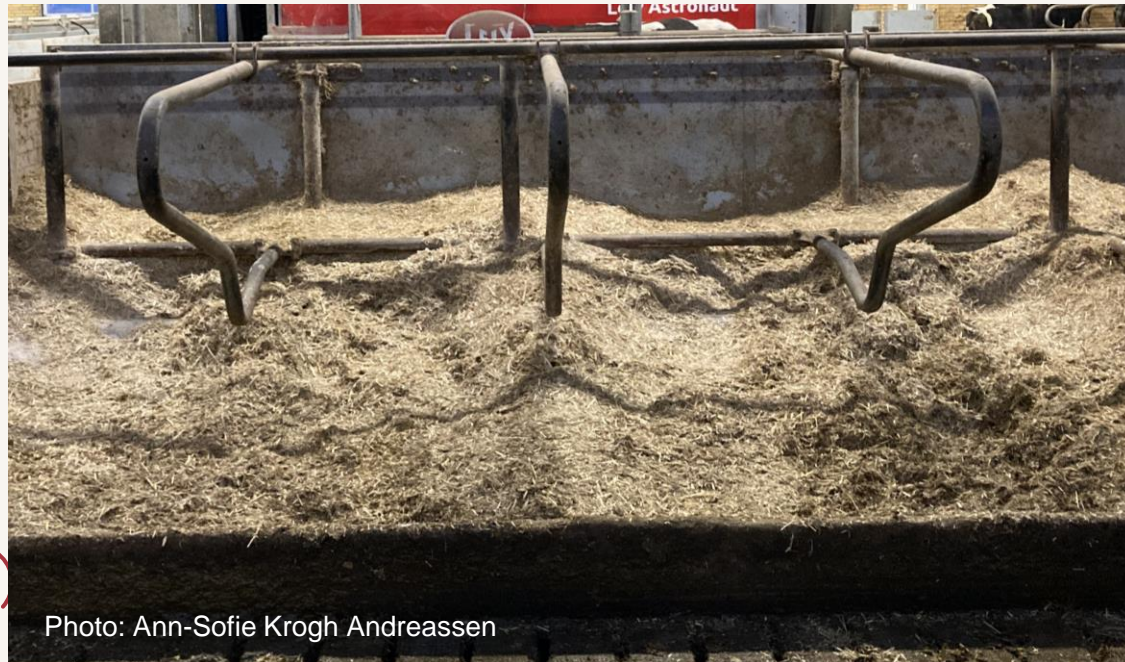


Photo: Ann-Sofie Krogh Andreassen



Photo: Ann-Sofie Krogh Andreassen



Oat straw pellets – deep bedded cubicle

Perceptions from 4 weeks trial

- Easy to work with
- Using cubicle dispenser
- New bedding 2x week
- Average 9.5 kg/cubicle/wk
- Level in the cubicles lowered in the period
- No changes in observed cow lying behaviour
- No changes in observed moisture/humidity, dust, smell etc. in cubicles



Oat straw pellets – mattresses

Perceptions from 4 weeks trial

- Same perceptions, though:
 - Pellets rolling down
 - Hock lesions
- Same level of "dry"
- 6 kg/cubicle/wk
- Crushed pellets as a solution?

