



From Farmer adoption to Consumer Acceptance. Circular Agronomics - Farmers' survey Results

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March 29th 2022



Main Objective:

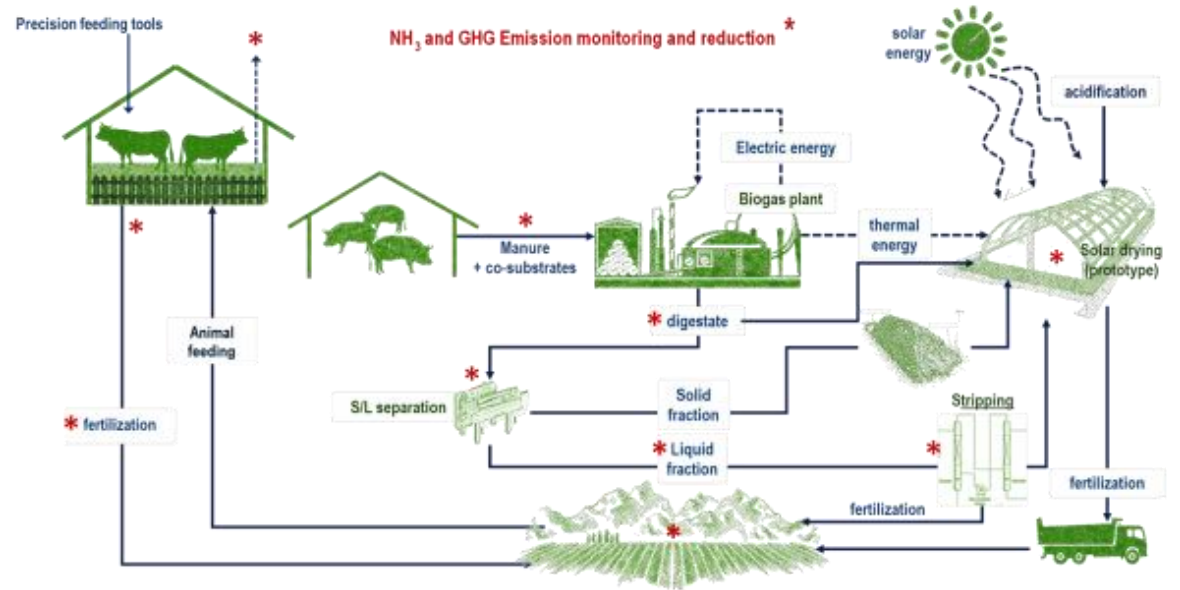
Identify the determinant **FACTORS** and **BARRIERS** that affect **FARMERS' ADOPTION** of several **INNOVATIVE SOLUTIONS** of Circular Agronomy on different countries of the EU.

Low-Input Farming

Precision feeding



Thermal /solar dryer



Fertigation with microfiltered slurry/digestate



Farmer's Survey

Common part

Farmer Characteristics

Farm Structure

Farm Management

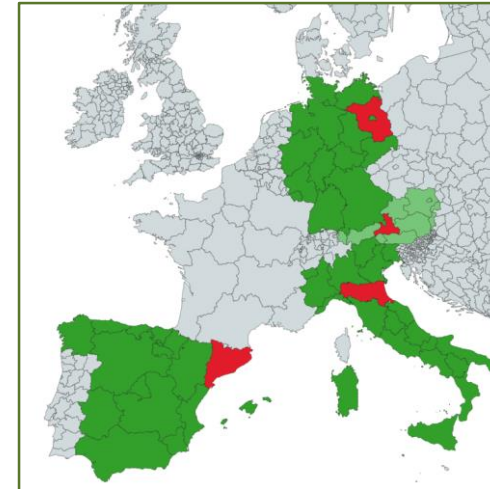
Farmer attitude and opinions

Social. economic and environmental objectives

Specific questions

Technologies or innovations proposed (Videos- Flyers)

Limitations and intentions to adopt innovations



Country	Innovation Case of study	<u>Observ.</u>
Catalonia. Spain	- Thermal /solar dryer - Precision feeding	51
Lungau. Austria	- Low-Input Farming	35
Emilia-Romagna. Italy	- Fertigation with microfiltered slurry/digestate	57
		143

Specific Innovation



- 1) Think it's a great idea
- 2) Think it's a good idea



VACATION ARTIST: DONNA OATNEY

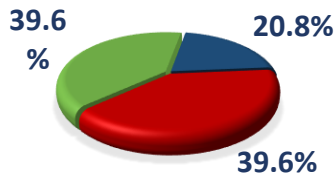
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3) Think it's not feasible	12.5%	14.3%	11.9%	4.5%
4) Think it is too much work for little result	8.3%	14.3%	2.4%	9.1%
5) Other	0.0%	4.8%	7.1%	4.5%

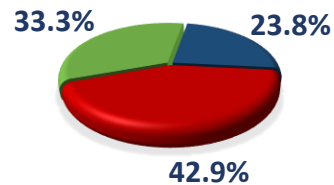
**Weighted average 48.24%
Willingness to adopt**

Willingness to adopt innovation

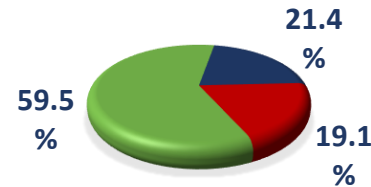
Thermal /solar dryer



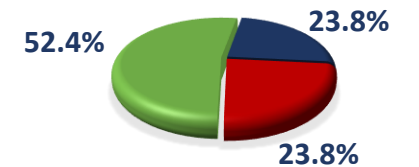
Precision feeding



Low-Input Farming



Fertigation with microfiltered slurry/digestate



■ do not know
■ No or probably not
■ Yes or probably yes

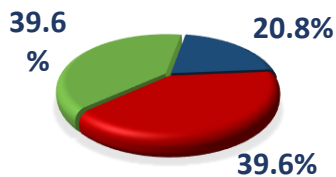
Opinions about the innovations proposed

	Thermal /solar dryer	Precision feeding	Low-Input Farming	Fertigation with microfiltered slurry/digestate
	48	21	42	57
1) Think it could be interesting	68.8%	57.1%	78.6%	68.2%
2) Think it's not very useful	10.4%	9.5%	0.0%	13.6%
3) Think it's not feasible	12.5%	14.3%	11.9%	4.5%
4) Think it is too much work for little result	8.3%	14.3%	2.4%	9.1%
5) Other	0.0%	4.8%	7.1%	4.5%

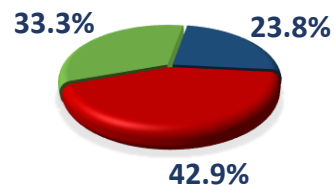
**Weighted average 48.24%
Willingness to adopt**

