Nutri2Cycle
Nurturing the Circular Economy

Nutri2Cycle

D.5.2 Report with results of consumers' preference surveys for the selected case studies

Deliverable:	Results of consumers' preference surveys for the selected case studies
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Abbreviations

ASC	=	Alternative Specific Constant
C	=	Carbon
CIRC	=	Circular farming
CONV	=	Conventional farming
DCE	=	Discrete Choice Experiment
EU	=	European Union
GHG	=	Green House Gases
GMO	=	Genetically Modified Organism
IIA	=	Independence of Irrelevant Alternatives
IID	=	Independent and Identically Distributed
KMO	=	Kaiser Meyer Olkin
MIXL	=	Mixed Logit Models
MNL	=	Multinomial Logit
MRS	=	Marginal Rate of Substitution
MVN	=	Multivariate Normal Distribution
N	=	Nitrogen
NEP	=	New Ecological Paradigm
NS	=	Non-Significant
OECE	=	Open-Ended Choice Experiment
ORG	=	Organic farming
P	=	Phosphorus
PCA	=	Principal Component Analysis
PDE	=	Price Demand Elasticity
RPL	=	Random Parameter Logit
RUT	=	Random Utility Theory
SD	=	Standard Deviation
WTP	=	Willingness to Pay

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Glossary

Agricultural systems: is a collection of components for the production of crops and raising livestock to obtain food, fiber, and energy from natural resources.

Agro-residue: describes all organic material produced as by-products after harvesting and processing agricultural crops.

Anthropocentric attitudes: are beliefs and values focused on human welfare.

Bioenergy: is energy produced from organic matter, (biomass) derived from plants or animals.

Circular farming: focuses on using minimal amounts of external inputs, closing nutrients loops, regenerating soils, and minimizing the impact on the environment.

Consumers' behaviors: are the actions of the consumers that drive them to buy and use certain products.

Consumers' attitudes: Is defined as favorableness or un-favorableness feeling that an individual has towards a subject or item.

Conventional farming: also known as traditional farming refers to farming systems which include the use of synthetic chemical fertilizers, pesticides, herbicides and other continual inputs, concentrated animal feeding operations, heavy irrigation and intensive production.

Discrete Choice Experiment: is a quantitative stated preference method based on questionnaire to elicit individual acceptance towards a product.

Ecocentric attitude: reflect the concern of individual for the ecosystems and their elements. Individuals with ecocentric attitude are much more likely to actually act upon their values, behaviors and beliefs in order to protect the environment.

Environmental attitude: beliefs and values of individuals or societies with respect to nature, ecology, or environmental issues. Can be defined both as the intensity of positive or negative affect about a particular environmental topic.

Environmentally friendly: Least potential impact on the environment, referring to goods and services, laws, guidelines and policies that claim reduced, minimal, or no harm upon ecosystems or the environment.

Environmentally sustainable: is the capacity to improve the quality of human life while living within the carrying capacity of the earth's supporting ecosystems.

Farming innovations: new or improved ways of doing things as they relate to farming and natural resource management.

Hypothetical purchase scenario: (hypothetical markets) defined as a situation in which individuals state their expected preferred product to purchase but no actual test is carried out.

Organic farming: is an agricultural system that uses ecologically based pest controls and biological fertilizers derived largely from animal and plant wastes.

Organic waste: is a biodegradable waste produced mainly from living organisms, either plant or animal.

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Preferences: is a technical term usually used in relation to choosing between alternatives.

Premium price: refers to the amount of money an individual is willing to pay to secure a specific attribute or characteristic or product.

Price elasticity of demand: is the relationship between consumer demand for service or a food product and its own price.

Purchase intentions: is the probability that a consumer will buy a product or service.

Random Utility Theory: is a choice theory explaining that individuals choose among the alternatives in a choice situation according to a utility function with two main components: a systematic (observable) component and a random error term (non-observable)

Renewable Bioenergy: It is a form of renewable energy that is derived from recently living organic materials known as biomass, which can be used to produce transportation fuels, heat, electricity, and products.

Sustainability: means meeting individual needs without compromising the ability of future generations to meet their own needs. It is a multidimensional that refer to social, economic, environmental and governance impacts.

Sustainable agriculture: practice that involves the successful management of resources for agriculture to satisfy human needs, while maintaining or enhancing the quality of the environment and conserving natural resources.

Sustainable behavior: is the set of deliberate and effective actions that result in the conservation of natural and social resources.

Sustainable food system: is a system that generate favorable outcomes related to the main-dimensions of sustainability such as economically profitable, bring balanced and more equitable benefits for the society, and have a positive or neutral environmental impact.

Willingness to pay: is the maximum price a customer is willing to pay for a product or service.

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Executive Summary

Purpose & methodologies

The **sustainability** of food systems is a **complex** and **multidimensional** concept that involves not only producers, policy makers, and researchers, but also consumers. The **consumers' choice** and preferences towards food produced through more sustainable agricultural systems may play an important role in **promoting** the generation of sustainable production **strategies** in the current **added-value** supply chain. The main objective of this report is twofold: **Firstly** (**Task 5.4**), to analyse at a European level, the **expected preferences**, purchase **intentions** and **attitudes** of consumers towards food products obtained through more sustainable farming systems, in terms of reducing carbon emissions and optimizing the recovery of nutrients (C, N, P) at farm level. Specifically, to identify **consumers' willingness to pay (WTP) a premium for sustainable food products** obtained from circular farming by adopting the solutions proposed within the Nutri2Cylce project. **Secondly** (**Task 5.5**), to analyse **consumers' perceptions regarding the value of agro-residue** processing into renewable energy. Particularly, respondents' opinions towards farm **innovation** level and **future** perceptive of environmental **sustainability** related to renewable bioenergy and recycling of organic waste. In this context, consumers' opinions towards the **environmental impact** of the current agricultural systems compared to circular farming, the level of environmental sustainability of different **consumption patterns** and **diet**, the recycling and waste management behaviour as well as **environmental attitudes** were also assessed. Respondents' opinions regarding the effect of using **manure** and **organic** waste as **fertilizers** on food **taste** and **safety** were also analysed.

Data was collected with questionnaire-based research carried out in **4 different** geopolitical **regions** (those are 1. Spain and Italy, 2. Belgium, 3. Poland and 4. Croatia and Hungary) targeting a minimum of 1.000 respondents **with a total of 5.591 participants in Belgium, Croatia, Hungary, Italy, Poland, and Spain**. The **Discrete Choice Experiment** (DCE) and the **Open-Ended Choice Experiment** (OECE) were used to analyse consumers' preferences towards 3 product categories representing 3 case studies: **Pork** for pig production, **milk** for cattle production and **bread** for cereal production. These products were identified as relevant for the EU during the development of the D.5.1 Meta-analysis study regarding the consumers' preferences towards sustainable products and because of the relative importance of each sector within the EU from a production point of view. The EU is the world's second biggest producer of pork and its dairy sector is the second biggest sector in terms of output value. The harvested production of cereals (including rice) in the EU was 295.1 million tonnes in 2018, representing about 11.3 % of global production. Hypothetical markets with several simulated purchasing situations were created following a statistical design for each product category under 3 farming systems (**conventional** farming, **organic** farming and **circular** farming). In order to reduce the hypothetical bias than occur in surveys, respondents were informed that previous studies found a gap between what respondents indicate in surveys and what they do in real life. They were also informed that in respondents often overestimate their WTP in a hypothetical purchase situation because they do not take into account their food budget constraints. Thus, they were asked to carefully evaluate each purchase situation accordingly

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Key findings & Conclusions

Results showed that a **market niche exists** for the analysed food products produced from circular farming where consumers exhibited a **willingness to pay a premium compared to conventional** products. By circular farming we refer to the farming activity that focuses on using minimal amounts of external inputs, closing nutrient loops, regenerating soils, and minimizing impact on the environment. Particularly, consumers positively evaluated the circular farming where livestock is raised under conventional farming conditions, but with the inclusion of the principles of the circular economy and using several technologies, solutions, and farming practices to improve the recycling of Carbon, Nitrogen, Phosphors, 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. Consumers were faced by three types of innovation according to each selected sector. 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. 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. 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 fertilizer

The circular farming innovations introduced and the specific **information** conveyed to consumers regarding their impact in reducing emissions **may contribute to increase consumers' acceptance** of sustainable food products. The estimated willingness to pay for the food product categories proposed under the different farming systems should be associated with the information delivered to respondents in the description of the simulated markets. Results highlighted the importance of the consumers' **environmental attitudes** and their **socioeconomic** characteristics in determining their **preferences** for environmentally **sustainable products**.

Results also **highlighted** in **all countries**, the consumers' **desire to see farmers more committed** with the protection of the **environment** by adopting **innovations** through the production of **Renewable Bioenergy** and **recycling organic waste which fit within the scope and objectives of Nutri2Cycle project** regarding the consumer perception on value of agro-residue processing into renewable energy. In this context, respondents agreed with the opinion that **governments** should make additional effort and demonstrate more interest in investing in **research** and **innovation** projects in **agriculture**. The main outcomes are summarized in the following sections.

Consumers' attitudes and behaviours identified

- ✓ The **circular farming is perceived** as an **environmentally friendly** system, in a similar way to the organic one in comparison to conventional system. Particularly, in Belgium, Hungary and Italy.
- ✓ Increasing the consumption of vegetables and fruits, and **reducing the consumption of meat** (flexitarian diet) is considered more **environmentally sustainable** than **vegan**, **vegetarian** and non-restricted diets.
- ✓ The percentage of consumers who **compost** their **organic** food waste is **higher in Belgium**, **Croatia** and **Hungary** compared to Italy, Spain and Poland.
- ✓ Almost **half** of the interviewed consumers (3,177 respondents) **generate leftovers**[1] **from the meals** they prepare at home. The highest percentage is found in Belgium and the lowest in

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Poland. **However**, only a **small share** of leftovers is **thrown** to garbage (wasted) with a percentage ranging from **6.8%** in **Italy** to **16.4%** in **Croatia**.

- ✓ Consumers' **ecocentric**[2] attitude is more revealed in **Italy**, **Hungary**, and **Croatia**, while the consumers' **anthropocentric**[3] attitude is more accentuated in **Spain**, **Belgium** and **Poland**.

Purchase intentions and Willingness to Pay (WTP)

- ✓ From the **DCE approach** (in which the proposed **price vectors** for the products from circular farming were considered **relatively higher than the average price of the conventional alternatives** at real market place) results showed that:
  - As expected, the **pork**, **milk** and **bread** products produced under the **circular farming systems,** developed in Nutri2Cycle, **received** a relatively **low rate of purchase intention** compared to **conventional**. However, the estimated rate is **similar to products from organic farming**, excluding milk in Spain and Croatia, and pork in Poland.
  - Although circular products were not the most preferred, there is a **clear potential market** for the products obtained and labelled under the proposed circular farming systems. The **global average rate of purchase intention** for the 3 products categories is **27,24%**.
  - A **heterogeneity level across countries** is found regarding the estimated rate of the purchase intentions of products from circular farming systems. For **pork** and **bread**, **Italy** showed the **highest purchase intention** while **Poland** the **lowest**. For **milk**, **Italy** also showed the **highest purchase intention** while **Spain showed** the **lowest**.
  - For almost all products and farming systems in all countries, **consumers showed sensitivity to the price levels when selecting their preferred products** from the simulated purchase situations, highlighting a **decreasing demand trend when price increase** as **expected** in the majority of the cases.
  - According to the **simulated purchase situations**, results of the estimated **elasticities** showed that when the **price** of the products from a specific production system (organic, conventional, and circular) **decrease**, the percentage of change in the **direct-probability** of **selection** (own quantity change) **increase** and the percentage of the **cross-probability** of selection (cross quantity change) **decrease**. These results confirm the **substitutability characteristics across the products from the different production systems** at a potential marketplace, and highlight the **potential acceptance** of the products from circular farming. The **substitutability** rate was highly related to the **product categories** and **countries**, suggesting the need to design **country-specific marketing strategies** and specific **price policies** at **retailer** level to better **position** the products from circular farming jointly with conventional and organic one **at market place**.

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1) A leftover part of a meal is the part that has not been used or eaten. Food remaining after a meal (Cambridge Advanced Learner's Dictionary & Thesaurus).
2) Ecocentric attitudes involve valuing the environment for the environment itself. Ecocentrism focuses on nature. (Simsar et al., 2021)
3) Anthropocentric attitudes involve valuing the environment for its benefits to people. Anthropocentrism regards humans as the most important component of life. (Simsar et al., 2021)

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- From the **OECE approach** (in which the proposed **price vectors** for the products from circular farming were identified relatively **close to the average price of the conventional alternative** at real market place), results showed that:
  - The median **maximum price** that participants were willing to pay for a unit of circular **pork** (500g) was €6.50 in Spain, €3.73 in Poland, €5.80 in Italy, €3.72 in Hungary, €4.95 in Croatia, and €7.50 in Belgium. Compared to the price of the same size of conventional pork, consumers in **Spain** were willing to pay a maximum premium of **44.44%** for 500 grams of circular pork, while those in **Poland** paid a premium of 30.88%, 38.10% in Italy, 12.05% in Hungary, **23.13% in Croatia**, and **15.38% in Belgium**.
  - In the case of circular milk, the median **maximum price** consumers were willing to pay for a liter of circular **milk** was €0.95 in Spain, €0.67 in Poland, €1.25 in Italy, €0.86 in Hungary, €0.90 in Croatia, and €1.05 in Belgium. The maximum WTP of respondents in **Spain** for 1 liter of circular milk was the highest with **26.67%**, followed by **Poland** with **24.07%**, **Croatia** with **21.62%**, **Italy** with **19.05%**, and **Belgium** with **10.53%**, while **Hungarian** consumers were willing to pay a premium percentage of **0%**, i.e., the WTP for circular milk was equal to the price of conventional milk.
  - With regard to circular **bread**, the median **maximum price** of consumers for a pack of circular bread (450g) was €1.50 in Spain, €1.70 in Poland, €1.15 in Italy, €1.06 in Hungary, €1.29 in Croatia, and €1.65 in Belgium. In addition, the maximum WTP premium of participants in **Spain** for circular bread was the highest with **36.36%**, followed by **Poland** with **24.09%**, **Italy** with **21.05%**, **Belgium** with **6.45%**. Respondents in **Hungary** and **Croatia** had the lowest one with **0%**.
- **When the identified price vectors** of circular farming products were **closer to the average level** of conventional alternatives **(as done in the OECE), results showed more consistent consumers' WTP** and demand trend than the **DCE.** Therefore, these results were considered for the WTP **heterogeneity analysis**.
- The **WTP' heterogeneity analysis** in all **countries** and for the **circular farming** products **showed** that:
  - **Younger** consumers may purchase more circular products than older people. **Business** owners and employees were more likely to buy circular products.
  - Respondents whose monthly income always cover household expenditure, who were in a good financial situation and have high level of education are likely to purchase higher quantity of circular products.
  - **Females** purchased a lower number of circular products than males (except in Croatia).
  - **Ecocentric** consumers tended to purchase a higher number of circular products in Belgium, Hungary, and Spain.

Perception on value of agro-residue processing into renewable energy

- In all countries, results showed **consumers' opinion** regarding the role of farmers in producing **bio-materials** and **renewable bioenergy** after the food products. Furthermore, consumers consider that their national agricultural sector exhibit some degree of innovation, such as (…)
- Results showed that consumers are **concerned** with the use of **fresh manure and organic** waste as fertilizers to **fruits** and **vegetables** rather than conventional one, particularly in

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Croatia, Belgium and Italy. Concerns were related to the potential impact of using manure on **safety**, **quality** and **taste**.

Sample representativeness and bias

- ✓ The samples used in the studied countries show high level of **heterogeneity** in terms of **socio-economic** and **demographic** characteristics, ensuring a **good representation** of the **population** distribution.
- ✓ The **methodological** approach **followed** to estimate **consumers' willingness** to **pay** and **purchase intention** were based on **simulating hypothetical markets**. Thus, results should be taken with care due to potential **hypothetical** bias. Expectations towards a new food product under different information contexts could lead to different results compared to consumers' actual behaviour even under the application of mitigation strategies followed in this research to reduce this bias.

Lessons learned

In monetary term, for the products categories analysed under the different **Circular farming innovations** proposed in Nutr2Cycle project, focusing on nutrients optimization and reduction of greenhouse gases GHG emission that were technically and macro-economically assessed in the WP3 and WP4, the **expected WTP** for circular products were **higher** than those estimated for the **conventional** products. However, some **heterogeneity** level was found depending on the product type and the country studied.

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**. Therefore, **marketing mix strategies** and retailers **price policies** should identify the price vectors according to the product category that should **not be too much far** from the **average** price level of **conventional** products. The price level for circular farming should be positioned in an interval from **0 to 40%** depending on **countries** and **product** category. Results should help **retailers** in their **pricing decisions** for circular products in the future, if these products appeared at market place. That is why, when designing strategies that encourage the producers through stimuli to promote agricultural systems with lower levels of carbon emissions and optimization of nutrient recovery, it is important that the **policy tools contribute to afford a share** of the initial investment cost in order to maintain **competitive prices** compared to conventional alternatives.

At empirical level, and due to the hypothetical bias, the **estimated WTP should be** interpreted **carefully**. The use of **experimental economics** approach with questionnaire-based research in order to mitigate and control for **hypothetical** bias in order to reduce the potential error induced by not confronting the individual with an actual purchase situation are suggested. Non-hypothetical purchase scenario by creating a "real" market to exchange products and money in order to enforce incentive compatibility would contribute to extract more accurate preferences patterns. 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 and mentioned above. Furthermore, additional effort should be done in order to shed light on the relation between the outcome regarding the **estimated WTP** and elasticities from the **DCE** and the **OECE**.

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1. Introduction

In recent years, food products produced by unsustainable and intensive production methods have had negative impacts on human well-being, society, and the environment (Reynolds et al., 2015; Li and Kallas, 2021). Therefore, the demand towards more sustainable food production systems and sustainable food consumption is becoming fundamental to sustainable development. The concept of sustainable food is complex and encompasses issues relating to biophysical, social, and economic environments which also encompasses reducing energy consumption, respecting animal welfare, using environmentally friendly agricultural technology that reduces the use of chemicals, protecting citizens' health, and maintaining human and rural communities (Horrigan et al., 2002).

In this context, there is a rising awareness among consumers to the wider ethical issues and sustainable food products. Local, animal welfare, fair-trade, seasonal, short food supply chain with low carbon footprints products are just a few examples of this growing trend (Codron et al., 2006). Measuring the willingness to pay (WTP) is an acceptable tool to understand consumers' preferences, attitudes and opinions towards sustainable attributes in food products (Li and Kallas, 2021). The WTP estimates represent the price premium or the maximum amount that a current or potential consumer is willing to pay for a product or good. Understanding consumers' WTP will allow policymakers and multi-agents stakeholders to carry out and design more socially acceptable policy actions that ensure sustainable food production (Vecchio and Annunziata, 2015).

The changes in consumers' attitudes towards sustainable food will also bring changes in consumers' behaviour and consumption patterns. Changes in human behaviour could encourage, attain or maintain sustainable systems. As a result, to promote sustainable agriculture, an abundance of empirical studies has attempted to investigate consumers' WTP for sustainable food products. The main results showed that the majority of consumers were willing to pay a premium price for sustainable products (Laroche, Bergeron, and Barbaro 2001). By sustainable agriculture we refer to an alternative for using resources and applied issues related to food production in an ecological way (Lichtfouse et al., 2009).

In this context, there is an increasing interest to analyse consumers' purchase intention towards food products obtained by circular farming systems, as well as understanding the sustainable behaviours of consumers, such as purchasing, recycling, and food waste behaviour, trough the analysis of their behaviour towards some specific sustainable actions and to understand consumers' perceptions regarding renewable bioenergy and farming role to reach environmental sustainability in the future.

This report contains the main results of the research carried out within Task 5.4 (Surveying study regarding consumers' preferences) and Task 5.5. (Surveying consumer perception on value of agro-residue processing into renewable energy). The former task focuses on the analysis of consumers' preferences, opinions, attitudes and WTP towards the environmentally friendly and sustainable food products. The main objective is to analyse the consumers' purchase intention and their willingness to pay (WTP) a premium for 3 selected products (pork, milk, and bread) obtained from different production systems: Conventional farming (CONV), Organic farming (ORG), and Circular farming (CIRC). The main goal of the Task 5.4 is to understand at the European level, the current situation regarding consumer preference and willingness to pay a premium for environmentally friendly and sustainable food products, in terms of reducing carbon emissions and optimizing the recovery of nutrients (C, N, P), identified throw their ecolabels. Also, for Task 5.5 we seek to analyse consumers' perceptions

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regarding the value of agro-residue processing into renewable energy. Particularly, respondents' opinions towards farm innovation level and future perceptive of environmental sustainability related to renewable bioenergy and recycling of organic waste.

This research fits within the proposed European measures of the European Green Deal (the 55th legislative package) focused on achieving climate neutrality by 2050, through a faster reduction of Greenhouse Gases (GHG). In the particular case of this study, identifying the willingness to pay for products obtained in terms of lower GHG emissions and optimise C, N, P loop at farm, regional and EU level and perceptions regarding renewable bioenergy. The latter task, focuses on analysing consumers' perceptions on the value of processing agro-residue into renewable energy. Data was collected through questionnaire-based research carried out in 4 different geopolitical regions targeting a minimum of 1.000 respondents with a total of 5.591 participants in Belgium, Croatia, Hungary, Italy, Poland, and Spain.

2. Brief Summary of the Methodological Approach

The methodological approach followed is summarized in Figure 2 in order to help readers to have a holistic view of the research carried out and the different aspects addressed. The questionnaire and data procedure were approved by the ethical committee in CREDA in accordance with the ethical norms in social science by preserving any information collected according to the European regulations (EU regulations 2016/679). In addition, to accomplish the ethical commitment of Nutri2Cycle project, at the survey´s beginning a consent form was included (Figure 1).

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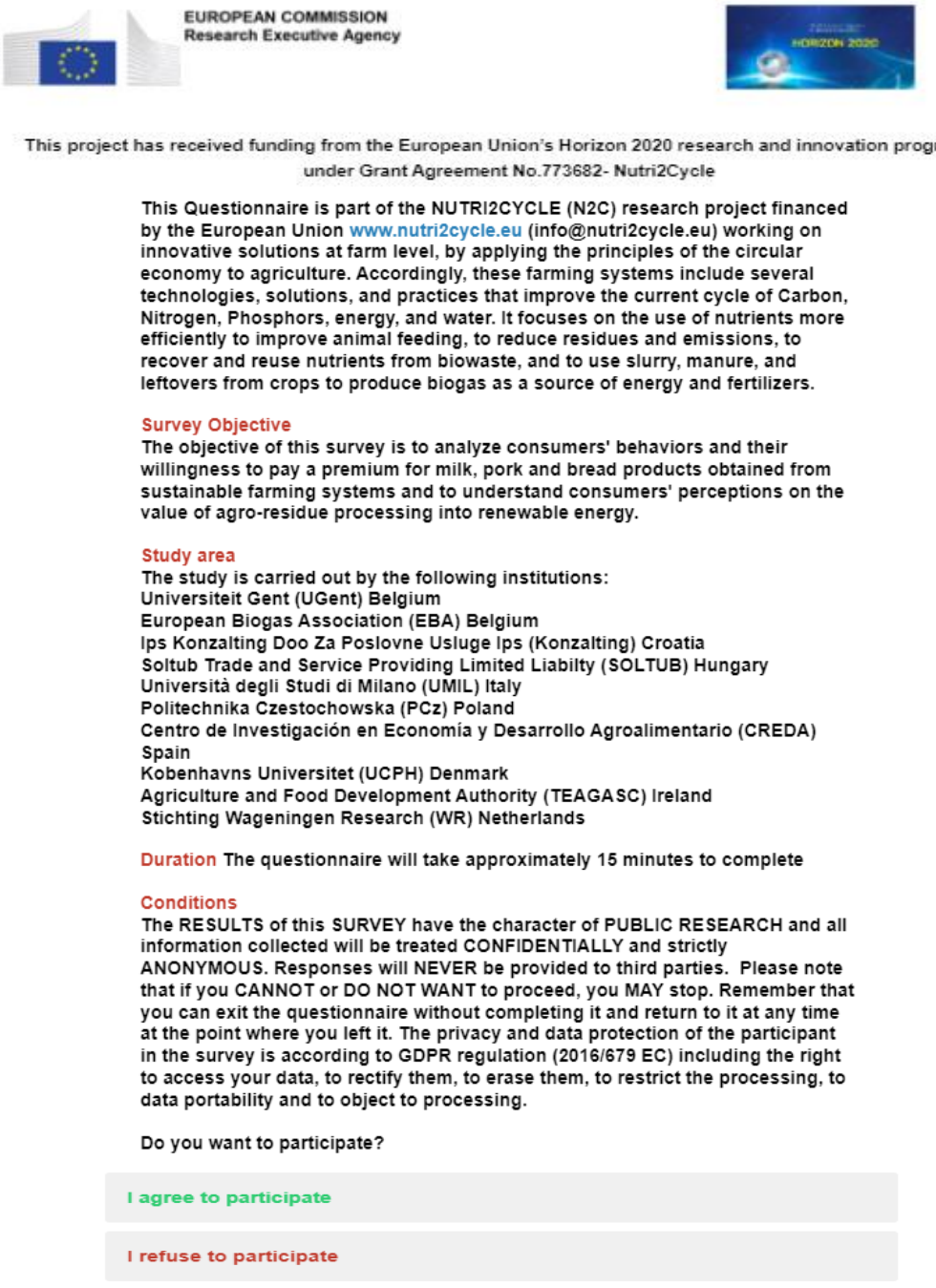

EUROPEAN COMMISSION
Research Executive Agency

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This Questionnaire is part of the NUTRI2CYCLE (N2C) research project financed by the European Union www.nutri2cycle.eu (info@nutri2cycle.eu) working on innovative solutions at farm level, by applying the principles of the circular economy to agriculture. Accordingly, these farming systems include several technologies, solutions, and practices that improve the current cycle of Carbon, Nitrogen, Phosphors, energy, and water. It focuses on the use of nutrients more efficiently to improve animal feeding, to reduce residues and emissions, to recover and reuse nutrients from biowaste, and to use slurry, manure, and leftovers from crops to produce biogas as a source of energy and fertilizers.

Survey Objective
The objective of this survey is to analyze consumers' behaviors and their willingness to pay a premium for milk, pork and bread products obtained from sustainable farming systems and to understand consumers' perceptions on the value of agro-residue processing into renewable energy.

Study area
The study is carried out by the following institutions:
Universiteit Gent (UGent) Belgium
European Biogas Association (EBA) Belgium
Ips Konzalting Doo Za Poslovne Usluge Ips (Konzalting) Croatia
Soltub Trade and Service Providing Limited Liabilty (SOLTUB) Hungary
Università degli Studi di Milano (UMIL) Italy
Politechnika Czestochowska (PCz) Poland
Centro de Investigación en Economía y Desarrollo Agroalimentario (CREDA) Spain
Kobenhavns Universitet (UCPH) Denmark
Agriculture and Food Development Authority (TEAGASC) Ireland
Stichting Wageningen Research (WR) Netherlands

Duration The questionnaire will take approximately 15 minutes to complete

Conditions
The RESULTS of this SURVEY have the character of PUBLIC RESEARCH and all information collected will be treated CONFIDENTIALLY and strictly ANONYMOUS. Responses will NEVER be provided to third parties. Please note that if you CANNOT or DO NOT WANT to proceed, you MAY stop. Remember that you can exit the questionnaire without completing it and return to it at any time at the point where you left it. The privacy and data protection of the participant in the survey is according to GDPR regulation (2016/679 EC) including the right to access your data, to rectify them, to erase them, to restrict the processing, to data portability and to object to processing.

Do you want to participate?

I agree to participate

I refuse to participate

Figure 1: Consent form

On the basis of the meta-analysis and the systematic literature review carried out in Task 5.3 and according to the objectives of this research, the questionnaire structure was identified as follows:

- ✓ The survey started by a first part including a consent form according to the ethical rules in social sciences and ethical commitments of Nutri2Cycle project (EU regulations 2016/679). An example of the consent form presented can be seen in previous Figure 1.
- ✓ The second part contains the selection criteria to allow respondent to be eligible for this study. The sample was stratified in terms of gender and age to be representative to the average

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population in each country. Furthermore, respondents included in this study were those that are mainly, or in part responsible for the household food shopping (Weinrich & Elshiewy, 2019).

- ✓ In the third part, consumers WTP for pork, milk and bread products obtained from circular farming compared to conventional and organic systems were presented following two methodological approaches, the Discrete Choice Experiment (DCE) (Lusk and Schroeder, 2004 Reference) and the Open-Ended Choice Experiment (OECE) (Levant et al., 2013). In the former, several purchasing situations (choice sets or scenarios) were simulated by including organic, conventional and circular farming products at different price combinations. Participants received information about the main characteristics of each farming system, that describe basically how the products were obtained and were asked to select their preferred product in each choice sets, hereby exhibiting their WTP. In the latter, consumers were also asked to indicate the quantity to be purchased from of the products from the different production systems given a price level offered. Furthermore, in the DCE the proposed price vectors for the products from circular farming were considered relatively higher than the average price of the conventional alternatives at real market place, while in the OECE the proposed price vectors for the products from circular farming were identified relatively closer to the average price of the conventional alternative at real market place.
- ✓ The description of the conventional system was as follows: 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 description of the organic system was as follows: 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 description of the circular farming was as follows: 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, Phosphors, 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.

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- ✓ The three circular innovation presented were: 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. 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. 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
- ✓ In the fourth part, consumers' opinions about the environmental impact of the different farming systems were addressed including their opinions regarding the environmental sustainability of the different diets (Weinrich & Elshiewy, 2019)
- ✓ The fifth part focuses on consumers' purchasing habits and sustainable behaviour and actions such as food waste and recycling behaviour (Molinillo, Vidal-Branco, & Japutra, 2020).
- ✓ In the sixth part, consumers' environmental attitudes were analysed through the New Ecological Paradigm scale (NEP) (Gomera et al., 2013).
- ✓ The last section addressed the consumers' perception of agro-industrial processes and their opinions regarding organic fertilizers and, current and future innovations in agriculture.

The different questionnaires used in each country can be consulted in these links:
Belgium: https://creda.eu.qualtrics.com/jfe/form/SV_3NQTW9m7Vdk2K8e
Croatia, Italy and Poland: https://creda.eu.qualtrics.com/jfe/form/SV_3r3fObIsPoSVZQO
Hungary: https://creda.eu.qualtrics.com/jfe/form/SV_9SSIdyR9vaWzHQW
Spain: https://creda.eu.qualtrics.com/jfe/form/SV_bvl0g4D10OQPqw6

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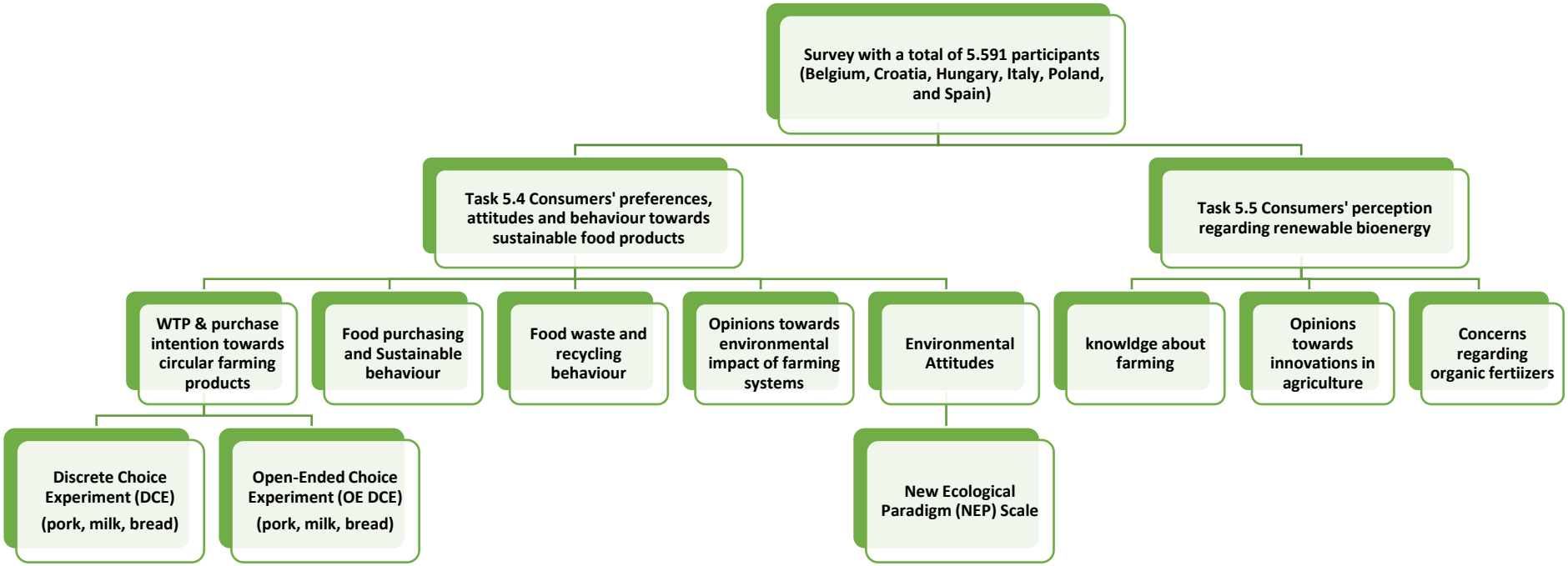

Figure 2: Summary of the methodological approach

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2.1. Data collection

The questionnaire was pre-launched using a pilot sample of 50 consumers in each case study country. The questionnaire and data collection were distributed using © Qualtrics platform and their European consumers' panels. In the case of Hungary, data was collected by the consumers' panel of Netpanel market company. The questionnaire was discussed by the partners involved in the case studies and several changes and suggestions were applied. The questionnaires were translated by the Partners to the languages of the countries involved in the data collection. Data collection was carried out in 4 distinctly different geopolitical regions, those are 1) Spain and Italy, 2) Belgium, 3) Poland and 4) Croatia and Hungary, targeting a minimum sample size of 4.000 respondents according to the DoA. Finally, a total of 5.591 participants were surveyed in Belgium, Croatia, Hungary, Italy, Poland, and Spain (Figure 3). Data was collected online using the Qualtrics market research company and Netpanel market company for Hungary (921 surveys) from June 2021 to January 2022. The total number of interviewed consumers was stratified by gender and age according to the population characteristics of the participant countries. The number of observations and the duration to collect data in each case study can be seen in Table 1.

Figure 3: Countries where the surveys were applied for data collection

Table 1: Number of interviewed consumers by case study

	Spain	Poland	Italy	Hungary	Croatia	Belgium	Total
Sample size	1050	1061	851	1017	521	1091	**5591**
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	

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2.2. Measuring consumers' WTP: The Discrete Choice Experiment method

The Discrete Choice Experiment (DCE) was used to derive consumers' willingness to pay and expected purchase intention towards 3 food categories (pork, milk, and bread) obtained under 3 production farming systems (conventional farming, organic farming, and circular farming). The DCE aims to identify the consumers' trade-offs in their choice decision. In this study, 3 choice experiments were designed by country, one for each of the selected products. Several choice sets are created containing the same product category under different production farming systems and different combinations of price levels. Respondents received a description about main characteristics of conventional farming, organic farming and circular farming as described above. Aafter that they were asked to select, in each choice set, the product that they would purchase in a real market situation, thereby revealing their preference for certain characteristics of the products.

In this context, analysing consumers' preferences and willingness to pay in a survey, may suffer from the well-known hypothetical bias. According to Loomis (2014), the hypothetical bias in surveys reflects the old saying "there is a difference between saying and doing". The hypothetical bias is defined as the difference between what a respondent indicates he would purchase in a survey or interview and what he would actually do in a real market. In order to reduce the impact of the hypothetical bias on results, Loomis (2014) presented an array of different ex-ante and ex-post approaches to reduce the hypothetical bias in surveys. One of the ex-ante ways is to include a cheap talk script before answering the DCE questions as also proposed by Carlsson et al. (2005). Respondent were informed that previous studies found a gap between what respondents indicate in surveys and what they do in real life. They were also informed that in respondents often overestimate their WTP in a hypothetical purchase situation because they do not take into account their food budget constraints. Thus, they were asked to carefully evaluate each purchase situation accordingly.

2.2.1. Creating the simulated purchase situations: The experimental design

The DCE aims to identify consumers' trade-offs in their choice decision. As abovementioned, in a DCE, respondents are presented with a series of alternative options (products of interest) in choice sets, differentiated in terms of attributes and levels. In each choice set, respondents are asked to choose their most preferred alternative at a specific combination of price levels. A baseline alternative is also presented in each choice set, representing 'do nothing' situation (neither of the products is preferred). In the standard application of the DCE, the first step is to identify the main attributes and level that describe the different products. However, on the basis of Erdem and Swait (1998), Lusk and Schroeder (2004) used an original design in which the same "labelled" products were presented and only differentiated by the price attribute without any other discriminant attributes nor levels incorporated. In this study, this labelled design was followed each product category (pork, milk and bread) was labelled with 3 different identified production systems and were repeated in all purchasing scenarios by using a D-optimal and efficient design using Ngene software (Ngene, 2019).

