



Embedded energy in dairy stables

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 Track 2:
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Implications - Background and objectives - How work was carried out - Key results and discussion



Implications

- The amount of embodied energy per cow differs with the factor four in 20 analysed barns
- Lower amount of embodied energy:
 - Walls of timber instead of concrete
 - Cold barns instead of warm/insulated
 - Tie-stall instead of free-stall
- Knowledge important for new buildings



Implications - Background and objectives - How work was carried out - Key results and discussion



Background

- Cows kept in stables in period without plant growth
- Energy is needed to built stables
- Goal to be energy efficient



Photo: Rose Bergslid

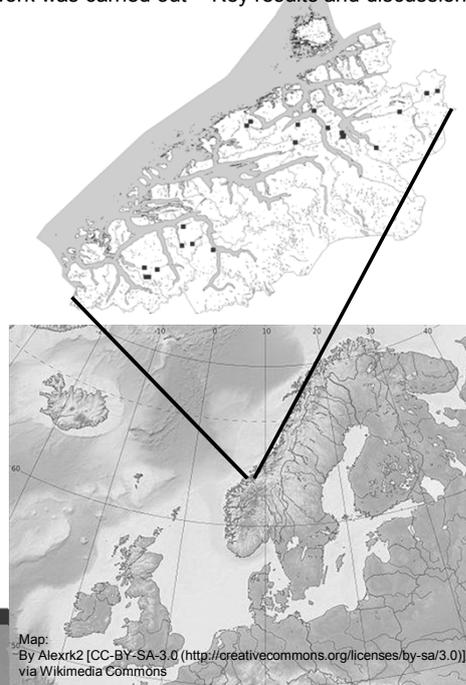
Therefore:

- Include embodied energy, when energy use on farm is analysed

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- Stables placed near the coast at 63 ° north
- 10 organic
- 10 conventional



Map:
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Objectives

- Estimation of embodied energy of dairy stables using a simple screening method
- Compare the effect of:
 - Different materials
 - Insulation
 - Stable type (tie-stall and free-stall barn)
 - Additional functions (storing hay, silage, machinery)

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How work was carried out

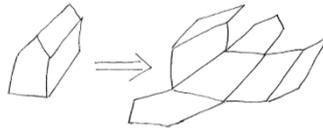
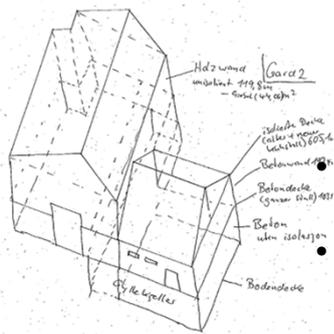
- Farm visits
 - Collecting data
 - Pictures for construction plan



Photo: Sissel Hansen

Implications - Background and objectives - How work was carried out - Key results and discussion

Drawing of a simple construction plan



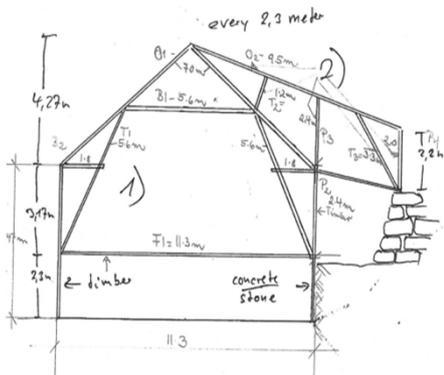
Calculation of space of different surfaces

- Stables differed a lot in appearance, but little in use of different «modules»
- We calculated the embedded energy for these «modules» using the ecoinvent database



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Implications - Background and objectives - How work was carried out - Key results and discussion



- Construction (timber-frame) for the stables
- Summing up for all parts
- 50 years use

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Implications - Background and objectives - How work was carried out - Key results and discussion



Key results

Buildings, older than 30 years

- Walls and construction mainly timber
- (Parts of) Cellar built with stones



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Buildings, 20 to 30 years old

- Walls and construction timber or concrete
- Cellar concrete
- Storage for silage often in tower
- Additional functions



Photo: Rose Bergslid

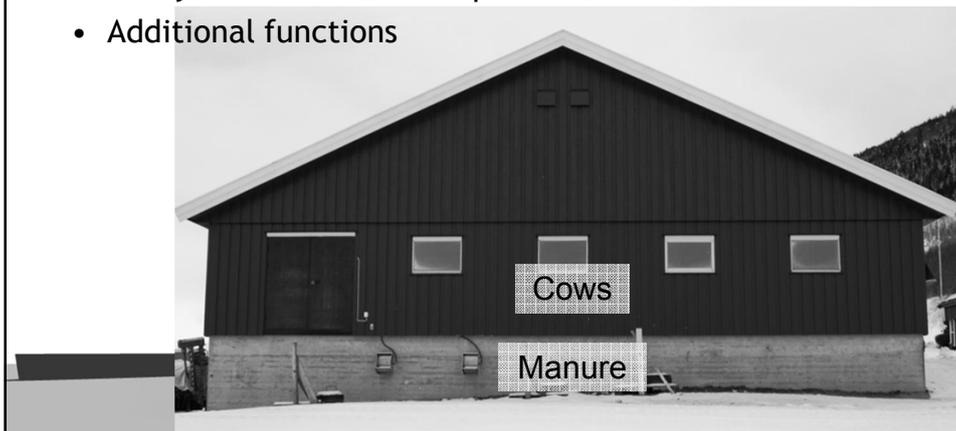
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Buildings, 2001 and younger

