Organic Farming as a GHG Emission Mitigation Possibility in Latvia

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Latvia University of Agriculture (LLU) - leading research institution in Latvia on agricultural GHG emissions

- Founded in 1939.
- Located in Jelgava, 40 km south-west of Riga.
- Modern regional and multidisciplinary university
- The University has 8 faculties

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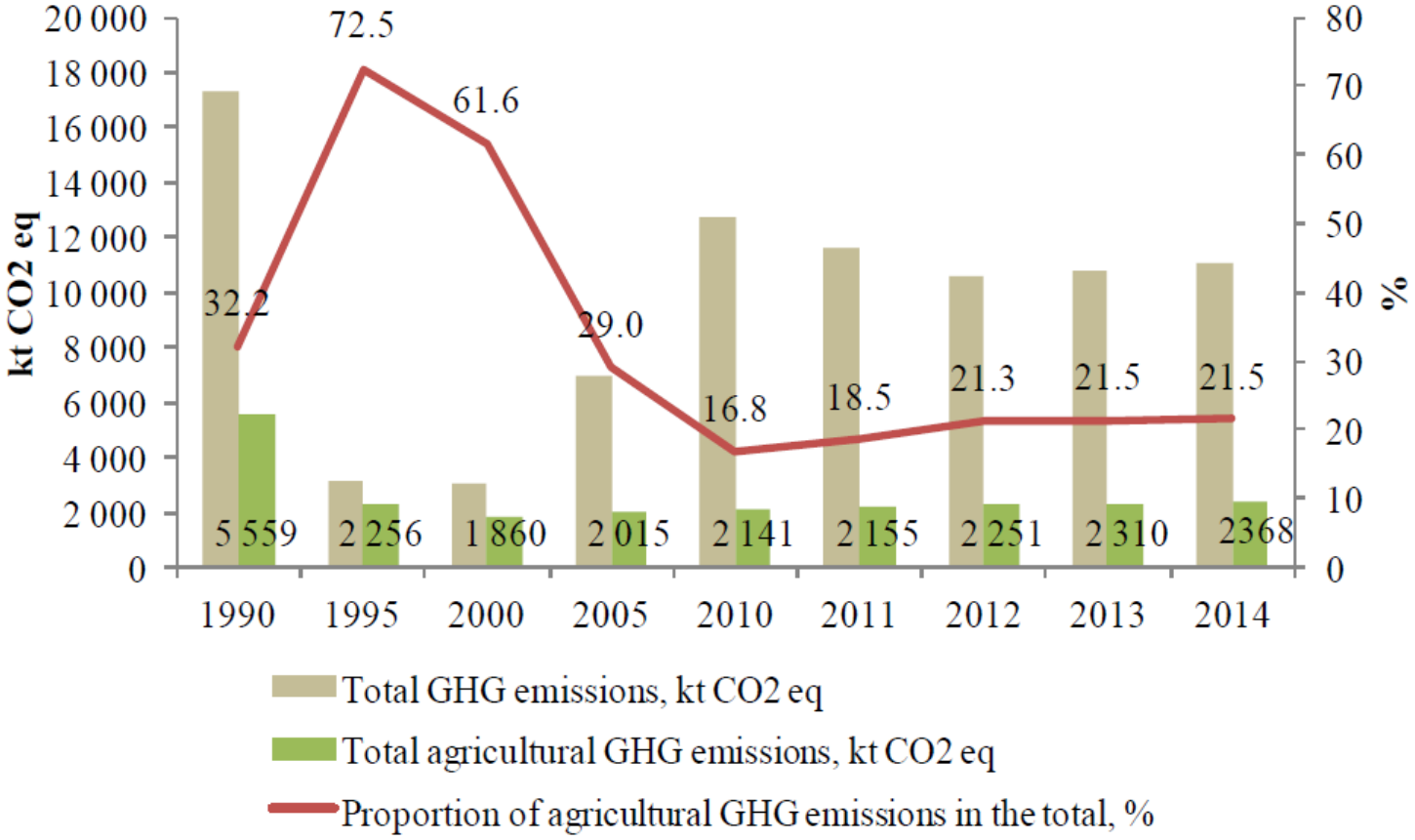
Actuality

- Without additional actions, GHG emissions in agriculture are projected to increase by 35-60 % up to 2030.
- Many agricultural practices can potentially mitigate GHG emissions through different mechanisms and could be potentially introduced in Latvian agriculture

Changes in the total and agricultural GHG emissions in Latvia in 1990-2014 (kt $CO_{2\ eq}$)



Target by 2030 is -6% compared to 2005 for non-ETS sectors

In 2014, agricultural GHG emissions were +17.5% compared with 2005 level.

Source: authors' construction based on Latvia's National Inventory Report 1990-2016

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The research aims

- to characterise the organic farming practices of farms surveyed within the present research,
- identify the GHG emissions produced by the farms and
- assess the farms' contribution to GHG emission mitigation in Latvia.

