Grassland and forages in high output dairy farming systems.
The18th EGF Symposium, Wageningen 15-17th June 2015

Dairy production systems in Finland

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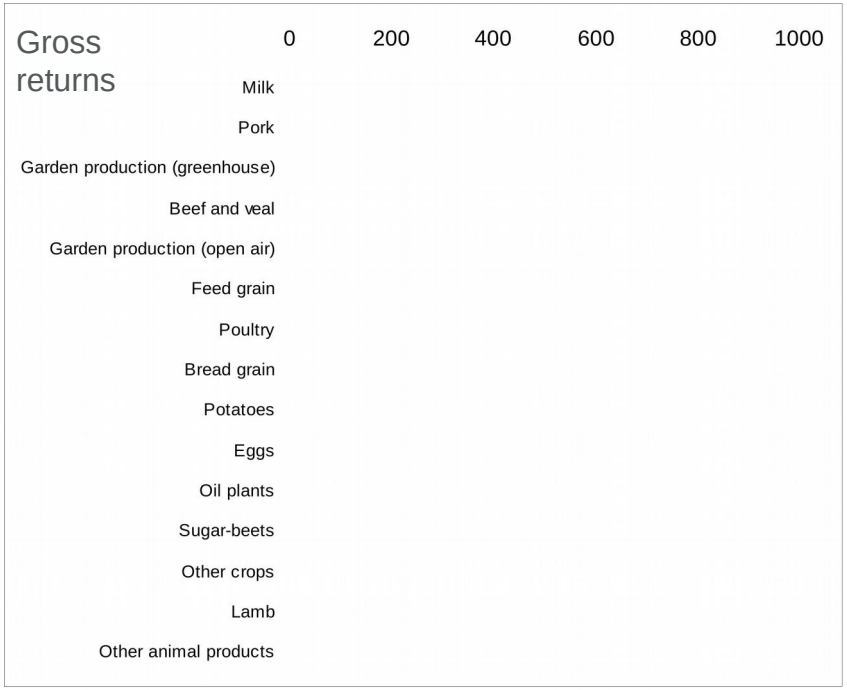
LUONNONVARAKESKUS

Importance of dairy production in Finland

- Milk contributes ~40 % of the agricultural gross return
- Milk sector is the 3rd largest employer in the food industry