Willingness to adopt innovation

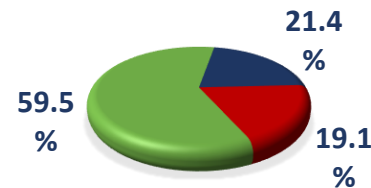
Thermal /solar dryer



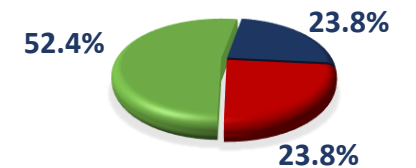
Precision feeding



Low-Input Farming



Fertigation with microfiltered slurry/digestate

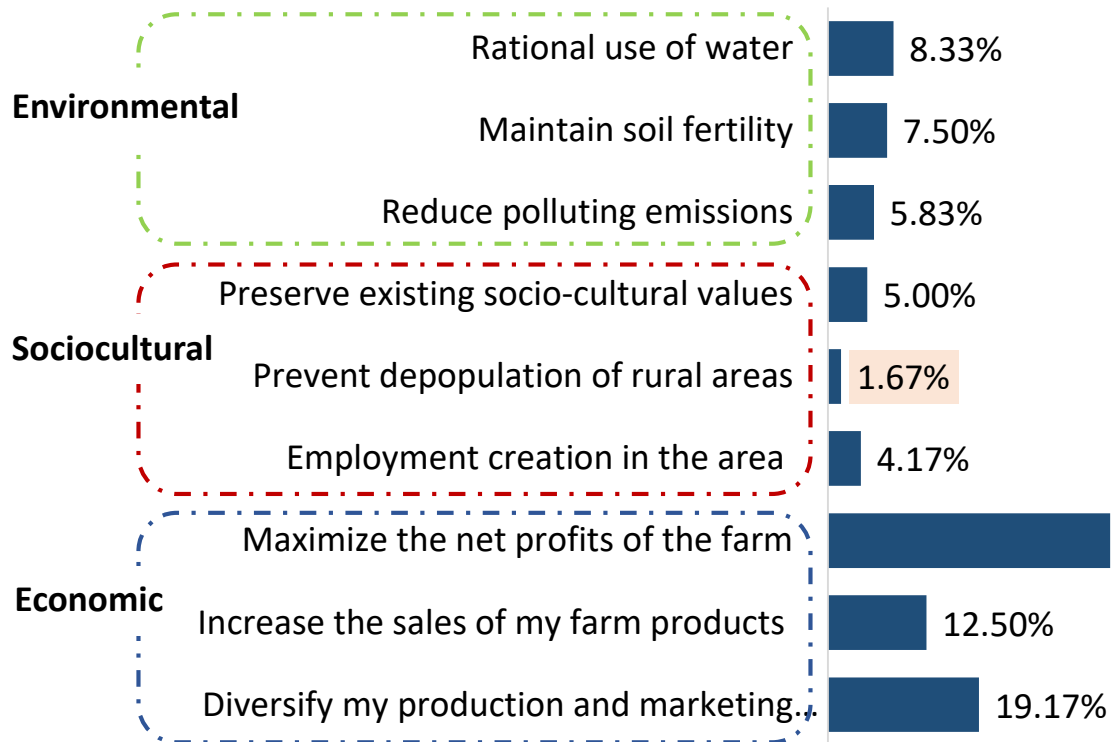


■ do not know
■ No or probably not
■ Yes or probably yes

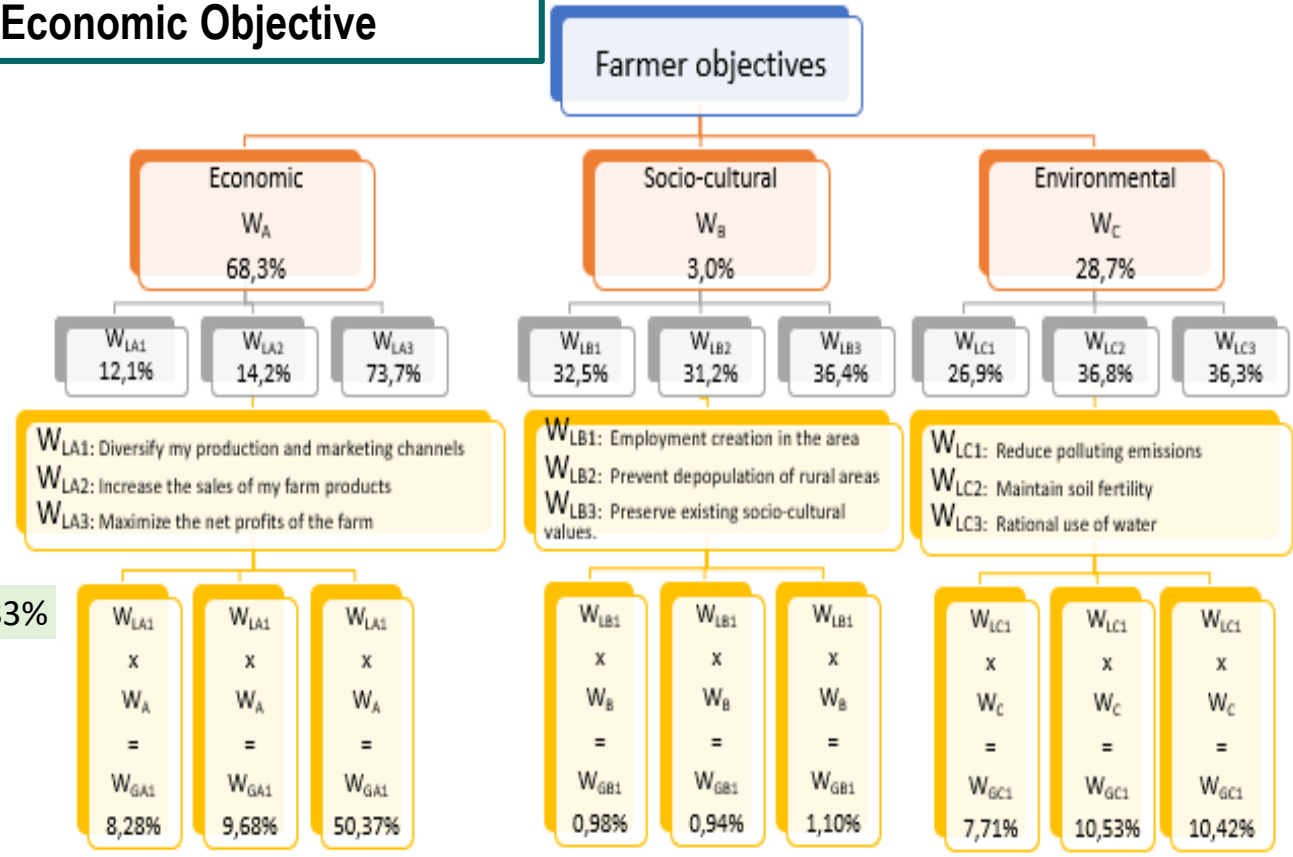
Farmers objectives as driven factors in their decision at farm level



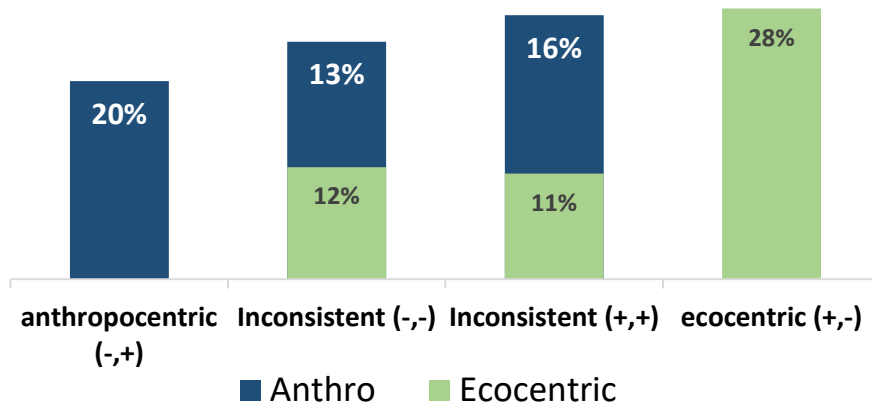
Relative importance of the farmers objectives:



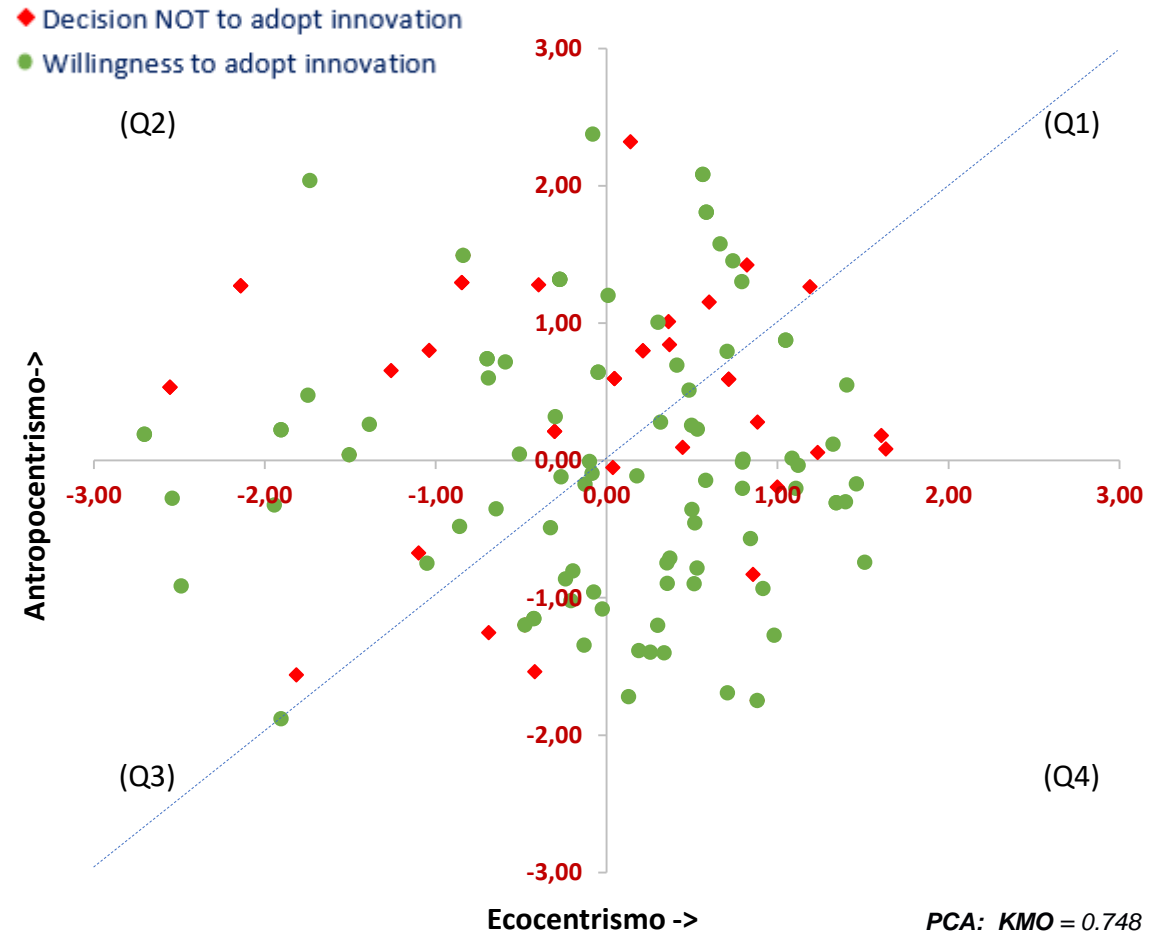
68.3% importance for the Economic Objective



