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NORSK INSTITUTT FOR BIOØKONOMI

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HEALTHY FOOD SYSTEMS FOR A HEALTHY PLANET

LCA unveils positive contribution from traditional sheep-farming

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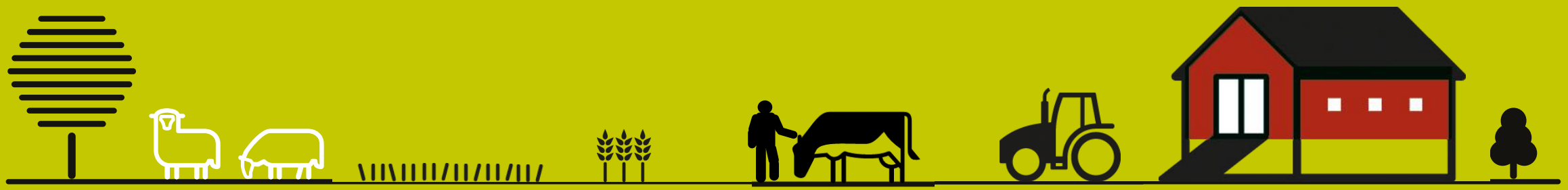
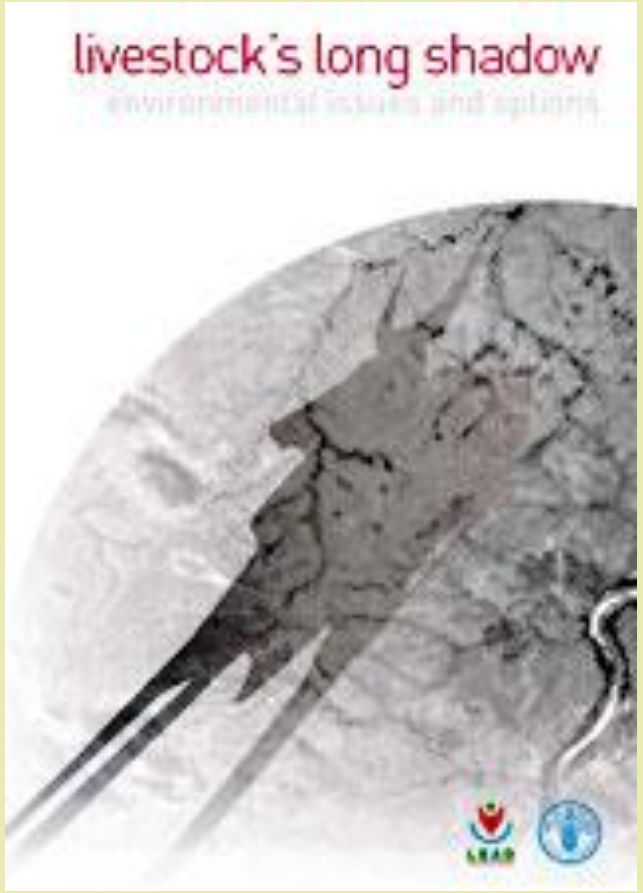


Proceedings:
pages 70-72



FAO, 2006. Livestock's long shadow: environmental issues and options.