A very important step in applying the DCE is to construct a comprehensive and efficient experimental design. By the experimental design we basically refer to the way in which we combine the different attribute' levels (in our case the price levels) to create the alternatives (products), how many alternatives to put in each choice set (purchasing situation) and how to deal with the dominant and unrealistic alternatives if existed. In this context, the DCE involves the use of statistical design theory to construct choice scenarios. The emphasis is usually done on designs that yield parameter

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estimates that are not confounded by other factors. The orthogonal designs are important from the point of view of isolating the effects of individual attributes on choice and are one of the most used designs in DCE literature. By orthogonal designs we refer to the mathematical constraint requiring that all price levels are statistically independent of one another which implies zero correlations between the appearance of a price in one product and the appearance of another price in a competing product within the design. It also ensures that the price levels are well spread over all choice tasks in balanced way, guarantying the same occurrence of all levels among all alternatives in the design and that attribute level combinations do not exhibit a certain pattern.

However, recently, the D-optimal designs were proposed to increase the statistical performance by minimizing the standard errors on parameters estimates (Bliemer and Rose, 2011). In order to construct D-efficient designs, the analyst is required to assume prior parameter estimates in a Bayesian-like fashion. In this occasion, we assume "- zero" as the prior of the price attribute. The Ngene software is one of the increasingly used tools to easily construct efficient designs (Choice Metrics, 2014)

In this context, the choice sets for each product category were built by adding the organic (ORG) and Circular (CIRC) jointly to conventional (CONV) alternatives in the same choice set. The "NONE" alternative was also included as an "opt-out" option to be consistent with the demand theory and to make the choice task more realistic as this option is available when shopping. Accordingly, for each product category, 4 choice sets were obtained by ensuring the orthogonality of prices across the products. The choice sets used in each study can be consulted in Appendix 1.

Not including any additional attribute in describing the different products is not new and may ensure that the products will be evaluated globally. Moreover, this type of holistic product design allows simulating the direct and cross price demand elasticities (Lusk and Tonsor, 2016) to identify the relationship between the change in the attribute price of a product on its own demand (direct elasticity) and the demand of the other products considering the production farming system (cross elasticity). Finally, as also reported by Lusk and Schroeder (2004), this kind of designs are helpful when many of the products are either new or unavailable in the local market place. The descriptions of the conventional, organic, and circular production farming systems used to obtain the specific selected products in the experiment are presented in Table 2, Table 3 and Table 4.

Table 2: Farming Systems Description for pork category and the circular innovation presented

Pork	
Conventional 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. (Chander et al., 2011; Sundrum, 2001; van Wagenberg et al., 2017)
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.

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	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 (Nowak et al., 2013; Läpple et al., 2013).
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, Phosphors, 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. ***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.*** (Yu-nan Xue et al., 2019; Koppelmäki et al., 2021; Qiong Yue et al., 2022)

Table 3: Farming Systems Description for Milk category and the circular innovation presented

Milk	
Conventional 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 (Chander et al., 2011; Sundrum, 2001; Slagboom et al., 2016; van Wagenberg et al., 2017).
Organic Farming	Livestock is raised following strict criteria of living conditions, medical treatment, and animal welfare. Cattle are usually pastured outdoors during the day and kept in stables at night or during calving. 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 (Slagboom et al., 2016; Nowak et al., 2013; Läpple et al., 2013).
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

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technologies, solutions, and farming practices to improve the recycling of Carbon, Nitrogen, Phosphors, 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***. 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*** (Rodias et al., 2020; Vlachokostas et al., 2021)**.**

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Table 4: Farming Systems Description for Bread category and the circular innovation presented

Bread	
Conventional Farming	The bread-quality wheat used for flour to produce the bread are improved varieties obtained from traditional breeding methods, excluding biotechnology (GMO). These varieties have higher yields, greater pest and disease resistance and larger seeds. It is a type of variety adapted to market demand and produces a homogeneous crop (e.g., grain protein-content) and flour quality (e.g., bread-volume index)) that satisfy large-scale marketing needs. The use of synthetic phytosanitary treatments (pesticides) and chemical fertilizers are allowed (Nowak et al., 2013).
Organic Farming	The cultivation of organic bread-wheat requires the application of specific certified organic practices and production rules. The use of genetically modified organisms (GMO) and seed radiation (for removal of seed-borne diseases and pests) are strictly prohibited. The use of synthetic phytosanitary treatments (pesticides) and chemical fertilizers are banned or highly limited; however, use of organic fertilizers (e.g., manures) approved for organic farming is permitted, though only within certain application limits. Preventive methods for insect and disease control are allowed, including crop rotation and the use of resistant and genetically improved varieties with traditional breeding methods (Puech et al., 2014; Nowak et al., 2013).
Circular Farming	Production of bread-wheat here consists of using the agricultural biomass (e.g., animal manure, crop residues) and processing waste and by products from the food industry as renewable resources. Recycling, Reusing, and Reducing losses to the environment are three key factors for circular agriculture. This farming system is considered multifunctional by producing both food, feed and different organic residues that can be used as fodder for livestock, bio-based fertilizers or source of bio-energy. ***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*** **(**Tagarakis et al., 2021)***.***

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For the **price vector of each product category and farming systems**, a specific product (type and weight) was identified: 500 g sliced loin (pork), 450 g sliced bread (bread) and 1 litre milk.

For each product and farming system 4 price levels were identified in each case study. Price levels and product size were identified after a deep review by partners involved and comparison with similar products at market level. In the case of the circular farming systems, the price levels were identified to be located between the interval of the highest prices of conventional and the lowest prices of organic products because the products analysed are not available at market place compared to with conventional and organic. As a result, the identified **price vector** for products from circular farming was considered **relatively higher than the average price of the conventional alternative at real market place**. The price vectors for each product category, farming systems and country are shown in Table 5, Table 6 and Table 7

Table 5: Price vectors of pork in each case study

Product	Pork: Sliced pork loin packs (500g each)					
Price levels (EUROS)	Spain	Poland	Italy	Hungary	Croatia	Belgium
ORG	9.00 €	5.65 €	8.00 €	5.50 €	6.60 €	12.00 €
	10.00 €	6.30 €	10.00 €	6.00 €	6.90 €	14.00 €
	11.00 €	6.95 €	12.00 €	6.50 €	7.20 €	16.00 €
	12.00 €	7.60 €	14.00 €	7.00 €	7.50 €	18.00 €
CONV	3.00 €	2.20 €	3.00 €	3.00 €	3.30 €	5.00 €
	4.00 €	2.60 €	3.80 €	3.20 €	3.80 €	6.00 €
	5.00 €	3.00 €	4.60 €	3.40 €	4.30 €	7.00 €
	6.00 €	3.40 €	5.40 €	3.60 €	4.80 €	8.00 €
CIRC	5.00 €	3.00 €	4.60 €	3.40 €	4.20 €	7.00 €
	6.00 €	3.50 €	5.40 €	3.60 €	4.70 €	8.00 €
	7.00 €	4.00 €	6.20 €	3.80 €	5.20 €	9.00 €
	8.00 €	4.50 €	7.00 €	4.00 €	5.70 €	10.00 €

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Table 6: Price vectors of milk in each case study

Product	Milk: Milk packs (1 litter/pack)					
Price levels (EUROS)	Spain	Poland	Italy	Hungary	Croatia	Belgium
ORG	1.20 €	0.90 €	1.50 €	1.30 €	1.60 €	1.40 €
	1.30 €	1.70 €	1.60 €	1.40 €	1.75 €	1.50 €
	1.40 €	2.15 €	1.70 €	1.50 €	1.90 €	1.60 €
	1.50 €	2.60 €	1.80 €	1.60 €	2.05 €	1.70 €
CONV	0.60 €	0.45 €	0.90 €	0.70 €	0.50 €	0.80 €
	0.70 €	0.50 €	1.00 €	0.80 €	0.65 €	0.90 €
	0.80 €	0.55 €	1.10 €	0.90 €	0.80 €	1.00 €
	0.90 €	0.60 €	1.20 €	1.00 €	0.95 €	1.10 €
CIRC	0.90 €	0.55 €	1.10 €	0.90 €	0.85 €	1.00 €
	1.00 €	0.60 €	1.20 €	1.00 €	1.00 €	1.10 €
	1.10 €	0.70 €	1.30 €	1.10 €	1.15 €	1.20 €
	1.20 €	0.75 €	1.40 €	1.20 €	1.30 €	1.30 €

Table 7: Price vectors of bread in each case study

Product	Bread: Sliced bread packs (450g each)					
Price levels (EUROS)	Spain	Poland	Italy	Hungary	Croatia	Belgium
ORG	2.50 €	2.80 €	1.40 €	1.50 €	2.10 €	2.10 €
	3.00 €	3.30 €	1.60 €	1.60 €	2.40 €	2.30 €
	3.50 €	3.80 €	1.80 €	1.70 €	2.70 €	2.50 €
	4.00 €	4.30 €	2.00 €	1.80 €	2.90 €	2.70 €
CONV	0.80 €	0.90 €	0.80 €	0.90 €	1.00 €	1.40 €
	1.00 €	1.20 €	0.90 €	1.00 €	1.20 €	1.50 €
	1.20 €	1.50 €	1.00 €	1.10 €	1.40 €	1.60 €
	1.40 €	1.80 €	1.10 €	1.20 €	1.60 €	1.70 €
CIRC	1.20 €	1.50 €	1.00 €	1.10 €	1.40 €	1.60 €
	1.40 €	1.80 €	1.10 €	1.20 €	1.60 €	1.70 €
	1.60 €	2.20 €	1.20 €	1.30 €	1.80 €	1.80 €
	1.80 €	2.50 €	1.30 €	1.40 €	2.00 €	1.90 €

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2.2.2. Estimating consumers' Willingness to Pay: The modelling

The DCE rely on Lancaster's Theory of Value (Lancaster, 1966) and on the Random Utility Theory (RUT) of Thurstone (1927). According to this theory, individuals choose among the alternatives in a choice situation according to a utility function with two main components: a systematic (observable) component and a random error term (non-observable):

$$U_{jn} = V_{jn} + \varepsilon_{jn} \quad (1)$$

Where:

- U_{jn} is the utility of alternative j to subject n,
- V_{jn} is the systematic component of the utility and
- ε_{jn} is a stochastic term.

Assuming linearity, the utility function for alternative j can be expressed as:

$$V_{jn} = \beta_j . ASC_j + \alpha_j . P_{jn} \quad (2)$$

where:

- j are the ORG, CONV, and CIRC products at the different production systems,
- P_{jn} is the price of alternative j selected by the consumer n,
- β_j are the coefficients of the Alternative Specific Constant (ASC) for each alternative j relative to the NONE option which in our case study represents the marginal utility of alternative j.
- α_j are the coefficients representing the effect of the jth product price on the utility for the j th product.

To predict the subjects' preferences for an alternative (i.e., a product obtained from a specific production system), we need to define the "probability of choice" that individual *n* chooses the alternative *i* rather than the alternative *j* (for any i and j within choice sets, T). McFadden (1974) developed the base model for the DCE often referred to as the multinomial logit (MNL) model. According to this model, the probability that a consumer *n* chooses production system$j$ is

$$\text{Prob}\{j \text{ is chosen}\} = \frac{e^{\mu V_{jn}}}{\sum_{k=1}^{J} e^{\mu V_{jn}}} \; \forall k \in T \quad (3)$$

Where:

- μ is a scale parameter that is inversely related to the variance of the error term.

For the MNL, the scale parameter is fixed to one for estimation reasons. Furthermore, in this model specification, the condition of Independent and Identically Distributed (IID) error term must be met according to a Gumbel distribution. Such a distribution in the error term allows for the verification of a restrictive property within the MNL which is the Independence of Irrelevant Alternatives (IIA) property. This restriction implies that the ratio of the probabilities of choosing any pair of alternatives i and j $\left[\frac{P(i/T)}{P(j/T)}\right]$ is not dependent on the systematic utility of any other alternative within the set of alternatives which is seldom ensured. As a consequence, the MNL impose a very strict structure on cross-price elasticities avoiding the possibility to analyse substitutability between the products

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(Hensher *et al*., 2005). Since the cross-price elasticities are one of the main outcomes to be used in the Task 5.6, we explored other modelling alternative to relax the IIA condition.

In this context, the universal or the "mother" logit model can be estimated (McFadden *et al*., 1977) for the labelled type design used in this study. In this model, the utility of each product is specified as a function of the descriptors of the other products. In our specific case studies, the utility of each product is a function of an Alternative Specific Constant (ASC) and the prices of all the other products. For instance, the utility of the ORG is a function of an ASC of the ORG and the prices of the ORG, the CONV and the CIRC production system of the product.
In this case, the utility function for production system j in the universal logit model is:

$$V_{jn} = \beta_j . ASC_j + \sum_{k=1}^{J} \alpha_{jk} . P_{kn} \qquad (4)$$

Where:

- j =the ORG, CONV, and CIRC,
- k is from 1 to 4 (i.e., the tree products presented; the ORG, CONV, and CIRC at 4 price levels and NONE option)
- P_{kn} is the kth product's price for consumer n, and
- α_{jk} represents the effect of the kth product's price on the utility for the jth product.

To estimate the universal Logit model, the equation (4) is placed into equation (3). However, the estimation of the model following the equation (3) may clearly incorporate the violation of the Independence from irrelevant alternatives (IIA) assumption commented before. Thus, we considered the Mixed logit models (MIXL) (also in the literature is referred to as Random Parameter Logit model RPL), that relax the IIA assumption.

The RPL model extends the MNL model by allowing for unobserved heterogeneity through random coefficients on attributes (Ben-Akiva *et al*., 1997). In our case studies, the random parameters were assigned on the Alternative Specific Constant (ASC) since this estimate encompass all descriptors of the product in a holistic way. According to this model, the coefficient vector for person n is $\beta_j = \bar{\beta} + \sigma\lambda_n$, where $\bar{\beta}$ is the estimated mean and σ is the standard deviation of the marginal distribution of β and λ_n is a random term assumed normally distributed with mean zero and unit standard deviation. Thus, the term $\sigma\lambda_n$is the vector of person *n* specific deviations from the mean value of the βs. The η_n is described by an underlying continuous distribution for the attributes (again in our case the ASC). In most applications the multivariate normal distribution is the most used, MVN (0, Σ). In our case, we considered the ASC independently normally distributed in the population. The price coefficients were considered fixed (i.e., non-random) to ensure that the estimated total Willingness to Pay distribution is finite. This is because the total Willingness to Pay (WTP) of a product j versus the baseline alternative NONE (i.e., none of the presented products) is calculated as the negative ratio of the ASC coefficient to the price coefficient of the same product *j* (Lusk and Schroeder, 2004):

$$WTP_{\text{Product j Vs. No-option}} = -\left(\frac{\frac{d}{dACS_j} \beta_j . ASC_j}{\frac{d}{dP_{kn}} \alpha_{jk} . P_{kn}} \right) = -\left(\frac{\beta_j}{\alpha_{jk}} \right) = \left(\frac{\beta_{\text{Product j}}}{\alpha_{\text{price j}}} \right) \qquad (5)$$

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This calculation relies on the estimation of the Marginal Rate of Substitution (MRS) of any two coefficients. Since one of the coefficients is a monetary one (i.e. the price), it is possible to determine the WTP. For The marginal WTP of any product *j* versus any other product *i* is simply obtained by subtracting both total WTP values (Lusk and Schroeder, 2004). Finally, the Wald test (Delta method) was applied to calculate the significance and the confidence intervals of the WTPs. We used the NLOGIT 6.0 software and 500 random draws to estimate the coefficients (Chiew, 2015).

2.3. Open-Ended Choice Experiment

In the Open-Ended Choice Experiments (OECE) respondents are presented with different price combinations and asked to indicate the **quantities of products** they would be willing to purchase at different price combinations (Corrigan et al., 2009), which could simulate a more realistic scenario of consumer purchases. The OECE has been employed in food-related research (Dennis et al., 2021; Elbakidze et al., 2014; Wongprawmas et al., 2016) and the difference between OECE and discrete choice experiments (DCE) is that in DCE, participants are asked to choose only the item, i.e., a product they prefer, whereas in OECE participants select both item and quantity (Dennis et al., 2021). Since respondents can purchase any non-negative quantity at different price levels, researchers are able to estimate not only the respondents' WTP for a unit of the product, but also the participants' entire demand curve (Corrigan et al., 2009; Wongprawmas et al., 2016). Due to the count nature of quantity demanded, Poisson regression, negative binomial (NB) regression, zero-inflated negative binomial regression (ZINB), Zero Inflated Poisson (ZIP), or double-hurdle model could be employed (Elbakidze et al., 2014).

In this study, three OECE for pork, milk, and bread were designed, and there were five purchase situations in each case. In each purchase situation, the products were presented at different prices. However, in all purchase situations, the price level of organic and conventional products was fixed (average market price), while the price of products from circular farming varied across purchase situations. In the case, of the circular farming systems, and because the products analysed are not available at market place compared with conventional and organic, **the price levels were identified to be set close to the average price level of conventional products** (which are the products to be compared with) by including some variation down and upward (Wongprawmas et al., 2016). As a result, the identified **price vector** for products from circular farming was considered **relatively closer to the average price of the conventional alternative** at real market place. Respondents were presented with this information and were asked to indicate how many products would be purchased in each purchase situation. The price vectors were presented in Table 8, Table 9 and Table 10.

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Table 8: Prices of pork in each case study from OECE

Product		Pork: Sliced pork loin packs (500g each)					
Price levels (EUROS)		Spain	Poland	Italy	Hungary	Croatia	Belgium
CIRC	Purchase situation 1	2.50 €	1.97 €	2.80 €	2.93 €	3.09 €	4.50 €
	Purchase situation 2	3.50 €	2.41 €	3.40 €	3.13 €	3.55 €	5.50 €
	Purchase situation 3	4.50 €	2.85 €	4.20 €	3.32 €	4.02 €	6.50 €
	Purchase situation 4	5.50 €	3.29 €	5.00 €	3.52 €	4.48 €	7.50 €
	Purchase situation 5	6.50 €	3.73 €	5.80 €	3.72 €	4.95 €	8.50 €
CONV	Purchase situation 1	4.50 €	2.85 €	4.20 €	3.32 €	4.02 €	6.50 €
	Purchase situation 2	4.50 €	2.85 €	4.20 €	3.32 €	4.02 €	6.50 €
	Purchase situation 3	4.50 €	2.85 €	4.20 €	3.32 €	4.02 €	6.50 €
	Purchase situation 4	4.50 €	2.85 €	4.20 €	3.32 €	4.02 €	6.50 €
	Purchase situation 5	4.50 €	2.85 €	4.20 €	3.32 €	4.02 €	6.50 €
ORG	Purchase situation 1	10.50 €	6.69 €	11.00 €	6.31 €	7.04 €	15.00 €
	Purchase situation 2	10.50 €	6.69 €	11.00 €	6.31 €	7.04 €	15.00 €
	Purchase situation 3	10.50 €	6.69 €	11.00 €	6.31 €	7.04 €	15.00 €
	Purchase situation 4	10.50 €	6.69 €	11.00 €	6.31 €	7.04 €	15.00 €
	Purchase situation 5	10.50 €	6.69 €	11.00 €	6.31 €	7.04 €	15.00 €

Table 9: Prices milk in each case study from OECE

Product		Milk: Milk packs (1 litter/pack)					
Price levels (EUROS)		SPAIN	POLAND	ITALY	HUNGARY	CROATIA	BELGIUM
CIRC	Purchase situation 1	0.55 €	0.43 €	0.85 €	0.66 €	0.42 €	0.75 €
	Purchase situation 2	0.65 €	0.47 €	0.95 €	0.76 €	0.58 €	0.85 €
	Purchase situation 3	0.75 €	0.54 €	1.05 €	0.86 €	0.74 €	0.95 €
	Purchase situation 4	0.85 €	0.60 €	1.15 €	0.96 €	0.9 €	1.05 €
	Purchase situation 5	0.95 €	0.67 €	1.25 €	1.06 €	1.06 €	1.15 €
CONV	Purchase situation 1	0.75 €	0.54 €	1.05 €	0.86 €	0.74 €	0.95 €
	Purchase situation 2	0.75 €	0.54 €	1.05 €	0.86 €	0.74 €	0.95 €
	Purchase situation 3	0.75 €	0.54 €	1.05 €	0.86 €	0.74 €	0.95 €
	Purchase situation 4	0.75 €	0.54 €	1.05 €	0.86 €	0.74 €	0.95 €
	Purchase situation 5	0.75 €	0.54 €	1.05 €	0.86 €	0.74 €	0.95 €
ORG	Purchase situation 1	1.35 €	1.86 €	1.65 €	1.46 €	1.79 €	1.55 €
	Purchase situation 2	1.35 €	1.86 €	1.65 €	1.46 €	1.79 €	1.55 €
	Purchase situation 3	1.35 €	1.86 €	1.65 €	1.46 €	1.79 €	1.55 €
	Purchase situation 4	1.35 €	1.86 €	1.65 €	1.46 €	1.79 €	1.55 €
	Purchase situation 5	1.35 €	1.86 €	1.65 €	1.46 €	1.79 €	1.55 €

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Table 10: Prices of bread in each case study from OECE

Product		Bread: Sliced bread packs (450g each)					
Price levels (EUROS)		SPAIN	POLAND	ITALY	HUNGARY	CROATIA	BELGIUM
CIRC	Purchase situation 1	0.70 €	0.71 €	0.75 €	0.86 €	0.86 €	1.35 €
	Purchase situation 2	0.90 €	1.04 €	0.85 €	0.96 €	1.07 €	1.45 €
	Purchase situation 3	1.10 €	1.37 €	0.95 €	1.06 €	1.29 €	1.55 €
	Purchase situation 4	1.30 €	1.7 €	1.05 €	1.16 €	1.5 €	1.65 €
	Purchase situation 5	1.50 €	2.03 €	1.15 €	1.26 €	1.72 €	1.75 €
CONV	Purchase situation 1	1.10 €	1.37 €	0.95 €	1.06 €	1.29 €	1.55 €
	Purchase situation 2	1.10 €	1.37 €	0.95 €	1.06 €	1.29 €	1.55 €
	Purchase situation 3	1.10 €	1.37 €	0.95 €	1.06 €	1.29 €	1.55 €
	Purchase situation 4	1.10 €	1.37 €	0.95 €	1.06 €	1.29 €	1.55 €
	Purchase situation 5	1.10 €	1.37 €	0.95 €	1.06 €	1.29 €	1.55 €
ORG	Purchase situation 1	3.25€	3.56 €	1.70 €	1.67 €	2.52 €	2.40 €
	Purchase situation 2	3.25€	3.56 €	1.70 €	1.67 €	2.52 €	2.40 €
	Purchase situation 3	3.25€	3.56 €	1.70 €	1.67 €	2.52 €	2.40 €
	Purchase situation 4	3.25€	3.56 €	1.70 €	1.67 €	2.52 €	2.40 €
	Purchase situation 5	3.25€	3.56 €	1.70 €	1.67 €	2.52 €	2.40 €

2.3.1. Price elasticity of demand

The relationship between consumer demand for service or a food product and its own price was known as the "own price elasticity of demand" (Green et al., 2013), which measured the sensitivity (or responsiveness) of the quantity demanded of a commodity or service to changes in its price (Devi, 2007). It was calculated by dividing the percentage change in quantity demanded by the percentage change in price (Green et al., 2013). Due to the "law of demand", i.e., the inverse nature of the relationship between price and quantity, the elasticity usually generates a negative value (Genchev & Yarkova, 2010). In the coefficients, therefore, the absolute value was in focus. If the price changed significantly then the arc elasticity of demand was used. The arc elasticity was a measure of the average elasticity, i.e., the elasticity at the midpoint of the chord connecting the two points on the demand curve defined by the initial price and the new price (Demand, 1951).

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2.4. Measuring consumers' environmental attitude: The NEP Scale

According to the Hawcroft and Milfont (2010), environmental attitudes can be observed through psychological tendencies that express positive or negative evaluations of the natural environment and therefore must be inferred. There are different tools to measure environmental attitudes, among which three psychometric tools are highlighted: The Ecology Scale, The Environmental Concern Scale, and The New Ecological Paradigm scale. The first two scales refer to very specific environmental issues, while the NEP scale, which is the most widely used, allows measuring general beliefs based on the relationships between humans and their environment (Hawcroft and Milfont, 2010). This scale analyses the relationship that relies between subject beliefs about themselves and nature, reflects the way in which the human being conceptualizes nature, and the way behaves in front of it (Vozmediano and San Juan, 2005). It also allows to identify the predominant latent environmental dimensions of the analysed sample (Gomera et al., 2013). The scale reflects the ways humans conceptualize and interact with ecosystems (Dunlap et al., 2000; Lezak and Thibodeau, 2016).

In this study, for measuring the consumers´ attitudes toward the environment, we used a reduced version of the original NEP scale including only the statements related to the ecocentric and anthropocentric attitudes as was proposed by Orduño et al. (2020), that consists of 8 statements that express a positive or negative evaluation of the environment and relies on individual's beliefs about themselves and nature (Orduño et al., 2020). The reduced scale was translated from its original English version to the different languages and validated in the pilot studies. The English version of the scale and the translated items can be consulted in Table 11.

Consumers' agreement about the statements was evaluated according to the nine-point Likert type scale using different verbal instruments. The nine-point Likert scale is the most widely used scale for measuring consumers' attitude and it contains the following categories: "disagree very strongly", "disagree strongly", "disagree moderately", "disagree slightly", "neutral", "agree slightly", "agree moderately", "agree strongly", and "agree very strongly". After the assessment of the statements of the NEP scale, an exploratory factor analysis, (Principal Component Analysis PCA), was performed to identify the dimensionality that characterizes the consumers interviewed by associating the items on the scale with several independent dimensions. The identified dimensions allowed to define latent factors that are present in the environmental attitudes of the participants (Gomera et al., 2013). The exploratory factor analysis (PCA) was performed with Varimax rotation and using the Statistical Package for Social Sciences (SPSS, version 23.0). Before performing the factorial analysis, the Kaiser-Meyer-Olkin (KMOS) measure of sample adaptation was applied to identify if the model fits our data. The internal consistency of the scale was measured by the Cronbach's alpha (Frias, 2021). As a result of the ACP, it is expected to retrieve two main dimensions that characterizes consumers' environmental attitudes: The anthropocentric and the ecocentric attitudes. According to Duran el al., "*Ecocentrism recognizes the intrinsic value of nature, considers that human beings share the same origin as other species and that the well-being of human communities and biotic communities is complementary"*. While *"Anthropocentrism views the human being as a being with unique and exceptional characteristics, independent of nature with a higher hierarchical level, can use it, according to his needs and desires without having to be subordinated to his laws"* (Durán et al., 2015).

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Table 11: The NEP scale in its original form and the translated versions

English	Spain	Poland	Italy
1. The balance of nature is strong enough to deal with the impact caused by economic development	1. El equilibrio de la naturaleza es lo suficientemente fuerte como para hacer frente al impacto causado por el desarrollo económico	1. Równowaga natury jest wystarczająco silna, aby poradzić sobie ze skutkami rozwoju gospodarczego.	1. L'equilibrio della natura è abbastanza forte da far fronte all'impatto causato dallo sviluppo economico
2. Over time, humans can learn how nature works to be able to control it	2. Con el tiempo, los humanos pueden aprender cómo funciona la naturaleza para poder controlarla	2. Z biegiem czasu ludzie mogą nauczyć się, jak działa natura, aby móc ją kontrolować	2. Nel corso del tempo, gli esseri umani possono imparare come funziona la natura per poterla controllare
3. Human ingenuity will ensure that we do not make the earth an uninhabitable place	3. El ingenio humano asegurará que no hagamos de la tierra un lugar inhabitable	3. Ludzka pomysłowość sprawi, że nie uczynimy ziemi miejscem nienadającym się do zamieszkania	3. L'ingegno umano farà sì che non facciamo della terra un luogo inabitabile
4. Humans have the right to modify the environment to adapt it to their needs	4. Los seres humanos tienen derecho a modificar el entorno para adaptarlo a sus necesidades	4. Ludzie mają prawo modyfikować środowisko, aby dostosować je do swoich potrzeb	4. Gli esseri umani hanno il diritto di modificare l'ambiente per adattarlo alle loro esigenze
5. Plants and animals have as much right to exist as humans	5. Las plantas y los animales tienen tanto derecho a existir como los humanos	5. Rośliny i zwierzęta mają takie samo prawo do istnienia jak ludzie	5. Le piante e gli animali hanno lo stesso diritto di esistere degli esseri umani
6. The balance of nature is very delicate and easily alterable	6. El equilibrio de la naturaleza es muy delicado y fácilmente alterable	6. Równowaga natury jest bardzo delikatna i łatwa do zmiany	6. L'equilibrio della natura è molto delicato e facilmente alterabile
7. If things continue as they are, we will soon face a major ecological catastrophe	7. Si las cosas continúan como están, pronto nos enfrentaremos a una gran catástrofe ecológica	7. Jeśli sytuacja ze środowiskiem, będzie się toczyć tak, jak teraz, wkrótce staniemy w obliczu poważnej katastrofy ekologicznej	7. Se le cose continueranno così come sono, presto ci troviamo di fronte a una grave catastrofe ecologica
8. Despite our special abilities, humans are still dependent on the laws of nature	8. A pesar de nuestras habilidades especiales, los seres humanos todavía dependen de las leyes de la naturaleza	8. Pomimo naszych specjalnych zdolności/ technologi, ludzie nadal są zależni od praw natury	8. Nonostante le nostre abilità speciali, gli esseri umani dipendono ancora dalle leggi della natura

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Table 11 (continued): The NEP scale in its original form and the translated versions

English	Hungary	Croatia	Belgium
1. The balance of nature is strong enough to deal with the impact caused by economic development	1. A természet egyensúlya eléggé erős, hogy a gazdasági fejlődés hatását kezelni tudja	1. Ravnoteža prirode je dovoljno jaka da se nosi s utjecajem koji uzrokuje gospodarski razvoj	1. De veerkracht van de natuur is sterk genoeg om de impact van economische ontwikkeling op te vangen
2. Over time, humans can learn how nature works to be able to control it	2. Idővel az ember megtanulhatja a természet működését, ahhoz hogy ellenőrizni legyen képes azt	2. S vremenom ljudi mogu naučiti kako priroda djeluje kako bismo je mogli kontrolirati	2. Na verloop van tijd kunnen mensen leren hoe de natuur werkt om het te kunnen beheersen
3. Human ingenuity will ensure that we do not make the earth an uninhabitable place	3. Az emberi kreativitás lehetővé teszi, hogy a Földet ne tegyük lakhatatlanná	3. Ljudska domišljatost osigurat će da zemlju ne učinimo nenaseljivim mjestom	3. Menselijke vindingrijkheid zal ervoor zorgen dat we de aarde niet tot een onbewoonbare plek maken
4. Humans have the right to modify the environment to adapt it to their needs	4. Az embernek joga van beavatkozni a természetbe és saját szükségletei szerint alakítani	4. Ljudi imaju pravo modificirati okoliš kako bi ga prilagodili svojim potrebama	4. Mensen hebben het recht om de omgeving aan te passen aan hun behoeften
5. Plants and animals have as much right to exist as humans	5. A növényeknek és az állatoknak ugyan olyan joguk van a létezésre, mint az embernek	5. Biljke i životinje imaju jednako pravo na postojanje kao i ljudi	5. Planten en dieren hebben evenveel bestaansrecht als mensen
6. The balance of nature is very delicate and easily alterable	6. A természet egyensúlya bonyolult és könnyen megingatható	6. Ravnoteža prirode vrlo je osjetljiva i lako se mijenja	6. Het evenwicht in de natuur is erg delicaat en gemakkelijk te veranderen
7. If things continue as they are, we will soon face a major ecological catastrophe	7. Ha a dolgok úgy mennek továbbra is mint most, hamarosan ökológiai katasztrófa elébe nézünk	7. Ako se stvari nastave kakve jesu, uskoro ćemo se suočiti s velikom ekološkom katastrofom	7. Als de zaken zo doorgaan, staan we binnenkort voor een grote ecologische ramp
8. Despite our special abilities, humans are still dependent on the laws of nature	8. Annak ellenére, hogy emberi képességekkel rendelkezünk, mégis függünk a természet törvényeitől	8. Unatoč našim posebnim sposobnostima, ljudi su i dalje ovisni o zakonima prirode	8. Ondanks onze deskundigheid zijn mensen nog steeds afhankelijk van de natuurwetten

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3. Results

3.1. Socio-economic and demographic characteristics of the samples

In this section, we summarized the main socio-economic and demographic variables of the samples in each country. The samples were collected by quotes according to the population in each country.

3.1.1. Gender

As can be seen in Figure 4, the gender variable was relatively distributed in acceptable proportion between male and female according to the population distribution in all countries. However, there was a small overrepresentation of female in the Poland case study.

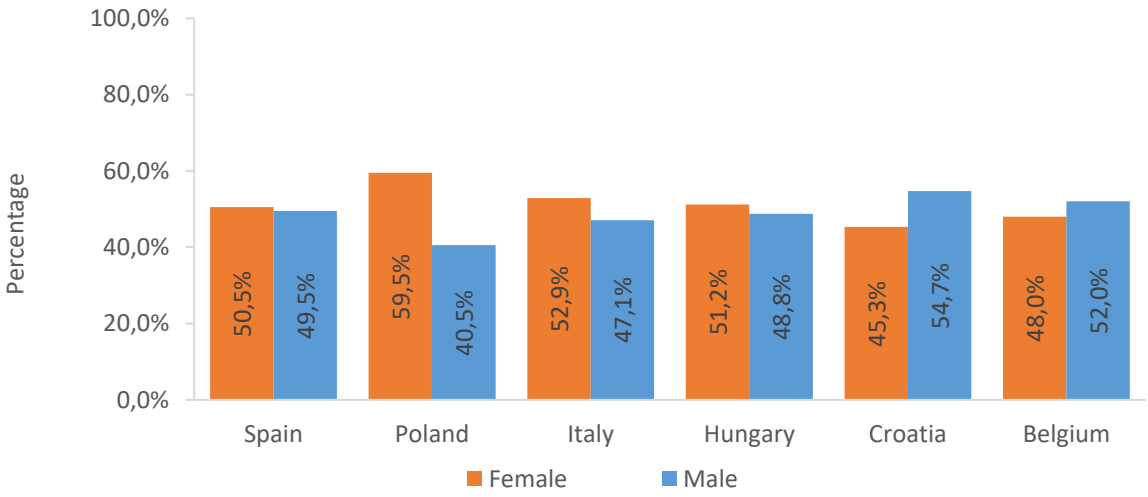

Figure 4: Gender distribution of the consumers by country

3.1.2. Age Categories

Regarding the age variable, results presented in Figure 5 showed a proportional distribution of all age categories according to countries' populations. Thus, a similar age distribution is found across each country except for Italy where the 55 years or more' category is overrepresented.

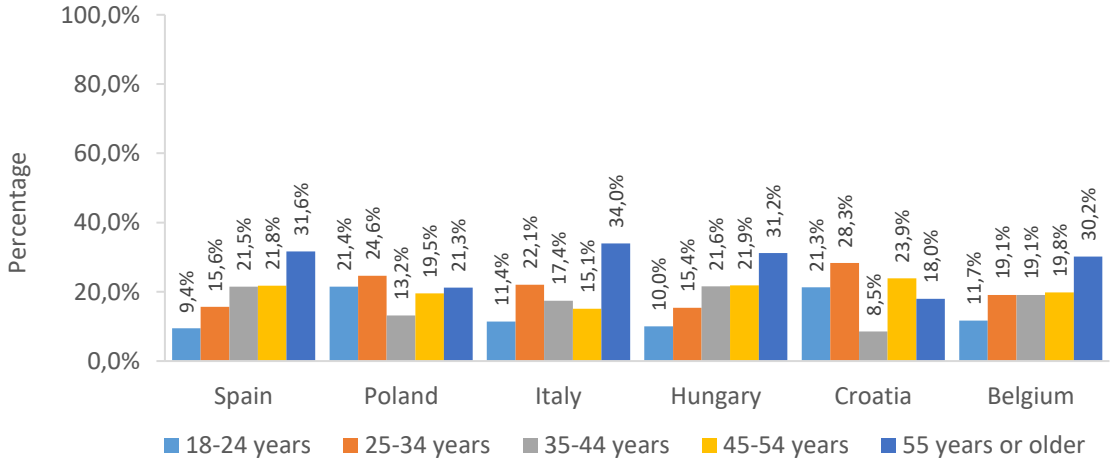

Figure 5: Age distribution of the consumers in each country

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Results in Figure 6 shows the percentage of respondents with children under 12 years old at home. Italy and Hungary have the lowest percentage Spain, Belgium, and Croatia showed similar percentage while Poland showed the highest percentage.