**Environmental attitude
(New Ecological Paradigm scale)**



Farmers environmental attitudes and willingness to adopt the innovations proposed



- ❑ Farmers who decided **NOT to adopt** the proposed innovation (red dots) mainly have an **anthropocentric attitude** towards the environment.
- ❑ Most farmers with a well-defined **ecocentric attitude** (Q4) are **willing to adopt** the proposed innovative solutions

FACTORS that affect FARMERS' ADOPTION of several INNOVATIVE SOLUTIONS of Circular Agronomy



The **PROBABILITY** to adopt increase (↑) or decrease (↓) depending on the following variables: (Logit model)

Description	Exp(B)	Sig.
Constant	-6.447	0.056
Who prioritize the diversification of the production and marketing channels ↓	-5.425	0.012
Who prioritize the maximization the net profits of the farm ↓	-3.69	0.018
Who trust on Family and / or friends information ↓	-2.005	0.009
Who believe that off-farming Income is important for financial security ↓	-0.597	0.009
Framers with high % off-farming income ↓	-0.047	0.002
Farmers with Low volume slurry of the tank/s (m3) ↓	-0.022	0.004
Large farm ↑	0.686	0.020
Who has Ecocentric attitude ↑	1.323	0.005
The farm is in a vulnerable area ↑	1.487	0.067
Agricultural vocational training ↑	1.728	0.022
Innovation adopted ↑	1.944	0.046
Agricultural university training ↑	2.825	0.017





There is a need to economic support to implement innovations and emission mitigation practices

- Rural development supports emission reduction in the livestock sector through various measure**
 - Agri-environmental commitments with respect to manure management**
 - Investments into physical assets with respect to manure storage, installation of anaerobic digesters.**

84% of the farmers surveyed consider that institutions should encourage the implementation of new technologies in agriculture → through subsidies and tax benefits



Thank you

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Understanding consumers' behaviour, perceptions and preferences towards 'circular farming'

Zein Kallas

March 29th 2022



Consumers' preferences results



Main Objective:

- ✓ To analyse at a European level,
 - The **expected willingness to pay a Premium**.
 - Purchase **intentions** and **attitudes**
Towards **FOOD PRODUCTS OBTAINED THROUGH MORE SUSTAINABLE FARMING SYSTEMS**, in terms of reducing carbon emissions and optimizing the recovery of nutrients (C, N, P), from **CIRCULAR FARMING** by adopting some of the solutions proposed within the **NUTRI2CYLCE** project
- ✓ **Consumers' perceptions regarding the value of agro-residue** processing into renewable energy

WHY?

- ✓ The **CONSUMERS' CHOICE & PREFERENCES** towards more sustainable food may play an important role in **PROMOTING** the **ADOPTION OF SUSTAINABLE PRODUCTION STRATEGIES** at farm level.

Survey and Data collection



✓ Data collection were obtained using @Qualtrics platform and their European consumers' panels

	Spain	Poland	Italy	Hungary	Croatia	Belgium	Total
Sample size	1,050	1,061	851	1,017	521	1,091	5,591
Duration (days)	15	35	35	50	35	21	
Date	06/2021	10-11/2021	10-11/2021	09-10/2021	10-11/2021	01/2022	



Nutri2Cycle
Nurturing the Circular Economy



QUESTIONNAIRE (Open-ended questions)

HYPOTHETICAL BIAS in surveys reflects the old saying “**there is a difference between saying and doing**”. ... is defined as the **DIFFERENCE** between what a respondent **INDICATES** he/she would purchase in a survey or interview and what he would **ACTUALLY** do in a **REAL MARKET**

Discrete Choice Experiment (DCE)
(pork, milk, bread)

Choice Experiment (OE DCE)
(pork, milk, bread)

New Ecological Paradigm (NEP) Scale



- ✓ 3 product categories representing 3 case studies:
 - Pork** for pig production The EU is the world's second biggest producer of pork
 - Milk** for cattle production The EU's dairy sector is the second biggest agricultural sector (output value)
 - Bread** for cereal production The harvested production of cereals in the EU is about 11.3 % global production

- ✓ Under 3 farming systems:
 - Conventional** farming (CONV)
 - Organic** farming (ORG)
 - Circular** farming (CIRC)

The WTP Questions



✓ 3 product categories representing 3 case studies:

- Pork** for pig production
- Milk** for cattle production
- Bread** for cereal production

Conventional farming

✓ Under 3 farming systems:

- Conventional** farming
- Organic** farming
- Circular** farming

Livestock is housed, generally under constantly controlled temperature, light, and humidity conditions. Livestock is mainly fed on feed and fodder. It uses high-performance breeds in meat production adapted to market demand and produces homogeneous products (cut, size, and volume) that satisfy large-scale marketing needs. It is governed by a general livestock regulation that regulates its operation in matters of food, hygiene, production and bans the use of growth hormones. The use of antibiotics in livestock farms is monitored and supervised. The use of drugs for disease control must be authorized and administered through veterinary prescription and following the principles of good veterinary practice.

The WTP Questions



✓ 3 product categories representing 3 case studies:

- Pork** for pig production
- Milk** for cattle production
- Bread** for cereal production

✓ Under 3 farming systems:

- Conventional** farming
- Organic** farming
- Circular** farming

Organic farming

Livestock is raised following strict criteria of living conditions, medical treatment, and animal welfare. Livestock is fed with grass, fodder, or feed with organic certificate. GMO feedstuff cannot be used, and animals exceptionally can be treated with antibiotics. However, there is a longer quarantine for the products (milk, meat) after treatment. Animals must have permanent access to outdoors and the space should maintain a low density of animals. The regulations place emphasis on improving animal welfare throughout their life span, controlling their transport and slaughter conditions

The WTP Questions



✓ 3 product categories representing 3 case studies:

- Pork** for pig production
- Milk** for cattle production
- Bread** for cereal production

Circular farming

Animal husbandry produces not only meat, milk, and eggs but also manure, urine, heat, ammonia, methane, and CO₂, which if emitted uncontrolled may lead to negative environmental impacts. These materials are often not used optimally and are by some farmers regarded as waste. As an alternative, in circular farming, livestock is raised under conventional farming conditions, but with the inclusion of the principles of the circular economy. Accordingly, these farming systems include several technologies, solutions, and farming practices to improve the recycling of Carbon, Nitrogen, Phosphorus, energy, and water by focusing on the use of nutrients more efficiently, improve animal feeding, reduce residues and emissions, recover and reuse nutrients from biowaste.

✓ Under 3 farming systems:

- Conventional** farming
- Organic** farming
- Circular** farming

In the case of pig farming, pig slurry and manure are treated to produce bio-energy (biogas) and bio-based fertilizers using a combination of techniques.