Introduction

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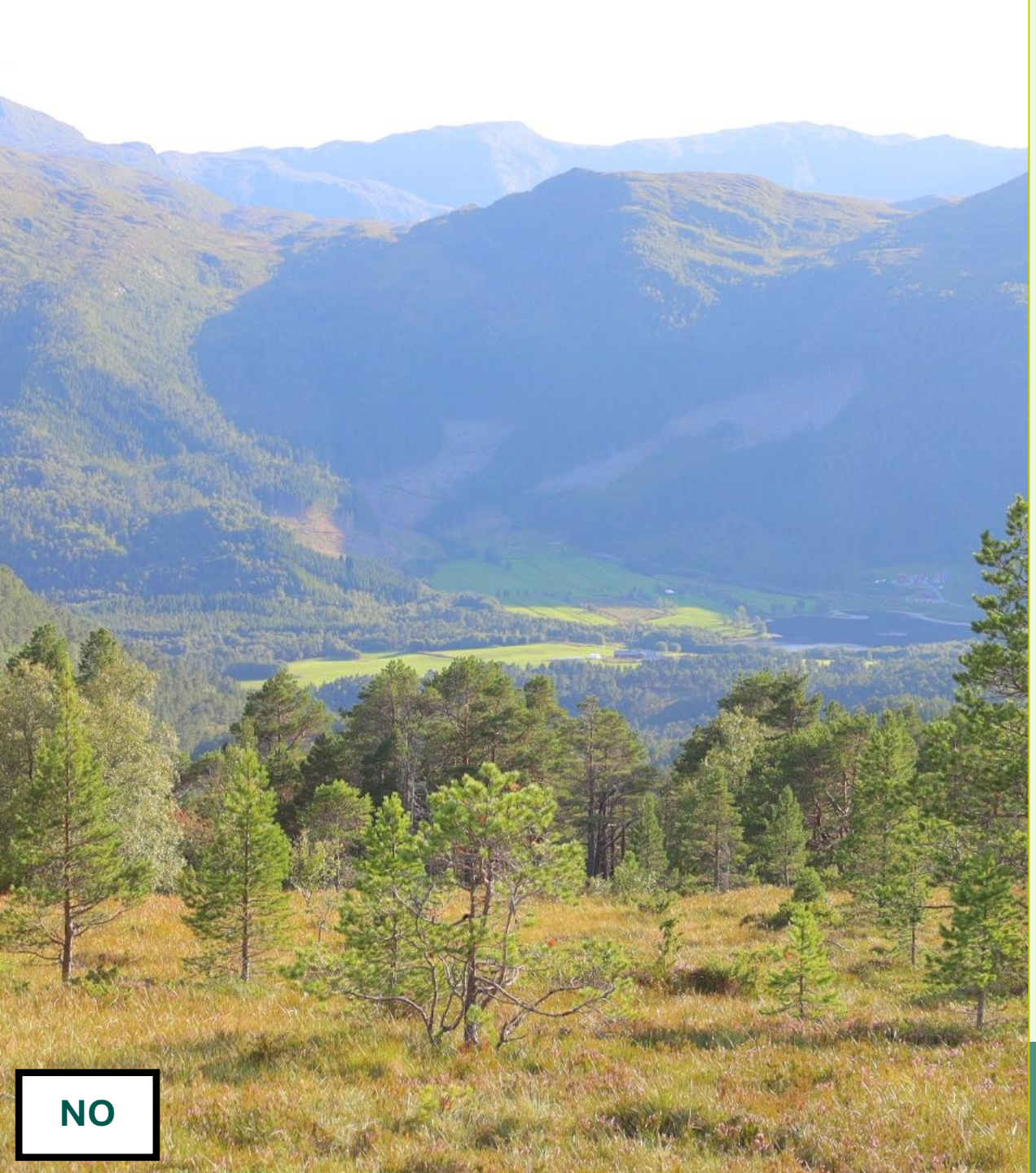
Ruminants (including sheep)

- Contribute significantly to methane emissions.
- Can have high emissions per kg of product.
- Can utilise plant material unsuitable for human consumption, transforming it into valuable, protein-rich food.



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Introduction

Grazing

- Can preserve cultural landscapes.
- Can contribute to carbon sequestration.
- Need to understanding the balance between these factors within the context of climate change.

Objectives

- Investigating the environmental impact of meat, milk, and wool production from sheep farming.
- Estimating the impact of grazing rangeland on carbon sequestration.