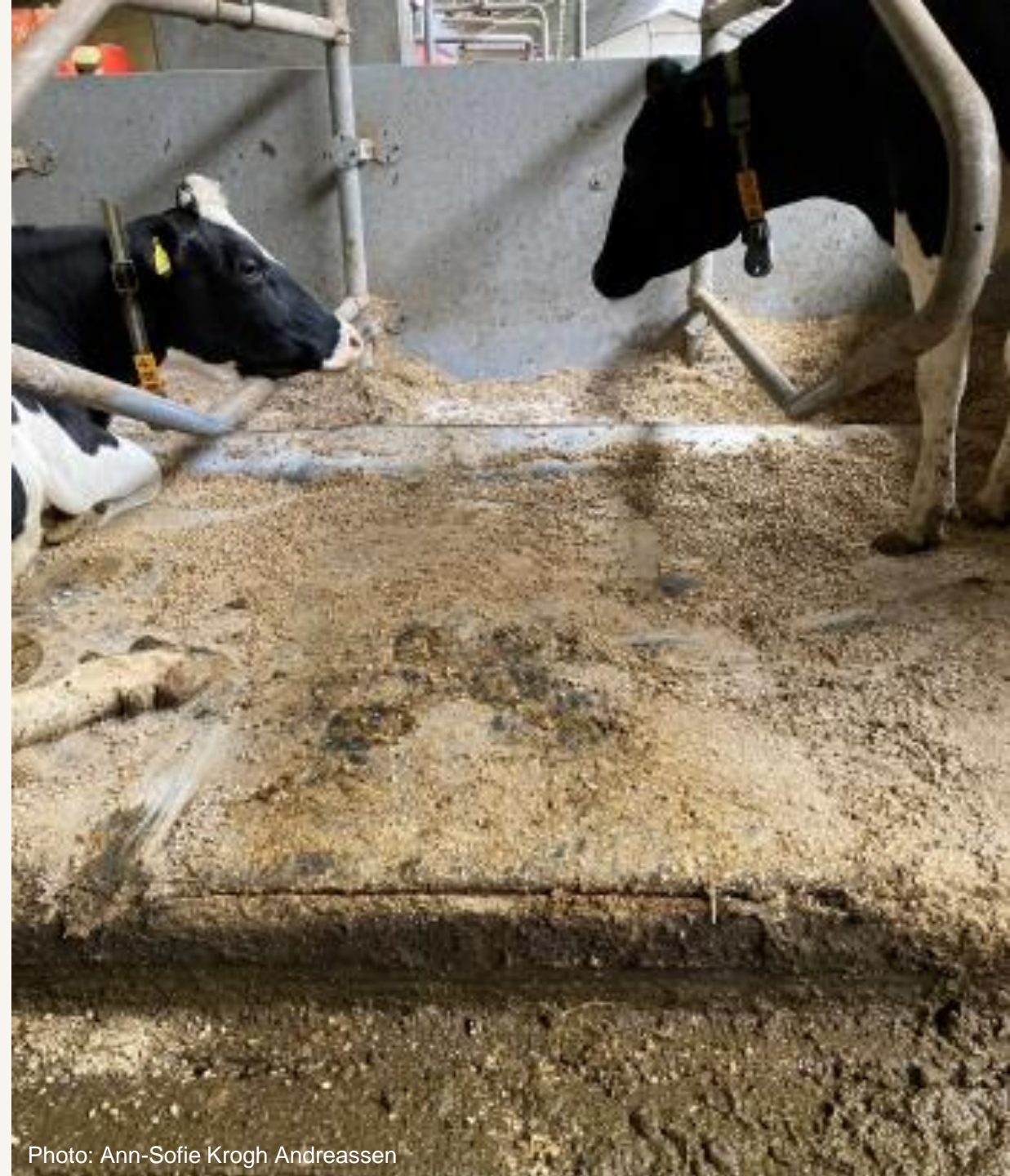


Photo: Ann-Sofie Krogh Andreassen

Oat straw pellets – deep litter

- Farmer wanted to see the potential of with no straw on top
- Keeping level comparable to that of de with straw
- 1750 kg/wk
- Calving heifers changed their lying behavior
 - Standing
 - Spending more time near the edge straw
- Dry cows: no observed change in lying behaviour
- Higher level and more dry at feed table
- Cleaning: hard!
 - Dry but warm
 - Still fine looking on top



Oat straw pellets – farmer perceptions

Positive experiences

- Cows responded well in general
- Apparently cleaner during trial compared to before
- Less dirt/straw/etc. on udder in AMS
- Absorbing lower layer in deep litter (?)
- Nice effect at feed table in deep litter

Negative experiences

- The price
 - 2,52 kr./kg (3,83 SEK/kg)
- Apparently not possible to reduce the amount of bedding when using straw pellets compared to straw
- The current pellets are very hard
- Not suitable for all cubicles

Solutions ?