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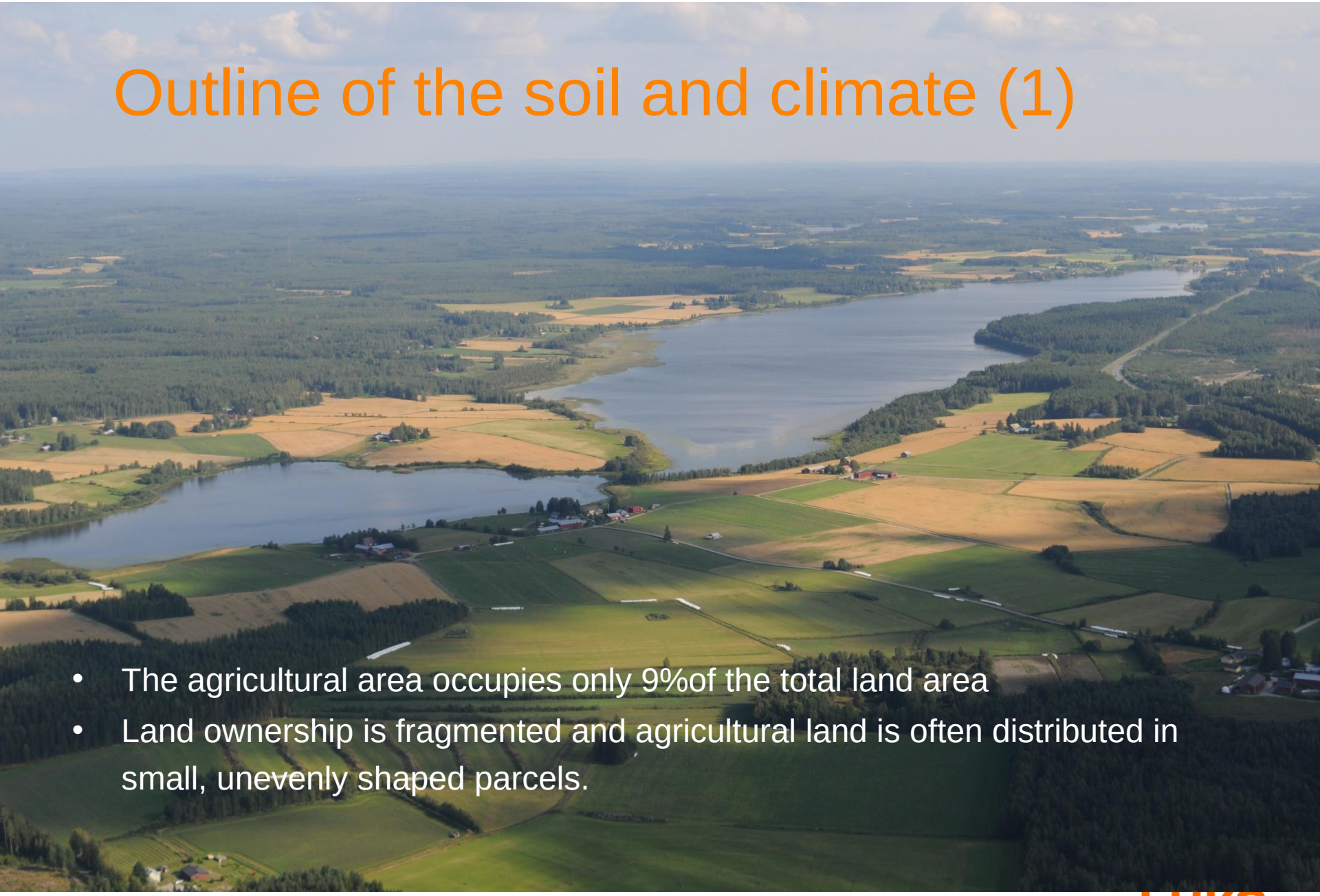