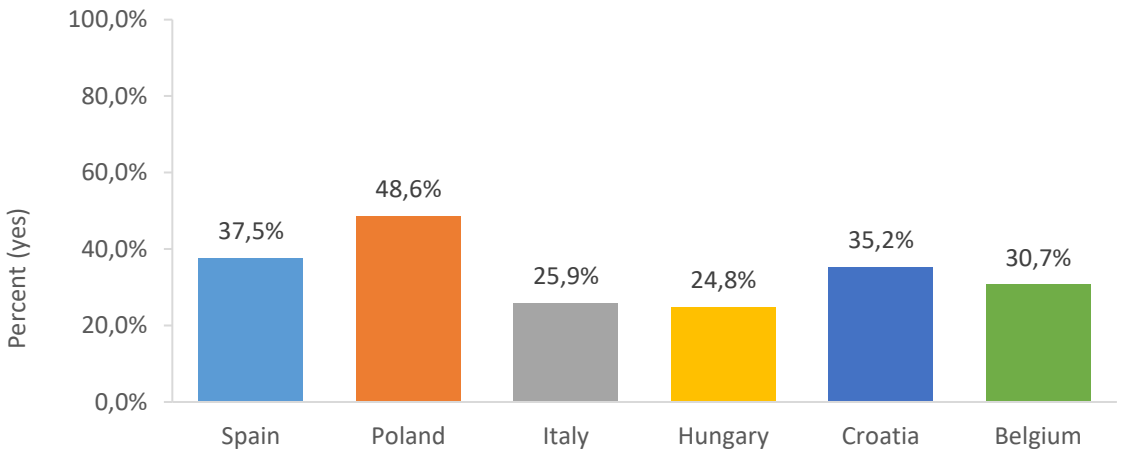

Figure 6: Average of respondents with children under 12 years at home

Results in Figure 7 shows consumers how answered yes to the question about if there are adults over 70 years old at home. These results showed that Belgium Hungary and Poland have the lowest percentage while Italy and Croatia have the highest percentage.

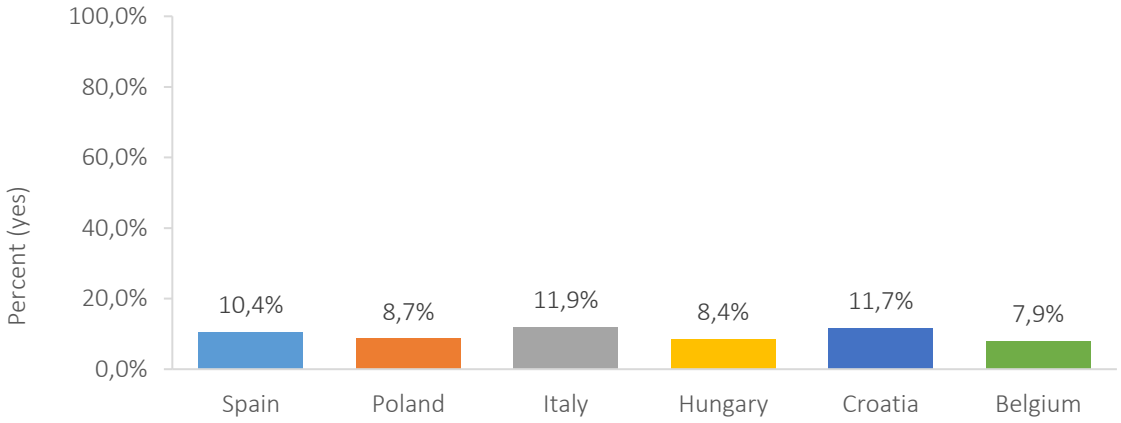

Figure 7: Average of respondents with adults over 70 years at home

3.1.3. Education level

The Figure 8 shows surveyed consumers´ education levels. As can be see the education level was distributed similarly in all countries. Also, in almost all countries with exception of Belgium, most interviewed consumers attended secondary studies. Results showed that highest percentage of consumers with university studies is in Belgium, and with elementary studies or with not completed elementary studies was present on Hungary case study.

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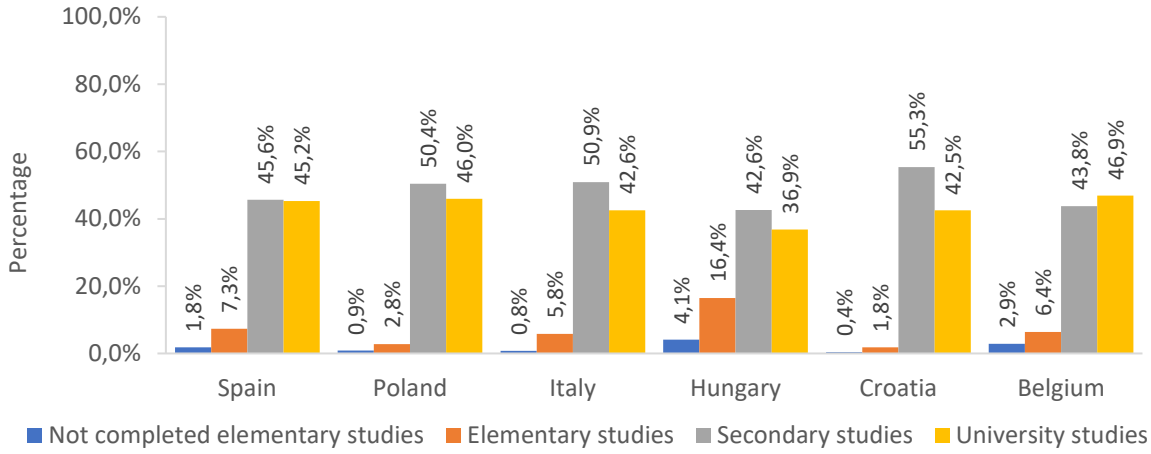

Figure 8: Consumers´ distribution by education level

3.1.4. Employment and financial situation

Results about current employment status (Figure 9) showed a similar distribution across countries according to answers of consumers in the survey. In the case of Italy, the full time employment was under 40 %, showing a quite high self-employment rate.

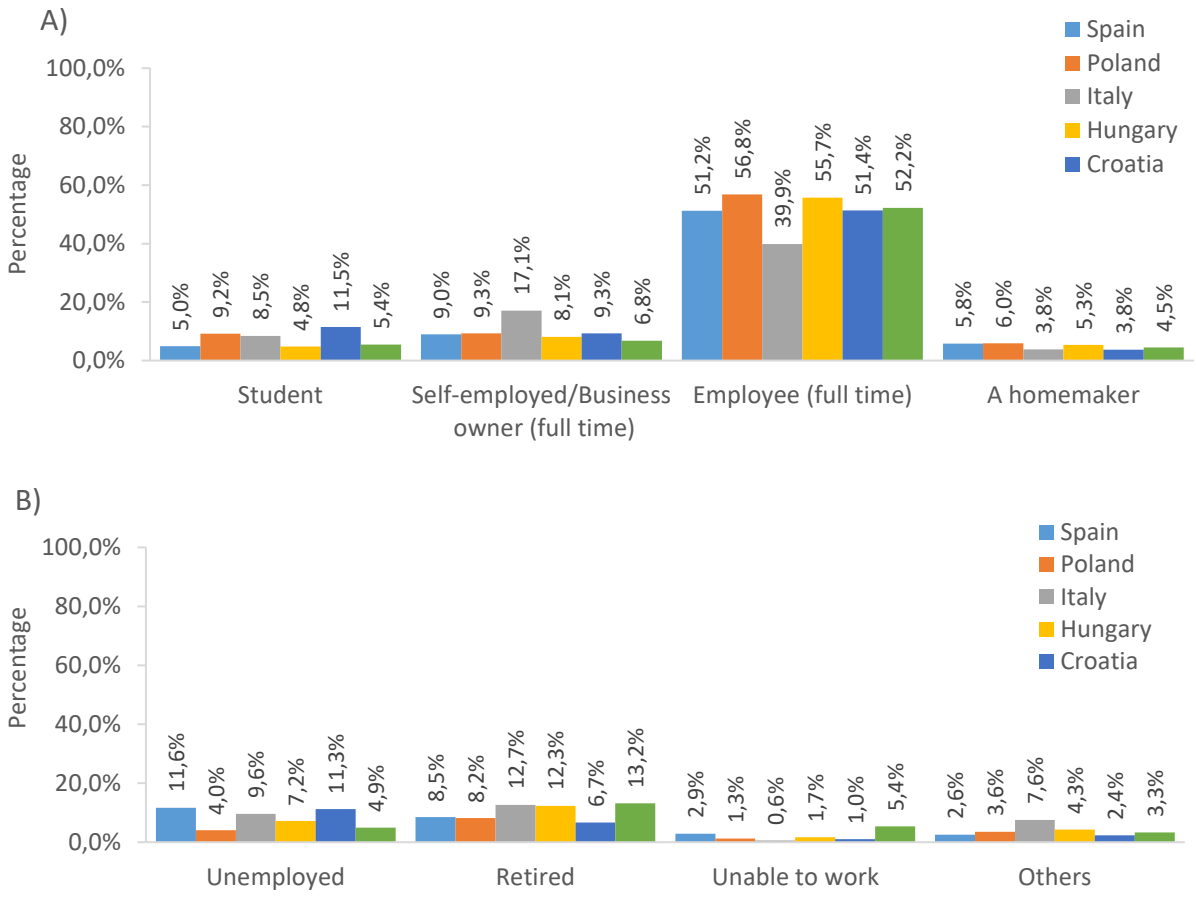

Figure 9: Employment status (A y B)

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Consumers were also asked to state their perception regarding their current financial situation. Results (Figure 10) showed a similar distribution across countries ensuring the presence of all social classes (in term of financial situation) in the surveys. We could relate a good financial situation with the employment status of self-employed/ business owner.

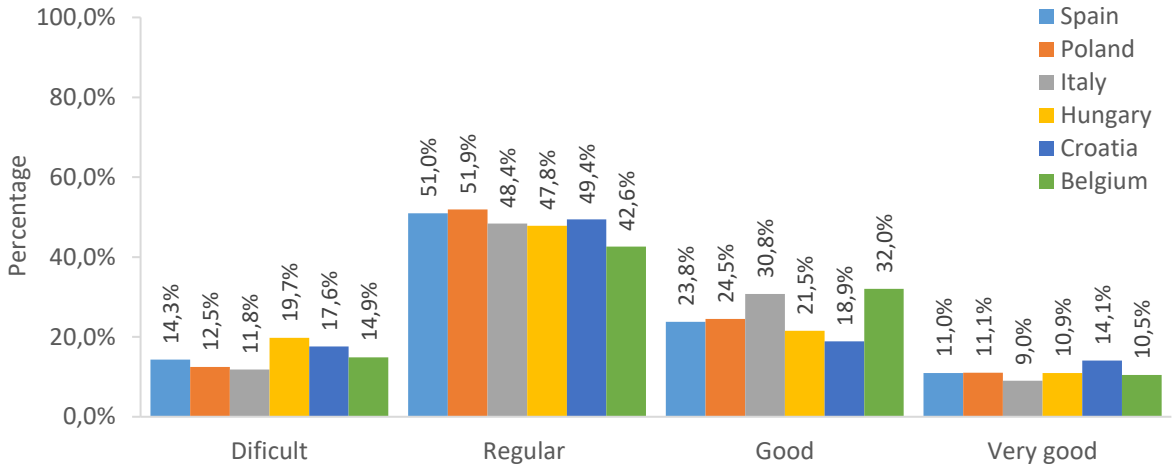

Figure 10: Perception of financial situation

Respondents were asked to state their opinion about the frequency that their monthly income covers their household expenditure. Results are showing in Figure 11. It is relevant mentioning that the highest percentage of the categories “Rarely” and “Never” were for the Croatian and Belgian consumers, while the highest percentage of the “Always” category was attributed to Italian consumers. This could be related to the higher percentage of self-employment rate in Italy compared to the other countries.

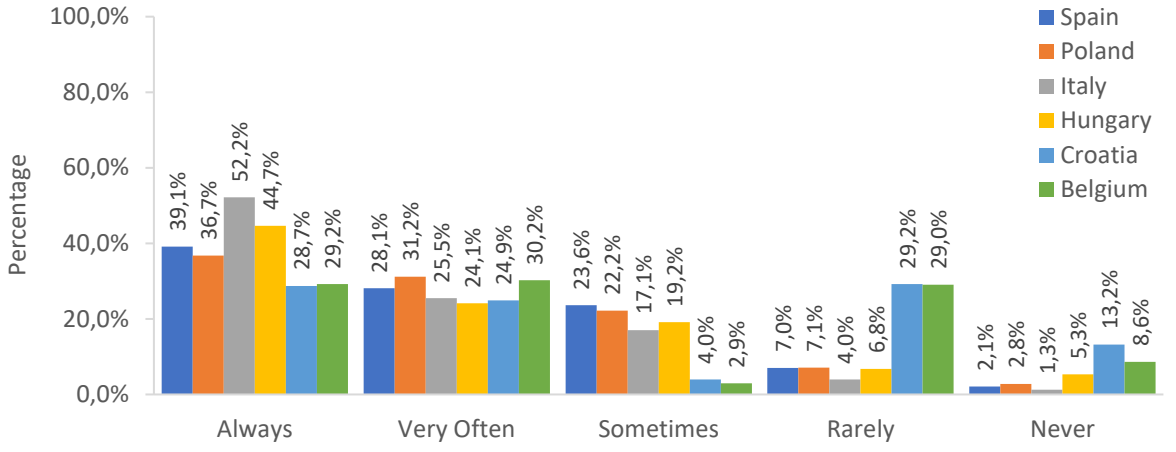

Figure 11: Frequency that Monthly income covers household expenditure

Finally, Table 12 shows a summary of the detailed results of the eight questions previously presented in figures.

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Table 12: Summary of the socio-economic and demographic variables by case study

Country Sample Size		Spain 1050	Poland 1040	Italy 780	Hungary 988	Croatia 506	Belgium 1000
Gender	Male	49.5%	40.5%	47.1%	48.8%	54.7%	52.0%
	Female	50.5%	59.5%	52.9%	51.2%	45.3%	48.0%
Range Age	18-24 years	9.4%	21.4%	11.4%	10.0%	21.3%	11.7%
	25-34 years	15.6%	24.6%	22.1%	15.4%	28.3%	19.1%
	35-44 years	21.5%	13.2%	17.4%	21.6%	8.5%	19.1%
	45-54 years	21.8%	19.5%	15.1%	21.9%	23.9%	19.8%
	55 years or older	31.6%	21.3%	34.0%	31.2%	18.0%	30.2%
Households with:	Children under 12 years	37.5%	48.6%	25.9%	24.8%	35.2%	30.7%
	Adults over 70 years	10.4%	8.7%	11.9%	8.4%	11.7%	7.9%
Education level	Not completed elementary studies	1.8%	0.9%	0.8%	4.1%	0.4%	2.9%
	Elementary studies	7.3%	2.8%	5.8%	16.4%	1.8%	6.4%
	Secondary studies	45.6%	50.4%	50.9%	42.6%	55.3%	43.8%
	University studies	45.2%	46.0%	42.6%	36.9%	42.5%	46.9%
	Student	5.0%	9.2%	8.5%	4.8%	11.5%	5.4%
Current employment status	Self-employed/Business owner (full time)	9.0%	9.3%	17.1%	8.1%	9.3%	6.8%
	Employee (full time)	51.2%	56.8%	39.9%	55.7%	51.4%	52.2%
	A homemaker	5.8%	6.0%	3.8%	5.3%	3.8%	4.5%
	Sick leave	0.2%	1.6%	0.3%	0.6%	2.8%	1.9%
	Unemployed	11.6%	4.0%	9.6%	7.2%	11.3%	4.9%
	Retired	8.5%	8.2%	12.7%	12.3%	6.7%	13.2%
	Unable to work	2.9%	1.3%	0.6%	1.7%	1.0%	5.4%
Current financial situation	Difficult	14.3%	12.5%	11.8%	19.7%	17.6%	14.9%
	Regular	51.0%	51.9%	48.4%	47.8%	49.4%	42.6%
	Good	23.8%	24.5%	30.8%	21.5%	18.9%	32.0%
	Very good	11.0%	11.1%	9.0%	10.9%	14.1%	10.5%
Monthly income covers their household expenditure	Always	39.1%	36.7%	52.2%	44.7%	28.7%	29.2%
	Very Often	28.1%	31.2%	25.5%	24.1%	24.9%	30.2%
	Sometimes	23.6%	22.2%	17.1%	19.2%	4.0%	2.9%
	Rarely	7.0%	7.1%	4.0%	6.8%	29.2%	29.0%
	Never	2.1%	2.8%	1.3%	5.3%	13.2%	8.6%

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3.2. Respondents' opinion regarding farming impacts on environment

Respondents' opinion regarding farming impacts on environment was measured using a Likert scale ranging from -5 "less environmentally friendly" to +5 "more environmentally friendly". Negative values were considered as "less environmental friendly", the "0" was considered as neutral and the positive value as more environmental friendly. Results showed that the conventional farming system was perceived as the less environmentally friendly and the organic farming was perceived as more environmentally friendly. The circular farming was also clearly perceived as environmentally friendly in a similar position to the organic systems, in particular in Belgium, Hungary and Italy.

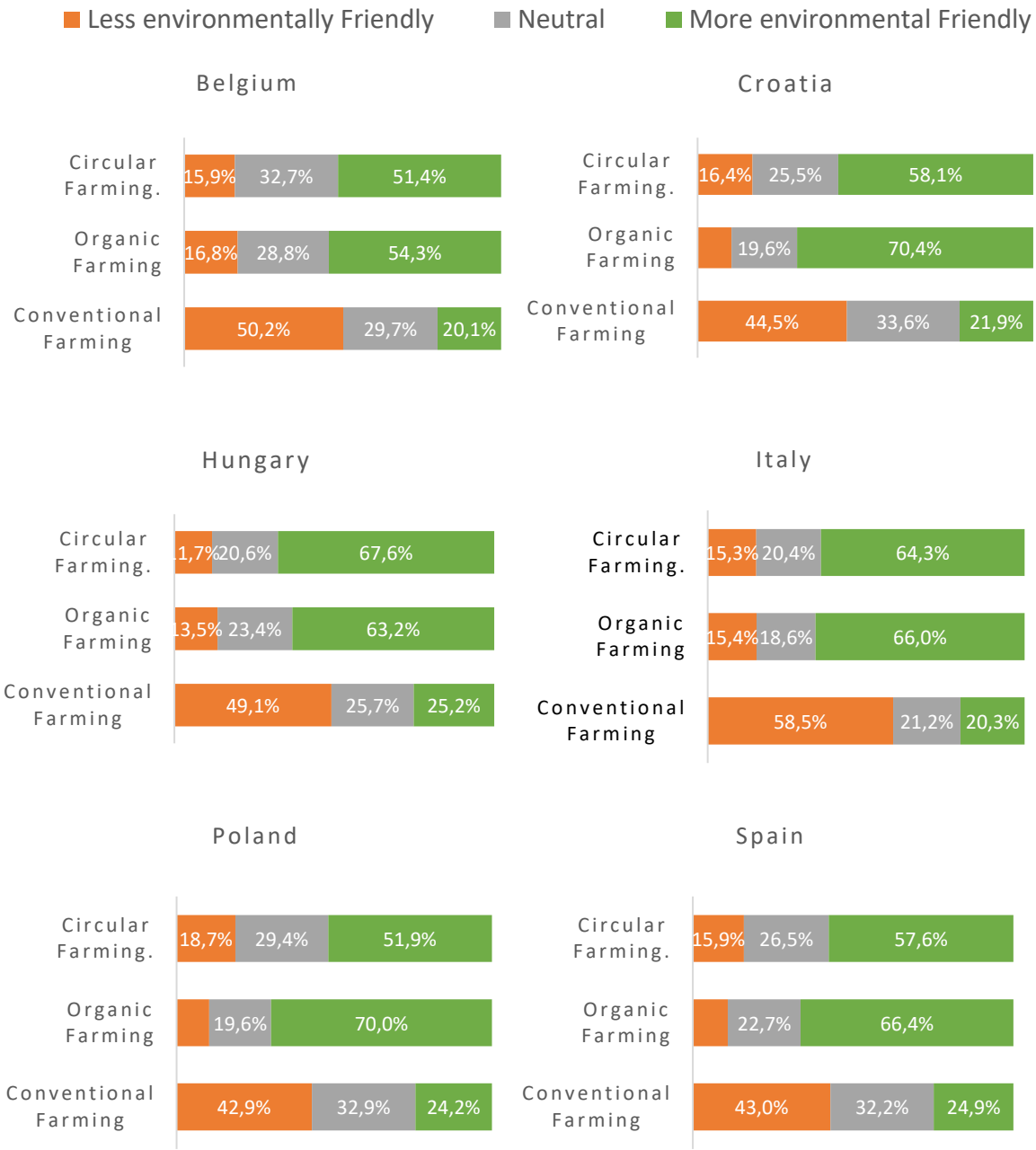

Figure 12: Consumer opinion about impact of farming systems on environment

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On the same scale mentioned before (-5 to +5), results in Figure 13 show detailed distribution of consumers´ evaluations of their perceptions towards the production systems across countries. The average scores (Table 13) showed that the conventional farming was perceived as the less environmentally friendly, especially in Italy and Belgium. The circular farming was considered similar to the organic farming regarding their impacts on environment, particularly in Hungary whose participants even considered the circular farming is more environmentally friendly than the organic one.

Table 13. Average consumers´ opinion about level of environmentally friendly of farming systems

Country	Conventional Farming	Organic Farming	Circular Farming
Belgium	- 1.14	1.14	1.03
Croatia	- 0.83	2.25	1.27
Hungary	- 0.72	1.74	1.86
Italy	- 1.48	1.81	1.55
Poland	- 0.59	2.19	0.94
Spain	- 0.62	2.04	1.32

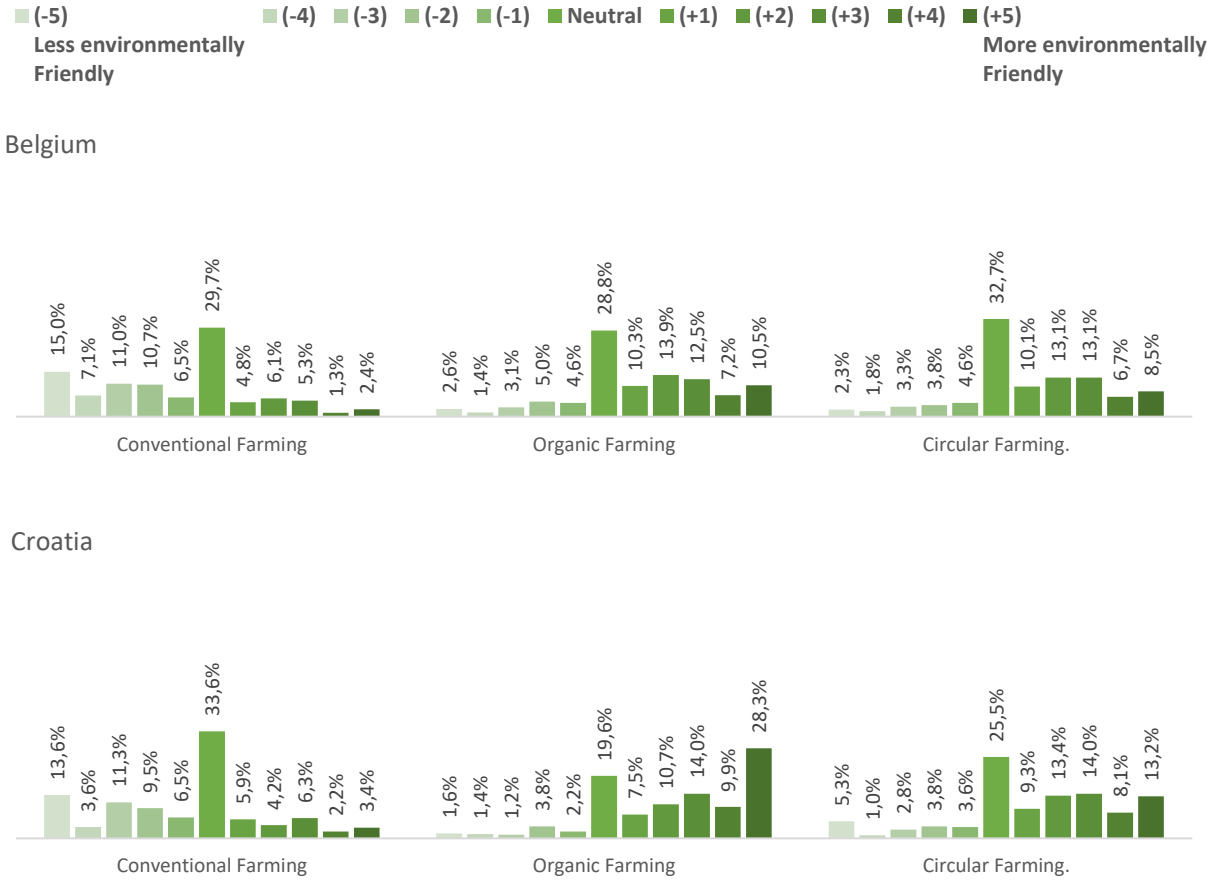

Figure 13: Consumer opinion about environmentally friendly level of farming systems (Belgium, Croatia)

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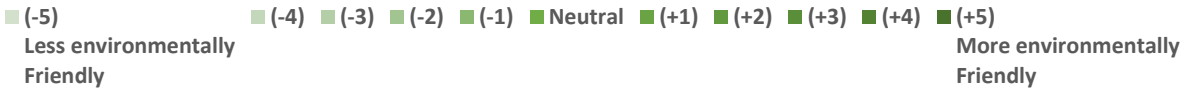
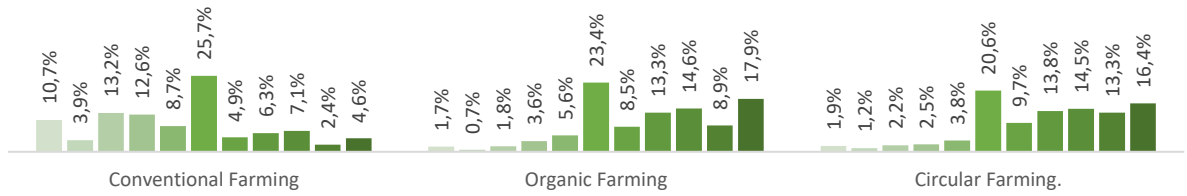
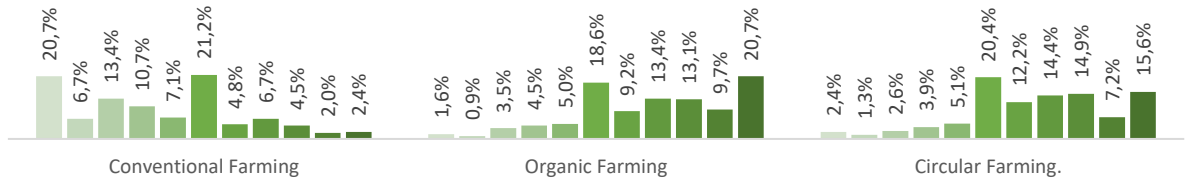


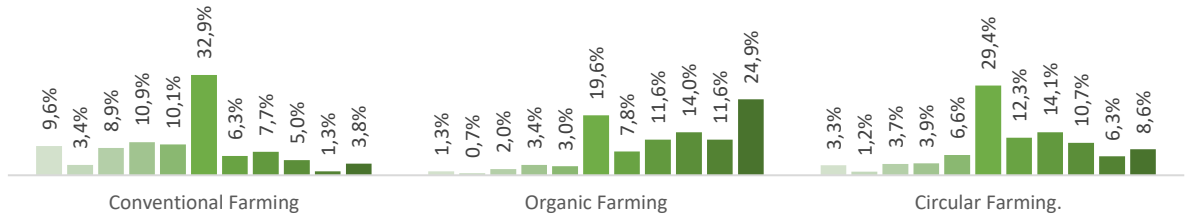
Hungary



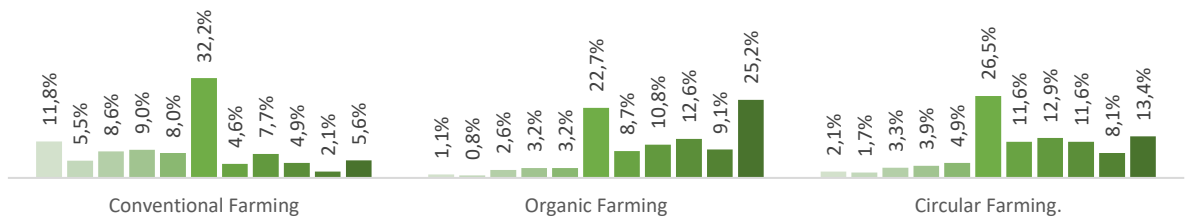
Italy



Poland



Spain



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Hungary

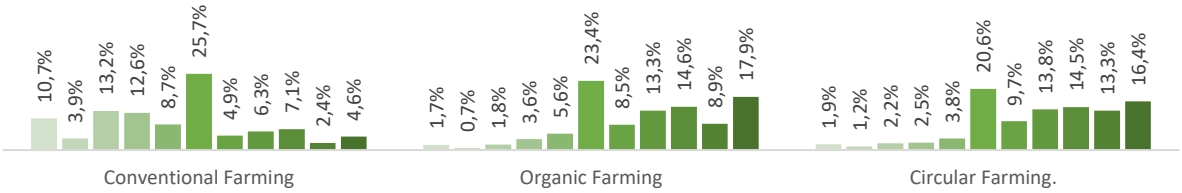

Figure 13 (continued): Consumer opinion about environmentally friendly level of farming systems (Hungary, Italy, Poland and Spain)

3.3. Diets and environmental sustainability

Consumers were asked about the level of environmental sustainability that different diets may have. Results showed that consumers in all countries consider a non-restricted diet, as the least environmentally sustainable, in particular the Italian consumers (59,3%). Results also showed that increasing the consumption of vegetables and fruits, and reducing the consumption of meat (flexitarian diet) was considered as environmentally sustainable according to more than 50% of respondents (48,4 – 59,9%). The agreement level with the environmental sustainability was even similar to the perceptions exhibited towards the vegetarian and vegan diets. In all cases, it is important to take into account that these results reflect consumers' own perceptions which could exhibit divergence from which diet is objectively more environmentally sustainable. Hallström et al. (2015) in a systematic review showed that the vegan and vegetarian diet have the lowest impact on environment compared to several flexitarian scenarios (meat partially replaced by plant-based food, meat partially replaced by dairy products and meat partially replaced by mixed food).

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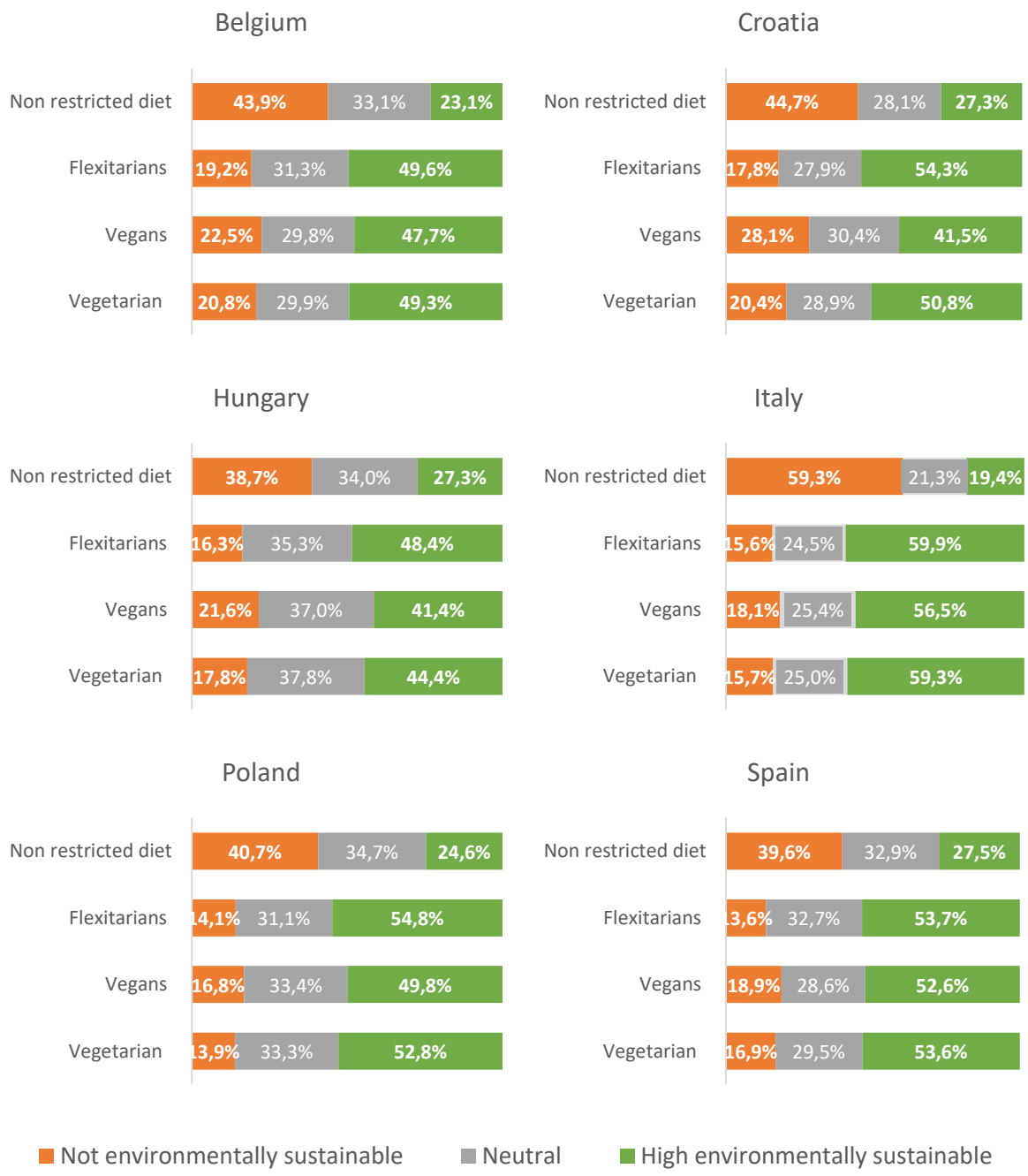

Figure 14: Consumer opinion about environmental suitability of diets

3.4. Purchasing and consumption behaviour

Analysing the food purchasing frequency, results (Figure 15) showed homogeneous outcomes across countries. The "2-3 times a week" frequency was the most preferred by consumers in all countries, and "once a month or less" frequency the least.

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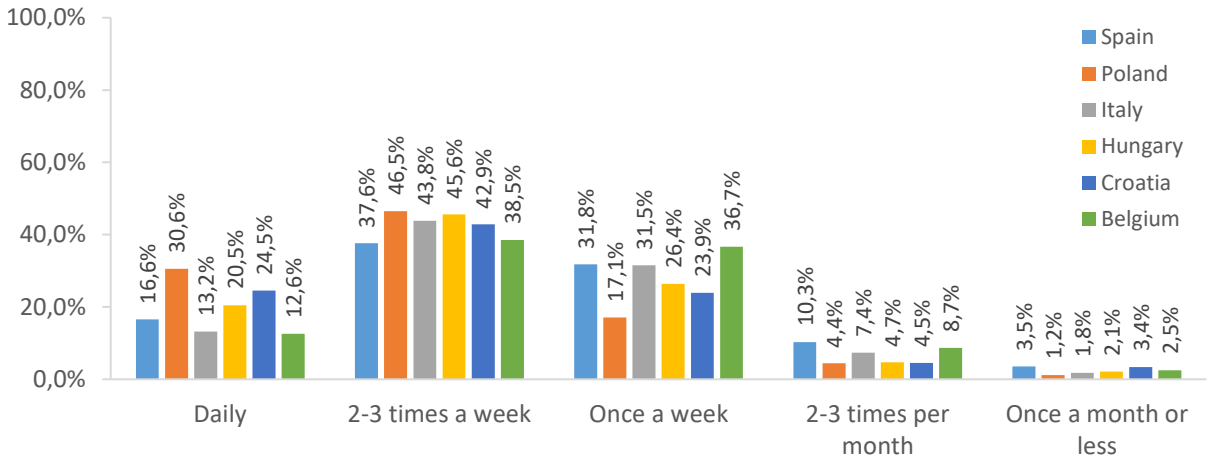

Figure 15: Food purchase frequency

Results of the pork (sliced loin) purchase frequency (Figure 16) showed relatively high consumption frequency confirming the suitability of the selected product for the case studies analysis.

