

## ORGANIC FARMING VERSUS CONVENTIONAL FARMING: CASE STUDY, DORNELOR BASIN, SUCEAVA COUNTY, ROMANIA

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### Abstract

*In the current context of increasing concerns for healthy agri-food systems, the adoption of ecological farming practices has gained ground and visibility both as sustainable approach to the farming activity and as scientific approach. The paper intends to analyse the differences between the organic and conventional systems of livestock raising in Dornelor Basin, Suceava county. The comparison of the two systems was based on several dimensions – labour, agricultural incomes, use of agricultural inputs, adoption of ecological farming practices, etc. The results obtained showed that both farming systems support, in different proportions, the health of ecosystems and inhabitants in the investigated area.*

**Key words:** ecological farming, conventional farming, Dornelor Basin - Suceava

### INTRODUCTION

For several decades, in the European countries, modern agriculture has developed from traditional, natural farming to highly productive, industrial systems. The use of large amounts of external agricultural inputs has caused a series of problems to the environment, such as contamination with pesticides, soil degradation and erosion, etc. However, in some countries, in marginal areas in particular, an orientation to ecological farming systems could be noticed, which use lower amounts of external inputs and focus, with different intensities, on sustainability aspects [16, 9].

Comparing the two systems is important in the approach to identify the best farming system that can sustainably meet the needs of the environment and population (Table 1).

The paper analyses the differences between ecological and conventional farming in Dornelor Basin, where favourable conditions exist for the development of the livestock sector, considered a high favourability area for cattle raising (mainly dairy cows) [14].

Table 1. Main characteristics of the ecological and conventional systems

<b>Ecological farming</b>
The ecological farming systems are more resilient to the changes of environmental conditions, on the short and long term, as they are based on: <ul style="list-style-type: none"><li>• homeostasis and self-regulation;</li><li>• adaptive patterns, complex systems and local particularity;</li><li>• high agro-biodiversity;</li><li>• integrating crop and livestock;</li><li>• multifunctionality</li></ul>
<b>Conventional farming</b>
Conventional farming is vulnerable to environmental changes as it is based on: <ul style="list-style-type: none"><li>• artificial natural balance, controlled by the application of large amounts of external inputs;</li><li>• uniformity and homogenization patterns;</li><li>• genetic improvement and reductionism;</li><li>• mono-cropping and intensive livestock raising;</li><li>• maximization of profits through production intensification;</li></ul>

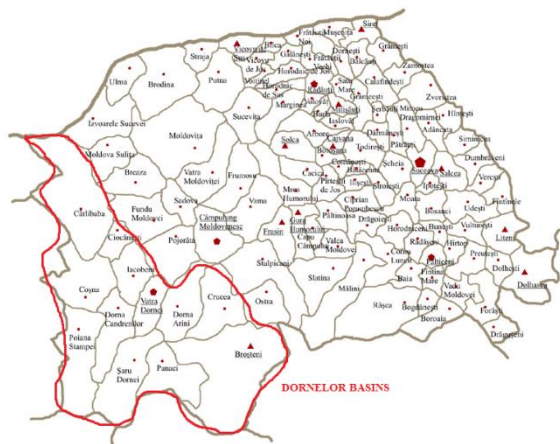
Source: authors' processing based on [1].

### MATERIALS AND METHODS

#### *Study area – Dornelor Basin*

Dornelor Basin lies in the south-western part of Suceava county, overlapping the relief unit Dorna Depression, consisting of 12

administrative units: 2 urban centers (Vatra Dornei Municipality and the town Broșteni) and 10 communes (Cârlibaba, Ciocănești, Coșna, Crucea, Dorna Arini, Dorna Candrenilor, Iacobeni, Panaci, Poiana Stampei, Șaru Dornei).



Map 1. Suceava county and Dornelor Basins  
 Source: [11].

