Organic Farms and Agricultural GHG Emissions in Latvia

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**Background and objectives**

In Latvia there can be observed rapidly growing interest of farmers to engage in organic farming – from 2012 till 2015 number of certified organic farms has increased by 4%, but utilized organic agricultural land area – by 18%. At the same time after the Paris Summit on Climate Change held at the end of 2015, Latvia has agreed on the need for reduce global greenhouse gas (GHG) emissions as soon as possible and joined to the initiative to scale up its efforts and support actions to reduce emissions, which in the agricultural sector shows constant increase (in 2015 agricultural GHG emissions have increased by 10% compared with 2010). Application of organic farming methods in agricultural production is one of the possibilities to reduce GHG emissions. This research aims to characterise role and contribution of organic farms in agricultural GHG emissions in Latvia.

**How work was carried out?**

The present research designed a typology of agricultural farms, which allowed identifying farming systems typical for the conditions in Latvia and clarifying role of organic farming systems in total agricultural production and GHG emission generation. The typology of agricultural farms was based on statistical data from the Farm Accountancy Data Network (FADN). Cluster analysis, which was based on 22 indicators, was employed and the SPSS program (IBM SPSS Statistics 22) were used to design the typology. The cluster analysis identified three different farm clusters that, depending on their characteristics, represented the following farm types: Cluster 1 – Intensive indoor fodder based livestock farms; Cluster 2 – Intensive cereal farms; Cluster 3 – Mixed specialization and pasture based livestock farms.

Given the fact that the FADN farms were represented only by economically active, commercial farms and produced their products for the market and the number of such farms was equal to approximately 36 808 or 45% of the total farms in Latvia, the three FADN farm clusters did not fully reflect the situation in the country. For this reason, two more clusters were added to the farm clusters identified in the cluster analysis, which gave more complete insight into the situation on farming systems in Latvia: Cluster 4 – Organic farms; Cluster 5 – Small farms.

Statistical data from FADN, EUROSTAT, Central Statistical Bureau of Republic of Latvia, organic farming certification bodies were used to describe the clusters; yet, the databases lacked data on farming practices in the context of GHG emissions. For this reason, the present research performed a survey of farms, which involved 50 farms (10 from each cluster). The questionnaire for the purpose of the survey were developed, which included questions about farming practice and activities affecting GHG emissions. Obtained data were used to calculate GHG emissions, where calculation based on a methodology prescribed in the Guidelines of the Intergovernmental Panel on Climate Change (IPCC) (IPCC, 2006).

**Key results and discussion**

Characteristics of identified farm clusters are given in Table 1, where organic farms are represented by Cluster 4. Preformed farm typology and obtained indicators characterizing performance of different farming systems were used to determine role and contribution of organic farms in agricultural GHG emissions in Latvia (Table 2).

Table 1. **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% |

Research results show very different GHG emission intensity which is significantly higher in intensive farms (Cluster 1 and 2) compared to organic farms (Cluster 4) and small farms (Cluster 5). These differences can be explained by a series of factors which differs among the clusters: type of market strategies, agricultural machinery availability, information about soil quality and properties, availability of financial sources for purchase fertilizers, livestock keeping and feeding practices, etc.

Table 2. **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 CO2 eq | 2570.33 | 877.71 | 307.62 | 1048.10 | 184.54 | 152.35 |
| Average GHG emissions per farm, t CO2 eq per farm | 31.42 | 3068.92 | 2796.58 | 50.40 | 53.14 | 2.67 |
| Average GHG emissions per UAA, t CO2 eq per ha | 1.37 | 3.09 | 1.80 | 1.21 | 0.99 | 0.41 |

Research results also indicates that organic farms comprises 7% from total agricultural GHG emissions and comprises relatively small GHG emissions per utilized agricultural area (UAA) – 0.99 t CO2 eq per ha, which means that further development and increase in organic areas can be used as one of the GHG emission reduction tools. Similar findings regarding role of organic farms in GHG emission reduction can be found in other studies (Bos et al., 2007; Cooper et al. 2011). 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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