Picture: Lise Grøva

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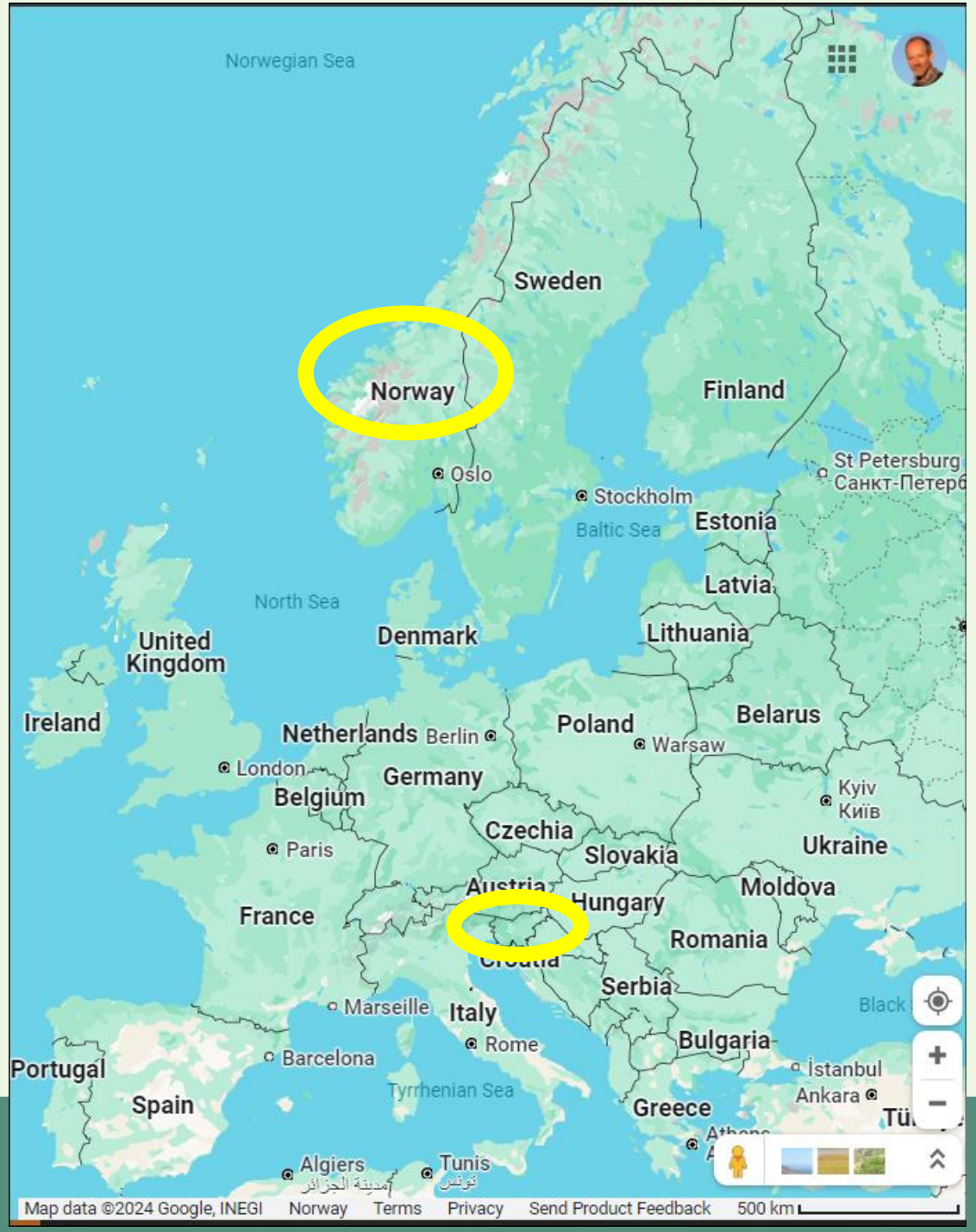

Data

Data regarding inputs and production were sourced from:

- eight sheep farms in central Norway.
- one research farm in the south-west of Slovenia.

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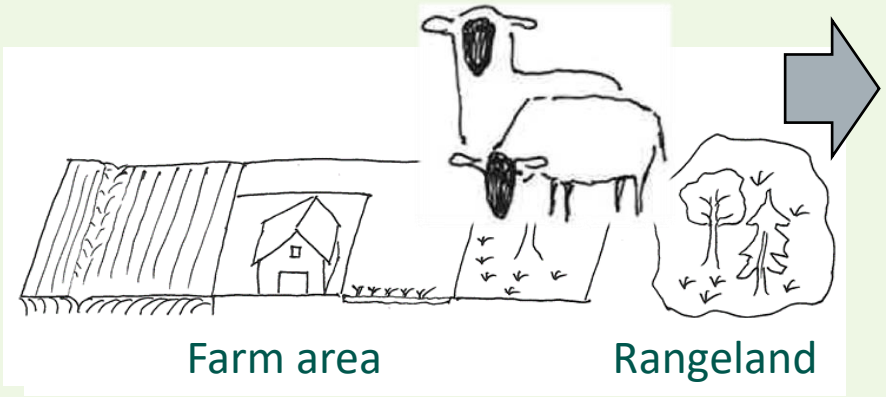
Methodology



Products:
- Meat
- Milk
- Wool

Feed demand for animal groups based on
- Energy requirements for maintenance, activity, lactation, pregnancy, growth, wool
- Winter barn feeding
- Grazing period

Biological based allocation on energy demand for meat, milk, and wool.