Several protected areas have been established in Dornelor Basin over time, the largest area being included in the European Network “Natura 2000”. The most important protected area of national interest is Călimani National Park and the best-known sites of Community importance are the natural reserves: *Pietrele Doamnei – Rarău*, *Codrul secular Giumalău*, *Cheile Zugreni*, *Tinovul Mare Poiana Stampei*, *Tinovul Șaru Dornei* etc.

Dornelor Basin has a total area of 221,517 ha, out of which the agricultural area accounts for only 23%. More than 90% of the region’s agricultural area is represented by pastures and natural grasslands. Mountain meadows have a high biodiversity, being classified as meadows of high natural value. Thus, the conditions from Dornelor Basin are favourable to livestock sector development, mainly for cattle raising. However, the number of livestock units per hectare is low: 51 LU/ha [14].

Ecological farming is a constant presence in the region: ecologically certified agricultural areas represent 6.3% of total UAA [8]. In 2019, the total ecologically certified agricultural area in Dornelor Basin was 3,289.6 hectares, and the communes with the largest ecologically certified agricultural areas

were: Dorna Candrenilor, Panaci and Saru Dornei (Fig. 1).

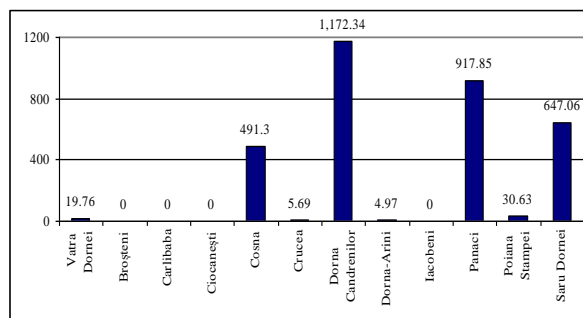


Fig. 1. Distribution of communes in the Dornelor Basin by ecologically certified agricultural area  
 Source: processing after MARD, 2020 [8].

In 2019, in the Dornelor Basin there were a number of 3,911 ecologically certified cattle, the most numerous being in the communes of Dorna Candrenilor, Panaci and Saru Dornei.

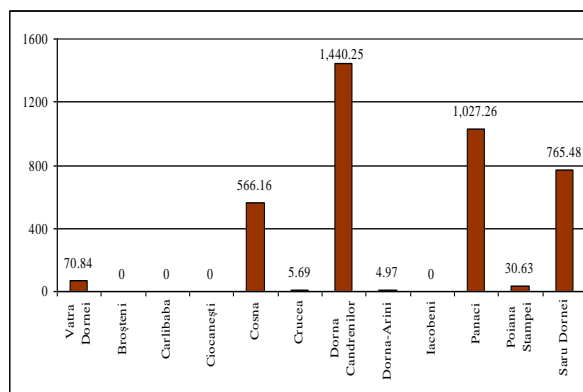


Fig. 2. Distribution of communes in the Dornelor Basin by number of ecologically certified cattle  
 Source: processing after MARD, 2020 [8].

It should be noted that out of the 12 localities of the Dornelor Basin, four did not have ecologically certified agricultural areas or cattle (Broșteni, Cârlibaba, Ciocănești and Iacobeni).

#### Field survey

To reach the main objective of the paper, i.e. to reveal the differences between raising cattle in ecological system and in conventional system, we used the information collected in a field survey implemented in Dornelor Basin in the year 2019, within LIFT project – Low-Input Farming and Territories – Integrating knowledge for improving ecosystem-based farming, H2020 [7].

A number of 52 questionnaires was applied that contained questions about the general characteristics of farms and farmers, the production practices and the factors that determined the adoption of these practices, alongside with a series of economic information. Thus, data and information were obtained on the practices adopted by farmers in the process of raising dairy cattle.

## RESULTS AND DISCUSSIONS

### *Premises of the analysis*

Conventional farming is generally considered a high-input farming type, which includes the use of synthetic chemical fertilizers, fungicides, insecticides and herbicides. However, this term, which is frequently used in the scientific literature, lacks technical content: a general definition shows that conventional farming sums up the prevailing farming practices applied in the region [15].