The WTP Questions



✓ 3 product categories representing 3 case studies:

Pork for pig production

Milk for cattle production

Bread for cereal production

Circular farming

Animal husbandry produces not only meat, milk, and eggs but also manure, urine, heat, ammonia, methane, and CO₂, which if emitted uncontrolled may lead to negative environmental impacts. These materials are often not used optimally and are by some farmers regarded as waste. As an alternative, in circular farming, livestock is raised under conventional farming conditions, but with the inclusion of the principles of the circular economy. Accordingly, these farming systems include several technologies, solutions, and farming practices to improve the recycling of Carbon, Nitrogen, Phosphorus, energy, and water by focusing on the use of nutrients more efficiently, improve animal feeding, reduce residues and emissions, recover and reuse nutrients from biowaste.

✓ Under 3 farming systems:

Conventional farming

Organic farming

Circular farming

In the case of cattle farming, the dairy farm uses wastewater to produce algae as a new source of proteins (animal feeding) and the milk industry uses dairy processing residues to produce fertilizer and build soil fertility.

The WTP Questions



✓ 3 product categories representing 3 case studies:

Pork for pig production

Milk for cattle production

Bread for cereal production

Circular farming

Animal husbandry produces not only meat, milk, and eggs but also manure, urine, heat, ammonia, methane, and CO₂, which if emitted uncontrolled may lead to negative environmental impacts. These materials are often not used optimally and are by some farmers regarded as waste. As an alternative, in circular farming, livestock is raised under conventional farming conditions, but with the inclusion of the principles of the circular economy. Accordingly, these farming systems include several technologies, solutions, and farming practices to improve the recycling of Carbon, Nitrogen, Phosphorus, energy, and water by focusing on the use of nutrients more efficiently, improve animal feeding, reduce residues and emissions, recover and reuse nutrients from biowaste.

✓ Under 3 farming systems:

Conventional farming

Organic farming

Circular farming

In the case of bread production, the cereals for flour are cultivated using crop management systems that increase soil fertility and organic matter content by adopting crop rotations, cover crops and no-tillage practice, and the crops are fertilized with recycled, bio-based fertilizers



Hypothetical markets were **simulated** through several designed **purchase situations** for each product category and farming system and country

Q3.2.

¿QUÉ PRODUCTO preferiría comprar?

SITUACIÓN DE COMPRA 1

 Agricultura Ecológica (11.00 €/500g)	 Agricultura Circular (5.00 €/500g)
 Agricultura Convencional (4.00 €/500g)	NINGUNO de estos

Q6.4.

¿QUÉ PRODUCTO preferiría comprar?

SITUACIÓN DE COMPRA 3

 Agricultura Ecológica (1.30 €/1 litro)	 Agricultura Circular (0.90 €/1 litro)
 Agricultura Convencional (0.60 €/1 litro)	NINGUNO de estos

Q9.4.

¿QUÉ PRODUCTO preferiría comprar?

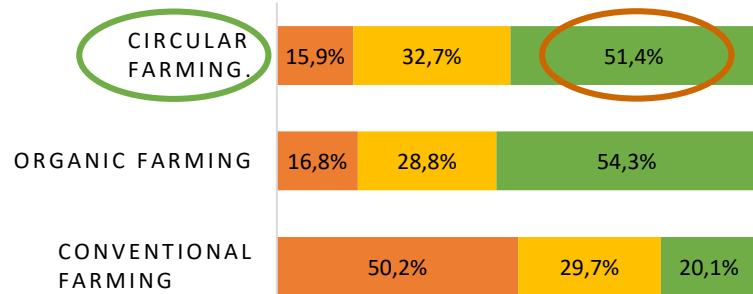
SITUACIÓN DE COMPRA 3

 Agricultura Ecológica (3.00 €/450g)	 Agricultura Circular (1.80 €/450g)
 Agricultura Convencional (0.80 €/500g)	NINGUNO de estos

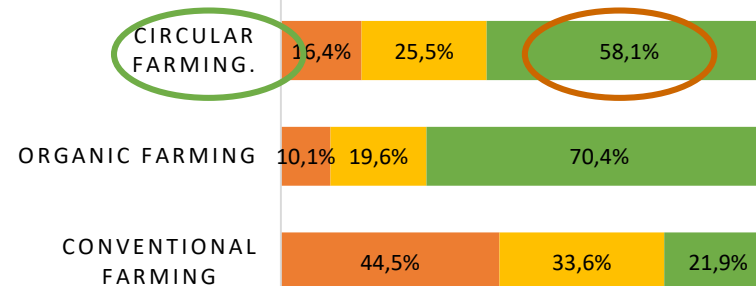
Perceptions regarding farming impacts on environment



The circular farming was also clearly perceived as environmentally friendly in a close position to the organic systems, in particular in Belgium, Hungary and Italy.



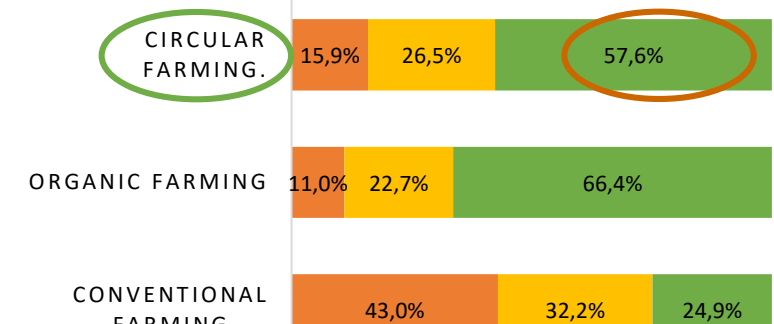
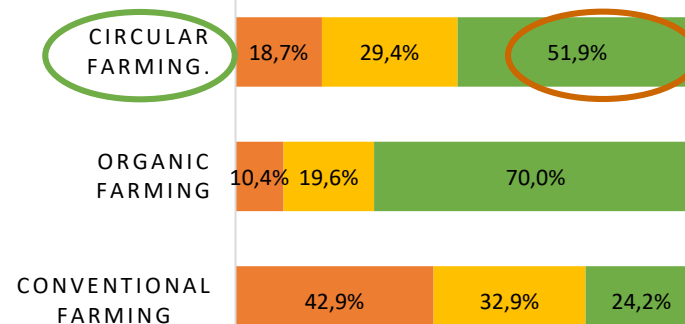
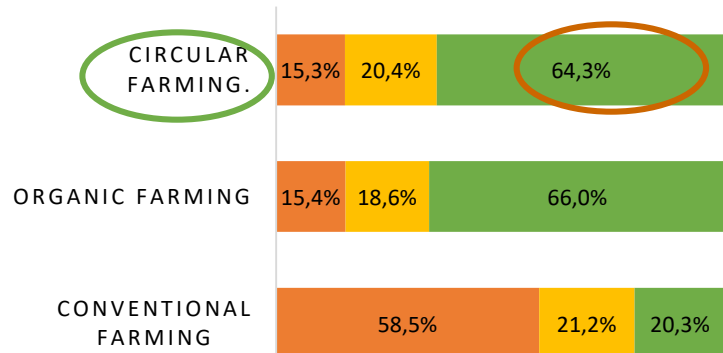
ITALY



POLAND

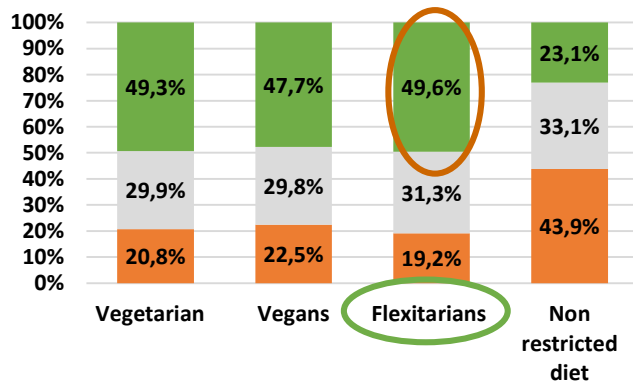


SPAIN

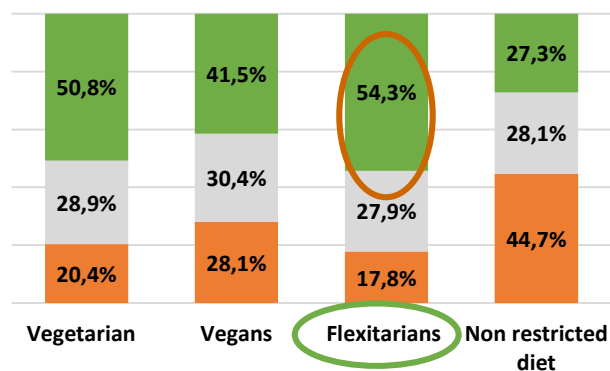


Reducing the consumption of meat (flexitarian diet) was considered as environmentally sustainable Diet according to more than 50% of respondents