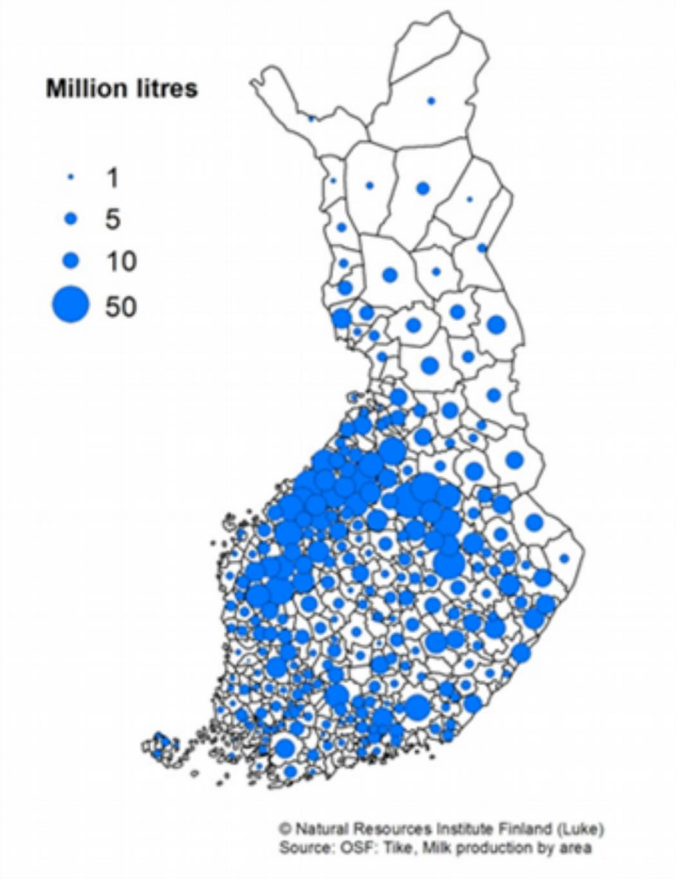
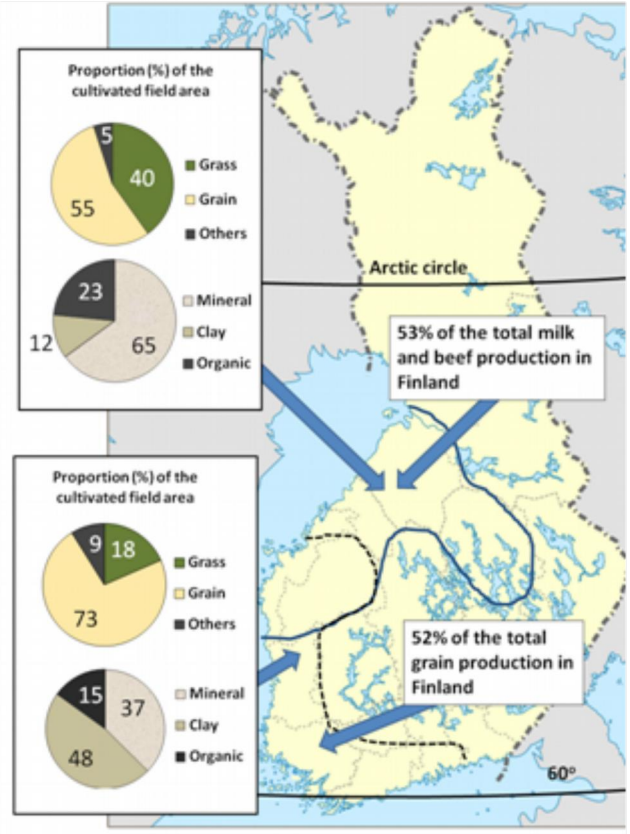
Outline of the soil and climate (1)