Conventional farming is often presented in contrast to ecological farming, as the latter prohibits the use of synthetic fertilizers and pesticides. Specialized bodies certify farmers on the basis of a set of production standards. Organic farming is based on sustainable systems, taking advantage of biodiversity and recycling [3].

The comparison between organic farming and conventional farming is present in the literature and covers several areas of interest: population's health [2], environmental impact [13] or biodiversity [6]. Comparing the two systems is necessary in the process of identification of the best farming system that can sustainably meet the needs of the current population.

There are methodological difficulties in comparing the conventional and organic systems that can be also attributed to the lack of knowledge about the diversity of organic farming systems. The main obstacle is represented by the wide range of inputs used in the farming practices all over the world, which do not allow to define a standard management for conventional farms [12].

However, depending on the levels of inputs used, at least two conventional farm management strategies can be distinguished:

(i) high-input or intensive farming systems that are characterized by intensive use of chemical pesticides and fertilizers;

(ii) low-input farming systems or extensive farming systems, terms that can be used interchangeably [10].

Extensive farming is considered here as a very low-input management system that applies very low amounts of fertilizers and pesticides in relation to the low yielding potential of the agricultural area. In addition, the latter type of management can be adopted to respond to specific environmental constraints.

### *Ecological farming versus conventional farming in Dornelor Basin, Suceava county*

In Dornelor Basin, the comparison between the organic and conventional farms targeted several dimensions that are summarized in Table 2.

The organic farm heads are mostly men, the average age of them are 52 years and they have 27 years of farming experience. They need more labour and they hire more permanent and seasonal workers than the conventional farms heads. On average the organic farm head work on week with 11 hours more than the conventional farms one. The share of incomes in total household incomes is 68% in ecological farms, while in conventional farms is 45%. The organic farms have a low density of animals per hectare existing an obvious concern for raising traditional breeds, enhanced by government support.

The share of farms that applied chemical inputs (fertilizers, pesticides and herbicides) was the same in both farms systems, zero. They did no use chemical inputs at all and both types of farms used manure mainly produced on own farms or from neighbouring farms. 42% of organic farms do not used any type of antibiotics.

The farming practices adopted for cattle raising have a strong ecological character in both types of farms. 75% of ecological farms used summer camps for livestock, while only 35% of conventional farms used these types of camps. The organic farms contribute much more to the environmental protection than the conventional farms.

Table 2. Comparison between organic farming and conventional farming – Dornelor Basin

Dimension	Ecological farms	Conventional farms	Remarks/comments
<b>Farm head</b>			
Average age of farm head	52 years	49 years	- organic farm heads, mostly men, are older and have consistent practical experience;
Gender of farm head			
-male	83%	68%	
-female	17%	32%	
Years of farming experience of farm head	27 years	26 years	
<b>Labour</b>			
Average number of permanent workers	2	1	- organic farms need more labour and consequently hire more permanent and seasonal workers than conventional farms; at the same time, the workload of farm head is higher;
Average number of seasonal workers	3	1	
Average number of hours worked per week by the farm head	53 hours	42 hours	
<b>Agricultural incomes</b>			
Share of agricultural incomes in total household incomes	68%	45%	- the share of income obtained from farming indicates a more pronounced orientation of organic farms towards agricultural activities;
<b>Farm size</b>			
Number of animals per hectare (LU / UAA ha)	0.69 LU/ha	0.42 LU/ha	-organic farms have a low density of animals per hectare; there is also an obvious concern for raising traditional breeds on these farms (enhanced by government support);
Share of farms on which traditional cattle breeds are raised	75%	25%	
Average number of cattle from traditional breeds per farm	5.33	1.18	
<b>Use of production inputs</b>			
Share of farms that applied chemical inputs (fertilizers, pesticides and herbicides)	0%	0%	-there are no significant differences between the two types of farming systems: both farm systems do not use chemical inputs; low exposure to toxic chemicals; - both types of farms use manure mainly produced on own farms or from neighbouring farms; -significant share of organic farms that do not use any type of antibiotic; it is known that excessive use of antibiotics creates resistance and thus makes the treatment of diseases more difficult;
Share of farms that applied manure	100%	100%	
Share of farms that use manure from their own farm or from neighbouring farms (%)	100%	87.5%	
Share of farms that do not use antibiotics to treat animals	42%	25%	
<b>Ecological practices</b>			
Share of farms that use grazing	100%	100%	- the farming practices adopted for cattle raising have a strong ecological character in both types of farms; the grazing systems make it possible to harmonize the lactation period with the vegetation period, to improve feed conversion, to synchronize calving in cows, reduce costs of fodder, reduce costs of fodder preservation; the grazing-based farms are less destructive for soil;
Average number of grazing days	161 days	182 days	
Share of farms that use summer camps for livestock	75%	35%	
<b>Environmental protection and biodiversity</b>			
Share of farms that contribute to environmental protection			-organic farms support eco-system health and biodiversity to a greater extent;
- shrubs	42%	20%	
- hedgerows	100%	3%	
- wetlands	41%	15%	