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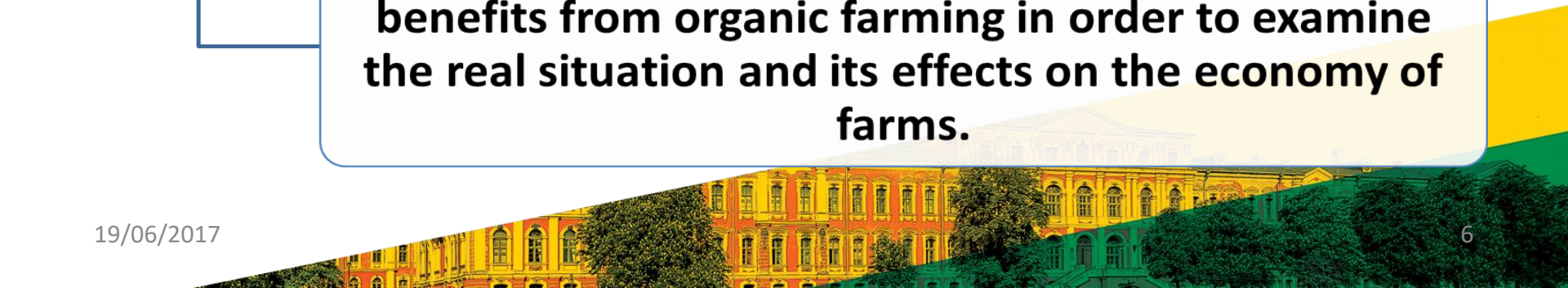
This study proceeds in two stages

To analyse the scientific literature on the effect of organic farming in other countries, as a few such research studies are available in Latvia.

To calculate GHG abatement marginal costs and benefits from organic farming in order to examine the real situation and its effects on the economy of farms.



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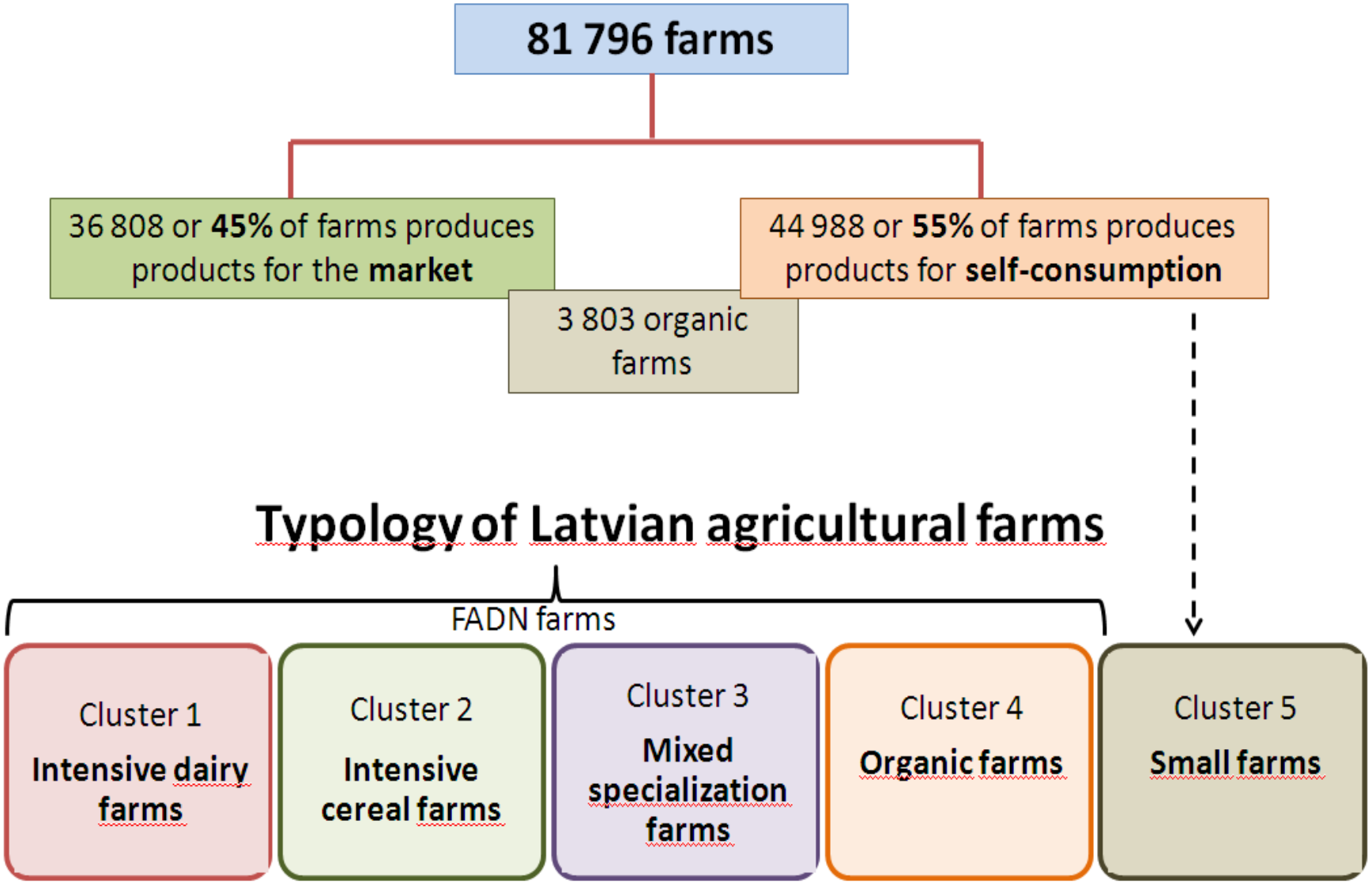
Applied generally accepted research methods in economics