- The agricultural area occupies only 9%of the total land area
- Land ownership is fragmented and agricultural land is often distributed in small, unevenly shaped parcels.

Regional differences in soil properties and crop production and distribution of milk production 2013-2014 (OSF, 2015)

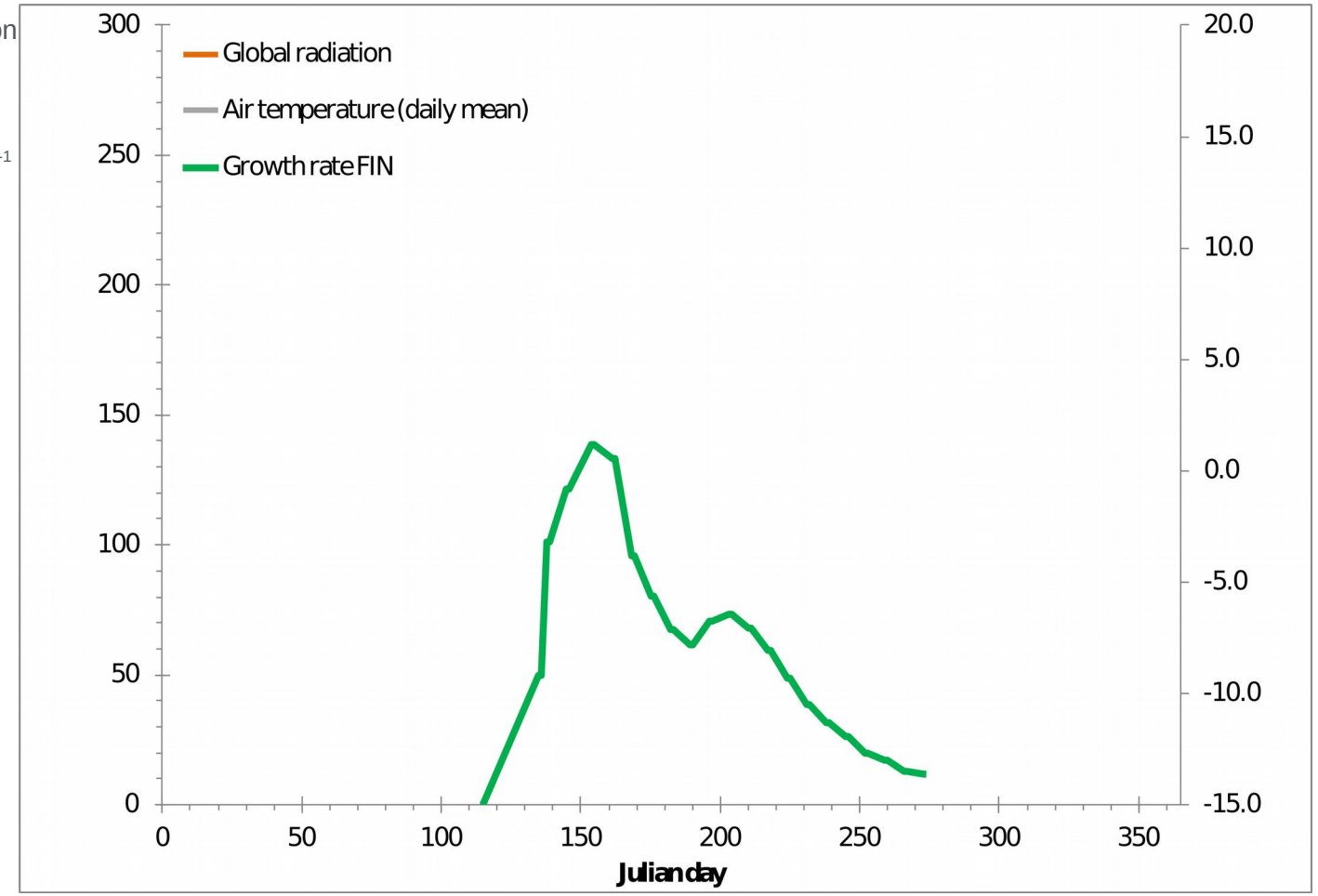




2. Seasonal pattern of herbage production

Global radiation (W m^{-2} d^{-1})

Growth rate (kg DM ha^{-1} d^{-1})



Mean daily air temperature (°C)

Source:
Global radiation, Temperature FMI Maaninka;
growth rate FIN Virkajärvi unpublished ;
FMI growth rate IRE Corrall 1984 EGF.