Source: authors' processing, Field Survey conducted under LIFT Project, 2019 [7].

On the basis of data presented, we can draw the conclusion that in Dornelor Basin area, the certified organic farms coexist with conventional farms that use low external inputs. The latter have adopted principles of agro-ecology in one or several stages of the conventional production model, contributing to the diminution of the negative impact on the environment and population. Many of these farms participate in the agro-environmental schemes through which they receive compensations for low production levels and/or higher management costs.

## CONCLUSIONS

The analysis of data from the implemented field survey highlights the fact that both farming systems under study support the health of eco-systems and inhabitants in Dornelor Basin area. Both farm types, yet organic farms to a greater extent, are based on ecological practices and processes, on production cycles adapted to local conditions and on the use of local inputs rather than on the use of certain inputs with adverse effects. These combine tradition and innovation to protect the environment, to promote fair relations and a good quality of life for all the involved actors.

The obtained results are in line with previous research that has shown that extensive farming prevails in Dornelor Basin with positive effects on environment and biodiversity [4, 5]. This conclusion is also supported by the interviewed farmers: 83% of the farmers considered conventional in this study declared that they see themselves as ecological farmers and think that most farmers they know have adopted at least one ecological practice (68%). For 78% of these farmers, understanding farm ecology is the basis of agriculture and environmental protection represents a significant part of their activity.

## ACKNOWLEDGEMENTS

This research work was carried out within the LIFT Project, “Low-Input Farming and Territories – Integrating knowledge for

improving ecosystem-based farming” that received funding from the European Union’s Horizon 2020 Research and Innovation Programme under Grant Agreement no. 770747, May 2018 – April 2022.