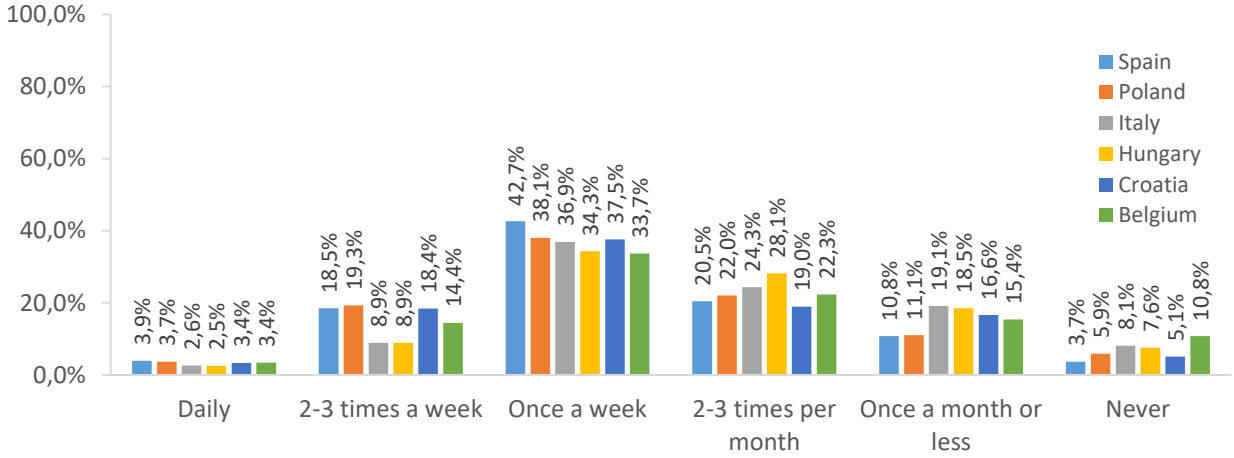

Figure 16: Pork purchase frequency

Respondents were asked if they purchase and consume pork. Results (Figure 17) showed that the percentage respondents that consume and the percentage of persons that purchase pork are very similar in Spain, Poland and Italy; while in Hungary, Croatia and Belgium the percentage of persons who consume is higher than those who purchase. Furthermore, results showed that the highest level of persons that purchase and consume pork was found in Spain and the lowest in Belgium. It is worth mentioning that consumers who stated that they do not purchase pork were not included in the Willingness to pay (DCE studies).

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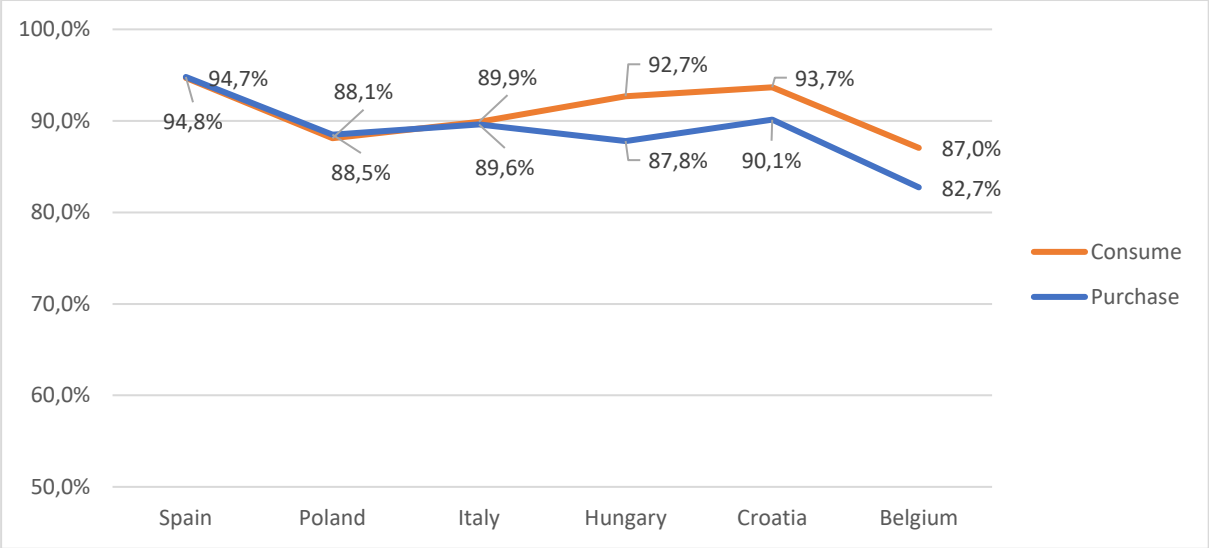

Figure 17: % of consumers that purchase and % consumers that consume pork

Similarly, participants were also asked if they consume or purchase milk in each case study. A clear majority stated that they do both at least once a week highlighting again the suitability of the sample for the DCE studies (Figure 18).

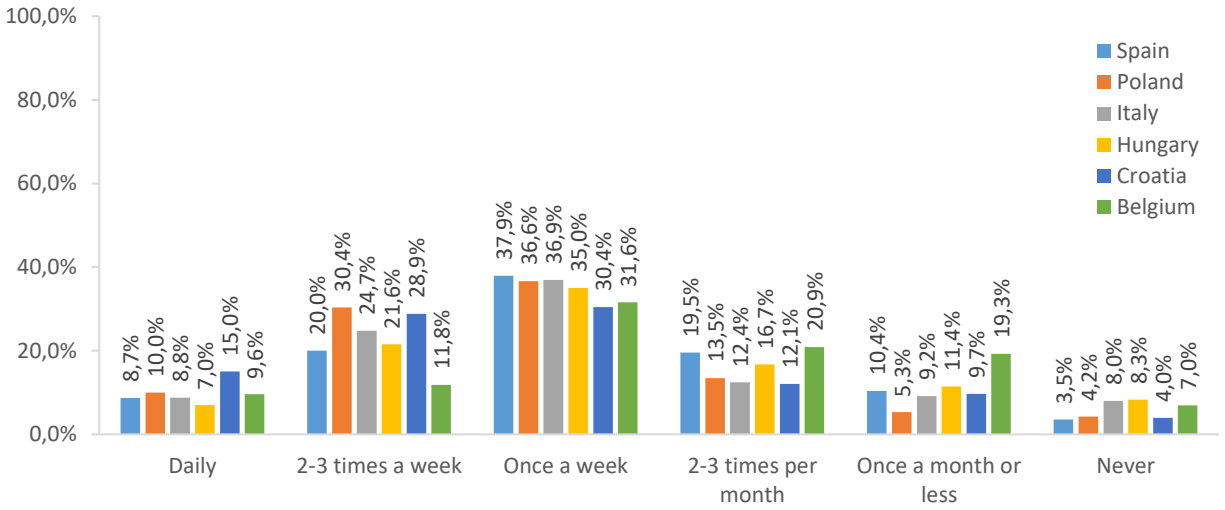

Figure 18: Milk purchase frequency

Results also showed small differences between the percentage of consumers who purchase and those who consume milk (Figure 19). The highest percentage of purchaser was in Croatia and Poland and the lowest in Hungary.

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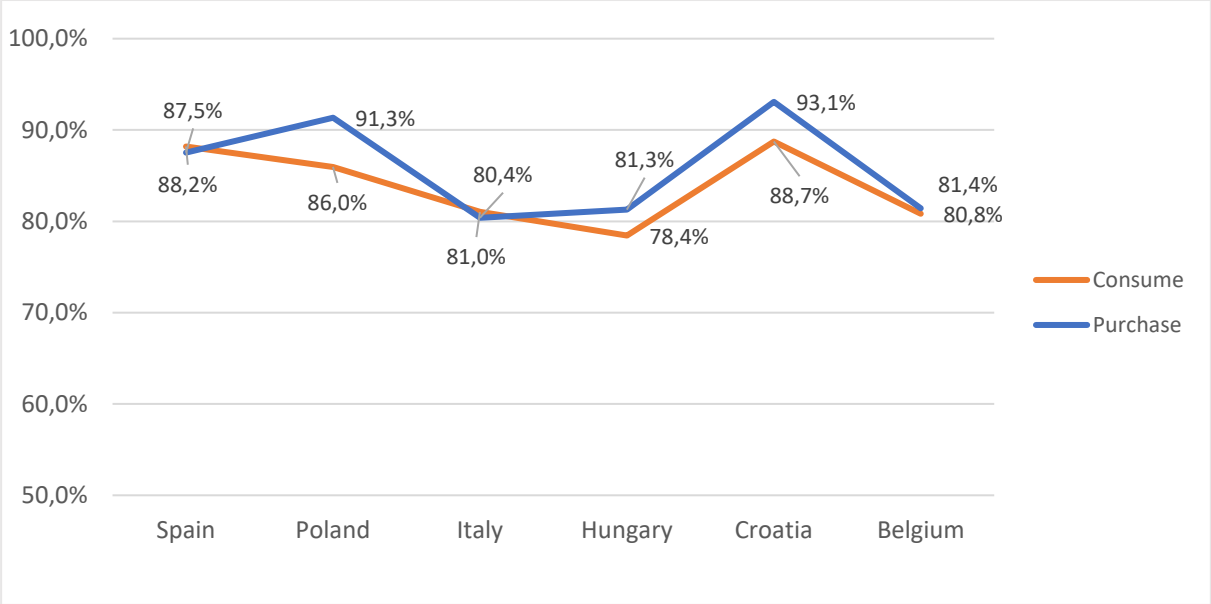

Figure 19: % of consumers that purchase and % consumers that consume of milk

Regarding the purchase and consumption of bread in each country, results (Figure 20) showed that bread purchase is more frequent. Results also highlighted that the purchase frequency in Spain and Croatia is high (daily), while in Poland, Italy, Hungary and Belgium the main purchase bread frequency was 2-3 times a week.

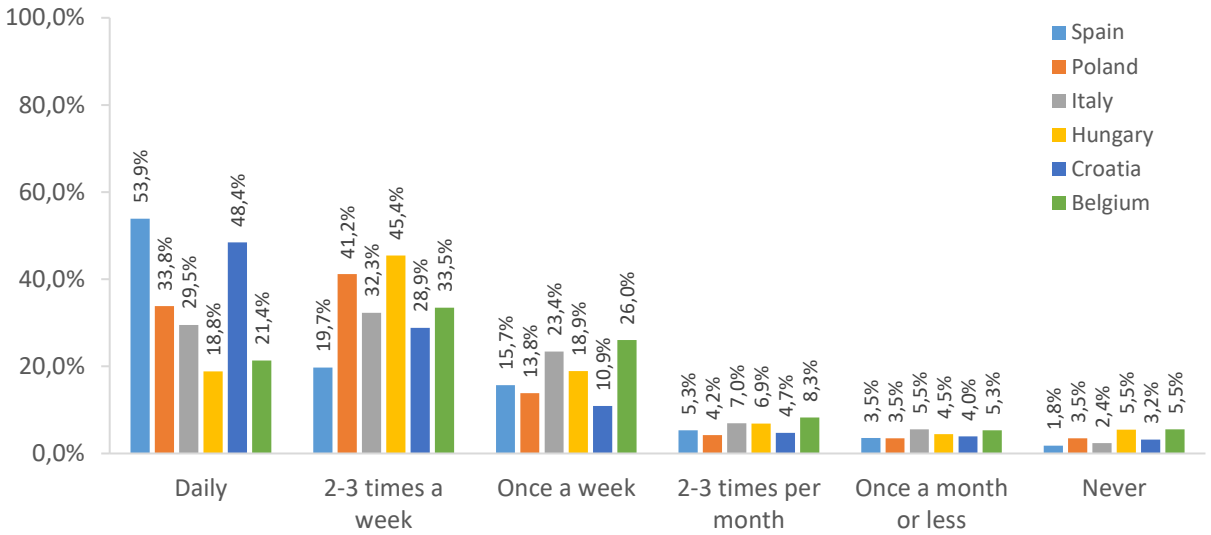

Figure 20: Bread purchase frequency

Results also showed that the percentage of participants who consume bread is higher than the percentage of who purchase it (Figure 21). Again, the WTP analysis was only carried out on these respondents who stated they purchase bread.

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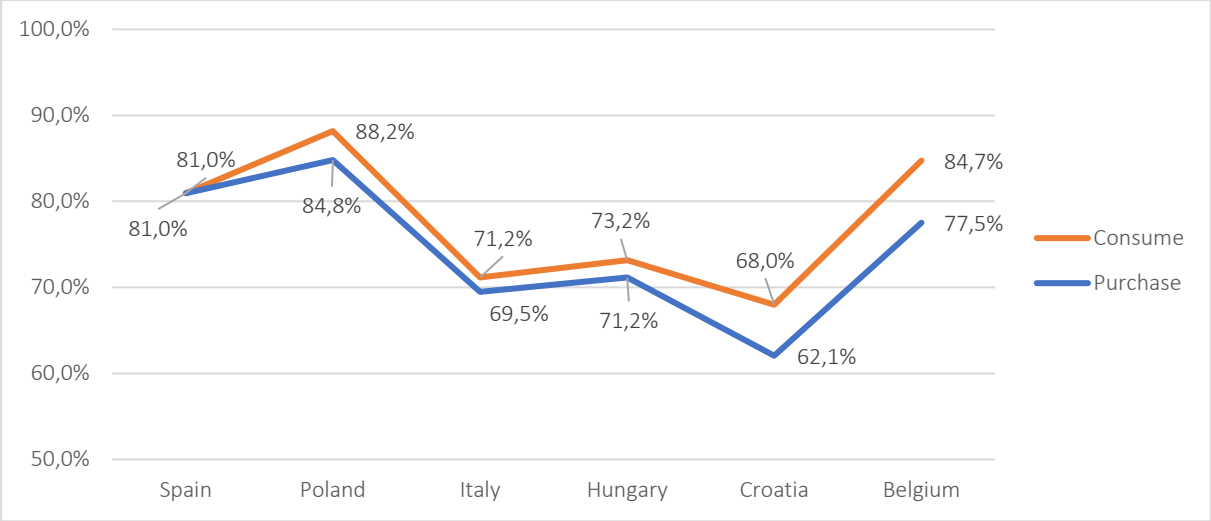

Figure 21: % of consumers that purchase and % consumers that consume of Bread

A summary of the detailed results of the previous questions are shown in Table 14 and Table 15.

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Table 14: Purchase frequency of general and specific food products (Pork, milk, and bread)

	Country	Spain 1050	Poland 1040	Italy 780	Hungary 988	Croatia 506	Belgium 998
Food (in general) Purchase Frequency	Daily	16.6%	30.6%	13.2%	20.5%	24.5%	12.6%
	2-3 times a week	37.6%	46.5%	43.8%	45.6%	42.9%	38.5%
	Once a week	31.8%	17.1%	31.5%	26.4%	23.9%	36.7%
	2-3 times per month	10.3%	4.4%	7.4%	4.7%	4.5%	8.7%
	Once a month or less	3.5%	1.2%	1.8%	2.1%	3.4%	2.5%
	Never	0.2%	0.2%	0.1%	0.6%	0.8%	1.0%
Pork Purchase Frequency	Daily	3.9%	3.7%	2.6%	2.5%	3.4%	3.4%
	2-3 times a week	18.5%	19.3%	8.9%	8.9%	18.4%	14.4%
	Once a week	42.7%	38.1%	36.9%	34.3%	37.5%	33.7%
	2-3 times per month	20.5%	22.0%	24.3%	28.1%	19.0%	22.3%
	Once a month or less	10.8%	11.1%	19.1%	18.5%	16.6%	15.4%
	Never	3.7%	5.9%	8.1%	7.6%	5.1%	10.8%
Milk Purchase Frequency	Daily	8.7%	10.0%	8.8%	7.0%	15.0%	9.6%
	2-3 times a week	20.0%	30.4%	24.7%	21.6%	28.9%	11.8%
	Once a week	37.9%	36.6%	36.9%	35.0%	30.4%	31.6%
	2-3 times per month	19.5%	13.5%	12.4%	16.7%	12.1%	20.9%
	Once a month or less	10.4%	5.3%	9.2%	11.4%	9.7%	19.3%
	Never	3.5%	4.2%	8.0%	8.3%	4.0%	7.0%
Bread Purchase Frequency	Daily	53.9%	33.8%	29.5%	18.8%	48.4%	21.4%
	2-3 times a week	19.7%	41.2%	32.3%	45.4%	28.9%	33.5%
	Once a week	15.7%	13.8%	23.4%	18.9%	10.9%	26.0%
	2-3 times per month	5.3%	4.2%	7.0%	6.9%	4.7%	8.3%
	Once a month or less	3.5%	3.5%	5.5%	4.5%	4.0%	5.3%
	Never	1.8%	3.5%	2.4%	5.5%	3.2%	5.5%

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Table 15: Interviewed consumers´ purchase and consume levels of pork, milk and bread

	Country	Spain 1050	Poland 1040		Italy 780	Hungary 988	Croatia 506	Belgium 998
Consume	Pork	94.7%	88.1%		89.9%	92.7%	93.7%	87.0%
		994	916		701	916	474	867
	Milk	88.2%	86.0%		81.0%	78.4%	88.7%	80.8%
		926	894		632	775	449	805
	Bread	81.0%	88.2%		71.2%	73.2%	68.0%	84.7%
		850	917		555	723	344	844
Purchase	Pork	94.8%	88.5%		89.6%	87.8%	90.1%	82.7%
		995	920		699	867	456	824
	Milk	87.5%	91.3%		80.4%	81.3%	93.1%	81.4%
		919	950		627	803	471	811
	Bread	81.0%	84.8%		69.5%	71.2%	62.1%	77.5%
		850	882		542	703	314	772

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3.5. Consumers' Sustainable behaviour

Consumers through their purchasing behaviour have a growing influence on sustainable agricultural practices (Grunert, 2011). Actions such as always carrying a reusable bag to reduce waste, avoiding food waste (buying and preparing only what is going to be eaten - more often and in less quantity) as well as going on foot to do the shopping (as part of mobility responsible), are related to sustainable consumption behaviours. Each decision made by the consumer has consequences for the sustainability concept, and provides information on their consumption patterns, reflecting their environmental concern. Environmental concern and the trend towards sustainability are also factors that shape the consumer profile and influence their consumption behaviour (Dueñas et al., 2014). In this context, consumers were asked if they carry their own bags when go for groceries. Results showed (Figure 22) that in all countries, a big share of consumers always take their own bags when go for groceries as a sustainable purchasing action.

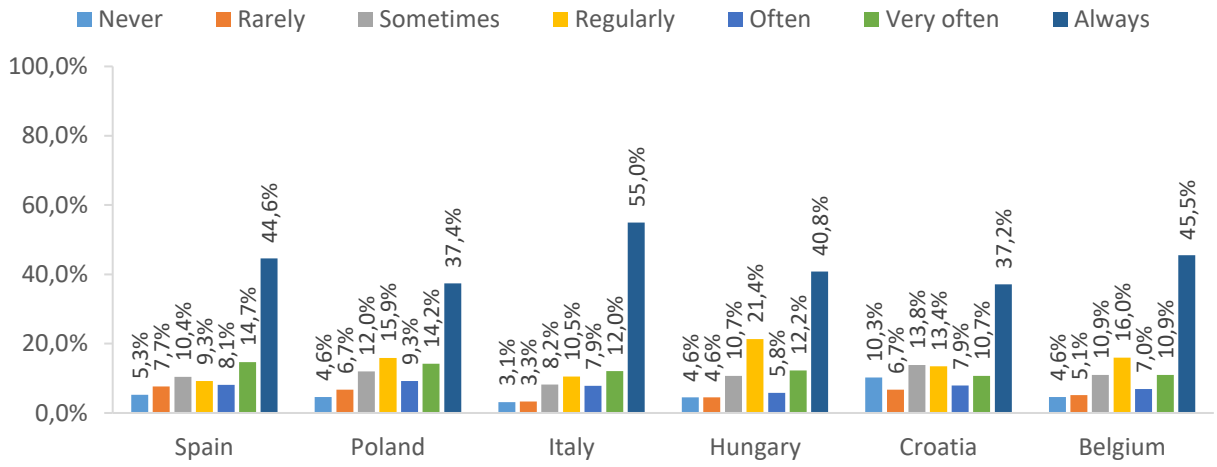

Figure 22: Consumers carry their own bags when go for groceries

Respondents were also asked, if they buy reusable bags at the store. Results (Figure 23) showed this action as non-frequent action compared to the previous results as expected.

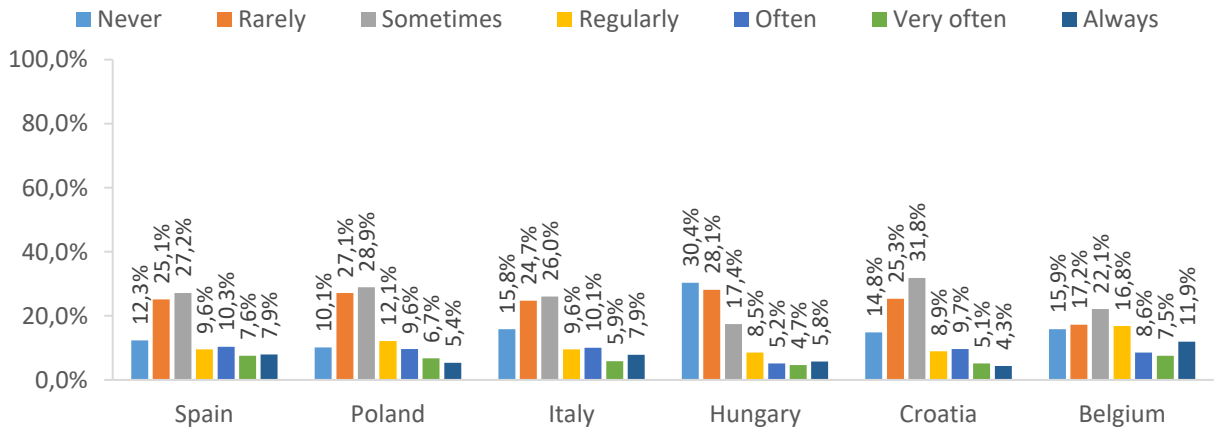

Figure 23: Consumers buy reusable bags at the store

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They were also asked if they use a shopping trolley when go for groceries. Results (Figure 24) showed that whit exception of Poland, in all countries, a big share of consumers are used to use a shopping trolley.

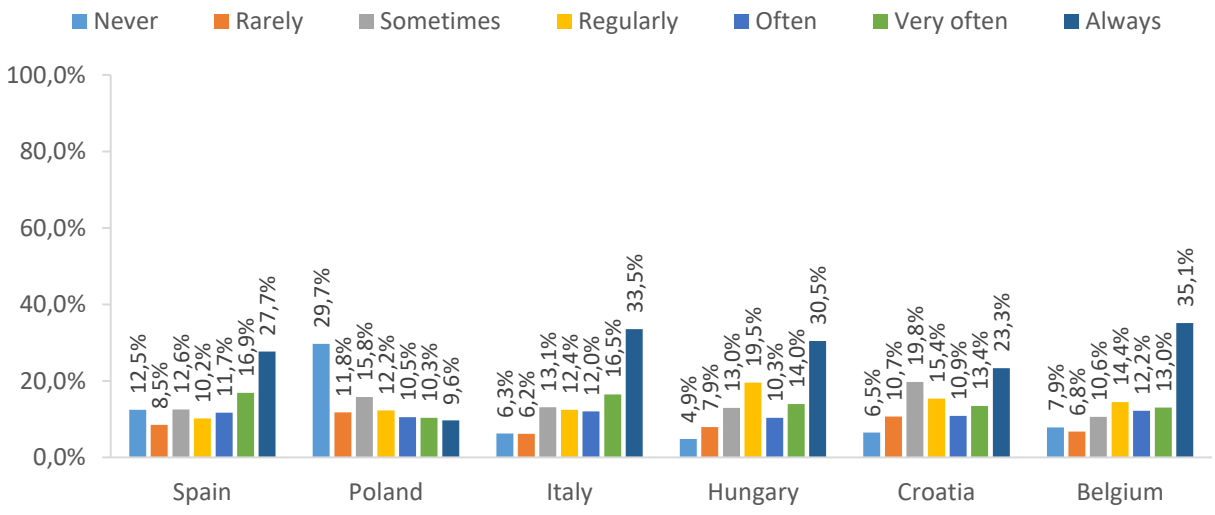

Figure 24: Consumers use a shopping trolley when go for groceries

The action of using cars for purchasing groceries is principally used in Italy (Figure 25) followed by Belgium.

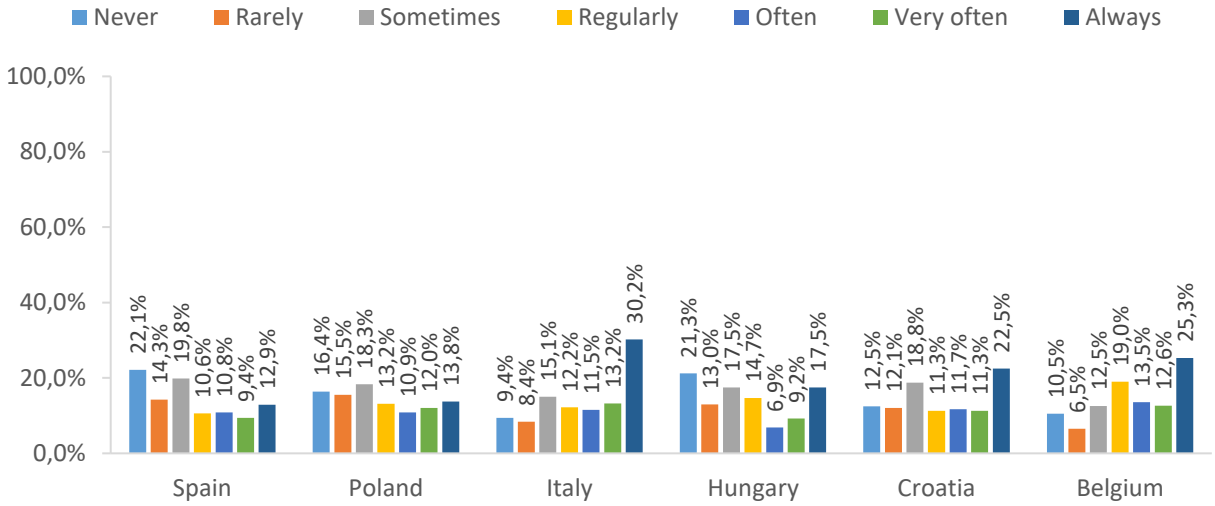

Figure 25: Consumers do groceries by car

Results (Figure 26) also showed that in almost all countries, the organic food waste is not usually used to make compost, with the except of Poland where the percentage of respondent who do these actions regularly is relatively high compared to the other countries. Local composting (household,

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community and small scale applications) is considered a sustainable option for bio-waste recovery and is receiving increasing demand from society (Torrijos, et al., 2021).

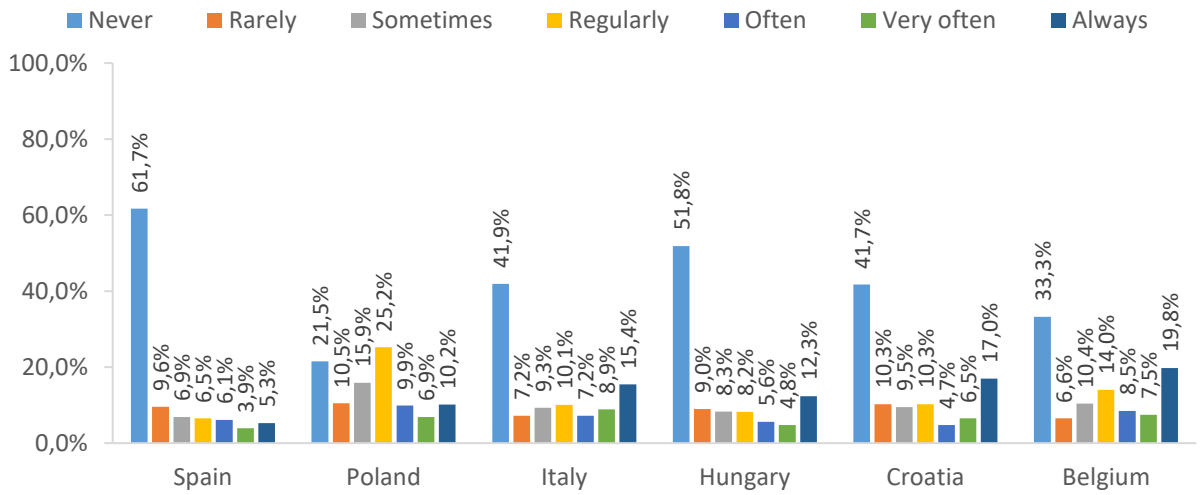

Figure 26: Consumers do compost with their organic food waste.

Finally, the Table 16 and Table 17 summarize the results of the of previous figures.

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Table 16: Frequency of sustainable actions related to food purchasing

Country Sample Size	Spain 1050	Poland 1040	Italy 780	Hungary 988	Croatia 506	Belgium 998
Carry their own bags when you go for groceries						
Never	5.30%	4.60%	3.10%	4.60%	10.30%	4.60%
Rarely	7.70%	6.70%	3.30%	4.60%	6.70%	5.10%
Sometimes	10.40%	12.00%	8.20%	10.70%	13.80%	10.90%
Regularly	9.30%	15.90%	10.50%	21.40%	13.40%	16.00%
Often	8.10%	9.30%	7.90%	5.80%	7.90%	7.00%
Very often	14.70%	14.20%	12.00%	12.20%	10.70%	10.90%
Always	44.60%	37.40%	55.00%	40.80%	37.20%	45.50%
Use a shopping trolley when go for groceries						
Never	12.50%	29.70%	6.30%	4.90%	6.50%	7.90%
Rarely	8.50%	11.80%	6.20%	7.90%	10.70%	6.80%
Sometimes	12.60%	15.80%	13.10%	13.00%	19.80%	10.60%
Regularly	10.20%	12.20%	12.40%	19.50%	15.40%	14.40%
Often	11.70%	10.50%	12.00%	10.30%	10.90%	12.20%
Very often	16.90%	10.30%	16.50%	14.00%	13.40%	13.00%
Always	27.70%	9.60%	33.50%	30.50%	23.30%	35.10%
Buy reusable bags at the store						
Never	12.30%	10.10%	15.80%	30.40%	14.80%	15.90%
Rarely	25.10%	27.10%	24.70%	28.10%	25.30%	17.20%
Sometimes	27.20%	28.90%	26.00%	17.40%	31.80%	22.10%
Regularly	9.60%	12.10%	9.60%	8.50%	8.90%	16.80%
Often	10.30%	9.60%	10.10%	5.20%	9.70%	8.60%
Very often	7.60%	6.70%	5.90%	4.70%	5.10%	7.50%
Always	7.90%	5.40%	7.90%	5.80%	4.30%	11.90%
Do groceries by car						
Never	22.10%	16.40%	9.40%	21.30%	12.50%	10.50%
Rarely	14.30%	15.50%	8.40%	13.00%	12.10%	6.50%
Sometimes	19.80%	18.30%	15.10%	17.50%	18.80%	12.50%
Regularly	10.60%	13.20%	12.20%	14.70%	11.30%	19.00%
Often	10.80%	10.90%	11.50%	6.90%	11.70%	13.50%
Very often	9.40%	12.00%	13.20%	9.20%	11.30%	12.60%
Always	12.90%	13.80%	30.20%	17.50%	22.50%	25.30%

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Table 17: Frequency of sustainable actions related with food waste

Country	Spain	Poland	Italy	Hungary	Croatia	Belgium
Sample Size	1050	1040	780	988	506	998
Do compost with their organic waste						
Never	61.70%	21.50%	41.90%	51.80%	41.70%	33.30%
Rarely	9.60%	10.50%	7.20%	9.00%	10.30%	6.60%
Sometimes	6.90%	15.90%	9.30%	8.30%	9.50%	10.40%
Regularly	6.50%	25.20%	10.10%	8.20%	10.30%	14.00%
Often	6.10%	9.90%	7.20%	5.60%	4.70%	8.50%
Very often	3.90%	6.90%	8.90%	4.80%	6.50%	7.50%
Always	5.30%	10.20%	15.40%	12.30%	17.00%	19.80%

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Respondents were also asked about their behaviour regarding food waste and the destination of their leftovers. we examined a waste decision related to leftovers from a fully prepared meal because this waste decision may be different for consumers relative to a single product like fruits, bread or milk because this is a value-added product rather than a single-ingredient and the time cost of preparation may be a factor in the decision (Ellison and Lusk, 2018). Stancu, et al. (2016) note that the reuse of leftovers may be an especially important behaviour to target in terms of reducing food waste. Results (Figure 27) showed that almost half of the interviewed consumers generate leftovers from the meals they prepare at home. The highest percentage was found in Belgium and the lowest in Poland.

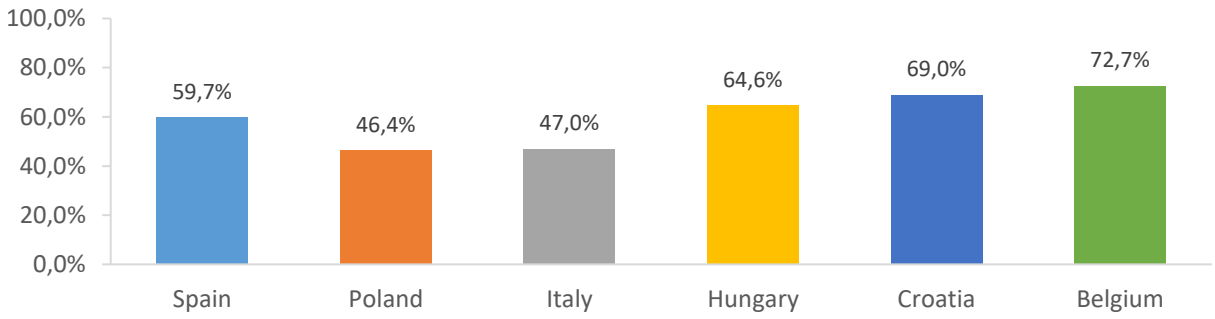

Figure 27: Consumers that have leftovers from the meals them prepare at home

Results regarding the destination of respondents' food leftovers (Figure 28) showed that in all countries the option "eat them in a shortly time" received the highest percentage. Respondents in Croatia and Hungary exhibited the highest percentage for "using leftovers for animal feeding". In Belgium, the participants showed the highest percentage for "freezing leftovers" and "eating them at work" compared to other countries.

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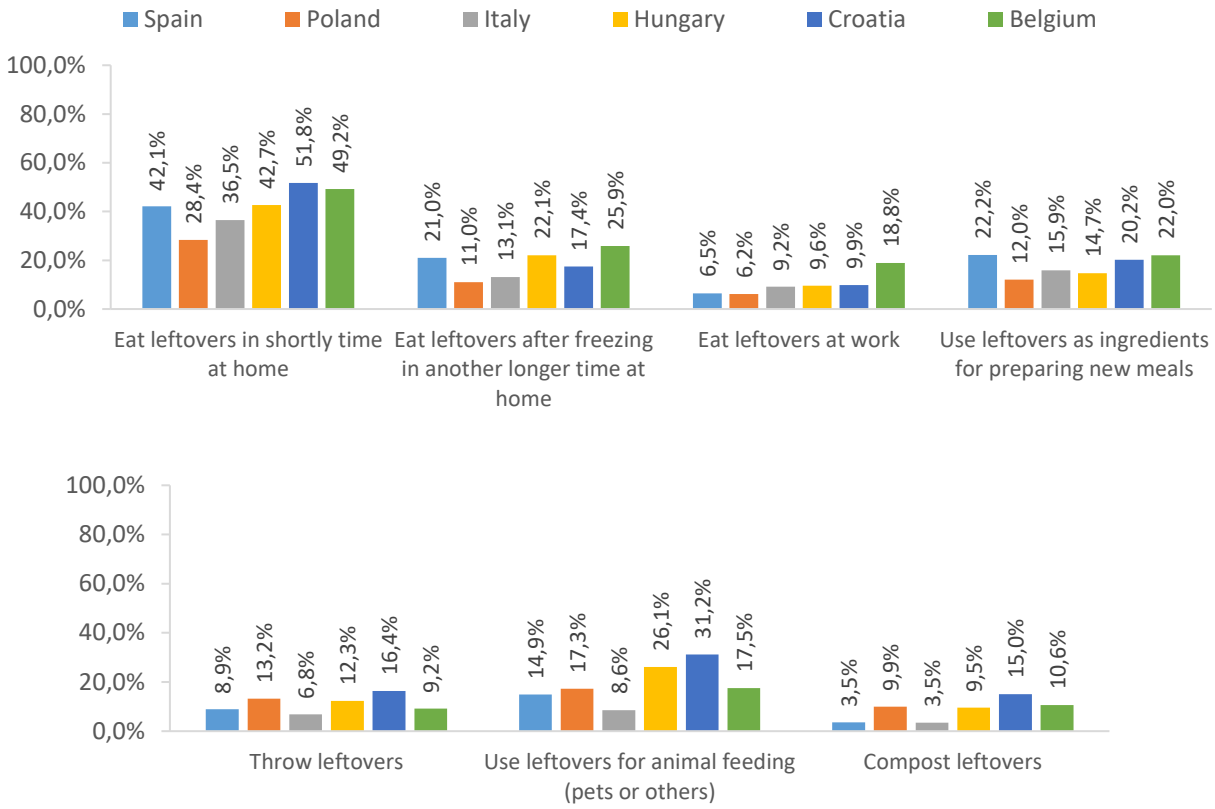

Figure 28: Use of leftovers from the meals them prepare at home

The summarized results are shown in Table 18.

Table 18: Consumers that have leftovers from their meals and how they use them.