Emissions modelled in line with ISO standards and IPCC (2007, 2021) guidelines

Emission of climate gasses

as CO_2-equivalents

Kilde: https://unsplash.com/photos/6xeDIZgoPaw
Patrick Hendry; @worldsbetweenlines

Kilde: https://unsplash.com/photos/guADzpF9pDI
Zachary Theodore; @zacharytheodore

Diesel

Products:
- Meat
- Milk
- Wool

LCA-calculations

- LCA software Umberto©
- ecoinvent© database for incorporating emissions related to purchased inputs

Emission of climate gasses

as CO_2-equivalents

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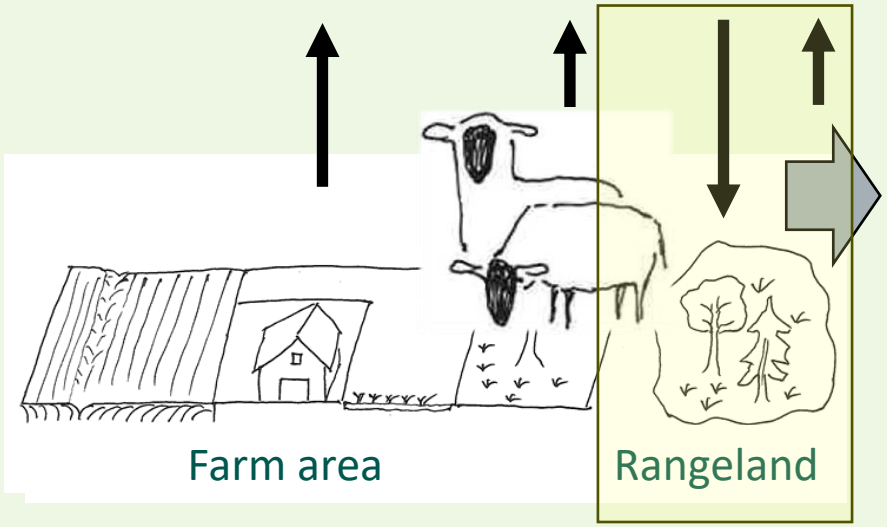
Diesel



Products:

- Meat
- Milk
- Wool

Farm-data

NO

	Unit	Commercial farms	Vremščica ICSR
Country		Norway (NO)	Slovenia (SI)
Number	n	8	1
Farm area	ha	29.4	260
Grazing period	days/year	163	240
Winter feed, main		silages	hey
Concentrates	kg/ewe	115.6	35.7
Diesel	l/ha meadow	92.3	55.6

Farm-data


NO


SI

	Unit		
Country		Norway (NO)	Slovenia (SI)
Ewes	n	143	420
Lambs, born	n/ewe	2.2	1.2
Sheep-milk, delivered	litre/farm	no milking	24,000

Results

Norway

- Increased demand for winter feed, resulting in higher emissions
- More use of purchased concentrates
- 19.2 kg CO_2-eq/kg meat GWP_{100} (IPCC 2007)

Results

Slovenia

- 19.6 kg CO_2-eq/kg meat GWP_{100} (IPCC 2007)
- Less emissions when related to edible energy from meat and milk
- 1.00 kg CO_2-eq/MJ GWP_{100}
- (1.45 kg CO_2-eq/MJ in Norway)

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SI

Results, GWP climate gas emissions

	Unit	Norway (NO)	Slovenia (SI)
GWP_{100} (IPCC 2007)			
all edible energy	kg CO_2/MJ	1.45	1.00
all edible energy	kg CO_2/MJ, sequestr. incl.	0.12	0.63

NO

Results, based on GTP, Global Temperature-change Potential

	Unit	Norway (NO)	Slovenia (SI)
GTP_{100} (IPCC 2021)			
all edible energy	kg CO_2/MJ	0.77	0.34
all edible energy	kg CO_2/MJ, sequestr. incl.	-0.57	-0.02

NO

Research demand

- Effect of grazing on
  - carbon sequestration
  - biodiversity
- Information for farmers
  - number of animals
  - grazing period
- Where is rangeland, where forest better

Conclusions

- Sheep can utilise feed from areas not suitable for food production to produce meat, milk, and wool. (entire year)
- Producing both milk, meat, and wool is better for the environment than producing meat and wool.
- Carbon sequestration by grazing rangeland, can out-way the emissions for the winter season.
- Under this conditions, sheep farming has the potential of sustainable, responsible, and carbon neutral food production.

Thank you for your attention

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