- monographic descriptive method
- analysis and synthesis methods to study the problem elements.

Taking into account that current national level databases lack data on farming practices in the context of GHG emissions, the present research performed survey of organic farms, which involved 24 farms.

Agricultural farms in Latvia



GHG emission-reducing measures divided by farm clusters

Measure	Intensive dairy farms	Int.cereal farms	Mixed farms	Organic farms	Small farms
Precision fertiliser application		x	x		
Minimum tillage		x			
Fertilisation planning	x	x	x	x	
Application of nitrification inhibitors		x			
Direct incorporation of fertilisers in soil	x		x		
Maintenance of amelioration systems	x	x	x	x	x
Liming acidic soils	x	x	x	x	x
Nitrogen fixation (legume plants)	x	x	x	x	x
Growing green manure crops		x	x	x	x
Introduction of perennial grasses in organic soils	x	x	x	x	x
Promotion of biogas production	x		x	/	
Enrichment of feed with fats	x		x	x	
Planning feed rations	x		x	x	
Enhancement of the quality of feed	x		x	x	x
Improvement of manure management systems	x		x	x	x
Intensive grazing (frequent livestock rotation in pastures)			x	x	
Extending the grazing season			x	x	x

Denotations: X – can be implemented; / – can be implemented with certain conditions

Characteristics of identified farm clusters in Latvia

Indicator	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Number of farms	286	110	20797	3473	57130
Used UAA, % from total	15%	9%	46%	10%	20%
Average UAA per farm, ha	992	1552	41	54	7
Agricultural animals, % from total					
Non-dairy cattle	25%	0%	33%	30%	12%
Dairy cattle	65%	0%	22%	7%	5%
Swine	82%	0%	14%	1%	3%
Poultry	93%	0%	6%	1%	0%
Other animals	0%	0%	55%	28%	17%
Utilization of UAA, % from total					
Meadows and pastures	3%	0%	66%	13%	19%
Permanent crops	0%	0%	42%	13%	45%
Arable land	22%	14%	55%	3%	7%
Synthetic N fertilizers, % from total	14%	28%	54%	0%	3%

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Cluster 4 – **Organic farms**

Variable	Average value
Utilized agricultural area, ha	54
Pastures and meadows, %	99.3
Potatoes, ha	62
Dairy cows	33
Pigs	10
Goats	78
Poultry	51

- ✓ ***Comprises 4.2% from total number of farms.***
- ✓ ***Comprises 10.7% from total UAA in Latvia.***

Sown areas of the surveyed farms by kind of crop and the incorporation of post-harvest crop residue into soil

Crop	ha	% of the total area	Incorporation of crop residues into soil	
			ha	%
Winter cereals	431.3	5.9	272.6	56.3
Spring cereals	1816.1	24.7	740.3	40.8
Annual legumes	84.7	1.2	74.6	84.8
Perennial grasslands	4030.9	54.9	×	×
Fallow, green manure	373.4	5.1	228.0	61.1

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.....proposals

- **To maintain soil fertility,** 80% of the surveyed farms in Latvia use manure, while the farms having no livestock used compost and crop residue
- **To control weeds and capture carbon**, 5% of the total sown area of the surveyed farms was the fallow land area, of which 61% was the area where green manure crops were incorporated into soil

Agricultural GHG emissions and its division by farm clusters in Latvia

Indicator	2013	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Total agricultural GHG emissions, kt $CO_{2\ eq}$	2570.33	877.71	307.62	1048.10	184.54	152.35
Average GHG emissions per farm, t $CO_{2\ eq}$per farm	31.42	3068.92	2796.58	50.40	53.14	2.67
Average GHG emissions per UAA, t $CO_{2\ eq}$ per ha	1.37	3.09	1.80	1.21	0.99	0.41

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Discussion

- The greatest emission reduction potential in agriculture relates to **carbon sequestration in soil** where the greatest role is played by organic farming, which, in this respect, may be placed on the same level with growing leguminous crops and using manure.