Use of leftovers	Spain 59.7% 627	Poland 46.4% 483	Italy 47.0% 359	Hungary 64.6% 638	Croatia 69.0% 349	Belgium 72.7% 721
Eat leftovers in shortly time at home	42.1%	28.4%	36.5%	42.7%	51.8%	49.2%
Eat leftovers after freezing in another longer time at home	21.0%	11.0%	13.1%	22.1%	17.4%	25.9%
Eat leftovers at work	6.5%	6.2%	9.2%	9.6%	9.9%	18.8%
Use leftovers as ingredients for preparing new meals	22.2%	12.0%	15.9%	14.7%	20.2%	22.0%
Throw leftovers	8.9%	13.2%	6.8%	12.3%	16.4%	9.2%
Use leftovers for animal feeding (pets or others)	14.9%	17.3%	8.6%	26.1%	31.2%	17.5%
Compost leftovers	3.5%	9.9%	3.5%	9.5%	15.0%	10.6%

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3.6. Environmental attitude

Following the methodological approach described in the method section, consumers' environmental attitude was analysed. The 8 specific items of the reduced NEP scale allowed to identify the latent dimensions related with their behaviour towards the environment. Using the Principal Component Analysis (PCA) two clear dimensions were observed in all countries. Results of the Kaiser Meyer Olkin test (KMO > 0.75) in each country indicate acceptable goodness of fit? and applicability of this method for the set of analysed variables. Furthermore, the accumulated explained variance of the 2 principal components in each case was higher than 55% (Table 19). The total variance explained by the first and second dimensions in each country is within the acceptable range of the NEP scale. Thereby, confirming the suitability of the NEP scale to describe the environmental attitude.

The two latent dimensions identified were defined as "ecocentric" and "anthropocentric" attitudes as also suggested by Vozmediano and San Juan (2005). Both components were represented graphically to highlight the associated items and factors correlations in each country (
Figure 29).

Figure 29) showed that in all case studies the same underlying components are present. The first component was related with a latent dimension identified as ecocentric attitude and it was principally defined by the statements of: "Q5- Plants and animals have as much right to exist as humans", "Q6- The balance of nature is very delicate and easily alterable", "Q7- If things continue as they are, we will soon face a major ecological catastrophe", and "Q8- Despite our special abilities, humans are still dependent on the laws of nature". This first component reflects pro-environmental behaviour, who seeks to achieve a balance between the human being and the natural ecosystem. While the anthropocentric attitude is represented by the statements: "Q1- The balance of nature is strong enough to deal with the impact caused by economic development", "Q2- Over time, humans can learn how nature works to be able to control it", "Q3- Human ingenuity will ensure that we do not make the earth an uninhabitable place" and "Q4- Humans have the right to modify the environment to adapt it to their needs" were highly related to the second component. This second component; "Anthropocentric dimension", reflects an attitude towards carrying out actions that satisfy needs and achieve human well-being above everything else (living beings, the environment, valuing the environment for its benefits to people, etc.). Respondents who give more importance to this dimension conceive the human being and his interests as the centre of everything (Gomera *et al.*, 2013).

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Table 19: The PCA analysis on NEP scale

	Belgium		Croatia		Hungary		Italy		Poland		Spain		Global	
	Component		Component		Component		Component		Component		Component		Component	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Q1. The balance of nature is strong enough to deal with the impact caused by economic development	-0.236	0.725	-0.252	0.672	-0.305	0.662	-0.290	0.703	-0.137	0.728	-0.165	0.744	-0.227	0.713
Q2. Over time. humans can learn how nature works to be able to control it	0.190	0.723	0.139	0.730	0.106	0.844	0.068	0.803	0.205	0.760	0.095	0.781	0.123	0.779
Q3. Human ingenuity will ensure that we do not make the earth an uninhabitable place	0.084	0.774	0.067	0.737	0.215	0.787	0.071	0.776	0.149	0.686	0.074	0.776	0.128	0.757
Q4. Humans have the right to modify the environment to adapt it to their needs	-0.237	0.710	-0.396	0.586	-0.380	0.563	-0.355	0.664	-0.229	0.668	-0.236	0.703	-0.310	0.654
Q5. Plants and animals have as much right to exist as humans	0.732	-0.023	0.748	-0.056	0.754	-0.033	0.740	-0.049	0.782	-0.003	0.805	-0.045	0.763	-0.033
Q6. The balance of nature is very delicate and easily alterable	0.654	0.009	0.776	-0.008	0.830	-0.029	0.819	-0.100	0.663	0.100	0.847	-0.056	0.774	-0.028
Q7. If things continue as they are. we will soon face a major ecological catastrophe	0.772	-0.181	0.777	-0.115	0.827	-0.142	0.810	-0.138	0.822	-0.137	0.815	-0.081	0.807	-0.130
Q8. Despite our special abilities. humans are still dependent on the laws of nature	0.758	0.025	0.714	-0.020	0.841	0.058	0.812	-0.044	0.810	0.008	0.801	-0.020	0.800	0.004
Explained variance by component %	28.60	27.30	31.49	23.60	36.80	26.41	34.41	27.68	31.48	25.68	34.62	28.40	33.15	26.69
Total Explained variance	55.90%		55.10%		63.21%		62.10%		57.16%		63.02%		59.84%	
(KMO) Kaiser-Meyer-Olkin Test	0.751		0.777		0.778		0.812		0.758		0.794		0.790	
Bartlett Test (significance)	1662.34		816.35		2655.82		1891.10		1923.62		2656.45		11239.87	
Cronbach Alfa	0.676		0.687		0.726		0.763		0.638		0.733		0.687	

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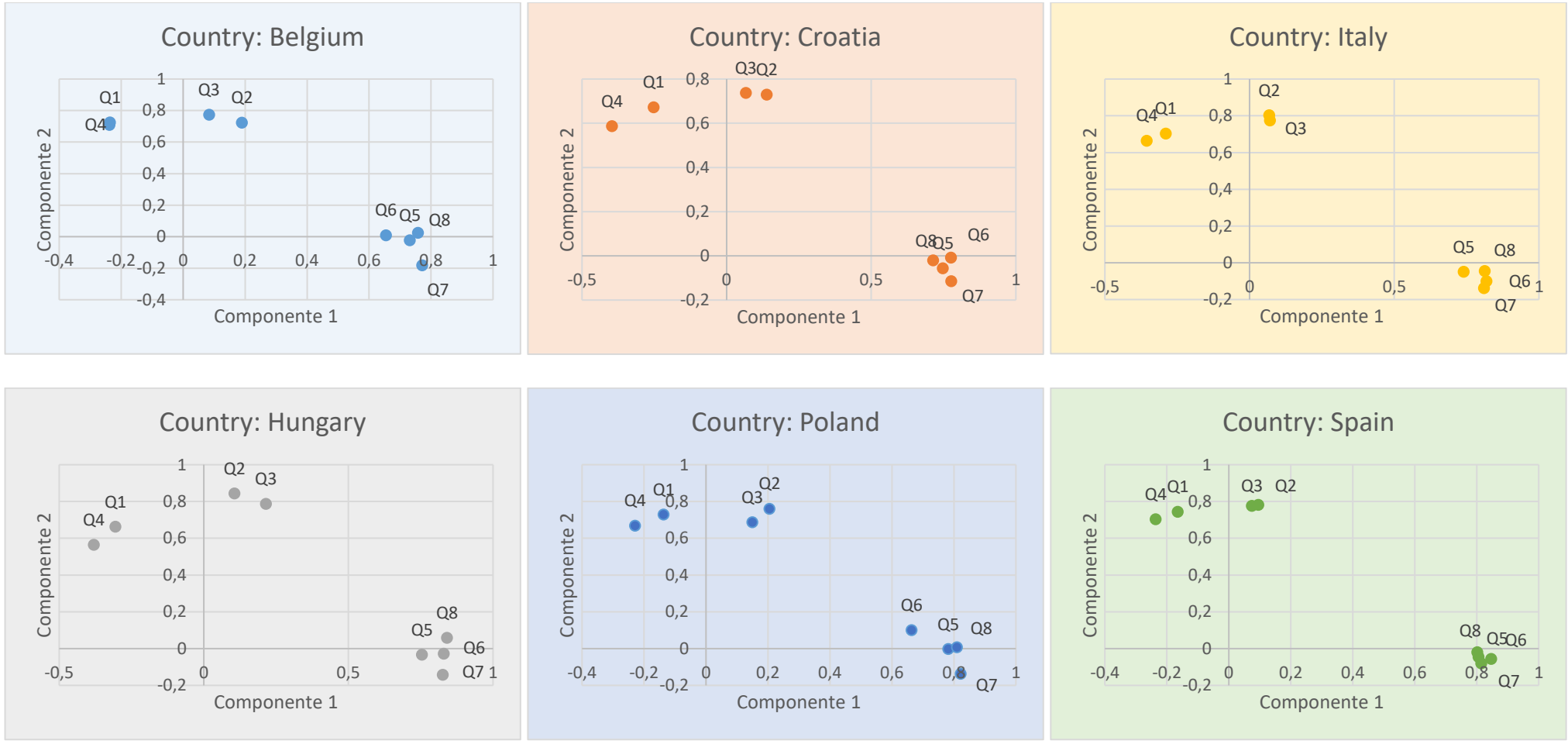

Figure 29: Factorial loading on the two principal components of Environmental Attitude.

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The global distribution of consumers (all countries) in both dimensions are shown in Figure 30. Results showed that consumers allocated on the 2nd and 4th quadrants have well identified environmental attitudes according to the latent dimensions of the NEP scale, their positive or negative valuation of the statements is clear: 2nd quadrant (+, -) more agreement to the anthropocentric statements and less agreement to ecocentric statements, and 4th quadrant (-, +) less agreement to the statements related to an anthropocentric attitude and more agreement to ecocentric ones. However, consumers allocated on 1st and 3rd quadrants exhibited non-well-defined environmental attitudes. Those in the quadrant 1 (+, +) exhibited more agreement levels for both ecocentric and anthropocentric statements while those in quadrant 3 (-, -) exhibited more disagreement levels with both types of statements. However, despite the fact that, respondents in quadrant 1 and 3 have non-well-defined environmental attitudes, their results always showed the superiority of one latent factor against the other, it means that one of the two attitudes, is highest than other one.

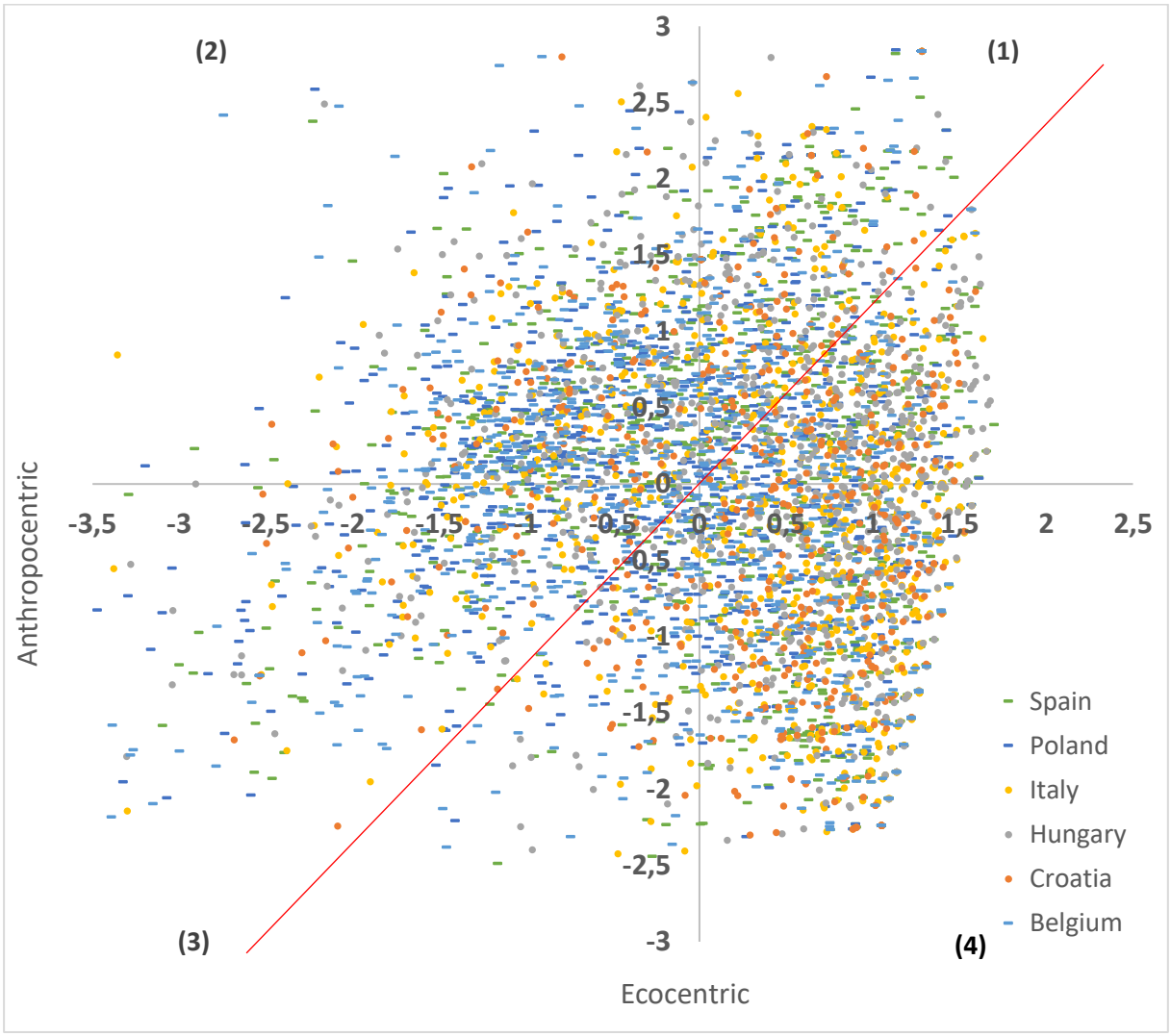

Figure 30: Global consumers´ distribution according to their environmental attitude

Figure 31 is set out in order to highlight the dispersion of scores. The dispersion of respondents in both dimensions reflect the heterogeneity of results in each country. Italy, Hungary, and Croatia respondents (yellow, grey, and orange dots) are generally distributed on the 4th quadrant and in the

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1st and 2nd quadrant under the red line, which means that they have a highest ecocentric attitude. This type of attitude prioritizes the conservation of species and ecosystems over the conservation of individuals, implying a more sustainable consumption awareness. While respondents from Belgium, Poland and Spain (blue, dark blue, and green short dash lines) were more spread and distributed above the red line, highlighting their anthropocentric attitude, focusing the value of the environment for its benefits to people

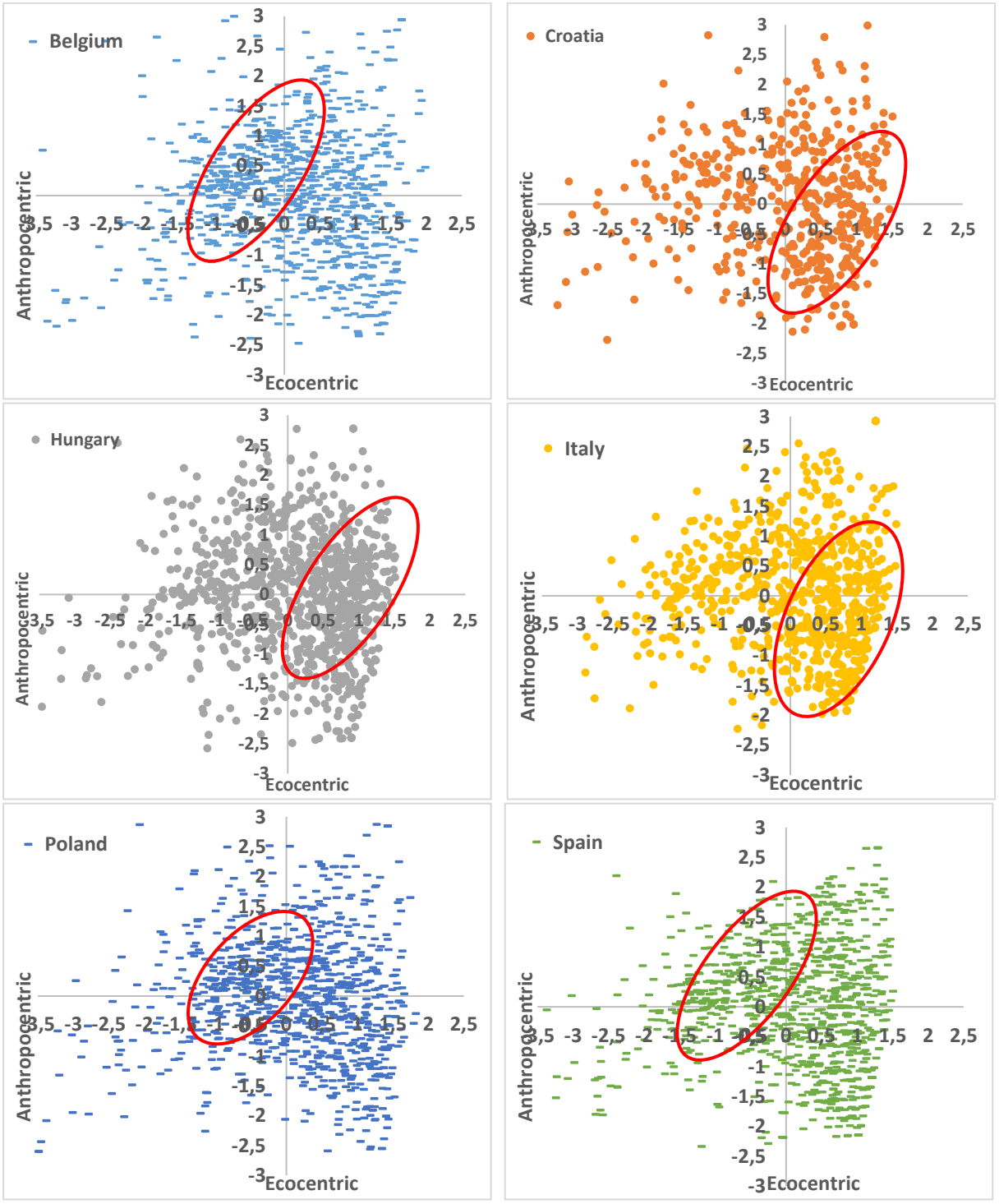

Figure 31: Consumers´ environmental attitude distribution by country

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Furthermore, this heterogeneity analysis was also carried out at country level (Figure 31). Results showed that Italy, Hungary and Croatia have a very similar dispersion where a big share of respondent are concentrated in the quadrant of the ecocentric attitude (51.28%, 50.91% and 53.16% respectively). However, the respondents' distribution in Belgium, Poland and Spain are more concentrated in the anthropocentric space, with 56.53%, 54.62% and 54.48% respectively.

Taking into account the superiority of each latent factor of the NEP scale, respondents, in each country, were classified according to the ecocentric and anthropocentric dimension (Figure 32). Results showed that the ecocentric attitude is more pronounced in Italy and Croatia, while the anthropocentric is more highlighted in Spain, Belgium and Poland.

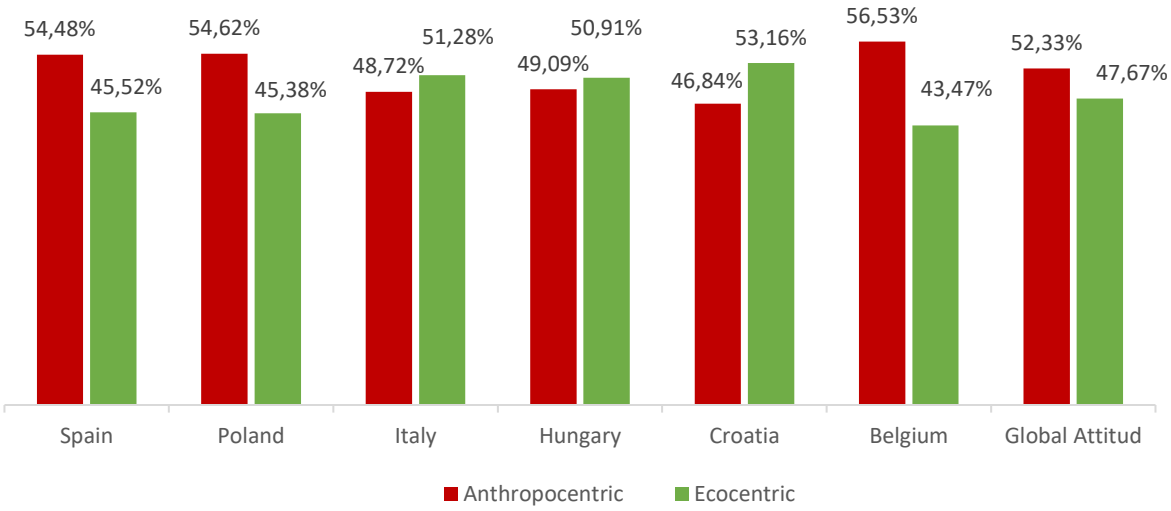

Figure 32: Consumer ecocentric and anthropocentric attitude

Finally, a summary of the NEP scale results is shown in Table 20. From the results we may identify how the specific attitudes are distributed. The percentage of ecocentric consumers with an inconsistent opinion (+,+ and -,-) are lower than the percentage of inconsistent anthropocentric consumers.

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Table 20: The descriptive details of environmental attitude according to the NEP scale.

Specific Environmental Attitude		Spain	Poland	Italy	Hungary	Croatia	Belgium	Total general
Anthropocentric (- ,+)		27.62%	28.94%	24.36%	27.02%	22.92%	31.33%	27.54%
Ecocentric (+ , -)		30.29%	28.46%	32.44%	29.15%	32.81%	27.81%	29.81%
Inconsistent	Anthropocentric (- . -)	10.48%	11.25%	9.23%	9.31%	8.50%	11.14%	10.17%
	Anthropocentric (+ . +)	16.38%	14.42%	15.13%	12.75%	15.42%	14.06%	14.63%
	Ecocentric (- . -)	4.67%	6.54%	6.54%	5.97%	6.92%	5.12%	5.84%
	Ecocentric (+ . +)	10.57%	10.38%	12.31%	15.79%	13.44%	10.54%	12.01%
		42.10%	42.60%	43.21%	43.83%	44.27%	40.86%	42.65%
General Environmental Attitude		**Spain**	**Poland**	**Italy**	**Hungary**	**Croatia**	**Belgium**	**Global Attitude**
Anthropocentric		54.48%	54.62%	48.72%	49.09%	46.84%	56.53%	52.33%
Ecocentric		45.52%	45.38%	51.28%	50.91%	53.16%	43.47%	47.67%

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3.7. Consumers purchase intention for Pork, milk, and bread (DCE)

Following the methodological approach of the DCE, first we will describe the main results in terms of the selected (i.e., preferred) option from choice sets. In other words, we will first focus on describing how many times consumers stated that will purchase a product (expected purchase intention), for sliced fresh pork loin, milk, and sliced bread obtained from the different production systems: Conventional (CONV), Organic (ORG), and Circular (CIRC).

3.7.1. Descriptive results of the aggregated choice preferences

Table 21, in general terms, results showed that the expected purchase decision for the CIRC and ORG products revealed a relatively low rate of preference compared to the CONV products, with the exception of Italy, where CIRC sliced pork and CIRC milk were the most preferred. However, although the CIRC products received a relatively low rate of purchase intention, there is still a clear potential market for the products obtained and labelled by circular farming systems, because the intention of purchase circular products represents almost a third part of the global average rate of purchase intention for the 3 products' category under the circular farming was 27,24%.

Furthermore, results showed that the purchase intentions for the 3 products produced under the circular farming system (CIRC) was relatively higher than those products from organic farming (ORG) excluding milk in Spain and Croatia, and pork in Poland, as can be observed on Figure 33. Consumers in Italy showed the highest purchase intention levels for the 3 CIRC products (pork= 40,92%, milk=34,93% and bread=35,29%). Consumers from Hungary showed the lowest purchase intention rate for products obtained from the organic farming system (pork= 7,55%, milk=5,57% and bread=4,87%).

To better understand the aggregated results at country level, it is important to analyse the percentages of the "preferred" product considering the different price levels in the choice sets. These results are detailed in the following sections.

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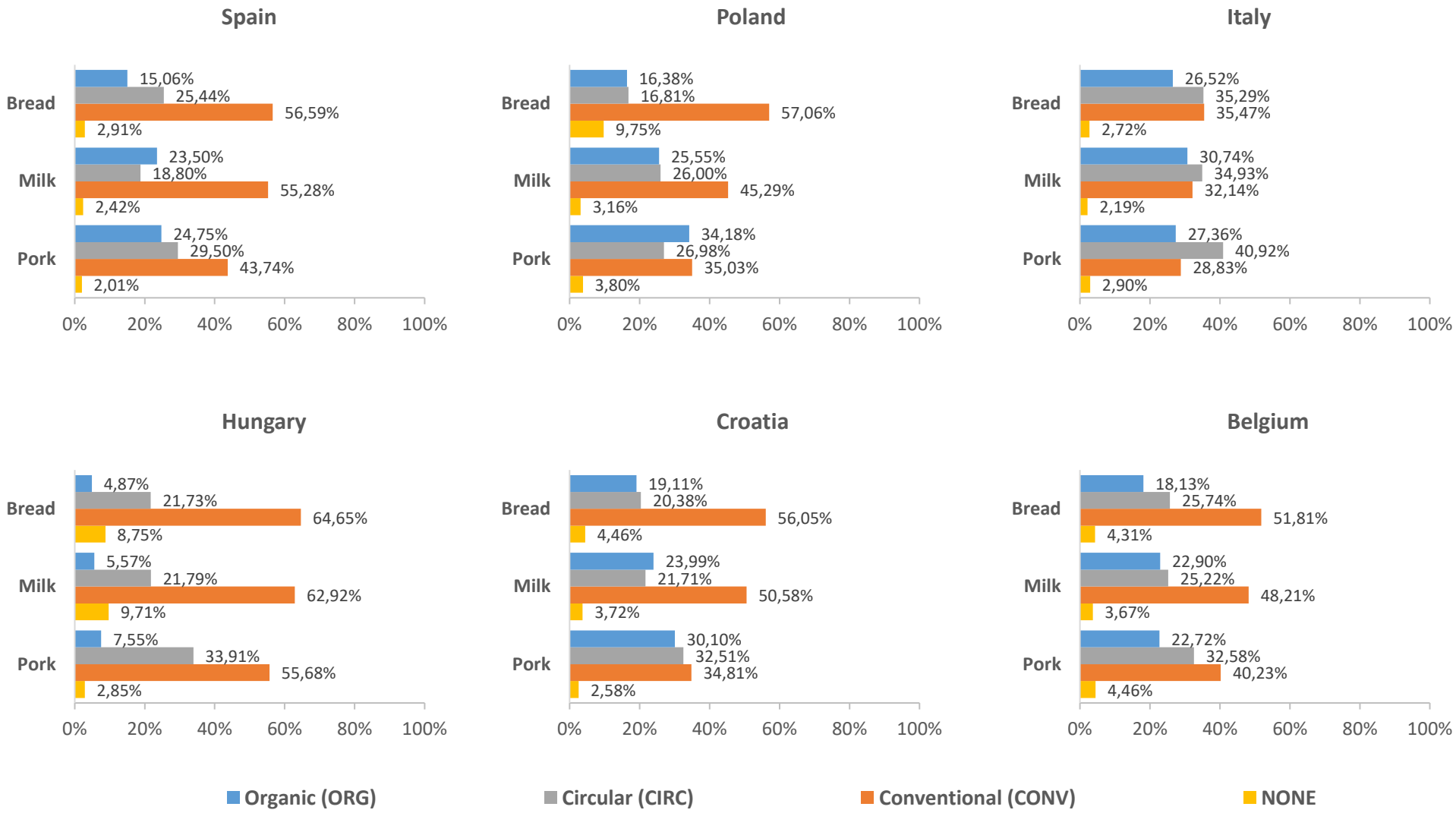

Figure 33: Aggregated results of purchase intention of each product

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Table 21: Aggregated results of purchase intention of each product

	Spain			Poland			Italy			Hungary			Croatia			Belgium		
Products	**Pork**	**Milk**	**Bread**	**Pork**	**Milk**	**Bread**	**Pork**	**Milk**	**Bread**	**Pork**	**Milk**	**Bread**	**Pork**	**Milk**	**Bread**	**Pork**	**Milk**	**Bread**
ORG	985	864	512	1258	971	578	765	771	575	262	179	137	549	452	240	749	743	560
	24.75%	23.50%	15.06%	34.18%	25.55%	16.38%	27.36%	30.74%	26.52%	7.55%	5.57%	4.87%	30.10%	23.99%	19.11%	22.72%	22.90%	18.13%
CONV	1741	2032	1924	1289	1721	2013	806	806	769	1931	2021	1818	635	953	704	1326	1564	1600
	43.74%	55.28%	56.59%	35.03%	45.29%	57.06%	28.83%	32.14%	35.47%	55.68%	62.92%	64.65%	34.81%	50.58%	56.05%	40.23%	48.21%	51.81%
CIRC	1174	691	865	993	988	593	1144	876	765	1176	700	611	593	409	256	1074	818	795
	29.50%	18.80%	25.44%	26.98%	26.00%	16.81%	40.92%	34.93%	35.29%	33.91%	21.79%	21.73%	32.51%	21.71%	20.38%	32.58%	25.22%	25.74%
NONE	80	89	99	140	120	344	81	55	59	99	312	246	47	70	56	147	119	133
	2.01%	2.42%	2.91%	3.80%	3.16%	9.75%	2.90%	2.19%	2.72%	2.85%	9.71%	8.75%	2.58%	3.72%	4.46%	4.46%	3.67%	4.31%
Consumers (Purchase)	995	919	850	920	950	882	699	627	542	867	803	703	456	471	314	824	811	772
Total possible choice	Consumers × 4 choice sets =			Consumers × 4 choice sets =			Consumers × 4 choice sets =			Consumers × 4 choice sets =			Consumers × 4 choice sets =			Consumers × 4 choice sets =		
	3980	3676	3400	3680	3800	3528	2796	2508	2168	3468	3212	2812	1824	1884	1256	3296	3244	3088

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3.7.2. Descriptive results of the choice sets in Spain

The detailed results of the choice of the 3 products ("sliced loin pork", "milk", and "sliced bread") in Spain taking into account the price levels are presented in Table 22. The results showed a consistent preference in the 3 products (pork, milk, and bread) under the organic, conventional, and circular farming systems, as expected according to demand theory (Figure 34). That is, the number of times a product was chosen decreased when the price increased. Although there are some number of choices at a given price greater than those obtained at a lower price, the final trend is decreasing when prices increase. For each product, the price according to the production farming system has a negative effect on number of times that it was chosen, conventional "the cheapest products" were more preferred compared to organic and circular products. Only on milk case, milk obtained by an organic farming system was most preferred (23.5%) than circular milk (18.8%). For organic and circular milk, at the same price (1.20 €) the number of times that organic milk was selected (299) more than the circular one (198).

Table 22: Descriptive results of the choice products at different price level in Spain

Product	PORK					
Organic	9.00 €	10.00 €	11.00 €	12.00 €	Subtotal	TOTAL
Number of times a product is chosen (n)	299	256	218	212	985	24.75%
(%)	30.36%	25.99%	22.13%	21.52%		
Conventional	3.00 €	4.00 €	5.00 €	6.00 €		
Number of times a product is chosen (n)	524	434	405	378	1,741	43.74%
(%)	30.10%	24.93%	23.26%	21.71%		
Circular	5.00 €	6.00 €	7.00 €	8.00 €		
Number of times a product is chosen (n)	333	359	284	198	1,174	29.50%
(%)	28.36%	30.58%	24.19%	16.87%		
"NONE" option					80	0.02 %
TOTAL					3,980	100%

Product	MILK					
Organic	1.20 €	1.30 €	1.40 €	1.50 €	Subtotal	TOTAL
Number of times a product is chosen (n)	259	214	201	190	864	23.50%
(%)	29.98%	24.77%	23.26%	21.99%		
Conventional	0.60 €	0.70 €	0.80 €	0.90 €		
Number of times a product is chosen (n)	497	581	481	473	2,032	55.28%
(%)	24.46%	28.59%	23.67%	23.28%		
Circular	0.90 €	1.00 €	1.10 €	1.20 €		
Number of times a product is chosen (n)	192	216	158	125	691	18.80%
(%)	27.79%	31.26%	22.87%	18.09%		
"NONE" option					89	0.02 %
TOTAL					3,676	100%

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Table 22 (continued): Descriptive results of the choice products at different price level in Spain

Product	BREAD					
Organic	2.50 €	3.00 €	3.50 €	4.00 €	Subtotal	TOTAL
Number of times a product is chosen (n)	153	133	116	110	512	15.06%
(%)	29.88%	25.98%	22.66%	21.48%		
Conventional	0.80 €	1.00 €	1.20 €	1.40 €		
Number of times a product is chosen (n)	556	485	454	429	1,924	56.59%
(%)	28.90%	25.21%	23.60%	22.30%		
Circular	1.20 €	1.40 €	1.60 €	1.80 €		
Number of times a product is chosen (n)	244	220	254	147	865	25.44%
(%)	28.21%	25.43%	29.36%	16.99%		
"NONE" option					99	0.03%
TOTAL					3,400	100%

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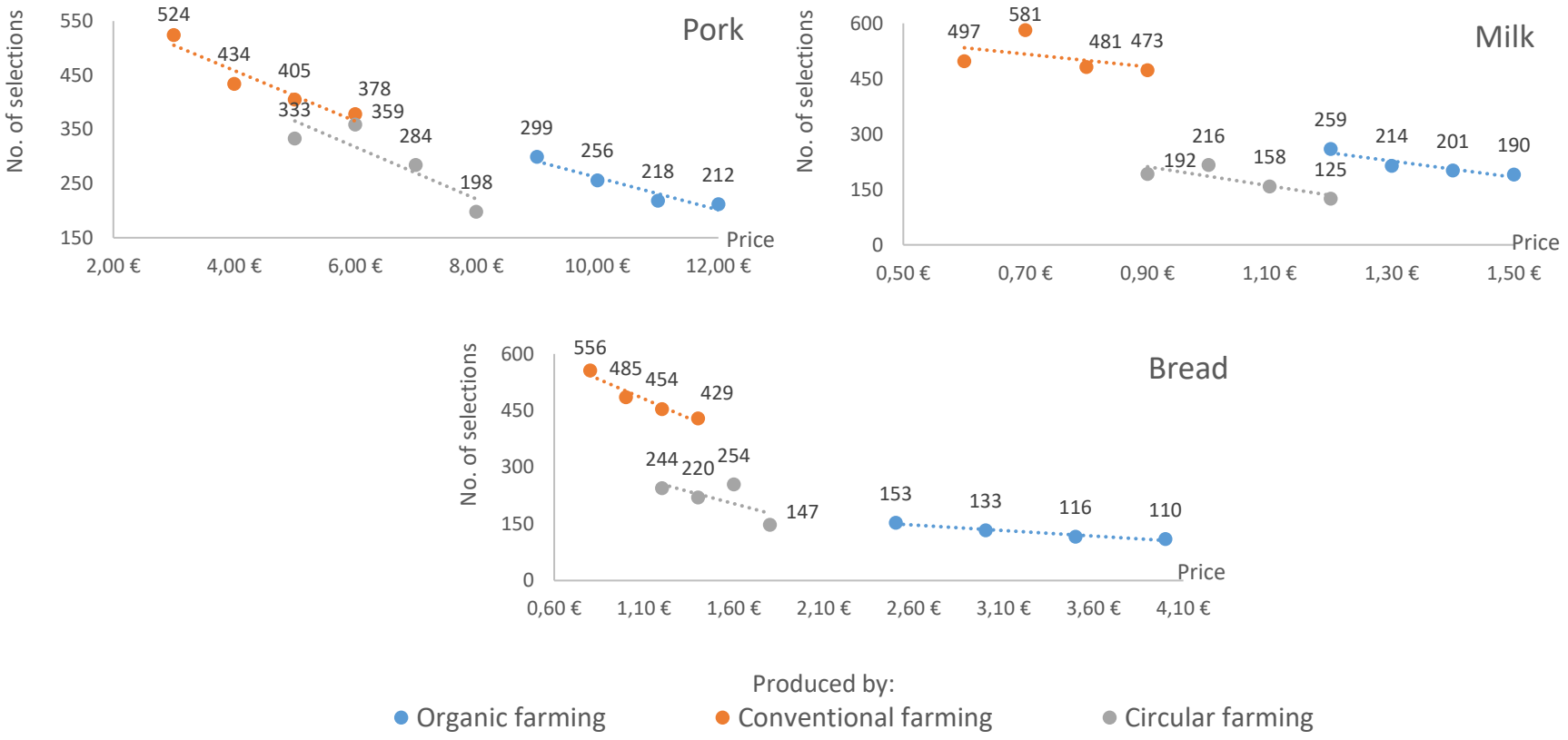

Figure 34: Choice of the preferred products according to the farming system vs price, Spain.

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3.7.3. Descriptive results of the products choice in Poland

In the case study of Poland, consumers' purchase behaviour showed the same tendency on each product (Table 23), with an apparent heterogeneous result especially for circular products (for instance circular pork at 4.00 € was selected 263 times while at 3.50 € was selected 214 times). These results may occur depending on the price level presented in choice sets and the experimental design. However, the tendency remains as expected for the 3 products under the three farming production systems (ORG, CONV, and CIRC). Figure 35 shows the trend for the 3 products pork, milk, and bread. Comparing between the 3 production farming systems for each product, we observe that the conventional products were the most selected (pork 35.03%, milk 42.29% and bread 57.06%), while the organic and the circular one received relatively similar percentages.