## REFERENCES

- [1] Altieri, M.A., 1995, *Agroecology: The Science of Sustainable Agriculture*, Boulder CO: Westview Press.
- [2] Barański, M., Srednicka-Tober, D., Volakakis, N., Seal, C., Sanderson, R., Stewart, G.B., Benbrook, C., Biavati, B., Markellou, E., Giotis, C., Gromadzka-Ostrowska, J., Rembiałkowska, E., Skwarło-Sońta, K., Tahvonon, R., Janovská, D., Niggli, U., Nicot, P., Leifert, C., 2014, Higher antioxidant and lower cadmium concentrations and lower incidence of pesticide residues in organically grown crops: a systematic literature review and meta-analyses. *Br J Nutr* 112:794–811. <https://doi.org/10.1017/S0007114514001366>, Accessed October 2020.
- [3] Council of the European Union, 2007, Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91. *Off J Eur Union* L189:1–23. <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:189:0001:0023:EN:PDF>>, Accessed on November 2020.
- [4] Florian, V., Rusu, M., Rosu, E., Chitea, M., Bruma, S., Pocol, C., 2020, Behavioural factors and ecological farming. Case studies, *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development Vol. 20, Issue 2, 2020*, 227-232.
- [5] Gițan, D., Ungureanu, D., 2010, Resurse de dezvoltare durabilă și creșterea atractivității turistice în Țara Dornelor [Sustainable development resources and increase of tourism attractiveness in Dornelor Area] - paper presented at the 12<sup>th</sup> National Conference with international participation “Romanian Rural Tourism in Sustainable Development Context. Actuality and Perspective”, ANZM - CEFIDEC Vatra Dornei, published in the conference volume, "Tehnopress" Publishers, Iași.
- [6] Hole, D.G., Perkins, A.J., Wilson, J.D., Alexander, I.H., Grice, P.V., Evans, A.D., 2005, Does organic farming benefit biodiversity? *Biol Conserv* 122:113–130. <https://doi.org/10.1016/j.biocon.2004.07.018>, Accessed on December 2020.
- [7] LIFT Project, “Low-Input Farming and Territories – Integrating knowledge for improving ecosystem-based farming” that received funding from the European Union’s Horizon 2020 Research and Innovation Programme under Grant Agreement no. 770747, May 2018 – April 2022.
- [8] MADR, 2020, Organic agriculture in Romania. Forwarding address No. 242787/2020 (Agricultura

ecologică în România, adresă de înaintare nr. 242787/2020).

[9]Magdoff, F., 2007, Ecological agriculture: Principles, practices, and constraints. Renewable Agriculture and Food Systems - Renew Agr Food Syst. 22. 10.1017/S1742170507001846.

[10]Nemecek, T., Huguenin-Elie, O., Dubois, D., Gaillard, G., Schaller, B., Chervet, A., 2011, Life cycle assessment of Swiss farming systems: II. Extensive and intensive production. Agric Syst 104:233–245. <https://doi.org/10.1016/j.agsy.2010.07.007>, Accessed on November 2020.

[11]Obiectiv, 2020, Map of Suceava County, <https://newsite.obiectivdesuceava.ro/stiri/harta>, Accessed on February 2021.

[12]Petit, C., Aubry, C., 2015, Typology of organic management styles in a cash-crop region using a multi-criteria method. Org Agric 6:155–169. <https://doi.org/10.1007/s13165-015-0124-4>, Accessed on December 2020.

[13]Tuomisto, H.L., Hodge, I.D., Riordan, P., Macdonald, D.W., 2012, Does organic farming reduce environmental impacts? – a meta-analysis of European research. Journal of Environmental Management 112:309–320.

<https://doi.org/10.1016/j.jenvman.2012.08.018>, Accessed on October 2020.

[14]Ungureanu, D., 2011, Viabilitatea exploatațiilor agricole din zona montană, în contextul crizei economice. Studiu de caz: Bazinul Dornelor, județul Suceava [Viability of agricultural holdings in the mountain area, in the context of economic crisis. Case study: Dornelor Basin, Suceava county], The 26<sup>th</sup> National Scientific Conference with international participation “Progress in the theory of economic decisions under risk and uncertainty conditions” – “Iași Academic Days” – Romanian Academy, Iași Branch – Institute of Economic and Social Research “Gheorghe Zane”, published in the conference volume.

[15]Viaux, P., 1999, Une troisième voie en grande culture. Éditions Agridécisions, Paris

[16]United Nations, 1987, Report of the World Commission on Environment and Development: Our Common Future,

[https://www.are.admin.ch/are/en/home/sustainable-development/international-cooperation/2030agenda/un-\\_-milestones-in-sustainable-development/1987--brundtland-report.html](https://www.are.admin.ch/are/en/home/sustainable-development/international-cooperation/2030agenda/un-_-milestones-in-sustainable-development/1987--brundtland-report.html), Accessed on January 2021.