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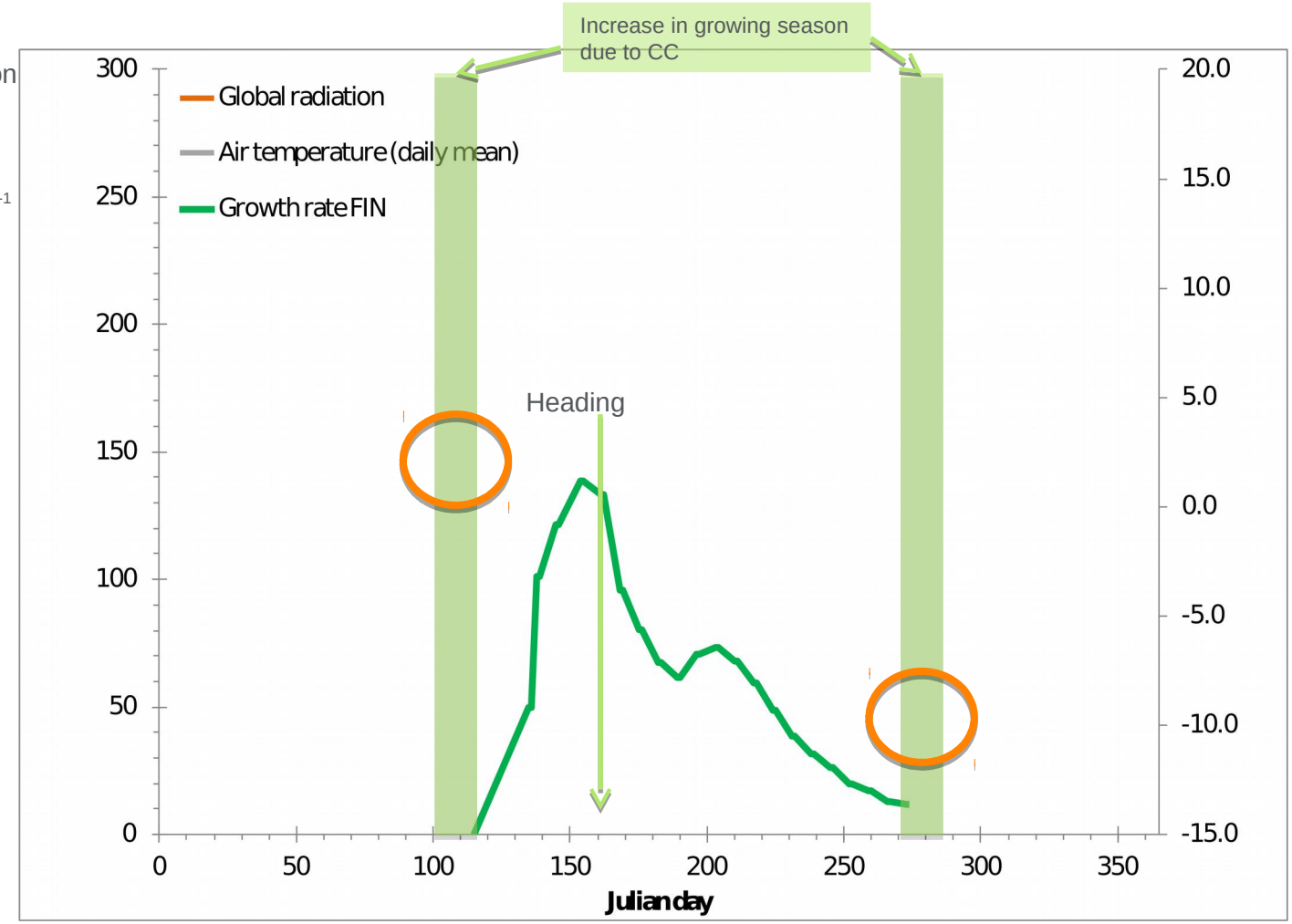

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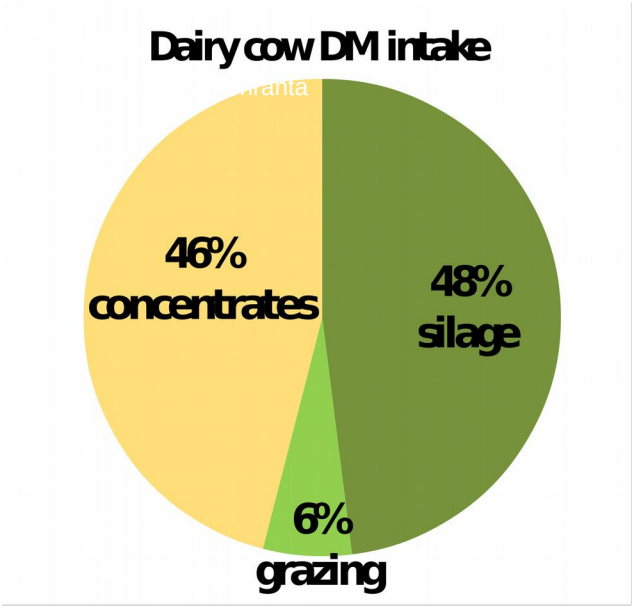
Outline of dairy production in Finland