Table 23: Descriptive results of the best choice at different price level in Poland

Product	PORK					
Organic	5.65 €	6.30 €	6.95 €	7.60 €		TOTAL
Number of times a product is chosen (n)	356	320	285	297	1,258	34.18%
(%)	28.30%	25.44%	22.66%	23.61%		
Conventional	2.20 €	2.60 €	3.00 €	3.40 €		
Number of times a product is chosen (n)	330	296	369	294	1,289	35.03%
(%)	25.60%	22.96%	28.63%	22.81%		
Circular	3.00 €	3.50 €	4.00 €	4.50 €		
Number of times a product is chosen (n)	292	214	263	224	993	26.98%
(%)	29.41%	21.55%	26.49%	22.56%		
"NONE" option					140	0.04%
TOTAL					3,680	100%

Product	MILK					
Organic	0.90 €	1.70 €	2.15 €	2.60 €		TOTAL
Number of times a product is chosen (n)	350	228	197	196	971	25.55%
(%)	36.05%	23.48%	20.29%	20.19%		
Conventional	0.45 €	0.50 €	0.55 €	0.60 €		
Number of times a product is chosen (n)	478	431	381	431	1,721	45.29%
(%)	27.77%	25.04%	22.14%	25.04%		
Circular	0.55 €	0.60 €	0.70 €	0.75 €		
Number of times a product is chosen (n)	301	191	283	213	988	26.00%
(%)	30.47%	19.33%	28.64%	21.56%		
"NONE" option					120	3.16%
TOTAL					3,800	100%

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Table 23 (continued): Descriptive results of the best choice at different price level in Poland

Product	BREAD					
Organic	2.80 €	3.30 €	3.80 €	4.30 €		TOTAL
Number of times a product is chosen (n)	172	141	134	131	578	16.38%
(%)	29.76%	24.39%	23.18%	22.66%		
Conventional	0.90 €	1.20 €	1.50 €	1.80 €		
Number of times a product is chosen (n)	560	587	417	449	2,013	57.06%
(%)	27.82%	29.16%	20.72%	22.31%		
Circular	1.50 €	1.80 €	2.20 €	2.50 €		
Number of times a product is chosen (n)	146	186	174	87	593	16.81%
(%)	24.62%	31.37%	29.34%	14.67%		
"NONE" option					344	9.75%
TOTAL					3,528	100%

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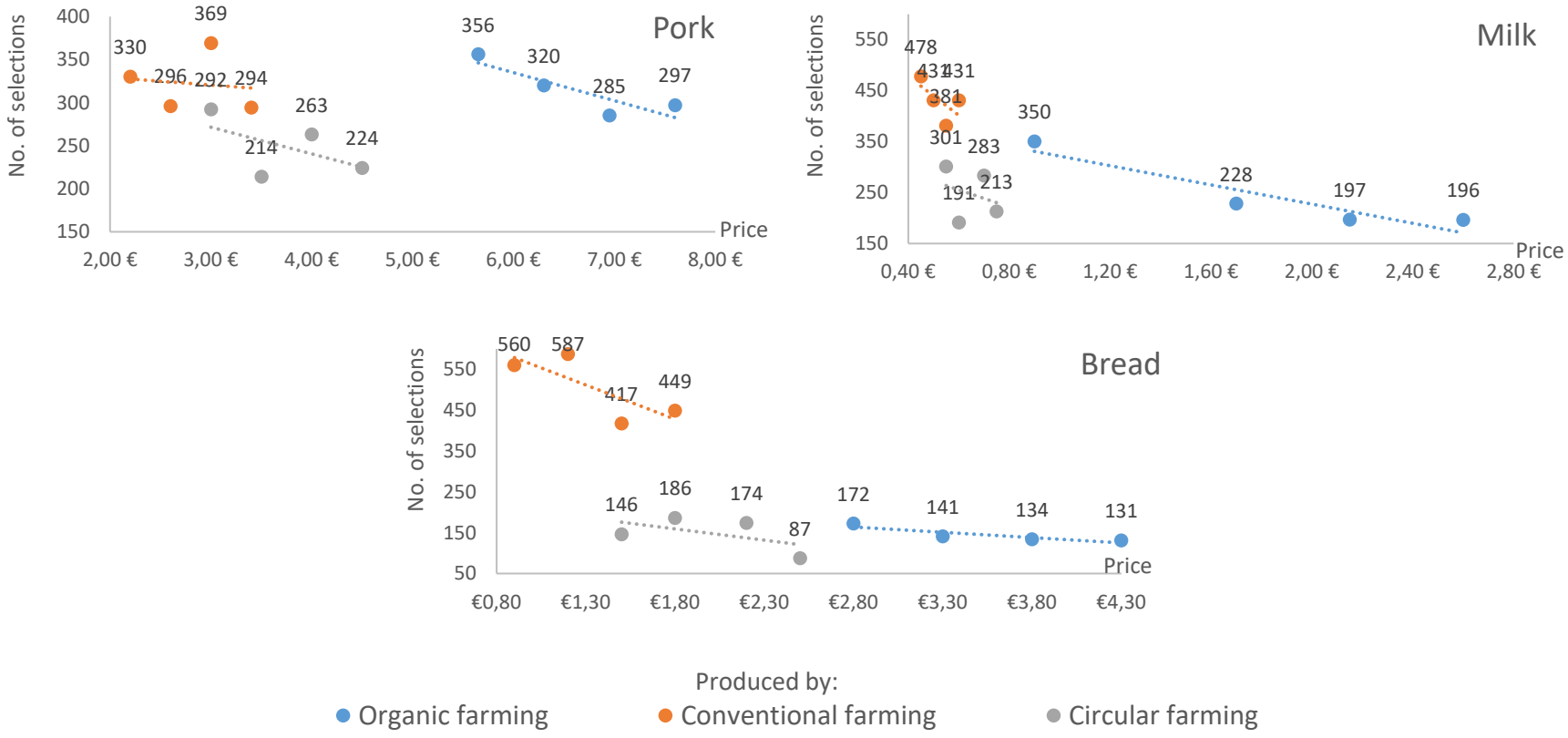

Figure 35: Choice of the preferred products according to the farming system vs price, Poland.

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3.7.4. Descriptive results of the products choice in Italy

For Italian consumers, results also followed the same scheme and patterns (Table 24) with some heterogeneous selected choices specifically in conventional and circular products. However, again the trend for each product remains the same trend. The number of times selected decreased for all products when the price increased as shown in Figure 36. However, analysing selected choices between the 3 production farming systems, we could observe that for pork and milk, consumers frequently selected the circular products, and for bread almost the same. This could be related Ito the fact that conventional and circular products prices were very similar.

Table 24: Descriptive results of the best product choice at different price level in Italy

Product	PORK					
Organic	8.00 €	10.00 €	12.00 €	14.00 €		TOTAL
Number of times a product is chosen (n)	238	189	175	163	765	27.36%
(%)	31.11%	24.71%	22.88%	21.31%		
Conventional	3.00 €	3.80 €	4.60 €	5.40 €		
Number of times a product is chosen (n)	188	257	176	185	806	28.83%
(%)	23.33%	31.89%	21.84%	22.95%		
Circular	4.60 €	5.40 €	6.20 €	7.00 €		
Number of times a product is chosen (n)	310	320	259	255	1,144	40.92%
(%)	27.10%	27.97%	22.64%	22.29%		
"NONE" option					81	0.03%
TOTAL					2,796	100%

Product	MILK					
Organic	1.50 €	1.60 €	1.70 €	1.80 €		TOTAL
Number of times a product is chosen (n)	230	201	183	157	771	30.74%
(%)	29.83%	26.07%	23.74%	20.36%		
Conventional	0.90 €	1.00 €	1.10 €	1.20 €		
Number of times a product is chosen (n)	262	190	164	190	806	32.14%
(%)	32.51%	23.57%	20.35%	23.57%		
Circular	1.10 €	1.20 €	1.30 €	1.40 €		
Number of times a product is chosen (n)	245	222	256	153	876	34.93%
(%)	27.97%	25.34%	29.22%	17.47%		
"NONE" option					55	0.02%
TOTAL					2,508	100%

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Table 24 (continued): Descriptive results of the best product choice at different price level in Italy

Product	BREAD					
Organic	1.40 €	1.60 €	1.80 €	2.00 €		TOTAL
Number of times a product is chosen (n)	168	152	131	124	575	26.52%
(%)	29.22%	26.43%	22.78%	21.57%		
Conventional	0.80 €	0.90 €	1.00 €	1.10 €		
Number of times a product is chosen (n)	211	188	164	206	769	35.47%
(%)	27.44%	24.45%	21.33%	26.79%		
Circular	1.00 €	1.10 €	1.20 €	1.30 €		
Number of times a product is chosen (n)	224	195	162	184	765	35.29%
(%)	29.28%	25.49%	21.18%	24.05%		
"NONE" option					59	0.03 %
TOTAL					2,168	100%

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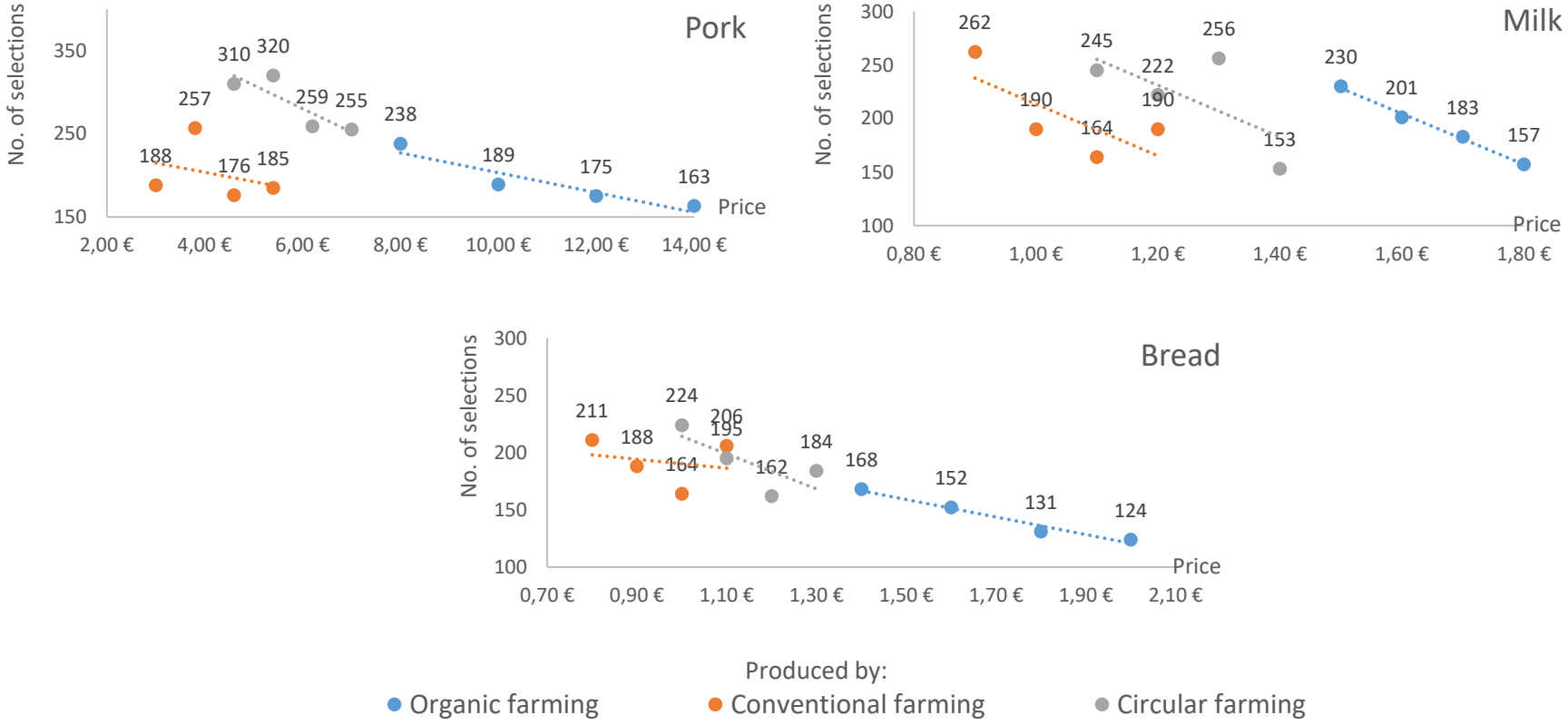

Figure 36: Choice of the preferred products according to the farming system vs price, Italy.

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3.7.5. Descriptive results of the products choice in Hungary

According to the percentage of expected purchase intention (Table 25), results showed that consumers in Hungary exhibited very heterogeneous results on pork selections. There are some cases in which the demand increases although the price increases. Additionally, as can be seen in Figure 37, the preferences of conventional pork and for the organic bread had an almost undefined trend. This may indicate that consumers were not sensitive enough to the price change, suggesting that the price vector selected for production farming system describing the products was relatively low. However, in the remaining choice sets, the trend was identified as expected. Comparing between the 3 production systems for the 3 analysed products, in all cases conventional "the cheapest" was selected more times, while organic "the expensive" was selected less times.

Table 25: Descriptive results of the choice preference in Hungary

Product	PORK					
Organic	5.50 €	6.00 €	6.50 €	7.00 €		TOTAL
Number of times a product is chosen (n)	90	59	62	51	262	7.55%
(%)	34.35%	22.52%	23.66%	19.47%		
Conventional	3.00 €	3.20 €	3.40 €	3.60 €		
Number of times a product is chosen (n)	534	421	450	526	1,931	55.68%
(%)	27.65%	21.80%	23.30%	27.24%		
Circular	3.40 €	3.60 €	3.80 €	4.00 €		
Number of times a product is chosen (n)	334	344	248	250	1,176	33.91%
(%)	28.40%	29.25%	21.09%	21.26%		
"NONE" option					99	0.03%
TOTAL					3,468	100%

Product	MILK					
Organic	1.30 €	1.40 €	1.50 €	1.60 €		TOTAL
Number of times a product is chosen (n)	51	46	42	40	179	5.57%
(%)	28.49%	25.70%	23.46%	22.35%		
Conventional	0.70 €	0.80 €	0.90 €	1.00 €		
Number of times a product is chosen (n)	614	499	472	436	2,021	62.92%
(%)	30.38%	24.69%	23.35%	21.57%		
Circular	0.90 €	1.00 €	1.10 €	1.20 €		
Number of times a product is chosen (n)	201	194	209	96	700	21.79%
(%)	28.71%	27.71%	29.86%	13.71%		
"NONE" option					312	9.71%
TOTAL					3,212	100%

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Table 25 (continued): Descriptive results of the choice preference in Hungary

Product	BREAD					
Organic	1.50 €	1.60 €	1.70 €	1.80 €		TOTAL
Number of times a product is chosen (n)	43	34	28	32	137	4.87%
(%)	31.39%	24.82%	20.44%	23.36%		
Conventional	0.90 €	1.00 €	1.10 €	1.20 €		
Number of times a product is chosen (n)	524	421	456	417	1,818	64.65%
(%)	28.82%	23.16%	25.08%	22.94%		
Circular	1.10 €	1.20 €	1.30 €	1.40 €		
Number of times a product is chosen (n)	193	155	165	98	611	21.73%
(%)	31.59%	25.37%	27.00%	16.04%		
"NONE" option					246	8.75%
TOTAL					2,812	100%

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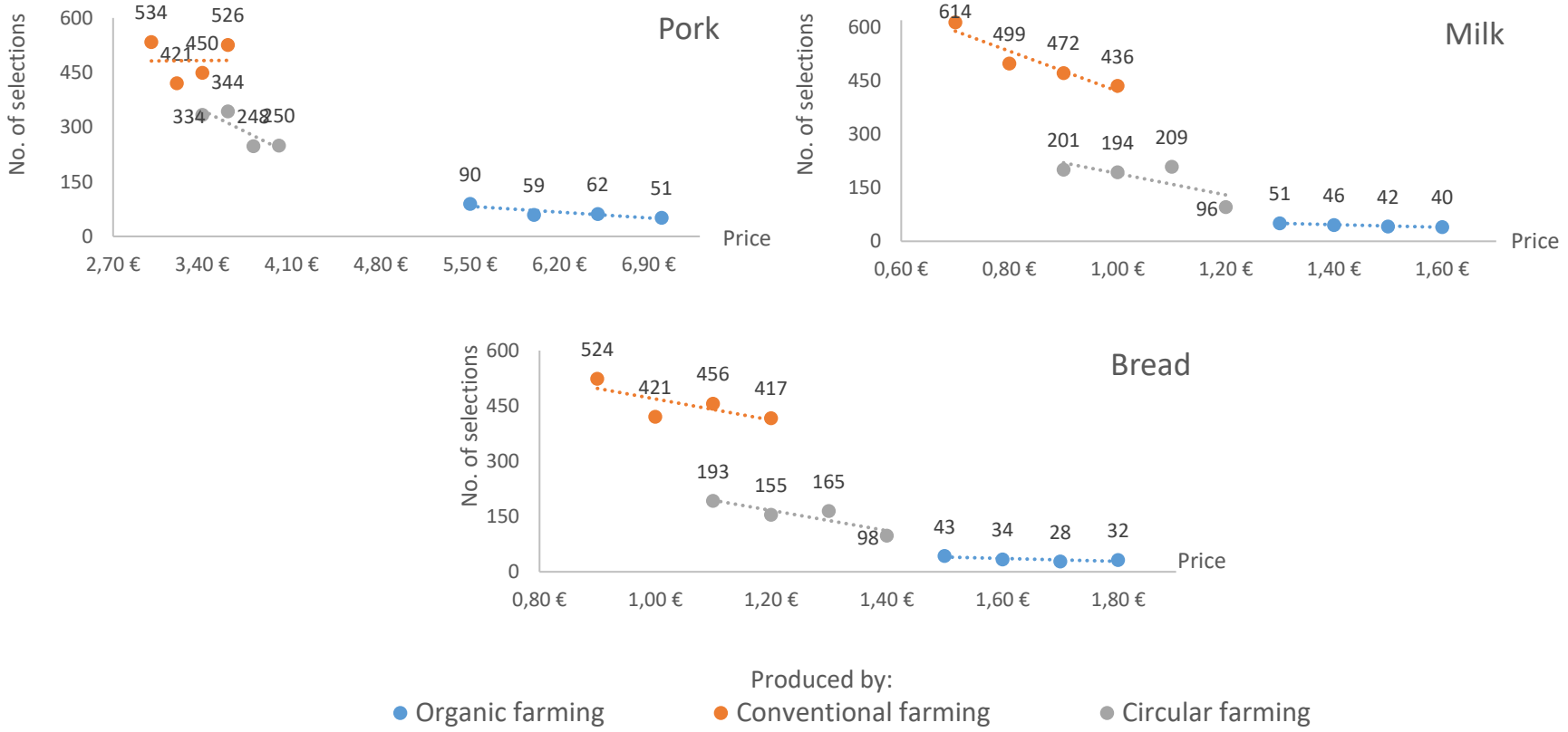

Figure 37: Choice of the preferred products according to the farming system vs price, Hungary.

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3.7.6. Descriptive results of the products choice in Croatia

In Croatia results showed (Table 26) expected trend for the purchase intention of sliced pork loin, milk and sliced bread regarding their price level of each product. Figure 38 clearly shows in all products a decreasing trend when prices increase. Also, comparing the farming production systems results, the conventional products were the most selected, and the organic one the least. With the exception of milk where the circular milk was less selected.

Table 26: Descriptive results of the choice preference in Croatia

Product	PORK					
Organic	6.60 €	6.90 €	7.20 €	7.50 €		TOTAL
Number of times a product is chosen (n)	139	149	142	119	549	30.10%
(%)	25.32%	27.14%	25.87%	21.68%		
Conventional	3.30 €	3.80 €	4.30 €	4.80 €		
Number of times a product is chosen (n)	204	134	142	155	635	34.81%
(%)	32.13%	21.10%	22.36%	24.41%		
Circular	4.20 €	4.70 €	5.20 €	5.70 €		
Number of times a product is chosen (n)	169	161	169	94	593	32.51%
(%)	28.50%	27.15%	28.50%	15.85%		
"NONE" option					47	0.03%
TOTAL					1,824	100%

Product	MILK					
Organic	1.60 €	1.75 €	1.90 €	2.05 €		TOTAL
Number of times a product is chosen (n)	124	114	106	108	452	23.99%
(%)	27.43%	25.22%	23.45%	23.89%		
Conventional	0.50 €	0.65 €	0.80 €	0.95 €		
Number of times a product is chosen (n)	277	239	216	221	953	50.58%
(%)	29.07%	25.08%	22.67%	23.19%		
Circular	0.85 €	1.00 €	1.15 €	1.30 €		
Number of times a product is chosen (n)	114	109	122	64	409	21.71%
(%)	27.87%	26.65%	29.83%	15.65%		
"NONE" option					70	3.72%
TOTAL					1,884	100.00%

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Table 26 (continued): Descriptive results of the choice preference in Croatia

Product	BREAD					
Organic	1.60 €	1.75 €	1.90 €	2.05 €		TOTAL
Number of times a product is chosen (n)	65	62	56	57	240	19.11%
(%)	27.08%	25.83%	23.33%	23.75%		
Conventional	0.50 €	0.65 €	0.80 €	0.95 €		
Number of times a product is chosen (n)	200	174	168	162	704	56.05%
(%)	28.41%	24.72%	23.86%	23.01%		
Circular	0.85 €	1.00 €	1.15 €	1.30 €		
Number of times a product is chosen (n)	73	69	72	42	256	20.38%
(%)	28.52%	26.95%	28.13%	16.41%		
"NONE" option					56	4.46%
TOTAL					1,256	100%

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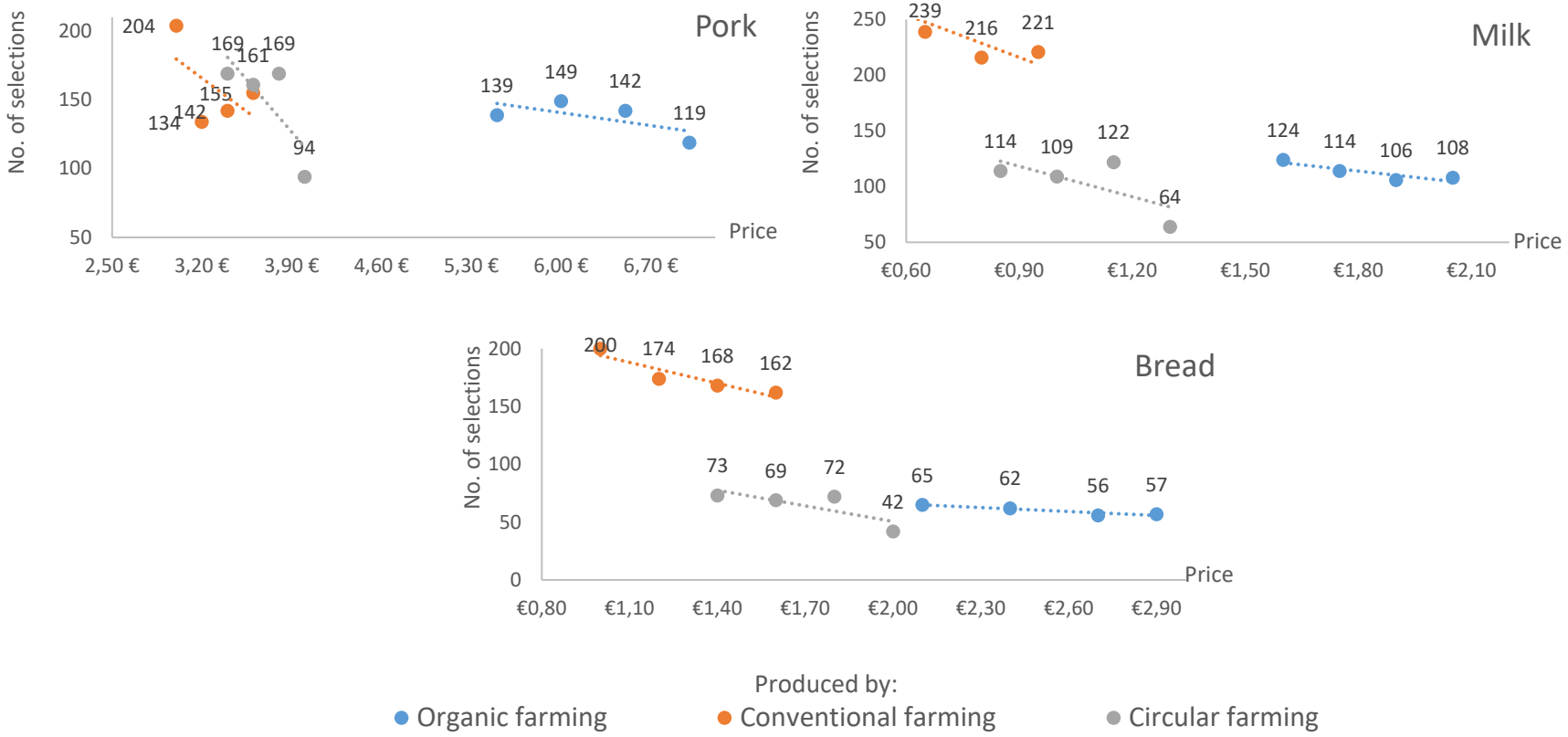

Figure 38: Choice of the preferred products according to the farming system vs price, Croatia

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3.7.7. Descriptive results of the products choice in Belgium

Finally, results in Belgium showed heterogeneous preferences scheme for the three analysed products (Table 27). For the milk and bread products, consumers showed consistency in their purchase intention and thus the demand curve was as expected (Figure 39). However, it was not the case for the pork product with conventional and circular farming systems. As mentioned before, the undefined or unexpected trend, as is the case of Hungary, could be related to relatively low-price vector of conventional pork (from 5.00 € to 8.00 €) and circular pork (from 7.00 € to 10.00 €) or because the comparative relation of the prices of the products on the same scenario.

Table 27: Descriptive results of the products at different price level in Belgium

Product	PORK					
Organic	12.00 €	14.00 €	16.00 €	18.00 €		TOTAL
Number of times a product is chosen (n)	238	161	191	159	749	22.72%
(%)	31.78%	21.50%	25.50%	21.23%		
Conventional	5.00 €	6.00 €	7.00 €	8.00 €		
Number of times a product is chosen (n)	306	380	290	350	1,326	40.23%
(%)	23.08%	28.66%	21.87%	26.40%		
Circular	7.00 €	8.00 €	9.00 €	10.00 €		
Number of times a product is chosen (n)	205	269	278	322	1,074	32.58%
(%)	19.09%	25.05%	25.88%	29.98%		
Expected "NONE" option					147	0.04%
TOTAL					3,296	100%

Product	MILK					
Organic	1.40 €	1.50 €	1.60 €	1.70 €		TOTAL
Number of times a product is chosen (n)	200	187	180	176	743	22.90%
(%)	26.92%	25.17%	24.23%	23.69%		
Conventional	0.80 €	0.90 €	1.00 €	1.10 €		
Number of times a product is chosen (n)	450	386	354	374	1,564	48.21%
(%)	28.77%	24.68%	22.63%	23.91%		
Circular	1.00 €	1.10 €	1.20 €	1.30 €		
Number of times a product is chosen (n)	224	228	228	138	818	25.22%
(%)	27.38%	27.87%	27.87%	16.87%		
Expected "NONE" option					119	3.67%
TOTAL					3,244	100%

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Table 27 (continued): Descriptive results of the products at different price level in Belgium

Product	BREAD					
Organic	2.10 €	2.30 €	2.50 €	2.70 €		TOTAL
Number of times a product is chosen (n)	169	132	135	124	560	18.13%
(%)	30.18%	23.57%	24.11%	22.14%		
Conventional	1.40 €	1.50 €	1.60 €	1.70 €		
Number of times a product is chosen (n)	438	376	371	415	1,600	51.81%
(%)	27.38%	23.50%	23.19%	25.94%		
Circular	1.60 €	1.70 €	1.80 €	1.90 €		
Number of times a product is chosen (n)	228	204	172	191	795	25.74%
(%)	28.68%	25.66%	21.64%	24.03%		
Expected "NONE" option					133	4.31%
TOTAL					3,088	100%

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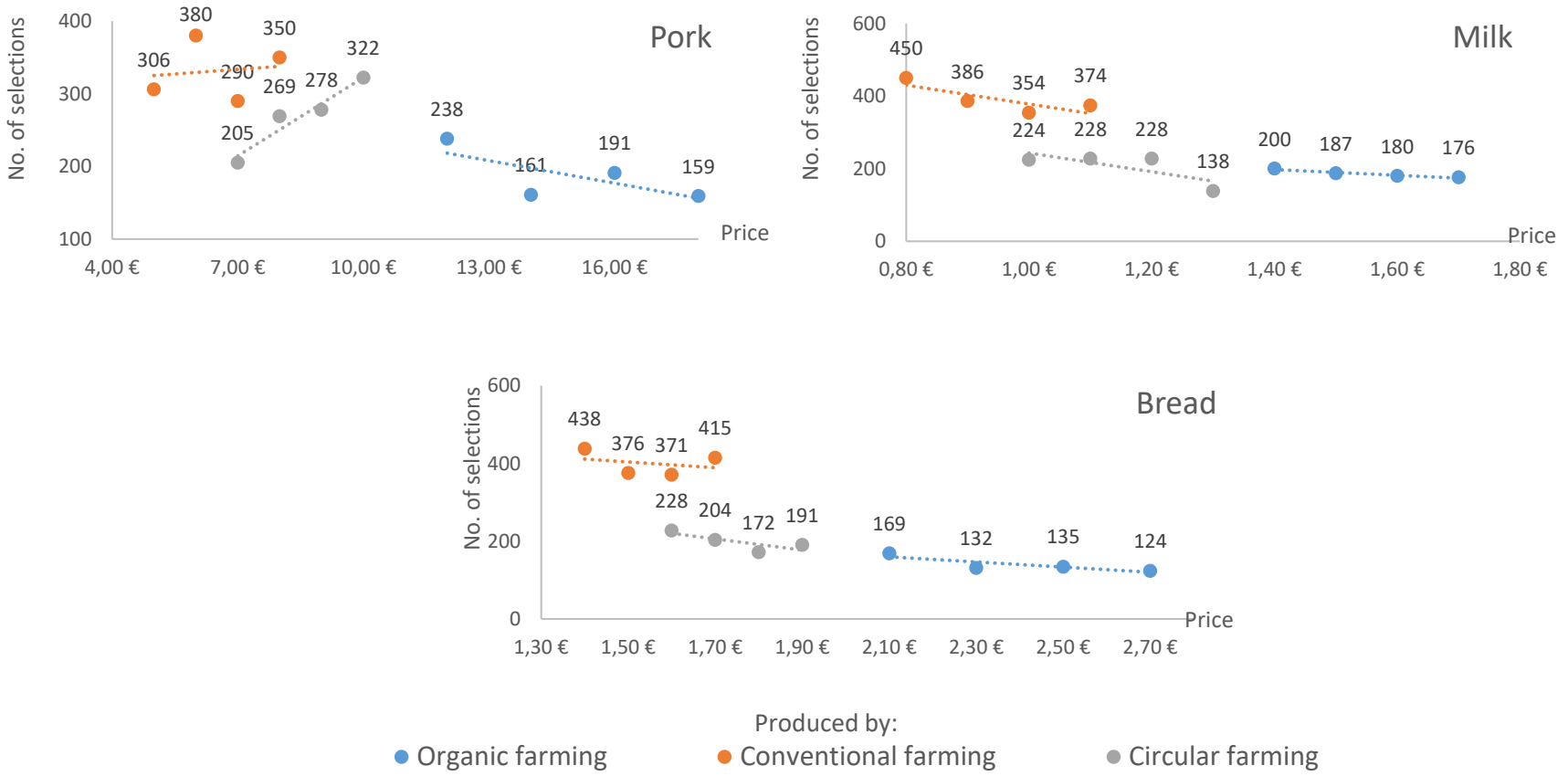

Figure 39: Choice of the preferred products according to the farming system vs price, Belgium.

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3.7.8. Consumers' Willingness to Pay (DCE)

In order to estimate the ***Expected Willingness to Pay***, the Random Parameter Logit (RPL) model was estimated for each case study and each specific product (1) sliced pork loin, (2) milk and (3) sliced bread.

Results of the RPL for the 3 analysed products (Table 28, Table 29, and Table 30 for pork, milk, and bread respectively) showed that at 99% confidence level, we can reject the null hypothesis that all coefficients are jointly equal to zero with a Log-Likelihood ratio test highly significant. This means that there is a significant difference between the preferences of the production farming system and the prices of products of each production farming system. The goodness of fit is assessed through the McFadden's pseudo-R^2 which is highly acceptable. According to Hensher *et al*. (2005) a pseudo-R^2 of 0.3 represents a decent model fit for a discrete choice model. Indeed, a pseudo-R^2 of 0.3 represents an R^2 of approximately 0.6 for the equivalent R^2 of a linear regression model. Values between the range of 0.3 and 0.4 can be translated as an R^2 of between 0.6 and 0.8 for the linear model equivalent. The positive/negative sign of the coefficients implies higher/lower levels of utility associated with the products, and thereby with their characteristics.

In this context, the model estimates showed that all coefficients are statistically significant in all countries and between production farming systems. However, estimates cannot be compared between countries due to the scale parameter and comparisons should be evaluated only at the WTP levels. It is important to remember that the price coefficients were considered fixed (i.e., non-random) to ensure that the estimated total Willingness to Pay will be normally distributed and with a finite moment. The results of the model for each product (Table 28, Table 29 and Table 30) show that all significative prices present negative sing, that indicates there are an inverse relationship between the price and the probability of their election, confirming the main trend mentioned in the previous section. Additionally, all the estimated standard deviations of the random coefficients (ASCs) were highly significant, confirming the presence of non-observed heterogeneity around the mean (i.e., the utilities of the products farming system) and thus the suitability of the used model specification.

As can be seen in the tables below, results showed high level of heterogeneity of the marginal utilities of the Alternative Specific Constant (ASC, which represents the marginal utility of a product relative to the NONE option) for circular farming products compared to the ASC of organic and conventional. Focusing on the Pork product from circular farming, results (Table 28) showed that it received the highest preference (marginal utility) in Italy, Belgium and Hungary, while in Spain, Croatia and Poland the marginal utility was higher than the conventional pork but relatively lower than the organic one. The milk results (Table 29) also showed that the utility of milk from circular farming was relatively higher than the organic one in Hungary, Croatia and Belgium. However, in Spain the utilities associated with this milk from circular farming received the lowest utility level. For the bread, results (Table 30) showed higher marginal utility of bread from circular farming compared to Organic farming. However, this utility level was lower? than the utility obtained from conventional bread.

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Table 28: RPL results and WTP estimated for Pork

β_s	Spain	Poland	Italy	Hungary	Croatia	Belgium
	RPL -PORK					
	Random β_s					
Alternative Specific Constant ORG β_1	5.64***	9.82***	6.61***	12.72***	13.93***	7.94***
Alternative Specific Constant CONV β_2	6.54***	7.72***	5.09***	10.79***	8.55***	6.9***
Alternative Specific Constant CIRC β_3	6.56***	8.8***	8.47***	24.47***	10.14***	9.56***
	Non- random α_s					
PRICE-ORG α_1	-0.55***	-0.23***	-0.55***	-0.004***	-0.39***	-0.59***
PRICE-CONV α_2	-0.84***	-0.15***	-0.54***	0.00002	-0.22***	-0.37***
PRICE-CIRC α_3	-0.77***	-0.2***	-1.13***	-0.01***	-0.26***	-0.93***
	S.D of Random β_s					
S.D-ORG	4.68***	7.08***	4.55***	6.62***	6.28***	5.42***
S.D-CONV	2.69***	5.19***	3.97***	6.41***	4.14***	5.58***
S.D-CIRC	3.55***	5.49***	3.58***	6.67***	3.82***	4.46***
Log-Likelihood (θ)	-3316.05	-2992.35	-2306.30	-2224.10	-1442.40	-2605.28
Pseudo R^2	0.40	0.41	0.40	0.54	0.43	0.43

***, **, * ==> Significance at 1%, 5%, 10% level.

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Table 29: RPL results and WTP estimated for Milk

β_s	Spain	Poland	Italy	Hungary	Croatia	Belgium
	RPL -MILK					
	Random β_s					
Alternative Specific Constant ORG β_1	11.87***	8.79***	15.49***	2.17	3.74***	9.00***
Alternative Specific Constant CONV β_2	12.08***	10.17***	11.15***	15.08***	7.23***	12.12***
Alternative Specific Constant CIRC β_3	**6.96*** **	**9.52*** **	**11.14*** **	**9.86*** **	**5.58*** **	**11.17*** **
	Non- random α_s					
PRICE-ORG α_1	-7.99***	-0.59***	-11.86***	-0.01***	-0.35*	-5.58***
PRICE-CONV α_2	-6.53***	-1.71***	-9.5***	-0.02***	-0.83***	-9.23***
PRICE-CIRC α_3	1.61	-1.3***	-7.11***	-0.01***	-0.48***	-8.41***
	S.D of Random β_s					
S.D-ORG	6.81***	5.95***	5.28***	9.49***	6.08***	6.94***
S.D-CONV	5.81***	5.53***	4.18***	6.08***	4.16***	5.98***
S.D-CIRC	6.11***	5.46***	4.61***	8.11***	4.00***	5.60***
Log-Likelihood (θ)	-2727.02	-3094.00	-2073.35	-2059.27	-1435.86	-2341.72
Pseudo R^2	0.46	0.41	0.40	0.54	0.45	0.48

***, **, * ==> Significance at 1%, 5%, 10% level.

Table 30: RPL results and WTP estimated for Bread

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773682.