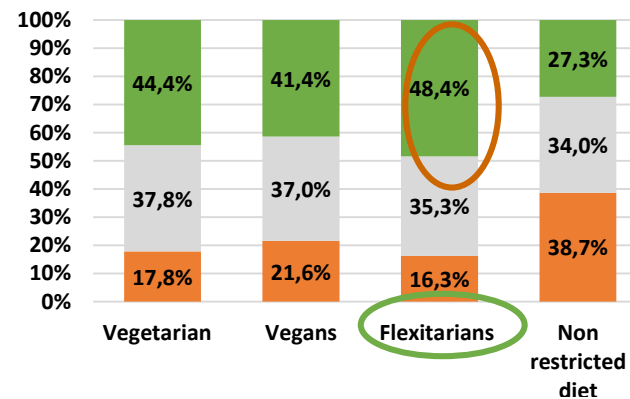
Belgium



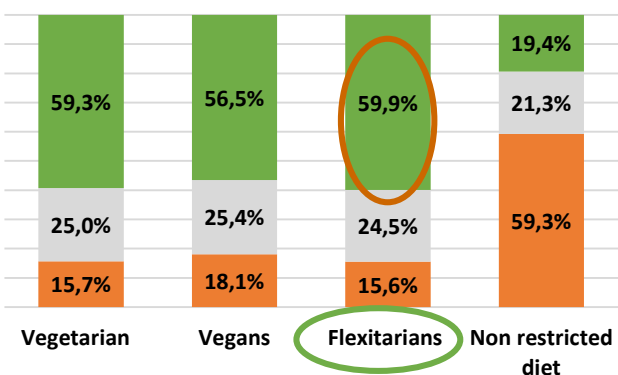
Croatia



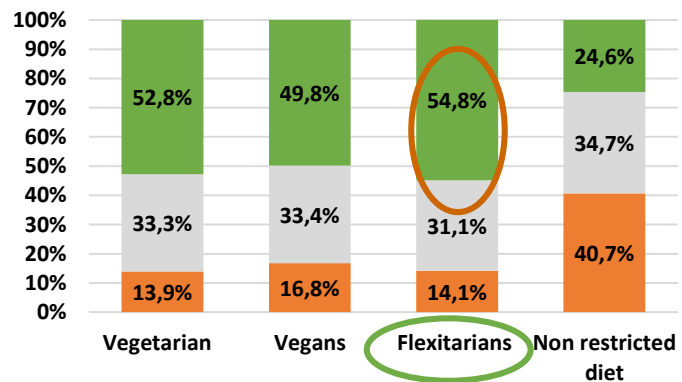
Hungary



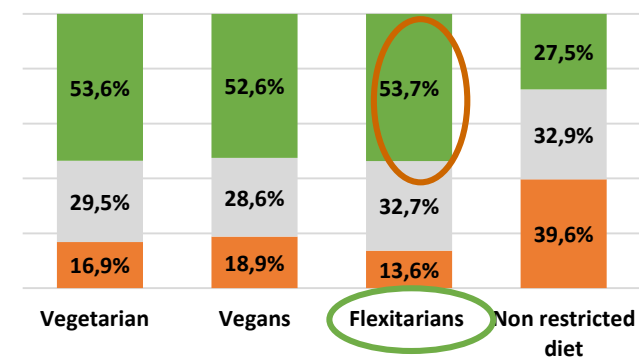
Italy



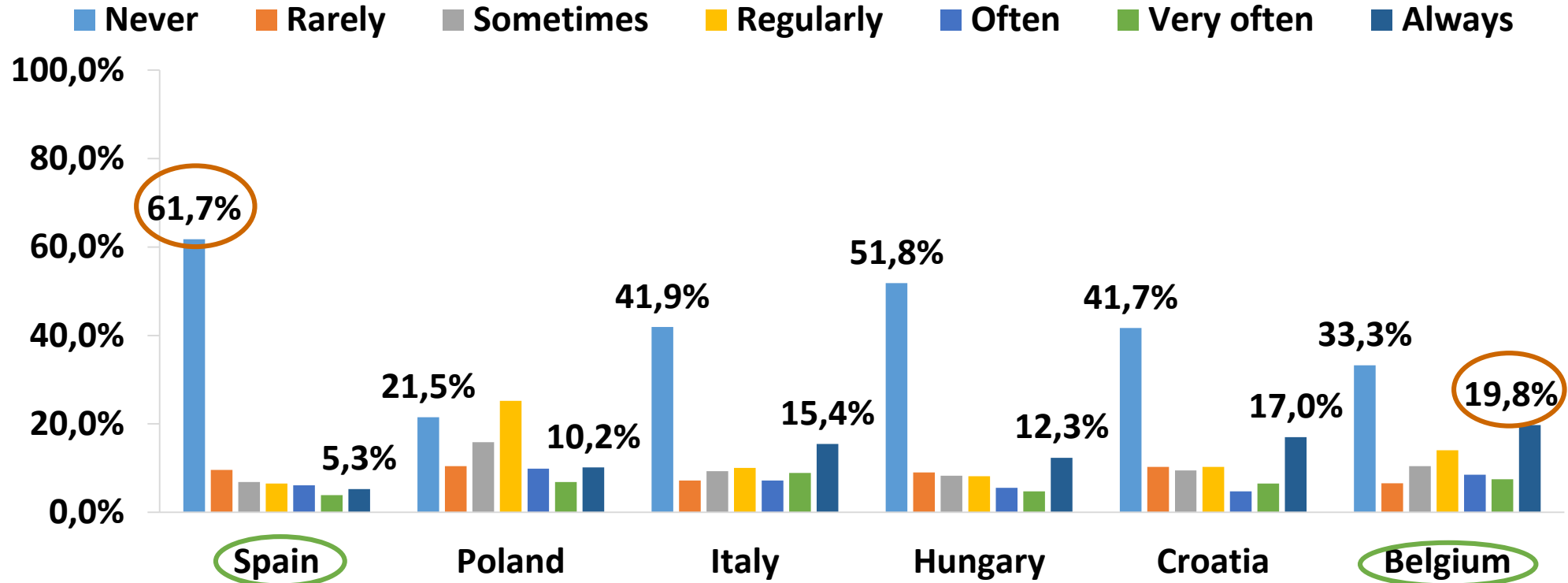
Poland



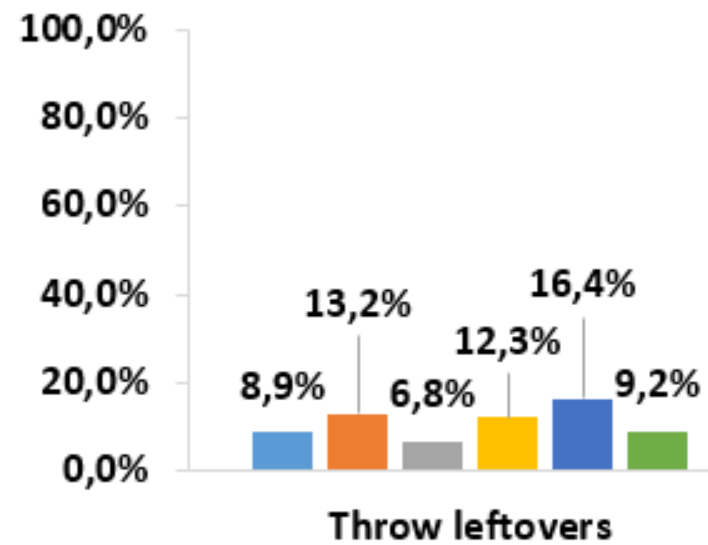
Spain



Consumers do compost with their organic food waste



Destination of respondents' food leftovers



■ Spain

■ Poland

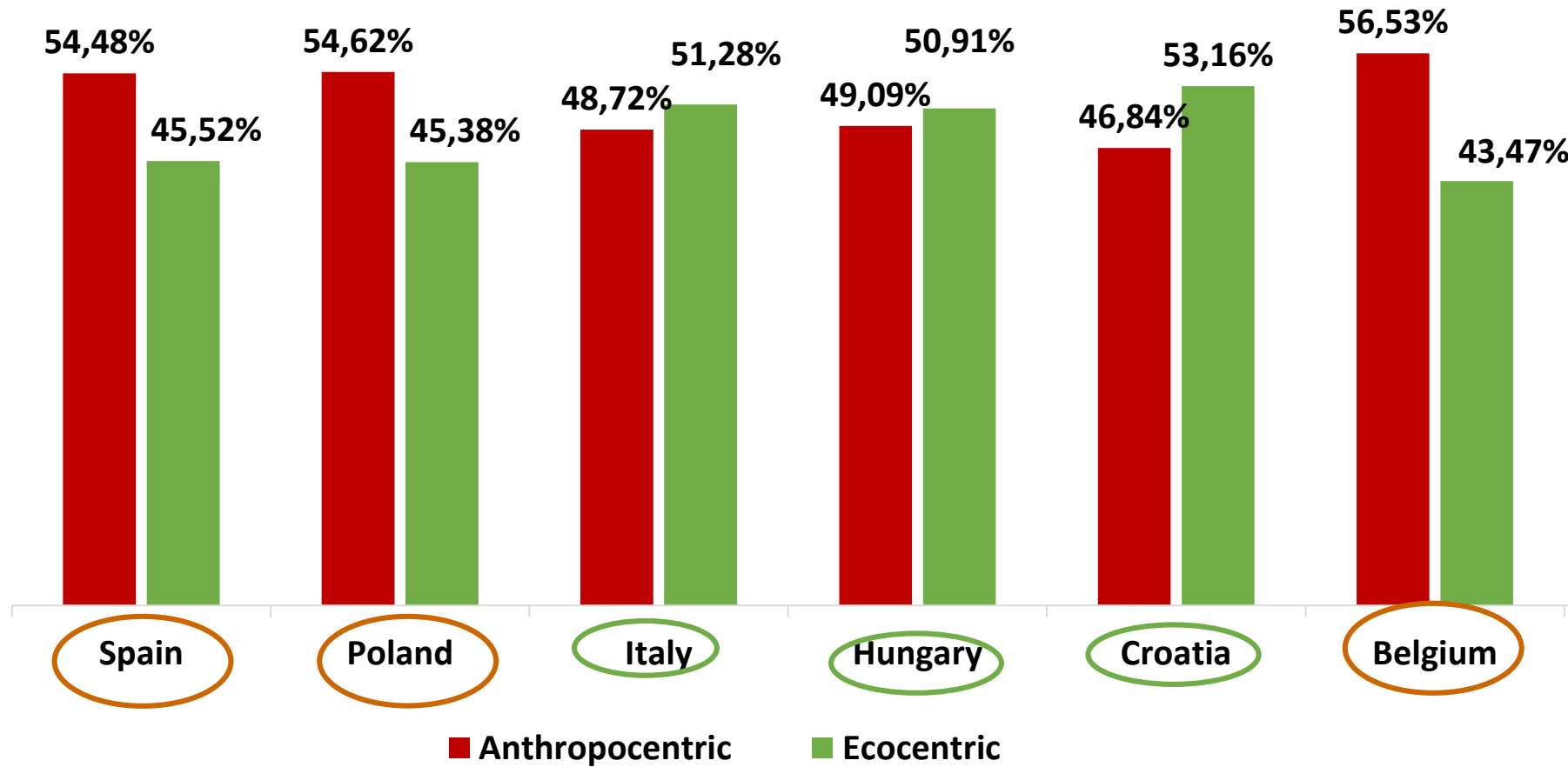
■ Italy

■ Hungary

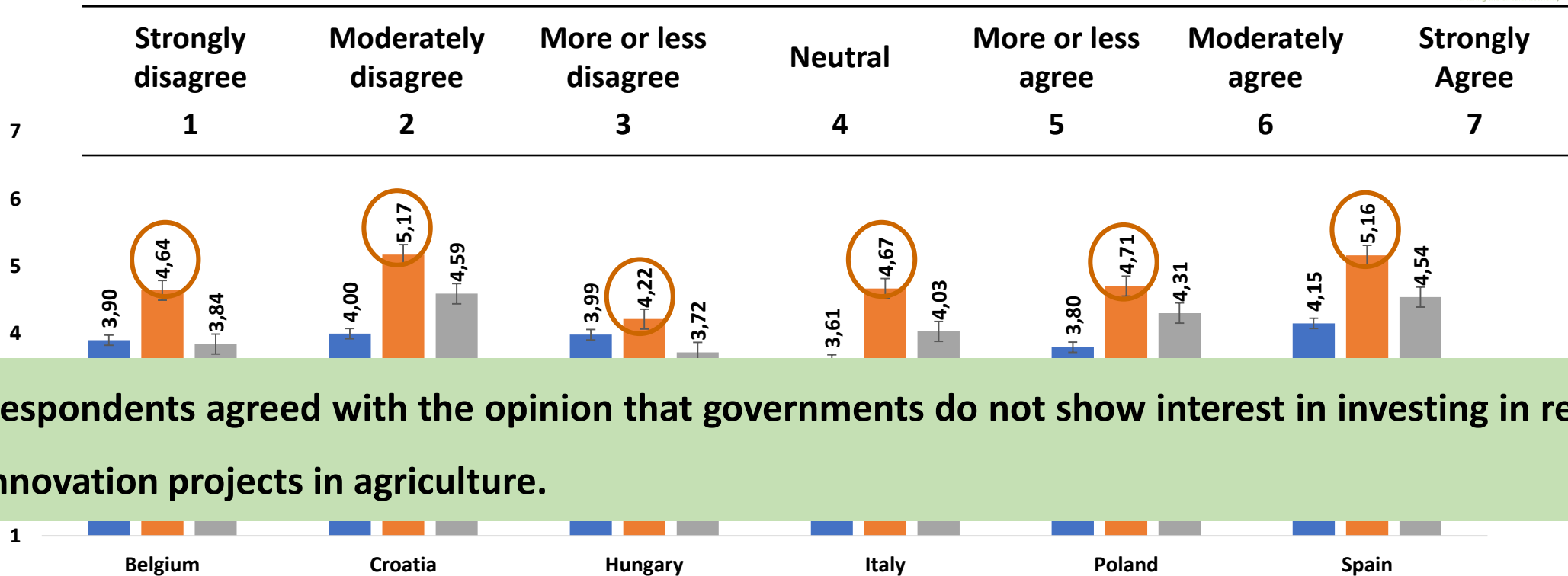
■ Croatia

■ Belgium

Respondents Environmental attitudes



