



Grass silage – source of valuable nutrients

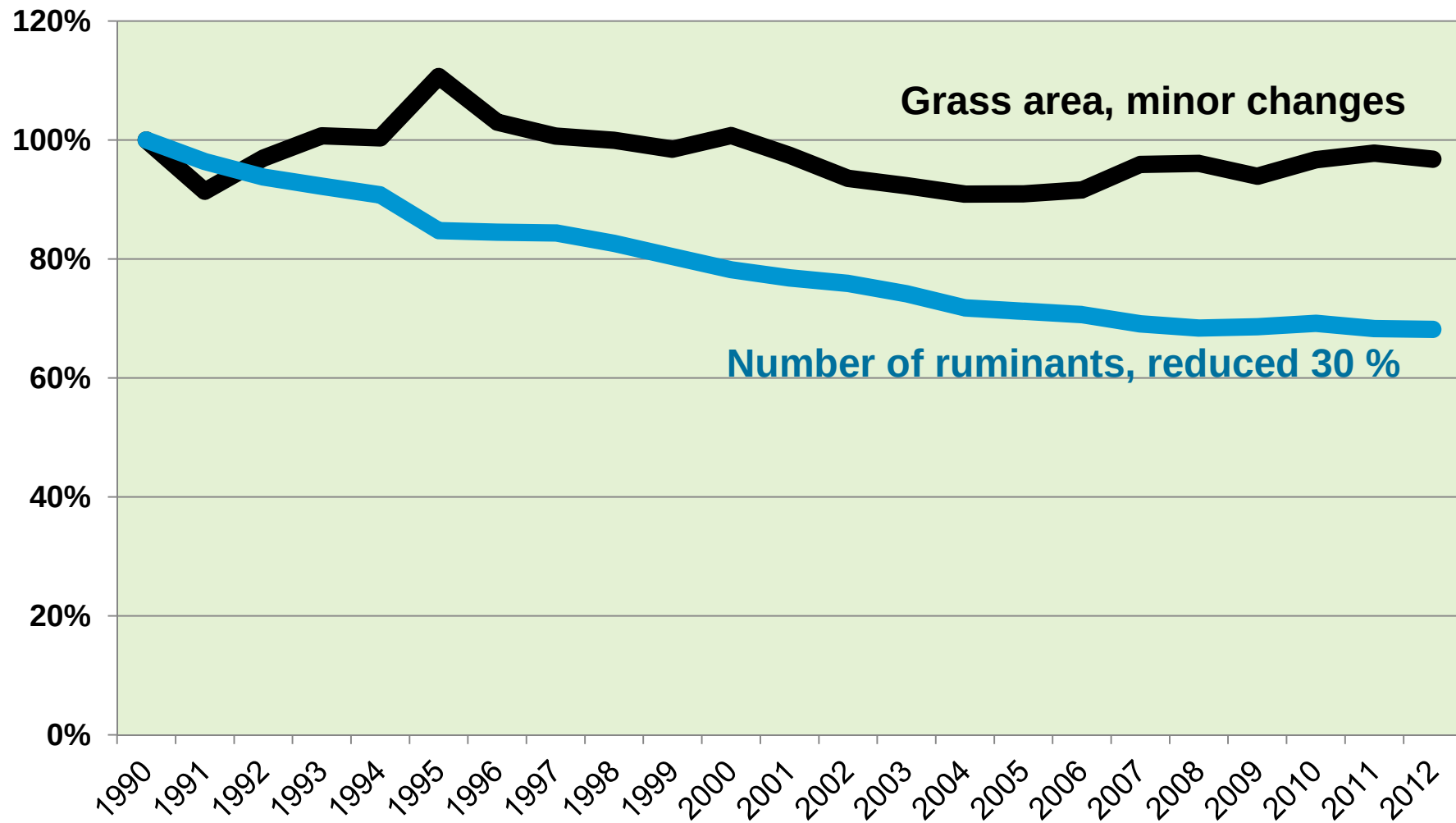
MTT's task in the project **Protein from Grass**