β_s	Spain	Poland	Italy	Hungary	Croatia	Belgium
	RPL -BREAD					
			Random β_s			
Alternative Specific Constant ORG β_1	4.36***	4.46***	8.37***	1.3	5.01***	9.53***
Alternative Specific Constant CONV β_2	9.65***	10.28***	7.6***	14.79***	9.61***	12.66***
Alternative Specific Constant CIRC β_3	7.13***	8.38***	9.77***	13.51***	7.83***	12.89***
			Non- random α_s			
PRICE-ORG α_1	-1.43***	-0.36***	-3.61***	-0.01*	-0.31**	-4.33***
PRICE-CONV α_2	-5.09***	-0.97***	-3.12**	-0.01***	-0.55***	-4.57***
PRICE-CIRC α_3	-2.81***	-0.74***	-5.75***	-0.02***	-0.41***	-6.28***
			S.D of Random β_s			
S.D-ORG	5.96***	11.03***	5.16***	11.31***	7.75***	8.37***
S.D-CONV	3.82***	5.42***	3.98***	7.38***	4.59***	6.11***
S.D-CIRC	5.27***	7.11***	4.89***	9.66***	5.2***	7.03***
Log-Likelihood (θ)	**-2499.00**	**-2718.75**	**-1819.10**	**-1671.76**	**-936.33**	**-2113.16**
Pseudo R^2	**0.47**	**0.44**	**0.39**	**0.57**	**0.46**	**0.51**

***, **, * ==> Significance at 1%, 5%, 10% level.

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In all cases, to better understand the estimated marginal utilities, it is important to calculate the consumers' WTP since in this case the marginal utility of the price is also included in the preference analysis. Results of the WTP are in Table 31, Table 32 and Table 33 for each product category. For the Pork product (Table 31), the expected WTP showed a positive and significant values for product from circular farming in all countries. Which means that all interviewed consumers are willing to pay an additional premium for circular pork. However, the WTP for pork from circular farming was only higher than the conventional one in Spain, Hungary and Croatia. The highest values, for the organic pork, were found in Spain, Italy, and Hungary compared to the pork obtained by conventional and circular farming. In Poland and Croatia, although the organic pork received the highest utility, consumers were not willing to pay too much for it. These results could also be associated with the high price level presented. In Belgium, the highest utility was obtained for pork produced by circular farming (Table 28, ASC CIRC β_3 = 11.17). However, the willingness to pay for circular pork (10.25) was relatively low as also succeed for the pork produced on an organic farming system (13.44). This outcome could also be related to the low price level presented of conventional pork that may influenced the results.

The estimated results for the willingness to pay for milk product (Table 32) showed that, the WTP for milk produced under circular farming was higher than the conventional milk in all countries except for Spain, where results showed a non-significant WTP value. The organic milk had the highest WTP in Poland and Belgium, while the consumers from Italy, Hungary, and Croatia, had the highest expected WTP for the circular milk. These results confirm the positive and significant expected WTP for the milk obtained from the circular farming system.

In the case of the bread, the estimated WTP results (Table 33) showed that the bread from circular farming received higher WTP than the conventional bread in Spain, Croatia and Poland. The expected WTP for organic bread was the highest in Spain and Poland, while for Croatian consumers, the circular sliced bread has the highest willingness to pay. However, although the circular bread represents the highest marginal utility for Italian and Belgium consumers, results showed that they are not willingness to pay a premium price for this product. In Hungary the estimated WTP for organic bread is not significant, as neither the utility that it represents for consumers. They obtained the highest utility from the conventional bread.

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Table 31: The Estimated Willingness to pay for the ORG, CONV and CIRC Pork

WTP	Spain	Poland	Italy	Hungary	Croatia	Belgium
	PORK 500 gr					
WTP-ORG β_1 / α_1	10.28***	9.19***	12.04***	8.49***	7.86***	13.44***
(95%) Confidence Interval	(7.40 - 13.15)	(6.47 - 11.91)	(9.36 - 14.72)	(6.36 - 10.61)	(6.55 - 5.61)	(10.80 - 16.07)
WTP-CONV β_2 / α_2	7.75***	11.53***	9.36***	-12.64	8.42***	18.41***
(95%) Confidence Interval	(6.09 - 9.41)	(3.36 - 19.7)	(4.55 - 4.162)	(-8.22 - 24.1)	(5.92 - 6.69)	(8.553 - 28.27)
WTP-CIR β_3 / α_3	8.46***	9.73***	7.52***	5.84***	8.6***	10.25***
(95%) Confidence Interval	(6.60 - 10.32)	(5.12 - 14.34)	(6.04 - 9.01)	(5.04 - 6.64)	(6.61 - 6.5)	(8.278 - 12.21)

Table 32: The Estimated Willingness to pay for the ORG, CONV and CIRC Milk

WTP	Spain	Poland	Italy	Hungary	Croatia	Belgium
	MILK					
WTP-ORG β_1/ α_1	1.49***	3.23***	1.31***	0.55	1.43***	1.61***
(95%) Confidence Interval	(0.93 - 2.04)	(2.51 - 3.94)	(1.11 - 1.49)	(-0.18 - 1.27)	(0.73 - 2.14)	(1.06 - 2.16)
WTP-CONV β_2 / α_2	1.85***	1.29***	1.17***	1.71***	1.16***	1.31***
(95%) Confidence Interval	(1.04 - 2.65)	(0.83 - 1.75)	(0.90 - 1.43)	(1.53 - 1.89)	(0.86 - 1.47)	(1.01 - 1.62)
WTP-CIR β_3 / α_3	-4.33	1.58***	1.57***	1.83***	1.55***	1.33***
(95%) Confidence Interval	(-7.60 - 1.03)	(0.92 - 0.08)	(1.15 - 1.97)	(1.5 - 2.17)	(0.92 - 2.19)	(1.00 - 1.65)

***, **, * ==> Significance at 1%, 5%, 10% level.

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Table 33: The Estimated Willingness to pay for the ORG. CONV and CIRC Sliced Bread

WTP	Spain	Poland	Italy	Hungary	Croatia	Belgium
	BREAD					
WTP-ORG β_1/ α_1	3.04***	2.73***	2.32***	0.50	2.19***	2.20***
(95%) Confidence Interval	(1.90 - 4.17)	(1.57 - 3.88)	(1.52 - 3.11)	(-1.45 - 2.45)	(0.98 - 3.39)	(1.50 - 2.89)
WTP-CONV β_2 / α_2	1.90***	2.30***	2.43***	2.97***	2.34***	2.77***
(95%) Confidence Interval	(1.50 - 2.28)	(1.93 - 2.66)	(0.69 - 4.17)	(2.28 - 3.65)	(1.46 - 3.21)	(1.54 - 3.99)
WTP-CIR β_3 / α_3	2.54***	2.46***	1.70***	2.21***	2.53***	2.05***
(95%) Confidence Interval	(1.65 - 3.41)	(1.94 - 2.98)	(1.10 - 2.29)	(1.73 - 2.70)	(1.36 - 3.69)	(1.42 - 2.68)

***, **, * ==> Significance at 1%, 5%, 10% level.

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3.7.9. Direct and cross Price Demand Elasticities (PDE): Simulation scenarios

The relationship between the percentage change for some attribute and the percentage change in the quantity demanded (***direct elasticity***), *ceteris paribus* (i.e. with other conditions remaining the same) can be estimated in the DCE with labelled design applied in this research. The change in quantity demanded of a product associated to its own price variation may also be associated to the price variation of the competing products (substitute or complementary products). It is for this reason we have also estimated the ***cross-elasticities***. This outcome will be the cornerstone of the Task 5.6 Consumer behaviour impact (e.g. dietary shifts) on flows, sustainability, agro-economics. In this task a quantitative model-based analysis is performed with the CAPRI model system in order to assess the impacts of demand-side management and shifts in preferences.

In the proposed DCE approach, Louviere *et al*. (2000) defined them as follows:

"*A direct elasticity measures the percentage change in the probability of choosing a particular alternative in the choice set with respect to a given percentage change in an attribute of that same alternative".*

"A cross elasticity measures the percentage change in the probability of choosing a particular alternative in the choice set with respect to a given percentage change in a competing alternative".

When the attribute change corresponds to the price, we then refer to the **price demand elasticity** (PDE).

To better understand the relationship between the change of the attribute price of a product on its own demand (direct elasticity) and the demand of the other products offered in a choice set (cross elasticity) we carried out a simulation analysis of two scenarios 1) in which the price was decreased by 25% and 2) the price was increased by 25%. The price decrease or increase are not simultaneous to all products, which means that the price change occurs only for one product type (*ceteris paribus* the other conditions). For the simulation calculation, we used the point elasticity method, using the price considered as continuous variable (Hensher *et al*., 2005) as follows:

$$E_{X_{ikn}}^{P_{in}} = \frac{\partial P_{in}}{\partial X_{ikn}} \cdot \frac{X_{ikn}}{P_{in}} \qquad (6)$$

Equation 6 summarizes the calculation of the elasticity of the probability of alternative *i* for individual *n* (P_{in}) with respect to a marginal change in the *k*th attribute of the *I* th alternative (which is X_{ikn}) as observed by individual *n* (Hensher *et al*., 2005).

Results of the simulations are shown in Table 34. The elasticity results for the case studies in Poland, Italy, Croatia, and Belgium (Pork, milk, and bread), Spain (Pork and bread), Hungary (milk and bread) were as expected. That is when the price of a specific production system (ORG, CONV, and CIRC) decrease by 25%, the percentage of change in the *direct-probability* (own change) of selection increase and the percentage of the *cross-probability* (cross change) decrease. Showing that there is a high substitutability across the products. In the same way, when the price of a specific production system increases by 25%, the percentage of change in the *direct-probability* of selection decrease and the percentage of the *cross-probability* increase. These results confirm the ***substitutability*** across the product at a potential marketplace. In this case, because the percentages of all direct probabilities are positives when price decrease and negatives when price increase. For example, if the price of the ORG product increase, the quantity demanded for a CIRC product (a substitute product) increases as consumers switch to a less expensive yet substitutable alternative.

In Spain, because the WTP for Circular milk was not significant, the own and cross elasticities are also meaningless. The same has happened in Hungary for pork in relation to a non-significant WTP for the conventional pork product.

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According to the estimated results in the simulated scenarios (25% variation in price decrease and increase) as can be shown in Table 34, the ORG pork in Poland and Croatia was more elastic (relatively higher value) than CONV and CIRC pork, while CIRC pork was more elastic in Spain, Italy, Hungary, and Belgium than CONV and ORG pork. Also results showed that price of ORG milk was more elastic than price of CIRC and CONV milk in Spain and Italy. In Belgium and Poland price of CIRC milk was more elastic than CONV and ORG milk. In Hungary and Croatia price of CONV milk was more elastic than prices of ORG and CIRC milk. Finally, for bread, consumers from Italy and Belgium were more sensitive to change in the price of CIRC bread. In Spain and Croatia, price of CONV bread showed more elasticity than price of ORG and CIRC bread. These results confirm the substitutability characteristics across the products from the different production systems at a potential marketplace, and highlight the potential acceptance of the products from circular farming. The substitutability rate was highly related to the product category and the country analysed, suggesting the need to design country-specific marketing strategies and specific price policies to better position the products from circular farming jointly with conventional and organic one. Results on the Table 34 show the percentage of increase or decrease in the number of times a product is selected if the price of the product is varied.

To better highlight the elasticity term, the outcome of the Table 35, were recalculated in unit percentage because the own-price elasticity of demand is a measure of the responsiveness of demand for a product to a change in the price of that product; in other words, the percent change in the quantity of a product resulting from a 1-percent change in its own price.

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Table 34: Direct and cross price demand elasticity scenarios

Product			Pork				Milk				Bread			
Price Variation			ORG	CONV	CIRC	NONE	ORG	CONV	CIRC	NONE	ORG	CONV	CIRC	NONE
Spain	-25%	ORG (-25%)	5.13%	-2.28%	-2.65%	-0.20%	8.64%	-3.78%	-4.50%	-0.36%	2.61%	-1.23%	-1.25%	-0.13%
		CONV (-25%)	-1.44%	4.63%	-2.78%	-0.41%	-1.54%	4.77%	-2.86%	-0.38%	-1.42%	6.23%	-4.07%	-0.73%
		CIRC (-25%)	-2.32%	-3.78%	6.34%	-0.23%	0.85%	1.24%	NS	0.04%	-1.12%	-3.22%	4.46%	-0.12%
	25%	ORG (+25%)	-4.62%	1.98%	2.46%	0.19%	-7.41%	2.71%	4.38%	0.32%	-2.33%	1.07%	1.14%	0.12%
		CONV (+25%)	1.35%	-4.56%	2.75%	0.47%	1.44%	-4.92%	3.08%	0.41%	1.35%	-6.46%	4.25%	0.86%
		CIRC (+25%)	2.09%	3.37%	-5.68%	0.22%	-0.91%	-1.34%	NS	-0.04%	1.05%	2.92%	-4.07%	0.11%

Product			Pork				Milk				Bread			
Price Variation			ORG	CONV	CIRC	NONE	ORG	CONV	CIRC	NONE	ORG	CONV	CIRC	NONE
Poland	-25%	ORG (-25%)	5.95%	-2.03%	-3.59%	-0.33%	4.51%	-1.56%	-2.74%	-0.21%	3.11%	-1.53%	-1.56%	-0.02%
		CONV (-25%)	-0.52%	1.90%	-1.20%	-0.18%	-1.31%	4.36%	-2.74%	-0.31%	-1.56%	7.08%	-3.73%	-1.79%
		CIRC (-25%)	-1.74%	-2.17%	4.08%	-0.17%	-2.20%	-2.73%	5.08%	-0.16%	-1.96%	-4.83%	7.18%	-0.39%
	25%	ORG (+25%)	-5.62%	1.77%	3.56%	0.29%	-4.06%	1.30%	2.57%	0.19%	-2.80%	1.30%	1.49%	0.02%
		CONV (+25%)	0.50%	-1.87%	1.19%	0.18%	1.23%	-4.33%	2.79%	0.32%	1.44%	-7.44%	4.09%	1.91%
		CIRC (+25%)	1.62%	2.05%	-3.82%	0.15%	2.03%	2.45%	-4.61%	0.14%	1.59%	3.71%	-5.58%	0.29%

Product			Pork				Milk				Bread			
Price Variation			ORG	CONV	CIRC	NONE	ORG	CONV	CIRC	NONE	ORG	CONV	CIRC	NONE
Italy	-25%	ORG (-25%)	5.47%	-1.72%	-3.46%	-0.29%	19.07%	-7.47%	-10.86%	-0.74%	5.92%	-2.22%	-3.47%	-0.24%
		CONV (-25%)	-0.64%	2.18%	-1.39%	-0.15%	-3.64%	11.01%	-6.78%	-0.59%	-1.04%	3.21%	-1.93%	-0.23%
		CIRC (-25%)	-3.71%	-4.07%	8.32%	-0.54%	-4.91%	-6.02%	11.32%	-0.40%	-3.73%	-4.42%	8.42%	-0.27%
	25%	ORG (+25%)	-4.93%	1.50%	3.16%	0.28%	-14.99%	5.35%	8.97%	0.66%	-5.32%	1.92%	3.18%	0.22%
		CONV (+25%)	0.61%	-2.11%	1.35%	0.15%	2.94%	-9.67%	6.12%	0.62%	0.99%	-3.12%	1.89%	0.24%
		CIRC (+25%)	3.50%	3.82%	-7.89%	0.57%	4.29%	5.41%	-10.05%	0.36%	3.45%	4.03%	-7.73%	0.24%

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Table 34 (continued): Direct and cross price demand elasticity scenarios

Product			Pork				Milk				Bread			
Price Variation			ORG	CONV	CIRC	NONE	ORG	CONV	CIRC	NONE	ORG	CONV	CIRC	NONE
Hungary	-25%	ORG (-25%)	6.99%	-3.49%	-3.13%	-0.37%	2.71%	-0.88%	-1.57%	-0.26%	1.64%	-0.54%	-0.99%	-0.11%
		CONV (-25%)	0.01%	-0.06%	0.04%	0.00%	-1.01%	13.91%	-9.29%	-3.62%	-0.65%	9.05%	-6.22%	-2.19%
		CIRC (-25%)	-4.07%	-25.82%	NS	-1.07%	-1.33%	-7.68%	9.59%	-0.58%	-1.60%	-10.44%	12.56%	-0.52%
	25%	ORG (+25%)	-4.10%	1.96%	1.89%	0.25%	-1.98%	0.59%	1.21%	0.19%	-1.31%	0.40%	0.83%	0.09%
		CONV (+25%)	-0.01%	0.06%	-0.04%	0.00%	0.83%	-15.42%	10.30%	4.28%	0.54%	-10.07%	7.06%	2.47%
		CIRC (+25%)	3.38%	18.06%	NS	0.83%	1.32%	6.65%	-8.38%	0.41%	1.46%	8.02%	-9.80%	0.32%

Product			Pork				Milk				Bread			
Price Variation			ORG	CONV	CIRC	NONE	ORG	CONV	CIRC	NONE	ORG	CONV	CIRC	NONE
Croatia	-25%	ORG (-25%)	14.69%	-6.24%	-7.73%	-0.73%	3.06%	-1.01%	-1.78%	-0.27%	3.22%	-1.52%	-1.53%	-0.18%
		CONV (-25%)	-1.93%	7.03%	-4.65%	-0.45%	-0.97%	4.25%	-2.67%	-0.61%	-1.34%	5.67%	-3.51%	-0.82%
		CIRC (-25%)	-3.72%	-6.81%	11.17%	-0.64%	-1.49%	-2.31%	3.99%	-0.19%	-1.45%	-3.86%	5.58%	-0.27%
	25%	ORG (+25%)	-12.21%	4.79%	6.71%	0.70%	-2.90%	0.88%	1.75%	0.26%	-2.95%	1.33%	1.46%	0.16%
		CONV (+25%)	1.67%	-6.61%	4.48%	0.46%	0.87%	-4.33%	2.78%	0.68%	1.23%	-5.88%	3.76%	0.89%
		CIRC (+25%)	3.06%	6.02%	-9.72%	0.64%	1.35%	2.05%	-3.58%	0.17%	1.25%	3.27%	-4.75%	0.23%

Product			Pork				Milk				Bread			
Price Variation			ORG	CONV	CIRC	NONE	ORG	CONV	CIRC	NONE	ORG	CONV	CIRC	NONE
Belgium	-25%	ORG (-25%)	6.56%	-2.34%	-3.72%	-0.50%	5.72%	-2.50%	-2.90%	-0.33%	5.55%	-2.35%	-2.92%	-0.28%
		CONV (-25%)	-0.59%	2.23%	-1.45%	-0.19%	-2.39%	7.32%	-4.22%	-0.71%	-1.49%	5.86%	-3.70%	-0.67%
		CIRC (-25%)	-3.28%	-4.91%	8.92%	-0.72%	-3.32%	-5.13%	8.99%	-0.55%	-3.10%	-6.36%	9.89%	-0.42%
	25%	ORG (+25%)	-5.62%	1.87%	3.29%	0.46%	-5.07%	2.09%	2.69%	0.29%	-4.70%	1.86%	2.61%	0.24%
		CONV (+25%)	0.57%	-2.20%	1.44%	0.19%	2.23%	-7.31%	4.32%	0.77%	1.40%	-5.96%	3.82%	0.74%
		CIRC (+25%)	2.98%	4.29%	-7.96%	0.70%	2.86%	4.18%	-7.52%	0.48%	2.72%	5.23%	-8.29%	0.34%

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Table 35: Direct (own) price elasticity of demand – Unit variation

Product		Pork				Milk				Bread			
		Price Variation	Elasticity	Price Variation	Elasticity	Price Variation	Elasticity	Price Variation	Elasticity	Price Variation	Elasticity	Price Variation	Elasticity
Spain	ORG		5.13%		0.21%		8.64%		0.35%		2.61%		0.10%
	CONV	-25%	4.63%	-1%	0.19%	-25%	4.77%	-1%	0.19%	-25%	6.23%	-1%	0.25%
	CIRC		6.34%		0.25%		NS		NS		4.46%		0.18%
	ORG		-4.62%		-0.18%		-7.41%		-0.30%		-2.33%		-0.09%
	CONV	25%	-4.56%	1%	-0.18%	25%	-4.92%	1%	-0.20%	25%	-6.46%	1%	-0.26%
	CIRC		-5.68%		-0.23%		NS		NS		-4.07%		-0.16%
Poland	ORG		5.95%		0.24%		4.51%		0.18%		3.11%		0.12%
	CONV	-25%	1.90%	-1%	0.08%	-25%	4.36%	-1%	0.17%	-25%	7.08%	-1%	0.28%
	CIRC		4.08%		0.16%		5.08%		0.20%		7.18%		0.29%
	ORG		-5.62%		-0.22%		-4.06%		-0.16%		-2.80%		-0.11%
	CONV	25%	-1.87%	1%	-0.07%	25%	-4.33%	1%	-0.17%	25%	-7.44%	1%	-0.30%
	CIRC		-3.82%		-0.15%		-4.61%		-0.18%		-5.58%		-0.22%
Italy	ORG		5.47%		0.22%		19.07%		0.76%		5.92%		0.24%
	CONV	-25%	2.18%	-1%	0.09%	-25%	11.01%	-1%	0.44%	-25%	3.21%	-1%	0.13%
	CIRC		8.32%		0.33%		11.32%		0.45%		8.42%		0.34%
	ORG		-4.93%		-0.20%		-14.99%		-0.60%		-5.32%		-0.21%
	CONV	25%	-2.11%	1%	-0.08%	25%	-9.67%	1%	-0.39%	25%	-3.12%	1%	-0.12%
	CIRC		-7.89%		-0.32%		-10.05%		-0.40%		-7.73%		-0.31%

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Table 35 (continued): Direct (own) price elasticity of demand – Unit variation

Product		Pork				Milk				Bread			
		Price Variation	Elasticity	Price Variation	Elasticity	Price Variation	Elasticity	Price Variation	Elasticity	Price Variation	Elasticity	Price Variation	Elasticity
Hungary	ORG		6.99%		0.28%		2.71%		0.11%		1.64%		0.07%
	CONV	-25%	NS	-1%	NS	-25%	13.91%	-1%	0.56%	-25%	9.05%	-1%	0.36%
	CIRC		30.95%		1.24%		9.59%		0.38%		12.56%		0.50%
	ORG		-4.10%		-0.16%		-1.98%		-0.08%		-1.31%		-0.05%
	CONV	25%	NS	1%	NS	25%	-15.42%	1%	-0.62%	25%	-10.07%	1%	-0.40%
	CIRC		-22.28%		-0.89%		-8.38%		-0.34%		-9.80%		-0.39%
Croatia	ORG		14.69%		0.59%		3.06%		0.12%		3.22%		0.13%
	CONV	-25%	7.03%	-1%	0.28%	-25%	4.25%	-1%	0.17%	-25%	5.67%	-1%	0.23%
	CIRC		11.17%		0.45%		3.99%		0.16%		5.58%		0.22%
	ORG		-12.21%		-0.49%		-2.90%		-0.12%		-2.95%		-0.12%
	CONV	25%	-6.61%	1%	-0.26%	25%	-4.33%	1%	-0.17%	25%	-5.88%	1%	-0.24%
	CIRC		-9.72%		-0.39%		-3.58%		-0.14%		-4.75%		-0.19%
Belgium	ORG		6.56%		0.26%		5.72%		0.23%		5.55%		0.22%
	CONV	-25%	2.23%	-1%	0.09%	-25%	7.32%	-1%	0.29%	-25%	5.86%	-1%	0.23%
	CIRC		8.92%		0.36%		8.99%		0.36%		9.89%		0.40%
	ORG		-5.62%		-0.22%		-5.07%		-0.20%		-4.70%		-0.19%
	CONV	25%	-2.20%	1%	-0.09%	25%	-7.31%	1%	-0.29%	25%	-5.96%	1%	-0.24%
	CIRC		-7.96%		-0.32%		-7.52%		-0.30%		-8.29%		-0.33%

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773682.

3.8. Consumers purchase intention for circular pork, milk, and bread (OECE)

As commented before, the purchase intention and the WTP for the 3 categories of products (pork, milk and bread) under the 3 production systems (organic, conventional and circular) were also assed using the Open-Ended Choice Experiment (OECE). Results are next presented.

3.8.1. Aggregated demand for circular products

Individual demands at each price level for sliced pork loin, milk, and sliced bread was summed, and the aggregated quantities were presented in Table 36**,** Table 37**,** and Table 38. Within this approach, and because quantities demanded and prices can be compared, the currencies of Poland, Hungary, and Croatia were converted into Euros. The demand for conventional and organic products (substitutes), which were fixed at market prices, was also introduced because previous studies suggested that novel products should be evaluated in the context of substitute commodities that consumers can purchase in the market (Wongprawmas et al., 2016). The market demand curve was the horizontal sum of the individual demand curves (Gwartney et al., 2021), and the demand curves for circular products were displayed in Figure 40. The results showed that quantities demanded for three circular products decreased in all countries as prices increased, which was consistent with the "law of demand". This result was also confirmed by the DCE presented before.

Table 36: Aggregate quantities of sliced pork loin produced by circular, organic, and conventional farming by prices

Pork loin

Spain (n=1050)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
2.50€	1760	10.50€	904	4.50€	1382
3.50€	1698	10.50€	910	4.50€	1335
4.50€	1587	10.50€	898	4.50€	1430
5.50€	1277	10.50€	900	4.50€	1520
6.50€	1123	10.50€	916	4.50€	1681

Poland (n=1040)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
1.97€	1639	6.69€	1011	2.85€	1228
2.41€	1578	6.69€	1039	2.85€	1282
2.85€	1446	6.69€	981	2.85€	1376
3.29€	1243	6.69€	1022	2.85€	1413
3.73€	1074	6.69€	1028	2.85€	1518

Italy (n=755)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
2.80€	1035	11.00€	516	4.20€	565
3.40€	992	11.00€	530	4.20€	588
4.20€	947	11.00€	507	4.20€	612
5.00€	808	11.00€	51	4.20€	684
5.80€	713	11.00€	521	4.20€	690

Hungary (n=988)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
2.93€	1624	6.31€	495	3.32€	1335
3.13€	1594	6.31€	520	3.32€	1380
3.32€	1580	6.31€	561	3.32€	1473
3.52€	1295	6.31€	523	3.32€	1644
3.72€	1084	6.31€	531	3.32€	1799

Croatia (n=506)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
3.09€	882	7.04€	502	4.02€	627
3.55€	857	7.04€	497	4.02€	623
4.02€	748	7.04€	543	4.02€	665
4.48€	602	7.04€	530	4.02€	760
4.95€	524	7.04€	558	4.02€	833

Belgium (n=950)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
4.50€	1094	15.00€	512	6.50€	878
5.50€	1060	15.00€	494	6.50€	906
6.50€	1007	15.00€	511	6.50€	954
7.50€	807	15.00€	517	6.50€	1067
8.50€	724	15.00€	531	6.50€	1135

Note: All prices are in Euros.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773682.

Table 37: Aggregate quantities of milk produced by circular, organic, and conventional farming by prices

Milk

Spain (n=1050)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
0.55€	2772	1.35	1325	0.75€	2145
0.65€	2623	1.35	1380	0.75€	2177
0.75€	2445	1.35	1359	0.75€	2353
0.85€	1925	1.35	1426	0.75€	2698
0.95€	1644	1.35	1452	0.75€	2834

Poland (n=1040)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
0.43€	2369	1.86€	1137	0.54€	1862
0.47€	2163	1.86€	1158	0.54€	1941
0.54€	2026	1.86€	1194	0.54€	1998
0.60€	1618	1.86€	1253	0.54€	2163
0.67€	1432	1.86€	1256	0.54€	2304

Italy (n=755)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
0.85€	1235	1.65€	591	1.05€	682
0.95€	1175	1.65€	622	1.05€	714
1.05€	1065	1.65€	629	1.05€	753
1.15€	866	1.65€	618	1.05€	859
1.25€	753	1.65€	638	1.05€	940

Hungary (n=988)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
0.66€	2340	1.46€	383	0.86€	1192
0.76€	2243	1.46€	402	0.86€	1207
0.86€	1829	1.46€	381	0.86€	1503
0.96€	1101	1.46€	393	0.86€	2056
1.06€	886	1.46€	449	0.86€	2244

Croatia (n=506)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
0.42€	1753	1.79€	696	0.74€	944
0.58€	1559	1.79€	720	0.74€	1076
0.74€	1238	1.79€	718	0.74€	1178
0.90€	829	1.79€	716	0.74€	1447
1.06€	698	1.79€	841	0.74€	1641

Belgium (n=950)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
0.75€	1877	1.55€	811	0.95€	1396
0.85€	1794	1.55€	819	0.95€	1417
0.95€	1700	1.55€	884	0.95€	1550
1.05€	1330	1.55€	909	0.95€	1727
1.15€	1107	1.55€	929	0.95€	1901

Note: All prices are in Euros.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773682.

Table 38: Aggregate quantities of sliced bread produced by circular, organic, and conventional farming by prices

Bread

Spain (n=1050)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
0.70€	1483	3.25€	691	1.10€	1114
0.90€	1472	3.25€	718	1.10€	1164
1.10€	1287	3.25€	750	1.10€	1279
1.30€	1101	3.25€	750	1.10€	1392
1.50€	1008	3.25€	755	1.10€	1447

Poland (n=1040)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
0.71€	1591	3.56€	698	1.37€	963
1.04€	1427	3.56€	708	1.37€	1053
1.37€	1173	3.56€	741	1.37€	1177
1.70€	938	3.56€	718	1.37€	1287
2.03€	841	3.56€	777	1.37€	1414

Italy (n=755)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
0.75	827	1.70€	449	0.95€	512
0.85	806	1.70€	464	0.95€	544
0.95	761	1.70€	509	0.95€	569
1.05	619	1.70€	479	0.95€	602
1.15	588	1.70€	482	0.95€	637

Hungary (n=988)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
0.86€	1111	1.67€	257	1.06€	758
0.96€	1077	1.67€	242	1.06€	736
1.06€	989	1.67€	265	1.06€	871
1.16€	562	1.67€	274	1.06€	1118
1.26€	492	1.67€	288	1.06€	1185

Croatia (n=506)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
0.86€	576	2.52€	331	1.29€	430
1.07€	525	2.52€	290	1.29€	451
1.29€	484	2.52€	335	1.29€	491
1.50€	362	2.52€	316	1.29€	591
1.72€	351	2.52€	331	1.29€	633

Belgium (n=950)

Circular		Organic		Conventional	
Price	Quantity	Price	Quantity	Price	Quantity
1.35€	933	2.40€	916	1.55€	1267
1.45€	919	2.40€	485	1.55€	806
1.55€	867	2.40€	509	1.55€	930
1.65€	698	2.40€	493	1.55€	997
1.75€	626	2.40€	502	1.55€	1090

Note: All prices are in Euros.

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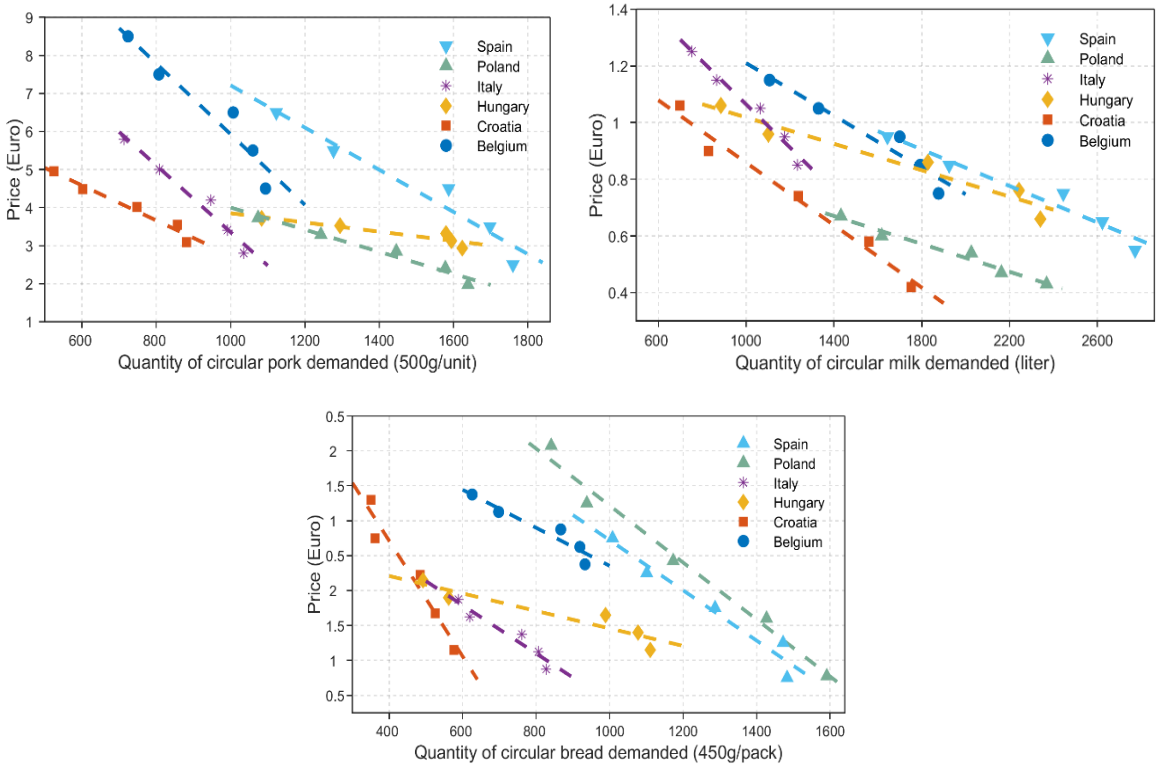

Figure 40: Observed aggregate demand for circular products in six countries

3.8.2. Price elasticity of demand

The relationship between consumer demand for service or a food product and its own price (own price elasticity of demand) (Green et al., 2013) measures the sensitivity (or responsiveness) of the quantity demanded of a commodity or service to changes in its price (Devi, 2007). The own price elasticity of demand was calculated by dividing the percentage change in quantity demanded by the percentage change in price (Green et al., 2013). Due to the "law of demand", i.e., the inverse nature of the relationship between price and quantity, the elasticity usually generates a negative value (Genchev & Yarkova, 2010). In the coefficients, therefore, the absolute value was in focus. If the price changed significantly then the arc elasticity of demand was used. The arc elasticity was a measure of the average elasticity, i.e., the elasticity at the midpoint of the chord connecting the two points on the demand curve defined by the initial price and the new price (Demand, 1951).

The own-price elasticity of circular products was presented in Table 39, Table 40, and Table 41. In most countries, when the price of a circular product was lower than or the same as the price of a conventional product, it was inelastic, and when it was higher than the price of a conventional product, it was elastic. That is, when the price of the circular product was higher than that of the conventional product, consumers became price sensitive. This may be because consumers will purchase substitutes (conventional products) when the price of the circular product is higher than that of the conventional product. However, there are some exceptions. For example, in Italy circular pork and in Spain circular bread were inelastic, regardless of price changed. In addition, circular pork in Croatia and circular milk in Hungary both became elastic from the point where the price was the same as the conventional product.