- Breeds: Nordic red 59%; Holstein 40%
- Proportion of organic farming is low (2.5 %)
- Most of the feed produced on the farm (71 %)
- Grass silage: pre-wilted with additives
- Use of soya bean is minor
- Majority of the cows graze during summer (legistlation) but proportion of pasture of dairy cow's annual DM intake is low
- Finland is free from many common cattle diseases
  - enzootic bovine leucosis, brucellosis, bovine tuberculosis etc
  - Low prevalence of e.g salmonella, EHEC , mycoplasma bovis



The development of dairy production in Finland from 1980 to 2012. (OFS, 2015)

Year	Number of dairy farms (1000)	Number of dairy cows (1000)	Total milk production (million litres y^{-1})	Average milk production, l cow^{-1}	Arable land, ha $farm^{-1}$	Dairy cows $farm^{-1}$	Dairy cows ha^{-1} *	Milk production, kg ha^{-1} y^{-1}
1980	91.3	719	3170	4478	na	11.5	na	na
1990	45.5	496	2730	5547	19.3	13.0	0.67	3700
2000	22.2	364	2450	6786	32.6	15.2	0.47	3200
2012	9.6	284	2230	7876	56.4	33.1	0.59	4600

- Only 10% dairy farms left in 2012 of those in 1980
- Much less decrease in total milk yield
- High production per cow but low stocking rate and thus low production per ha.
  - This diminishes the environmental impact as well

* Note: Calculated per total area occupied by the farm

The spectrum of plant species and cultivars is limited due to our climatic conditions

Photographs © Marketta Rinne

Perennial rye grass in autumn and following spring

Boreal Plant Breeding, Jokioinen SW Finland

September 2013

7200 alive individuals

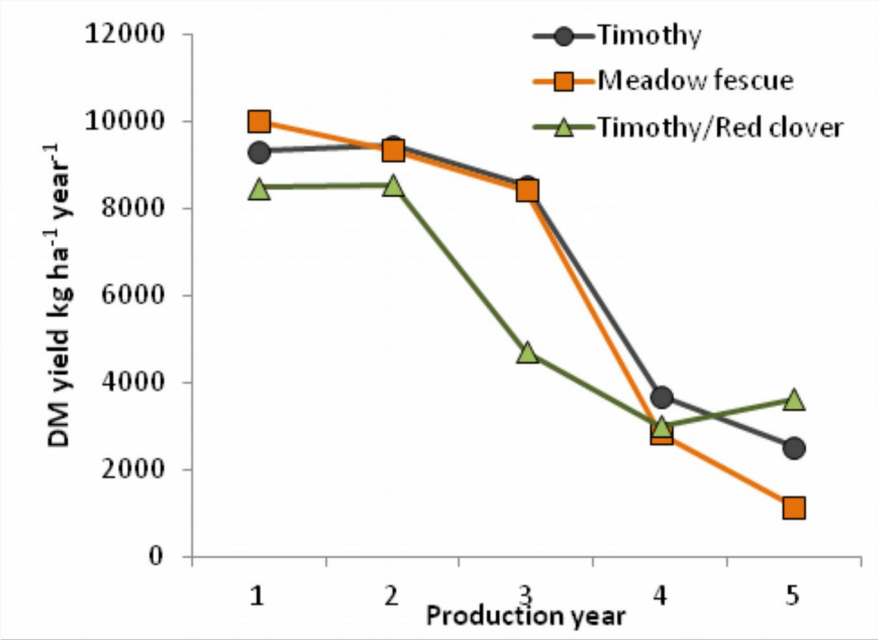
May 2014

155 alive individuals

Photographs ©Mika Isolahti, via Boreal Plant Breeding

Typical DM yield decrease in three forage species during successive years after establishment.

(Modified from Nissinen & Hakkola 1994).



- This is the reason for short term leys
- Mostly because of difficult winter conditions
- Mostly renowated by ploughing
- Grassland should be used in crop rotation with cereals.