- The introduction of **green manure in combination with a minimal soil tillage system** reduces GHG emissions from organic farming.

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Summary

- organic farms comprises 7% from total agricultural GHG emissions and comprises relatively small GHG emissions per utilized agricultural area (UAA) – 0.99 t $CO_{2\ eq}$ per ha, which means that further development and increase in organic areas can be used as one of the GHG emission reduction tools.
- Results of this research will serve as background for broader research which aims to identify GHG emission reduction possibilities in Latvia.

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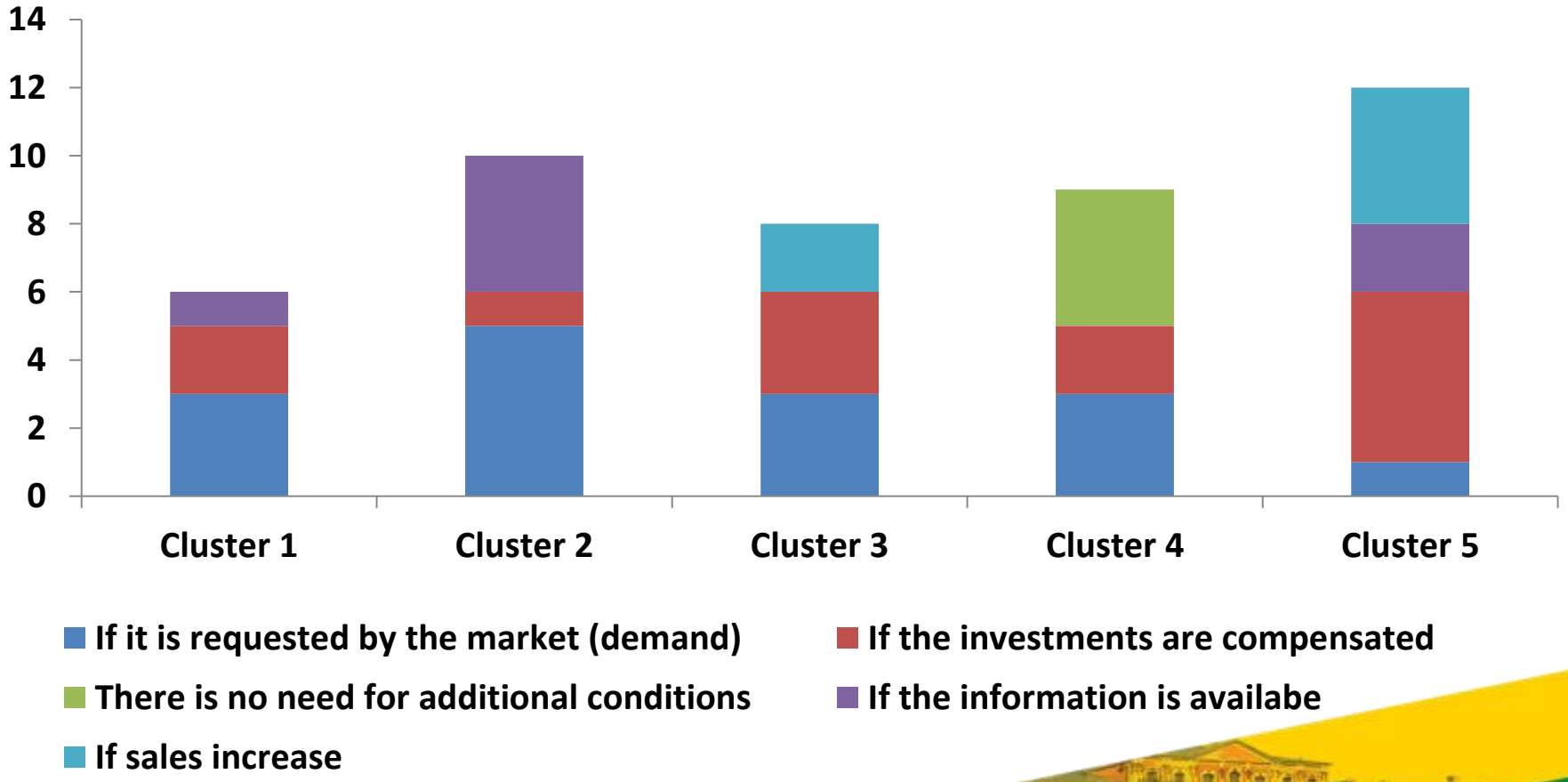
Attitude of farmers…

Under which condition you are ready to introduce GHG emissions-reducing farming practice?




Thank You for attention!