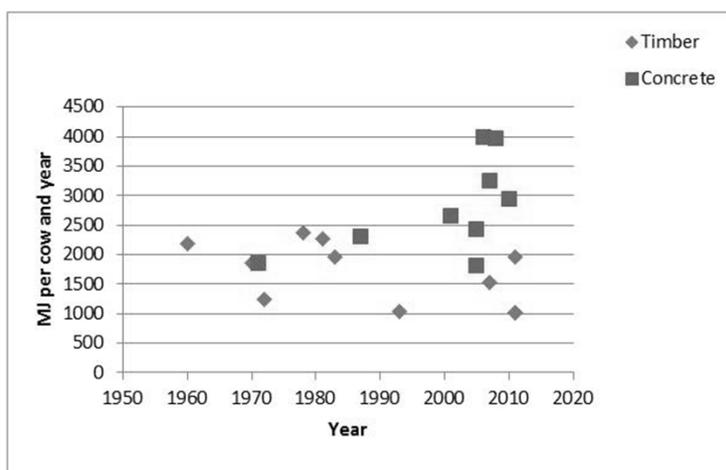


- Free-stall barns
- Insulated or cold
- Use of timber, concrete and steel
- Slurry tank in cellar or separate
- Additional functions



Implications - Background and objectives - How work was carried out - Key results and discussion

Results from the 20 farms



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Implications - Background and objectives - How work was carried out - **Key results** and discussion



More embodied energy in free-stall barns than in tie-stall

- 1) More use of concrete and steel in newer stalls
- 2) More area needed for free-stall



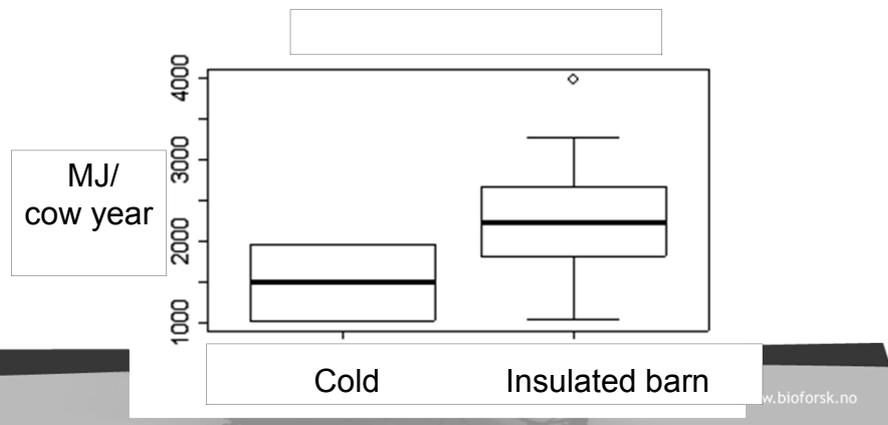
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Implications - Background and objectives - How work was carried out - **Key results** and discussion

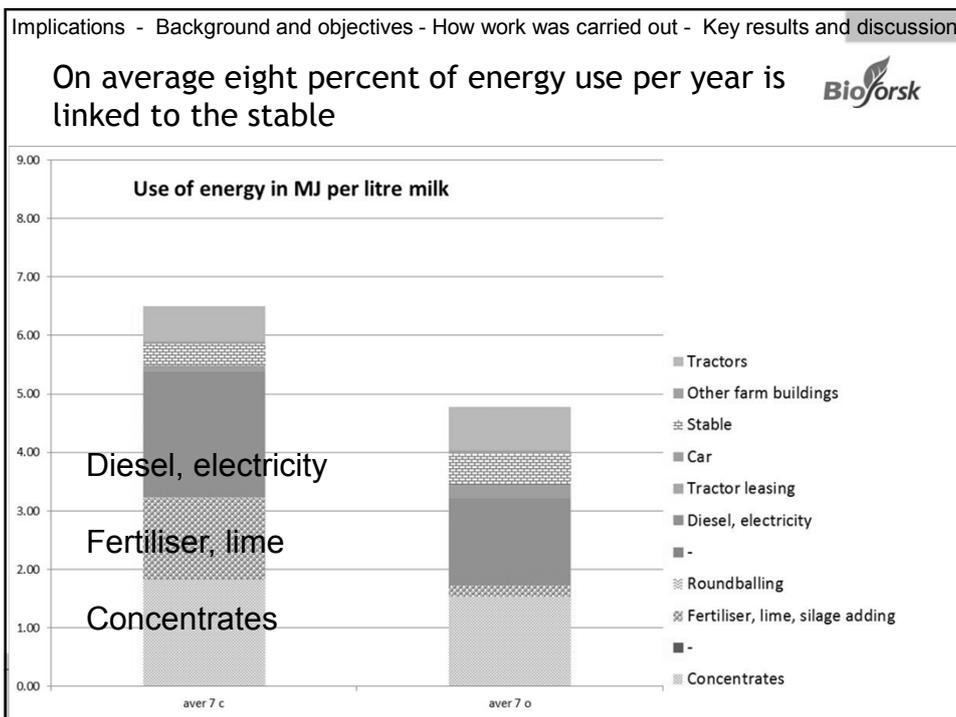


Cold barns need less energy

- Insulation is energy demanding



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Discussion

- For the 20 farms the amount of embodied energy varied considerably
- Amount of buildings in relation to overall energy consumption on the farms varied
- Regulation for organic farming requires more place per animal and thus more «building»
- Lower yield per cow on organic farms leads to a higher energy value per litre of milk



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Nevertheless - limitation of results

- Results are a rough estimate
- Only production and use phase included (no disposal)
- Transportation from store to farm not included



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Thank you for your attention



Acknowledgement

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