Typical fertilization rates of grass in relation to DM yield

	Nitrogen	Phosphorus	Potassium	Annual DM Yield
	kg/ha/year			
Maximum [1)]	160 - 240	0 - 46	0 - 170	**9 – 12** Mg/ha/y in experiments
In farm surveys [2)]	150 - 160	15	66	5.5 Mg/ha/y
Farm gate balance [3)]	107	12	na	

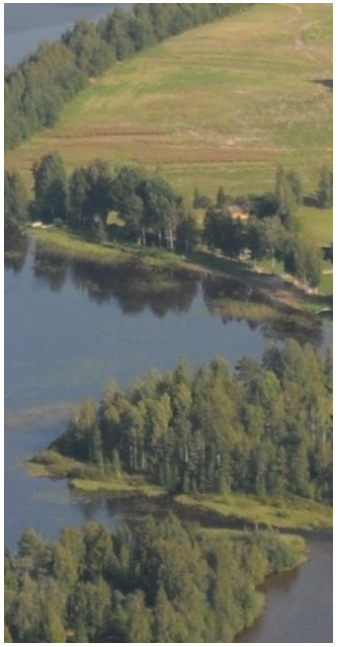
Reasons for low DM yield on farms:

- Extra area act as a buffer in difficult years
- Area based subsidies
- Administrative area demand per LU (fixed ratio for herds > 30 LU)

1) Finnish Agri-Environmental Scheme 2015
2) ProAgria Field Parcel registry 2014, n= 16 100 parcels in years 2005-2012
3) Virtanen & Nousiainen 2005

Environmental impact

Share (%) of total	Agriculture	Dairy	Note
N load	50%	na	NO_3 directive applies the whole country, but NO_3 not an serious issue
P load	60%	na	Important, Most of P is in dissolved form
GHG	9%	2.5%	Originating especially from organic soils
NH_3	90%	30%	Low proportion of agricultural land



- Low proportion of agricultural land and low LU/ha reduces impact
- Local and regional problems do occur
- 50 % of precipitation falls as snow –

  a peak in surface runoff period in spring

Grönroos J., et al (2009 The Finnish Environment 8, 63p
Statistics Finland (2014). National Inventory Report under the UNFCCC and the Kyoto Protocol 15.4.2014.
Huhtanen et a.l 2(009). MTT No 138.

Note

- No permanent grassland (only 4%)
- No perennial ryegrass
- No lucern
- No maize
- No white clover
- Very little annual grassland
- Grazing only 6 % of energy intake of dairy cows

Economy of dairy production

- Milk price +22% higher than average of EU-15 during 2000-2013
  - a result of high value products
- Production costs are one of the highest in Europe
  - especially labour and machinery
  - Labour input is high 207 h/cow/year (NL & DK 34- 52 H/cow/year)
- Profitability ratio 0.40-0.67 (EU -27 average 0.49-0.73)
  - Large variation between farms
- Construction of new barns is capital intensive

Import and export of dairy products

- Import has increased during recent years
- 2014: Export markets : Russia (48 % of total dairy exports)
- 2015: Exports to Russia are banned -> forced to find new markets,
  - Such as low margin milk powder (WMP, SMP)
  - Average producer price - 15 % if compared 1-5/2014 and 1-5/2015
    - N
    - Pr e, b t remain high, which ca

Challenges and possible solutions

Maintaining profitability	• Increase in farm size without over-indebtness •There are many farms that have a high profitability
To get new, young farmers to choose dairying as a profession	• Inspiring examples of others • AMS systems etc. to reduce labour demand/ to change nature of the work
Combining economy with environmental and ethical challenges	• Water protection measures must be tailored for dairy production • Consumers opinion (diet, animal rights)
Protein demand (No GMO)	•New species, such as Broad bean (Vicia faba) in addition to rape seed meal
Climate change	• There are several adaptation measure to utilize positive effects of CC • Very large variation in among current scenarios

Thank you!