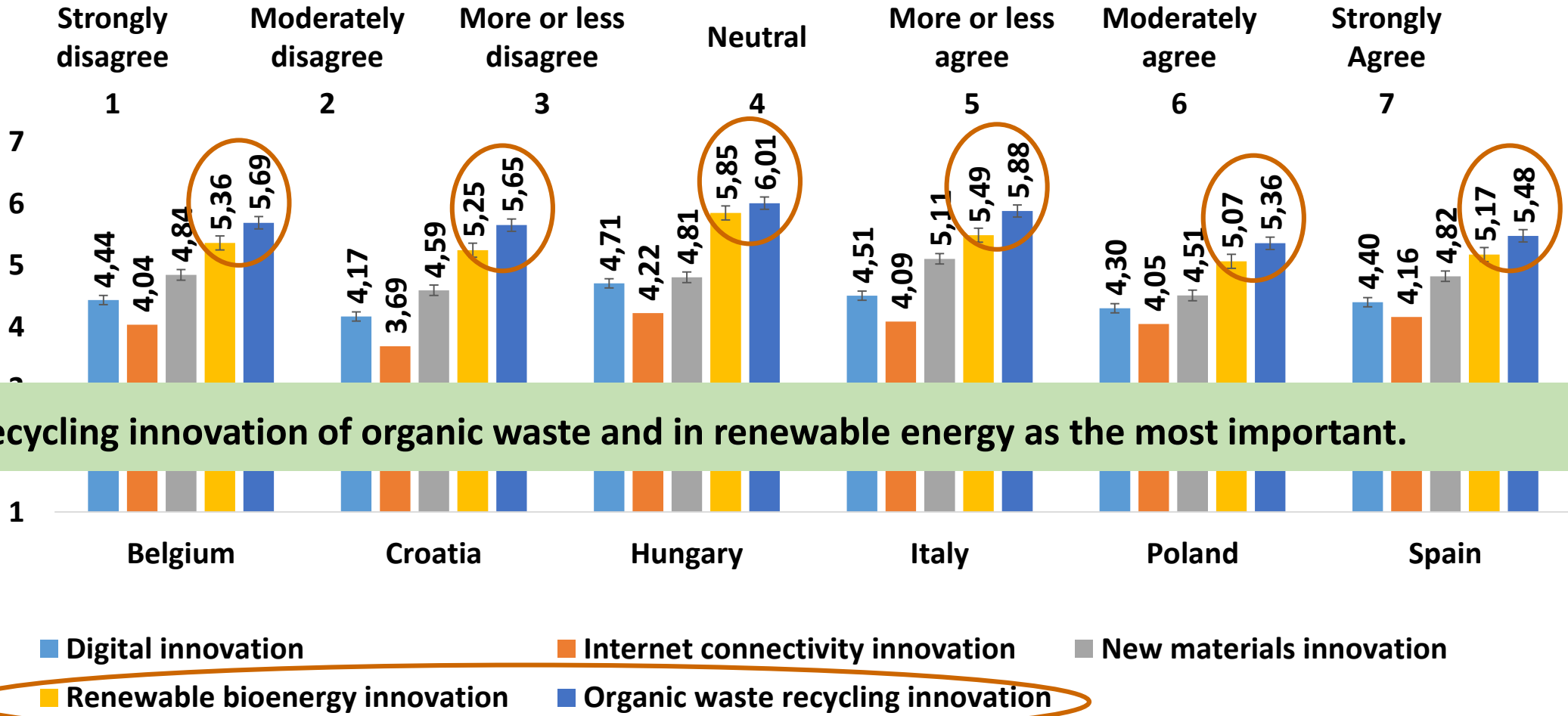
Opinions regarding innovation level in agriculture and the involvement of institutions



Respondents agreed with the opinion that governments do not show interest in investing in research and innovation projects in agriculture.

- Agriculture is a very traditional sector that do not show big degree of innovation
- **Governments are not interested to invest in research and innovation projects**
- Universities are not interested to invest in research and innovation projects for agriculture

Important innovations in the future for farmers



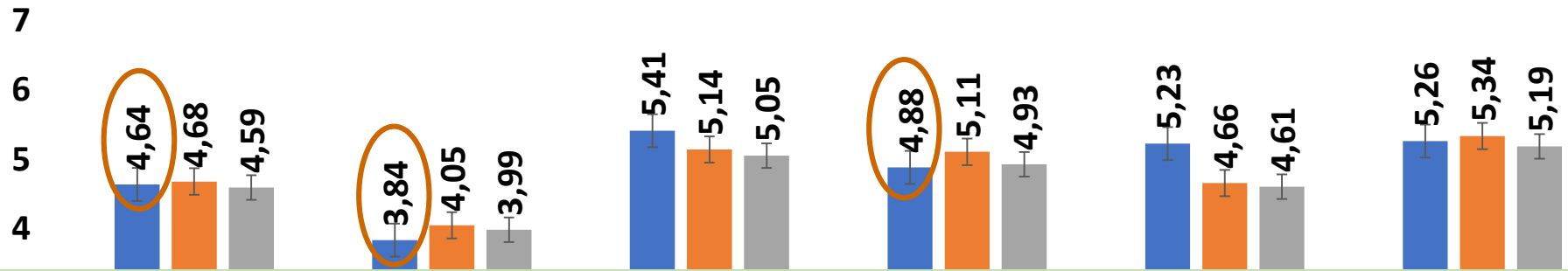