- Crushed pellets in stead of whole pellets?
- Mixing pellets with other bedding type?
- Mixing oat straw with e.g., rape straw = looser pellet
- ...

<https://www.youtube.com/watch?v=jh5k5WCyLRM>



Elephant grass – trial on a Danish organic dairy farm

- Perennial crop
- N-efficient
 - Take available N during the first 2-3 years
 - May need N after year 3
- Producing for ~15-20 years
- Average yield ~ 10-20 t dm/ha/year
- Establishing is the demanding part
 - Weed control
 - Planting manually

Currently expanding business in England and Germany



Photo: Malthe Karstensen



Elephant grass – trial on a Danish organic dairy farm



Elephant grass – trial on a Danish organic dairy farm



Photo: Martin Frederiksen



Photo: Linda Rosager Duve

Elephant grass – cubicles

- Trial during summer period
- Using 400 g/cubicle/d
- Easy to handle (comparable to "easystro")
- Cows became more dirty
- Increasing cases of hock lesions
- Trial stopped after 2 weeks

Questions remaining:

- More bedding per cubicle?
- Weather conditions related to reduced cleanliness?
- How to handle the dust when cows are inside?



Photo: Ann-Sofie Krogh Andreassen

Elephant grass – deep litter

- Building up
 - Day 1: 2x300 kg
 - Day 2: 2x300 kg
 - Day 4: 2x150 kg + straw on top
 - Adding elephant grass + straw every second day
- Evaluation 14 days later:
 - Building up fast
 - Comparable to straw deep litter
- Trial with both maize cut and haybusted elephant grass
- Nothing to remark on the calves



<https://www.youtube.com/watch?v=Yu9jknvQgw>



Compost and willow – trial on a Danish organic dairy farm



Photo: Ann-Sofie Krogh Andreassen



Photo: Ann-Sofie Krogh Andreassen

Compost and willow – trial on a Danish organic dairy farm

4 week trial during June/July

Focus on flies

- Deep litter area build from (32 sq.m)
 - 3x1500 l
 - 3-4 shovels per week with mini-loader
- 16-20 cm
- 1.999 kr./bigbag
- Faeces got covered within the bedding
- Clean and dry surface
- An experience of fewer flies
- No smell or dust



Photo: Heidi Mai-Lis Andersen

Compost and willow – trial on a Danish organic dairy farm

- Calves remained nice and clean
- Bedding got caught in the hoof

Analysis of the bedding showed:

- Total N and ammonium N: may look like garden waste
- Mycotoxins: levels below any risks
- DM:
 - Heated at 63 °C or 103 °C for 17 hours: 44%
 - Surface measure (laser): 90,4-96,2%



Photo: Ann-Sofie Krogh Andreassen

Other potentials



Hemp

- 2024: 305 ha organic hemp
- Yield: 8-14 ton biomass
 - Most of this will be "skærver" (the non fiber part of the stem)
- Currently grown for the fiber part (insulation, growth medium for vegetables etc.)
 - "Skærver" currently a waste product
- Can compete against weeds
- Some varieties grows to +2 meters of height
- As bedding: comparable to the structure of a dry stinging nettle

Reed canary grass

- GoGrass (EU project)
- Briquetted reed canary grass
- An easy crop
 - Perennial, low input need, grown in different soil types etc.
- Experiences from the project:
 - Soft lying area
 - Long lasting
 - Keeps a dry environment
 - Heating removes bacteria and fungus
 - Reduced ammonia smell

[GO-GRASS – circular business models for rural agri-food value chains - GO-GRASS](#)

Summing up

How about the economics?

- Economy is important but...
- Minor trials
- Focus on suitability and farmer perception
- Potential materials
- Self producing farmers

How about the organic status?

- Aim to reach 100% organic bedding on organic farms (Organic sector commitments)
- Supply and demand (more organic demand = more organic supply)
- Everything within the projects can be produced organic

Thank you for listening



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Photo: Malthe Karstensen