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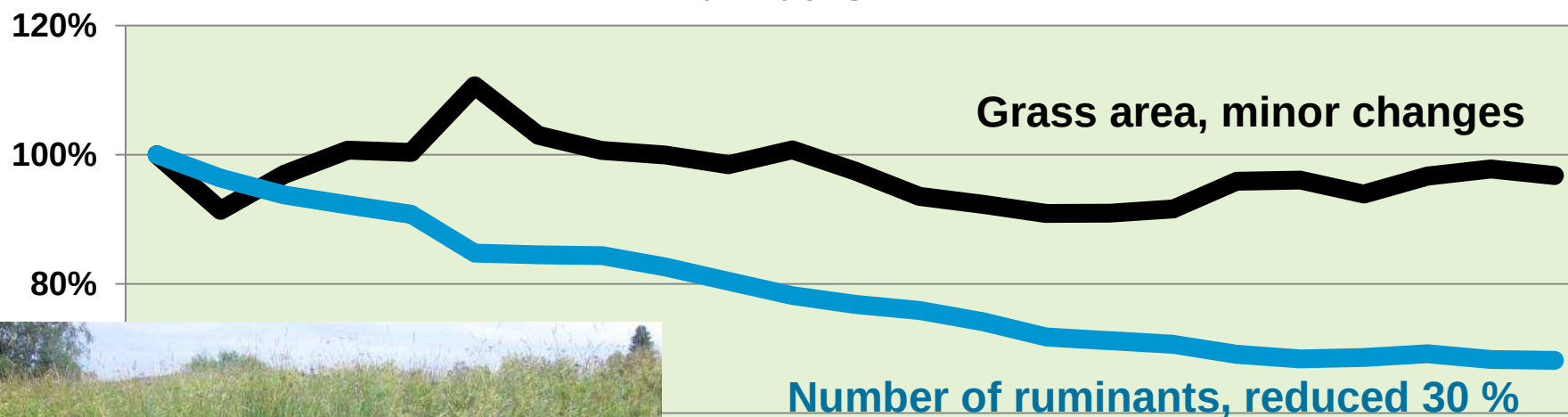
Work group:

- Research scientist *Pellervo Kässä*,
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- Professor *Marketta Rinne*

Relative change 1990 – 2012 in grass area and cattle numbers



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Grass area
available due to
reduced intensity

205 000 hectares

Fallow area

267 000 hectares

Alltogether

472 000 hectares

**Available for new
applications**

20 % of the
agricultural area

Leafy grass is really full of nutrients – but the fibre restricts its utilization by monogastrics

Leafy grass is susceptible for rapid spoiling and nutrient losses as soon as it is cut



Nutrient rich leafy grass is ensiled to maintain the nutrients



Grass silage would provide constant supply of high quality raw material for processing

Grass silage in Finland, typical composition (mean +/- standard deviation)



	Mean - stdev	-	mean + stdev
Dry matter (DM; g/kg)	212	-	430
In DM (g/kg)			
Digestible organic matter	639	-	709
Cell wall fibre	495	-	587
Crude protein	120	-	173
Water sol. carbohydrates	15	-	107
Lactic acid	23	-	66
Volatile fatty acids	2	-	23
Potassium (K)	17.5	-	29.5
Calcium (Ca)	3.0	-	6.6
Phosphorus (P)	2.3	-	3.3

Data: Grass and clover silages from Artturi (1998-2012, n = 110192)



Grass silage used in the fractioning: second cut timothy-meadow fescue sward, summer 2012,
harvested using farm scale machinery,
cut, short prewilting and precision chopping, additive formic acid-based additive AIV2Plus 5 l/t (formic acid 760, ammoniumformate 55, water 185 g/kg).
Silage silo opened in April 2013 and silage frozen for this project



Silage quality

Dry matter	ash	protein	NDF –fibre	Digestibility of the organic matter	Digestible organic matter
g/kg	g/kg DM	g/kg DM	g/kg DM	%	g/kg DM
241	115	138	524	79	646

Fermentation quality – not superior, but not bad

pH	ammonium N	Ethanol	Lactic acid	sugar	Acetic acid	Butyric acid
	g/ total N	g/kg DM	g/kg DM	g/kg DM	g/kg DM	g/kg DM
4.19	69	29	69	14	21.0	0.66

Press juice



		Juice pressing, fractioning the silage	
	In 1 kg silage	To the juice %	To the cake %
Mass	1000	30 %	70 %
Dry mass (oven method)	221	10 %	100 %
ash	25	23 %	77 %
protein	30	18 %	91 %
Acetic acid	5.1	34 %	66 %
Lactic acid	16.6	30 %	70 %
Water soluble carbohydrates	3.5	16 %	84 %
P	0.7	38 %	62 %
K	6.6	34 %	66 %
Fibre	116	-15 %	115 %

What is the price of grass silage?

- In minimum the price should cover fertilization, harvesting, ensiling and transportation
- Contractors for silage harvesting would take the biggest “slice of the cake” of silage price
- The slice for the farmer would be quite marginal – just the more easy way to fulfill the terms of agricultural subsidies. According to the economical calculations done in Bionurmi-project that would be still interesting option for fallow area or for cereals if the price for cereals is not satisfactory.

Value of concentrated silage extract in pig feeding

Feed components	Price, €/t	Two recipes for liquid pig feeding (% of feed DM)	
		Without silage extract	Silage extract included (10 % DM)
Barley	140	73	65
Wheat	165	10	10
Soyameal	500	13.3	11
Silage extract	204		10
Rape seed oil	1250	0.57	1.5
L-Lysin	1400	0.34	0.37
L-Threonin	2000	0.08	0.08
DL-Methionine	2750	0.03	0.07
Monocalciumfosfate	500	1.04	0.78
Calciumcarbonate	75	1.59	1.47
Added adid	2000	Dosage 2 l/liquid feed	
Price of the mixture		211	211