The recycling innovation of organic waste and in renewable energy as the most important.

Renewable bioenergy innovation Organic waste recycling innovation

Concerns when using fresh manure and organic waste as fertilizers to fruits and vegetables



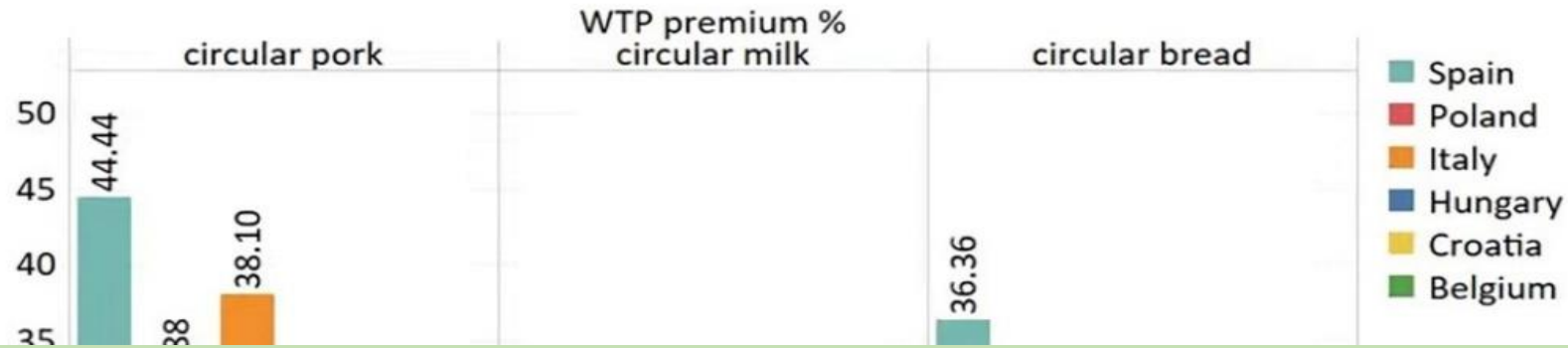
Strongly afraid	Moderately afraid	More or less afraid	Neutral	More or less confident	Moderately confident	Strongly confident
1	2	3	4	5	6	7



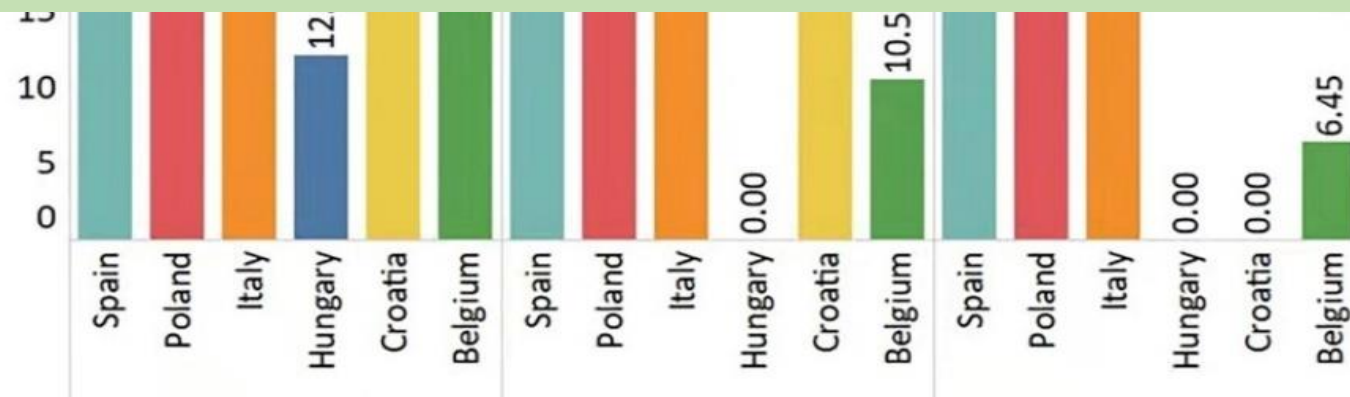
Consumers are neutral to more or less confident towards fresh manure and organic waste compared to conventional fertilizers.

- A) Fresh manure or organic waste vs Conventional fertilizers
- B) Processed and sanitized manure /organic waste vs Conventional fertilizers
- C) Processed and sanitized - manure /organic waste vs Fresh unprocessed manure

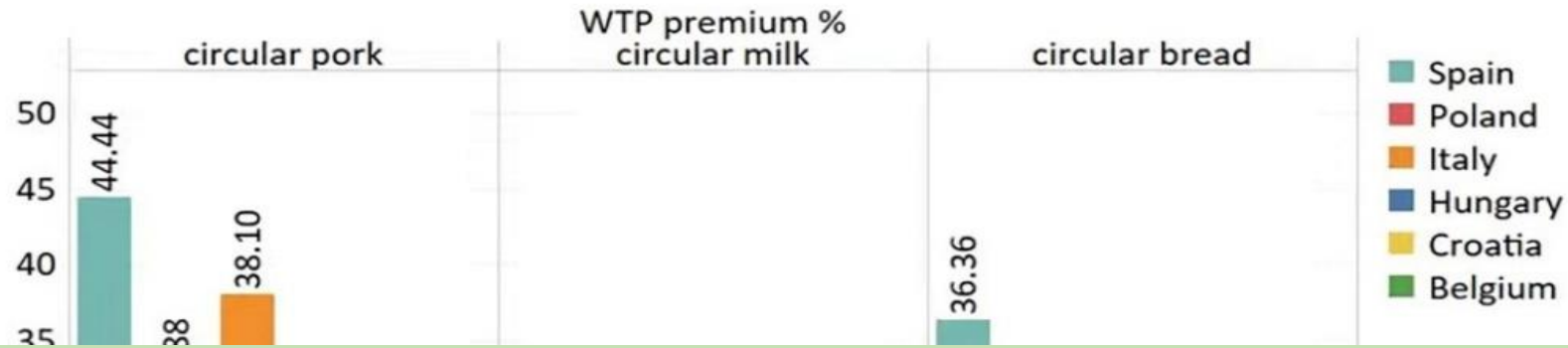
Consumers WTP for Circular Farming products



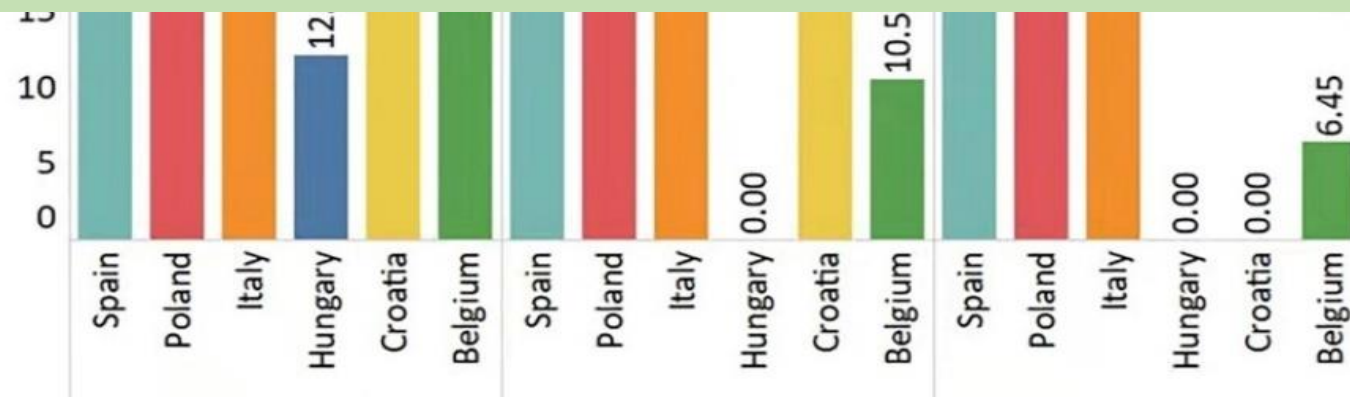
In monetary term, for the products categories analysed under the different **Circular farming innovation** proposed in Nutr2Cycle project the **expected WTP** for circular products were **higher** than those estimated for the **conventional** products



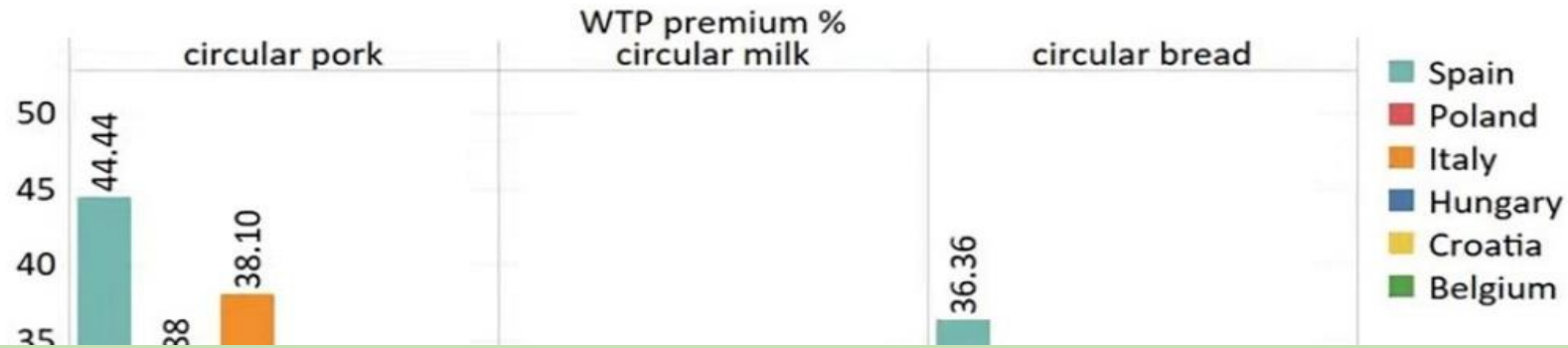
Consumers WTP for Circular Farming products



Although a consumer prefers or considers that a **product obtained through a more sustainable system generates greater utility** compared to another substitute, the **willingness to pay** will depend to a large extent on **the price levels** presented to extract preferences

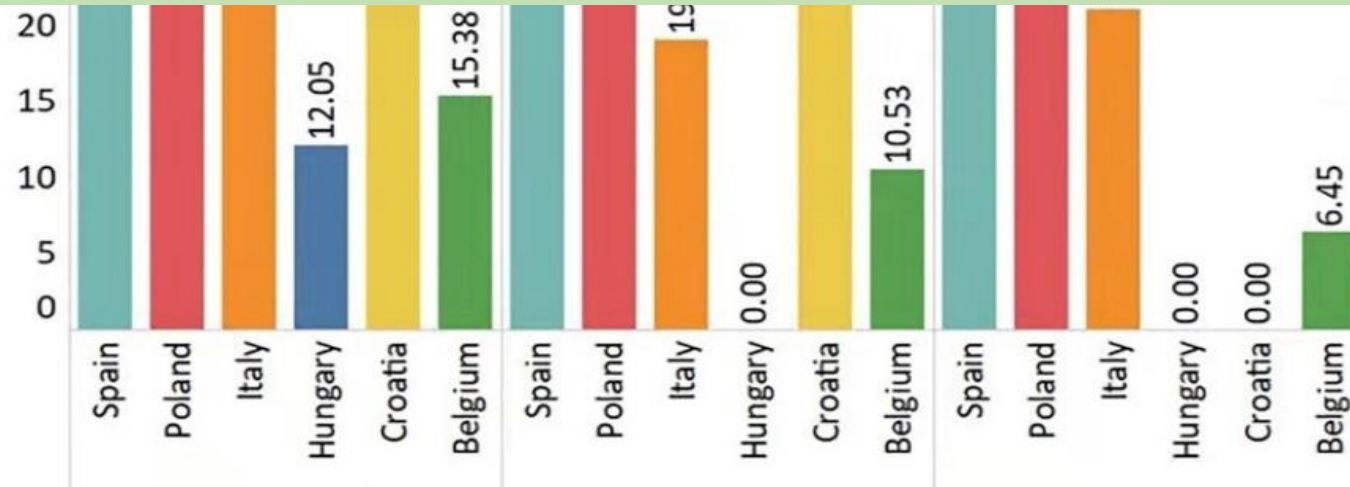


Consumers WTP for Circular Farming products



There is a **clear potential market** for the products obtained and labelled under the circular farming systems.

The **global average rate of WTP a premium** for the 3 products categories is **27,24%**





- The price level for circular farming should be **positioned in an interval from 0 to 40%** depending on countries and product category with **27,24% as average**.
- Results could help **retailers** in their **pricing decisions** for circular products in the future, if these products appeared at market place.
- In all cases, the analysis should be **extended to other products** category and also to **other circular farming innovations**, practices and solutions, not only the innovations presented to the consumers in this study I think it should be noted which ones you presented to the consumers, somewhere in the beginning of the summary.

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Thank you

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