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Table 39: Own-price elasticity for circular pork in all countries

Own-price elasticity for circular pork

Spain (n=1050)

Price	Quantity	Arc Elasticity	
2.50	1760	-0.11	inelasticity
3.50	1698	-0.27	inelasticity
4.50	1587	-1.08	elasticity
5.50	1277	-0.77	inelasticity
6.50	1123		

Poland (n=1040)

Price	Quantity	Arc Elasticity	
1.97	1639	-0.19	inelasticity
2.41	1578	-0.52	inelasticity
2.85	1446	-1.05	elasticity
3.29	1243	-1.16	elasticity
3.73	1074		

Italy (n=755)

Price	Quantity	Arc Elasticity	
2.80	1035	-0.22	inelasticity
3.40	992	-0.22	inelasticity
4.20	947	-0.91	inelasticity
5.00	808	-0.84	inelasticity
5.80	713		

Hungary (n=988)

Price	Quantity	Arc Elasticity	
2.93	1624	-0.28	inelasticity
3.13	1594	-0.15	inelasticity
3.32	1580	-3.39	elasticity
3.52	1295	-3.21	elasticity
3.72	1084		

Croatia (n=506)

Price	Quantity	Arc Elasticity	
3.09	882	-0.21	inelasticity
3.55	857	-1.09	elasticity
4.02	748	-2.00	elasticity
4.48	602	-1.39	elasticity
4.95	524		

Belgium (n=950)

Price	Quantity	Arc Elasticity	
4.50	1094	-0.16	inelasticity
5.50	1060	-0.31	inelasticity
6.50	1007	-1.54	elasticity
7.50	807	-0.87	inelasticity
8.50	724		

Table 40: Own-price elasticity for circular milk in all countries

Own-price elasticity for circular milk

Spain (n=1050)

Price	quantity	Arc Elasticity	
0.55	2772	-0.33	inelasticity
0.65	2623	-0.49	inelasticity
0.75	2445	-1.90	elasticity
0.85	1925	-1.42	elasticity
0.95	1644		

Poland (n=1040)

Price	Quantity	Arc Elasticity	
0.43	2369	-1.02	elasticity
0.47	2163	-0.47	inelasticity
0.54	2026	-2.13	elasticity
0.60	1618	-1.11	elasticity
0.67	1432		

Italy (n=755)

Price	Quantity	Arc Elasticity	
0.75	827	-0.21	inelasticity
0.85	806	-0.52	inelasticity
0.95	761	-2.06	elasticity
1.05	619	-0.57	inelasticity
1.15	588		

Hungary (n=988)

Price	Quantity	Arc Elasticity	
0.66	2340	-0.30	inelasticity
0.76	2243	-1.65	elasticity
0.86	1829	-4.52	elasticity
0.96	1101	-2.19	elasticity
1.06	886		

Croatia (n=506)

Price	Quantity	Arc Elasticity	
0.42	1753	-0.37	inelasticity
0.58	1559	-0.95	inelasticity
0.74	1238	-2.03	elasticity
0.90	829	-1.05	elasticity
1.06	698		

Belgium (n=950)

Price	Quantity	Arc Elasticity	
0.75	1877	-0.36	inelasticity
0.85	1794	-0.48	inelasticity
0.95	1700	-2.44	elasticity
1.05	1330	-2.01	elasticity
1.15	1107		

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Table 41: Own-price elasticity for circular bread in all countries

Own-price elasticity for circular bread							
Spain (n=1050)				Poland (n=1040)			
Price	quantity	Arc Elasticity		Price	Quantity	Arc Elasticity	
0.70	1483	-0.03	inelasticity	0.71	1591	-0.29	inelasticity
0.90	1472	-0.67	inelasticity	1.04	1427	-0.71	inelasticity
1.10	1287	-0.93	inelasticity	1.37	1173	-1.04	elasticity
1.30	1101	-0.62	inelasticity	1.70	938	-0.62	inelasticity
1.50	1008			2.03	841		
Italy (n=755)				Hungary (n=988)			
Price	Quantity	Arc Elasticity		Price	Quantity	Arc Elasticity	
0.75	827	-0.21	inelasticity	0.86	1111	-0.28	inelasticity
0.85	806	-0.52	inelasticity	0.96	1077	-0.86	inelasticity
0.95	761	-2.06	elasticity	1.06	989	-6.11	elasticity
1.05	619	-0.57	inelasticity	1.16	562	-1.61	elasticity
1.15	588			1.26	492		
Croatia (n=506)				Belgium (n=950)			
Price	Quantity	Arc Elasticity		Price	Quantity	Arc Elasticity	
.86	576	-0.43	inelasticity	1.35	933	-0.21	inelasticity
1.07	525	-0.44	inelasticity	1.45	919	-0.87	inelasticity
1.29	484	-1.92	elasticity	1.55	867	-3.46	elasticity
1.50	362	-0.23	inelasticity	1.65	698	-1.85	elasticity
1.72	351			1.75	626		

In addition, constant elasticity (log-log or double log specification) was also estimated in this study, which has been widely used for demand analysis by Houthakker (1957), Burney and Khan (1991). The log-log model presumes elasticities to be constant, and the log-linear functional form allows coefficients to be interpreted directly as elasticity values (Schleich & Hillenbrand, 2009).

Table 42 reported constant elasticity for circular products in all countries. Durbin-Watson statistic was close to 2 for each equation in all countries, which indicated a high probability that the observations were independent of each other. All constant elasticity of the three types of circular food products in all countries were less than 1 (inelastic), which was probably related to the fact that they were basic products.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773682.

Table 42: Constant elasticity for circular products in all countries

	Spain	Poland	Italy	Hungary	Croatia	Belgium
Pork						
Coefficient (Constant elasticity)	**-0.919****	**-0.951****	**-0.949****	**-0.900****	**-0.960*****	**-0.927****
Constant	7.978***	7.907***	7.506***	9.276***	8.168***	8.071***
Adjusted R-square	0.793	0.872	0.868	0.747	0.895	0.811
Durbin-Watson	1.500	1.416	1.481	1.445	1.647	1.634
Milk						
Coefficient	**-0.944****	**-0.976*****	**-0.940****	**-0.944****	**-0.960*****	**-0.933****
Constant	7.417***	6.831***	6.615***	6.993***	6.675***	7.256***
Adjusted R-square	0.855	0.938	0.845	0.854	0.894	0.827
Durbin-Watson	1.517	2.416	2.064	1.759	1.746	1.477
Bread						
Coefficient	**-0.949****	**-0.976*****	**-0.940****	**-0.913****	**-0.953****	**-0.937****
Constant	7.168***	7.215***	6.515***	6.800***	6.285***	7.393***
Adjusted R-square	0.868	0.937	0.845	0.779	0.878	0.838
Durbin-Watson	1.842	1.861	2.064	2.026	2.507	1.688

3.8.3. Willingness to pay (WTP) for circular products

The summary statistics for individual quantities of circular sliced pork, milk, and sliced bread demanded in six countries were displayed in Table 43,

Table 44, and Table 45 respectively. The consumer's maximum WTP was presented in Table 46, and it was estimated as the highest price at which they indicated a positive quantity of the products (Wongprawmas et al., 2016). Figure 41 presented the maximum WTP premium in percentage terms. The following formula was used (Li & Kallas, 2021).

$$WTP\ (\%) = \frac{WTP\ sustainable - P\ conventional}{P\ conventional} \times 100\% \qquad (7)$$

Table 43: Summary statistics for individual quantities of circular sliced pork demanded

Circular sliced pork												
Spain (n=1050)				Poland (n=1040)				Italy (n=755)			
Price (€)	Median (unit)	Mean (unit)	SD (unit)	Price (€)	Median (unit)	Mean (unit)	SD (unit)	Price (€)	Median (unit)	Mean (unit)	SD (unit)
2.50	1	1.77	1.76	1.97	1	1.78	1.78	2.80	1	1.57	1.60
3.50	1	1.71	1.75	2.41	1	1.72	1.76	3.40	1	1.50	1.44
4.50	1	1.59	1.74	2.85	1	1.57	1.71	4.20	1	1.43	1.48
5.50	1	1.28	1.60	3.29	1	1.35	1.70	5.00	1	1.22	1.33
6.50	**1**	**1.13**	**1.62**	**3.73**	**1**	**1.17**	**1.72**	**5.80**	**1**	**1.08**	**1.29**
Hungary (n=988)				Croatia (n=506)				Belgium (n=950)			
Price (€)	Median (unit)	Mean (unit)	SD (unit)	Price (€)	Median (unit)	Mean (unit)	SD (unit)	Price (€)	Median (unit)	Mean (unit)	SD (unit)
2.93	1	1.87	2.25	3.09	2	1.93	1.96	4.50	1	1.40	1.64
3.13	1	1.84	2.18	3.55	2	1.88	1.88	5.50	1	1.36	1.58
3.32	1	1.82	2.13	4.02	1	1.64	1.80	6.50	1	1.29	1.52
3.52	1	1.49	1.95	4.48	1	1.32	1.58	**7.50**	**1**	**1.04**	**1.35**
3.72	**1**	**1.25**	**1.89**	**4.95**	**1**	**1.15**	**1.61**	8.50	0	0.93	1.41

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Table 44: Summary statistics for individual quantities of circular milk demanded

Circular milk											
Spain (n=1050)				Poland (n=1040)				Italy (n=755)			
Price (€)	Median (liter)	Mean (liter)	SD (liter)	Price (€)	Median (liter)	Mean (liter)	SD (liter)	Price (€)	Median (liter)	Mean (liter)	SD (liter)
0.55	2	3.02	4.03	0.43	2	2.49	3.01	0.85	1	2.08	2.72
0.65	2	2.85	3.81	0.47	1	2.28	2.74	0.95	1	1.98	2.59
0.75	1	2.66	3.79	0.54	1	2.13	2.66	1.05	1	1.79	2.22
0.85	1	2.09	3.30	0.60	1	1.70	2.37	1.15	1	1.46	1.99
0.95	**1**	**1.79**	**2.96**	**0.67**	**1**	**1.51**	**2.31**	**1.25**	**1**	**1.27**	**1.88**
Hungary (n=988)				Croatia (n=506)				Belgium (n=950)			
Price (€)	Median (liter)	Mean (liter)	SD (liter)	Price (€)	Median (liter)	Mean (liter)	SD (liter)	Price (€)	Median (liter)	Mean (liter)	SD (liter)
0.66	1	2.91	4.45	0.42	2	3.72	4.76	0.75	1	2.44	3.57
0.76	1	2.79	4.31	0.58	2	3.31	4.23	0.85	1	2.33	3.44
0.86	**1**	**2.28**	**3.71**	0.74	1	2.63	3.58	0.95	1	2.21	3.37
0.96	0	1.37	2.76	**0.90**	**1**	**1.76**	**2.64**	**1.05**	**1**	**1.73**	**3.19**
1.06	0	1.10	2.45	1.06	0	1.48	2.73	1.15	0	1.44	2.71

Table 45: Summary statistics for individual quantities of circular bread demanded in six countries

Circular bread											
Spain (n=1050)				Poland (n=1040)				Italy (n=755)			
Price (€)	Median (pack)	Mean (pack)	SD (pack)	Price (€)	Median (pack)	Mean (pack)	SD (pack)	Price (€)	Median (pack)	Mean (pack)	SD (pack)
0.70	1	1.74	1.84	0.71	1	1.80	1.86	0.75	1	1.61	1.57
0.90	1	1.73	1.85	1.04	1	1.62	1.75	0.85	1	1.57	1.52
1.10	1	1.51	1.67	1.37	1	1.33	1.65	0.95	1	1.48	1.45
1.30	1	1.30	1.73	**1.70**	**1**	**1.06**	**1.60**	1.05	1	1.20	1.37
1.50	**1**	**1.19**	**1.69**	2.03	0	0.95	1.67	**1.15**	**1**	**1.14**	**1.39**
Hungary (n=988)				Croatia (n=506)				Belgium (n=950)			
Price (€)	Median (pack)	Mean (pack)	SD (pack)	Price (€)	Median (pack)	Mean (pack)	SD (pack)	Price (€)	Median (pack)	Mean (pack)	SD (pack)
0.86	1	1.58	2.04	0.86	1	1.83	2.02	1.35	1	1.29	1.69
0.96	1	1.53	2.03	1.07	1	1.67	1.92	1.45	1	1.27	1.60
1.06	**1**	**1.41**	**1.88**	**1.29**	**1**	**1.54**	**1.94**	1.55	1	1.20	1.58
1.16	0	0.80	1.48	1.50	0	1.15	1.77	**1.65**	**1**	**0.96**	**1.47**
1.26	0	0.70	1.35	1.72	0	1.12	1.95	1.75	0	0.86	1.46

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Table 46: Respondents' maximum WTP for circular products

Maximum WTP for circular products						
	Spain (n=1050)		Poland (n=1040)		Italy (n=755)	
Products	Median (€)	Mean±SD (€)	Median (€)	Mean±SD (€)	Median (€)	Mean±SD (€)
Circular pork	6.50	4.82±2.45	3.73	2.76±1.45	5.80	4.50±2.14
Circular milk	0.95	0.70±0.38	0.67	0.52±0.25	1.25	0.96±0.49
Circular bread	1.50	1.12±0.56	1.70	1.37±0.73	1.15	0.91±0.44
	Hungary (n=988)		Croatia (n=506)		Belgium (n=950)	
Products	Median (€)	Mean±SD (€)	Median (€)	Mean±SD (€)	Median (€)	Mean±SD (€)
Circular pork	3.72	2.96±1.40	4.95	3.68±1.92	7.50	5.91±3.52
Circular milk	0.86	0.79±0.37	0.90	0.75±0.40	1.05	0.79±0.49
Circular bread	1.06	0.91±0.48	1.29	1.22±0.63	1.65	1.17±0.78

The median maximum price that participants were willing to pay for a unit of circular pork (500g) was €6.50 in Spain, €3.73 in Poland, €5.80 in Italy, €3.72 in Hungary, €4.95 in Croatia, and €7.50 in Belgium. These results, when compared to the price of the same size of conventional pork, showed that consumers in Spain were willing to pay a maximum premium of 44.44% for 500 grams of circular pork, while those in Poland paid a premium of 30.88%, 38.10% in Italy, 12.05% in Hungary, 23.13% in Croatia, and 15.38% in Belgium. In the case of circular milk, the median maximum price consumers were willing to pay for a liter of circular milk was €0.95 in Spain, €0.67 in Poland, €1.25 in Italy, €0.86 in Hungary, €0.90 in Croatia, and €1.05 in Belgium. With regard to circular bread, the median maximum WTP of consumers for a pack of circular bread (450g) was €1. 50 in Spain, €1.70 in Poland, €1.15 in Italy, €1.06 in Hungary, €1.29 in Croatia, and €1.65 in Belgium.

From Figure 41, as can be seen, consumers in Spain had the highest WTP premium (in percentage terms) for circular pork, followed by Italy, Poland, Croatia, and Belgium, while consumers in Hungary received the lowest percentage of the premium. The maximum WTP of respondents in Spain for 1 liter of circular milk was the highest with 26.67%, followed by Poland with 24.07%, Croatia with 21.62%, Italy with 19.05%, and Belgium with 10.53%, while Hungarian consumers were willing to pay a premium percentage of 0%, i.e., the WTP for circular milk was equal to the price of conventional milk. In addition, the maximum WTP premium of participants in Spain for circular bread was the highest with 36.36%, followed by Poland with 24.09%, Italy with 21.05%, Belgium with 6.45%. Respondents in Hungary and Croatia had the lowest one with 0%. Among these three products, Spanish consumers received the highest WTP premium (in percentage terms), whereas Hungarian consumers received the lowest one.

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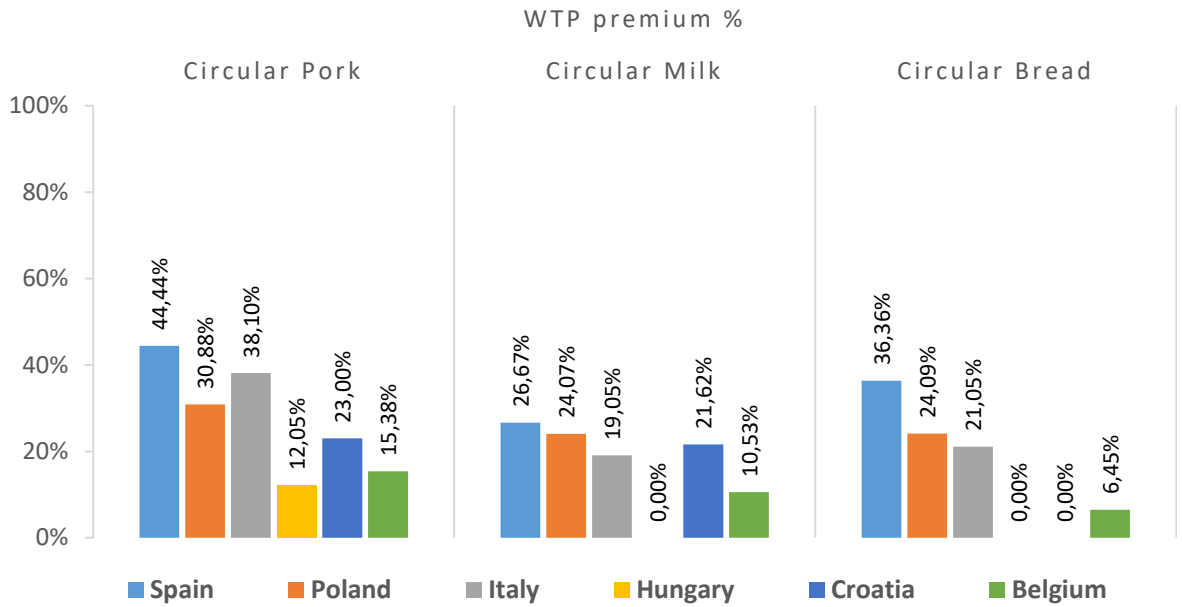

Figure 41: The maximum WTP premium in percentage terms

3.8.4. Factors influencing the demand of the circular products

In this study, the variance and mean of the dependent variables (quantity desired) were different and there was overdispersion; therefore, **negative binomial (NB) regression** was more flexible and appropriate than Poisson regression. In the models, the dependent variables were the quantity desired for three circular products in each country. The independent variables included gender, age, education level, employment status, income covers expenditure, stated financial situation (from 1=very difficult to 10=very good), environmental attitude (using NEP scale), and price (price of circular, conventional, and organic products). Conventional and organic prices were fixed.

The estimated NB coefficients for all countries were presented from Table 47 to

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Table 52, and a summary of results from all countries was presented in Figure 42 and Figure 51. Results revealed that age, employment status, income covers expenditure, environmental attitude, and price of circular products were key factors related to consumers' quantity demanded of the circular products defined in this study in all six countries. To be specific, in all countries, consumers aged 45-54 years and more than 55 years were likely to purchase lower quantities of circular food products compared to those aged 18-24 years. That is, younger consumers may purchase more circular products than older people. In addition, employment status was associated with quantities desired of circular products. Business owners and employees had a higher income than students and were therefore likely to buy more circular products, while those who retired tended to purchase fewer quantities of circular products. As expected, respondents whose monthly income rarely and never covered their household expenditure purchased a lower number of circular products compared to those whose income always cover expenditure. In addition, price of circular products was negatively associated with the number of circular products purchased, demonstrating that the higher price was, the fewer quantities purchased, which was in line with the demand theory.

Ecocentric consumers tended to purchase a higher number of circular products in Belgium, Hungary, and Spain, whereas in Croatia, Italy, and Poland, ecocentric consumers bought a lower number. These results may be driven by different forces. Firstly, this may be related to the attitude-behaviour gap. Ecocentric consumers always have pro-environmental attitudes; however, there is a gap between favourable attitudes and actual purchase of sustainable food products, i.e., the attitude-behaviour gap (Aschemann-Witzel & Zielke, 2017). Secondly, this may be because some ecocentric people perceived that sustainability can be achieved through other measures rather than through food innovation. It could also be related to the fact that they had a greater understanding of environmental sustainability.

This is supported by Table 53, which presented the correlation between consumers' environmental attitude, opinion about the impact of farming systems on the environment, and opinion about the environmental sustainability of diets. Results from

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Table 53 revealed that ecocentric consumers in all countries had a positive correlation with vegetarians, vegans, flexitarians and a negative correlation with non-restricted diets. Ecocentric consumers perceived vegetarians, vegans, and flexitarians to be more environmentally sustainable, while non-restricted diets were less sustainable. Ecocentric people were more likely to have sustainable diets (i.e., vegetarianism, veganism, and flexitarianism), possibly because they perceived meat and dairy to be less environmentally sustainable. As a result, they were less likely to buy more circular pork and milk and were more likely to achieve sustainability by having a more sustainable diet.

Results also showed that there was a positive correlation between ecocentric consumers and organic, circular and a negative correlation with conventional farming in all countries. In addition, in five countries, females purchased a lower number of circular products than males (except in Croatia). Education level was a crucial factor influencing the number of purchases made by consumers (except in Poland). That is, people with a high level of education purchased more circular products than those with a low level of education. Stated financial situation was found to influence the quantity of purchases (except in Italy). Participants who stated that they were in a good financial situation purchased higher quantities of circular products than those who stated that they were in a difficult financial situation in Croatia, Hungary, Poland, and Spain, while those who stated that they were in a good financial situation purchased lower quantities in Belgium.

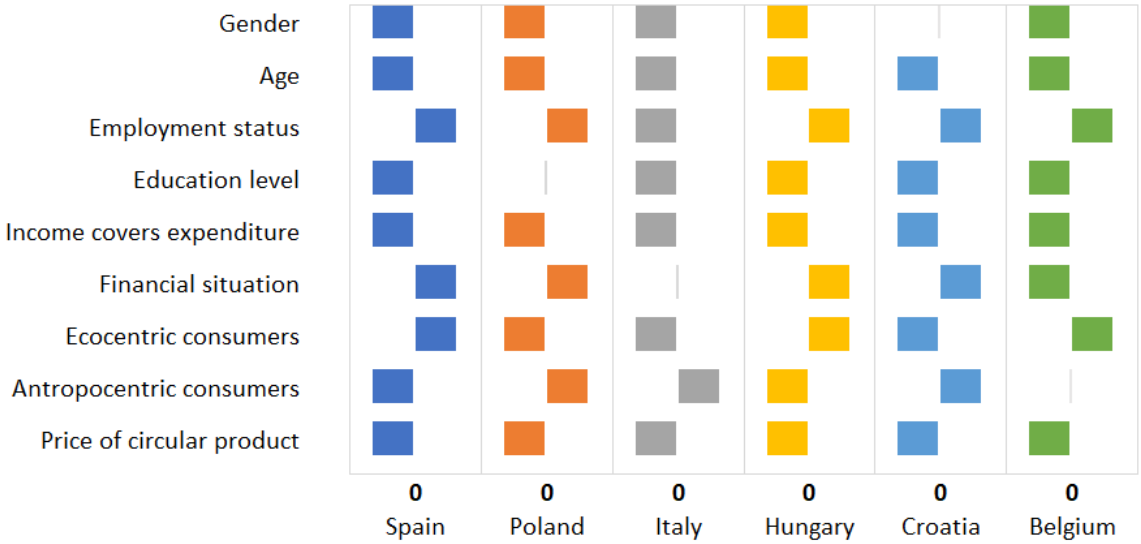

Figure 42: Summary of NB results of three circular products in all countries

(Note: The y-axis represents the significant factors influencing consumers' demand, and the x-axis shows quantities of circular products desired in each country. On the right side of the scale line of 0, it means a positive relationship between the independent and the dependent variables, while on the left side it means a negative relationship)

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Table 47: NB regression of circular products in Spain

Variables	Circular pork quantity	Circular milk quantity	Circular bread quantity
Gender (vs male)			
female	-0.124***	-0.118***	-0.162***
Age (vs 18-24 years)			
45-54 years	-0.573***	-0.309***	-0.714***
>55 years	-0.668***	-0.358***	-0.813***
Employment (vs student)			
Business owner	0.183**	0.191	0.128
Sick leave	0.279	0.121	0.878***
Education (vs university studies)			
Elementary studies	-0.119*	-0.121	0.0736
Secondary studies	-0.0325	-0.127***	-0.136***
income covers expenditure (vs always)			
sometimes	0.0829	-0.243	-0.291**
Stated finance [a]	0.000439	0.0210**	0.0265**
Environmental attitude [b]			
Eco-centric consumers	0.0497***	0.164***	0.0337*
anthropocentric consumers	0.000533	-0.0965***	0.0262*
Price			
Circular pork price	-0.121***		
Circular milk price		-1.384***	
Circular bread price			-0.563***
_cons	1.211***	1.905***	1.308***
lnalpha			
_cons	-0.916***	0.179***	-0.868***
N	4980	4595	4250

[a] Stated financial situation was measured using a 10-point Likert scale (1=very difficult, 10=very good).

[b] The New Ecological Paradigm (NEP) scale was used to measure this variable. Factor analysis was adopted. Eco-centric consumers and anthropocentric consumers were extracted.

* p<0.1, ** p<0.05, *** p<0.01

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Table 48: NB regression of circular products in Poland

Variables	Circular pork quantity	Circular milk quantity	Circular bread quantity
Gender (vs male)			
female	-0.220***	-0.281***	-0.176***
Age (vs 18-24 years)			
45-54 years	-0.0390	-0.227***	-0.397***
>55 years	-0.171***	-0.466***	-0.225***
Employment (vs student)			
Business owner	0.102	0.420***	0.363***
Retired	-0.632***	-0.233*	-0.191
income covers expenditure (vs always)			
never	-0.0683	0.0445	-0.308***
Stated finance	0.0246**	0.0232**	0.0447***
Environmental attitude			
Eco-centric consumers	-0.0410**	-0.00549	-0.176***
anthropocentric consumers	0.0963***	0.0365*	0.102***
Price			
Circular pork price	-0.0571***		
Circular milk price		-0.489***	
Circular bread price			-0.122***
_cons	1.241***	2.092***	0.980***
lnalpha			
_cons	-0.706***	-0.263***	-0.542***
N	4600	4750	4410

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Table 49: NB regression of circular products in Italy

Variables	Circular pork quantity	Circular milk quantity	Circular bread quantity
Gender (vs male)			
female	-0.142***	-0.315***	-0.161***
Age (vs 18-24 years)			
45-54 years	-0.149*	-0.288***	-0.0469
>55 years	-0.476***	-0.253***	-0.300***
Employment (vs student)			
Retired	-0.180*	-0.287**	-0.505***
Education (vs university studies)			
Elementary studies	-0.128	-0.386***	-0.139
Secondary studies	0.0158	-0.185***	0.0132
income covers expenditure (vs always)			
rarely	-0.0261	-0.144**	-0.0374
never	-0.496***	-0.401***	-0.0263
Environmental attitude			
Eco-centric consumers	-0.00825	-0.0232	-0.0431**
anthropocentric consumers	0.0404**	0.0239	0.00476
Price			
Circular pork price	-0.126***		
Circular milk price		-1.274***	
Circular bread price			-0.953***
_cons	1.401***	2.559***	1.629***
lnalpha			
_cons	-1.553***	-0.368***	-1.547***
N	3285	2960	2565

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Table 50: NB regression of circular products in Hungary

Variables	Circular pork quantity	Circular milk quantity	Circular bread quantity
Gender (vs male)			
female	-0.147***	-0.0803	-0.117**
Age (vs 18-24 years)			
45-54 years	-0.252***	-0.0902	0.0127
>55 years	-0.292***	-0.287**	-0.0481
Employment (vs student)			
Business owner	0.249**	-0.0312	0.444***
employee (full time)	0.284***	0.317**	0.251*
Education (vs university studies)			
Elementary studies	-0.374***	-0.308***	-0.419***
Secondary studies	-0.203***	-0.238***	-0.0964
income covers expenditure (vs always)			
rarely	0.0761	-0.202***	0.0355
never	0.0158	-0.547***	-0.292***
Stated finance	0.0143	0.0189	0.0327***
Environmental attitude			
Eco-centric consumers	0.114***	0.0658**	0.0416
anthropocentric consumers	-0.0190	-0.0494*	-0.0694**
Price			
Circular pork price	-0.520***		
Circular milk price		-2.632***	
Circular bread price			-2.230***
_cons	2.256***	2.998***	2.266***
lnalpha			
_cons	-0.449***	0.345***	-0.274***
N	3965	3730	3270

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Table 51: NB regression of circular products in Croatia

Variables	Circular pork quantity	Circular milk quantity	Circular bread quantity
Age (vs 18-24 years)			
45-54 years	-0.326***	-0.214**	-0.570***
>55 years	-0.491***	-0.341***	-0.457***
Employment (vs student)			
Business owner	0.374***	0.156	0.252*
employee (full time)	0.223**	0.280***	0.275**
Education (vs university studies)			
Elementary studies	-0.472*	-0.822***	-0.266
income covers expenditure (vs always)			
rarely	-0.0752	-0.255***	0.0118
never	-0.167**	-0.114	0.120
Stated finance	0.0239*	0.00759	0.0113
Environmental attitude			
Eco-centric consumers	-0.0684**	-0.147***	-0.193***
anthropocentric consumers	0.0540**	0.0785***	0.0429
Price			
Circular pork price	-0.309***		
Circular milk price		-1.740***	
Circular bread price			-0.717***
_cons	1.679***	2.307***	1.470***
lnalpha			
_cons	-0.680***	0.305***	-0.341***
N	2280	2355	1570

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Table 52: NB regression of circular products in Belgium

Variables	Circular pork quantity	Circular milk quantity	Circular bread quantity
Gender (vs male)			
female	-0.213***	-0.346***	-0.183***
Age (vs 18-24 years)			
45-54 years	-0.550***	-0.559***	-0.709***
>55 years	-0.671***	-0.726***	-0.821***
Employment (vs student)			
Business owner	0.726***	0.417***	0.341**
employee (full time)	0.599***	0.584***	0.245**
Education (vs university studies)			
Elementary studies	0.054	-0.399***	-0.120
Secondary studies	-0.070*	-0.090	-0.198***
income covers expenditure (vs always)			
rarely	0.062	-0.205***	0.067
never	-0.281***	-0.311***	-0.085
Stated finance	-0.024**	-0.058***	-0.003
Environmental attitude			
Eco-centric consumers	0.068***	0.176***	0.081***
anthropocentric consumers	0.004	-0.004	0.013
Price			
Circular pork price	-0.109***		
Circular milk price		-1.410***	
Circular bread price			-1.087***
_cons	1.038***	2.587***	2.109***
lnalpha			
_cons	-0.872***	0.402***	-0.562***
N	3895	3850	3620

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Table 53: Correlations between consumers' environmental attitude, opinion about the impact of farming systems on the environment, and opinion about the environmental sustainability of diets

	conventional	organic	circular	vegetarian	vegans	flexitarians	non-restricted diets
			Spain				
Eco-centric consumers	-0.106**	0.432**	0.274**	0.274**	0.313**	0.305**	-0.198**
anthropocentric consumers	0.387**	0.048	0.090**	0.066*	0.025	0.085**	0.306**
			Poland				
Eco-centric consumers	-0.053	0.359**	0.200**	0.302**	0.291**	0.303**	-0.177**
anthropocentric consumers	0.304**	0.002	0.123**	0.027	-0.024	0.018	0.321**
			Italy				
Eco-centric consumers	-0.177**	0.322**	0.180**	0.274**	0.286**	0.331**	-0.343**
anthropocentric consumers	0.328**	0.063	0.042	0.061	-0.015	0.084*	0.340**
			Hungary				
Eco-centric consumers	-0.075*	0.334**	0.344**	0.192**	0.215**	0.250**	-0.103**
anthropocentric consumers	0.225**	0.139**	0.031	0.110**	0.067*	0.121**	0.199**
			Croatia				
Eco-centric consumers	-0.085	0.338**	0.160**	0.182**	0.161**	0.255**	-0.183**
anthropocentric consumers	0.267**	-0.114*	0.005	0.027	-0.034	-0.043	0.254**
			Belgium				
Eco-centric consumers	-0.196**	0.326**	0.281**	0.312**	0.326**	0.284**	-0.240**
anthropocentric consumers	0.304**	0.049	0.032	0.031	-0.036	0.078*	0.390**

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3.9. Perception of agro-industrial processes.

Outcomes of this section corresponds to the questions related to the consumer perception about the value of agro-residue processing into renewable energy of Task 5.5 addressed in the survey.

This descriptive section analysed throughout different Likert scales shows how is perceived the added value of agro-industrial processes like production of biomaterials and renewable bioenergy, by consumers from the European countries involved on the data collect.

Firstly, respondents were asked about their opinions regarding **the most common produced category** commodity and services produced by agriculture in their country. In general terms, results (Figure 43) showed that according to consumers' opinion the food products (blue bars) were perceived as the most common produced products, followed by bio-material and renewable bio-energy respectively.

Very uncommon	Moderately uncommon	More or less uncommon	Neutral	More or less common	Moderately common	Very common
1	2	3	4	5	6	7

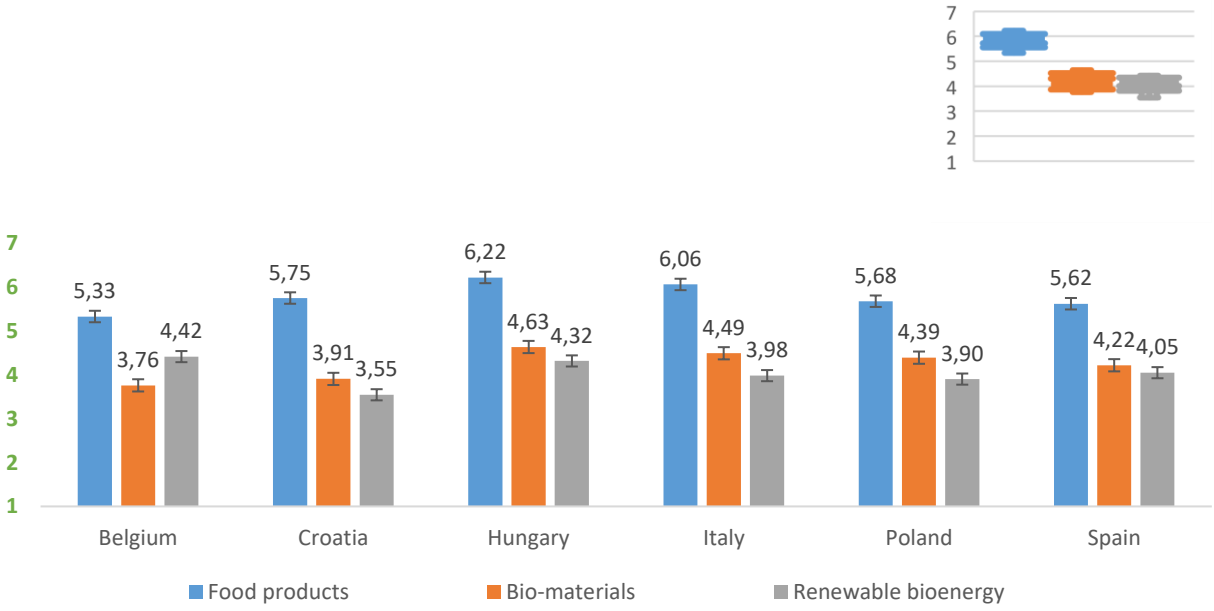

Figure 43: Opinion - the most common products that farmers produce in agriculture

It is worth mentioning that respondent in Belgium were the only participants who exhibited the production of renewable bioenergy as the second products produces after food.

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Furthermore, respondents were asked about their opinions regarding **which type of products farmers should produce more** in the future. Results showed in all countries consumers' desire that farmers be more involved in the production of renewable bioenergy (grey bars, Figure 44). Furthermore, and before food products category, respondent in Italy highlighted also that farmers need to be more focused on bio-materials production, as can be observed on Figure 44.

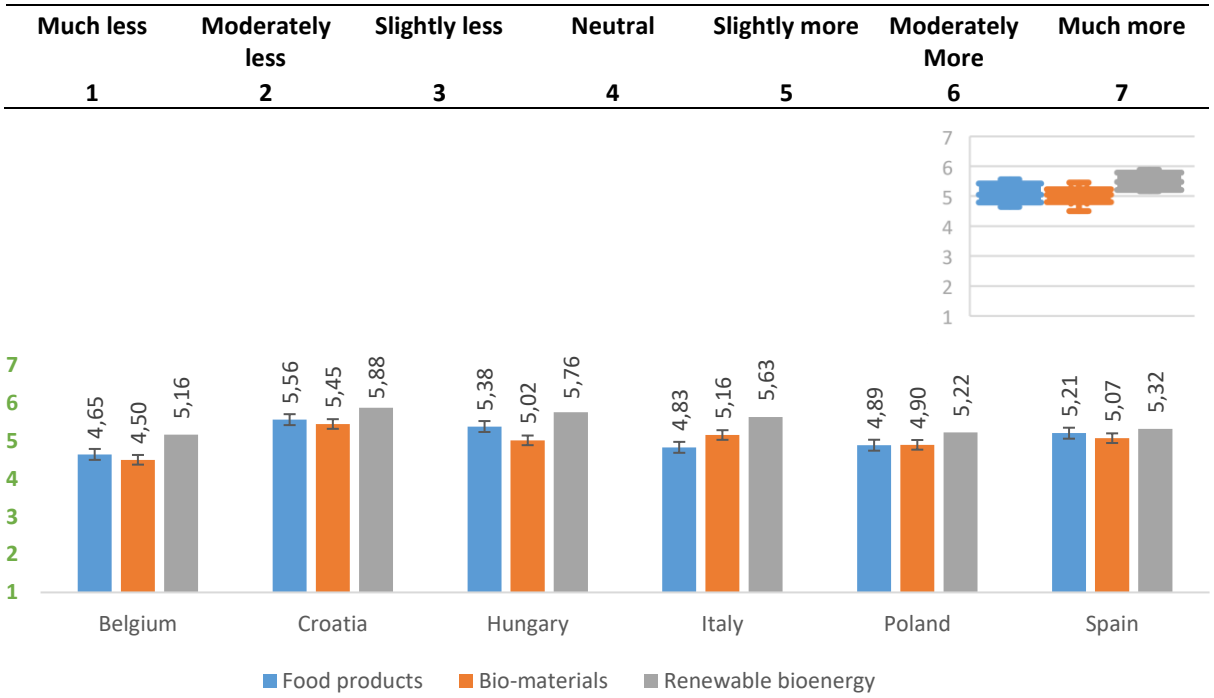

Figure 44: Opinion - Products that would like farmers to produce more or less in future

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Participants were asked about their agreement level regarding several affirmations on the **innovation level in agriculture and the involvement of institutions**. Results showed that in all countries, respondents more or less agreed with the opinion that **governments do not show interest** in investing in research and innovation projects in agriculture as can be seen on Figure 45 (orange bars), while universities were better evaluated with the exception of respondents in Croatia and Spain. Consumers more or less disagree with the opinion about Universities are not interest to invest in research and innovation projects for agriculture. Additionally, consumers´ opinion shows a neutral position about if agricultural sector is very traditionalist and without a big degree of innovation.

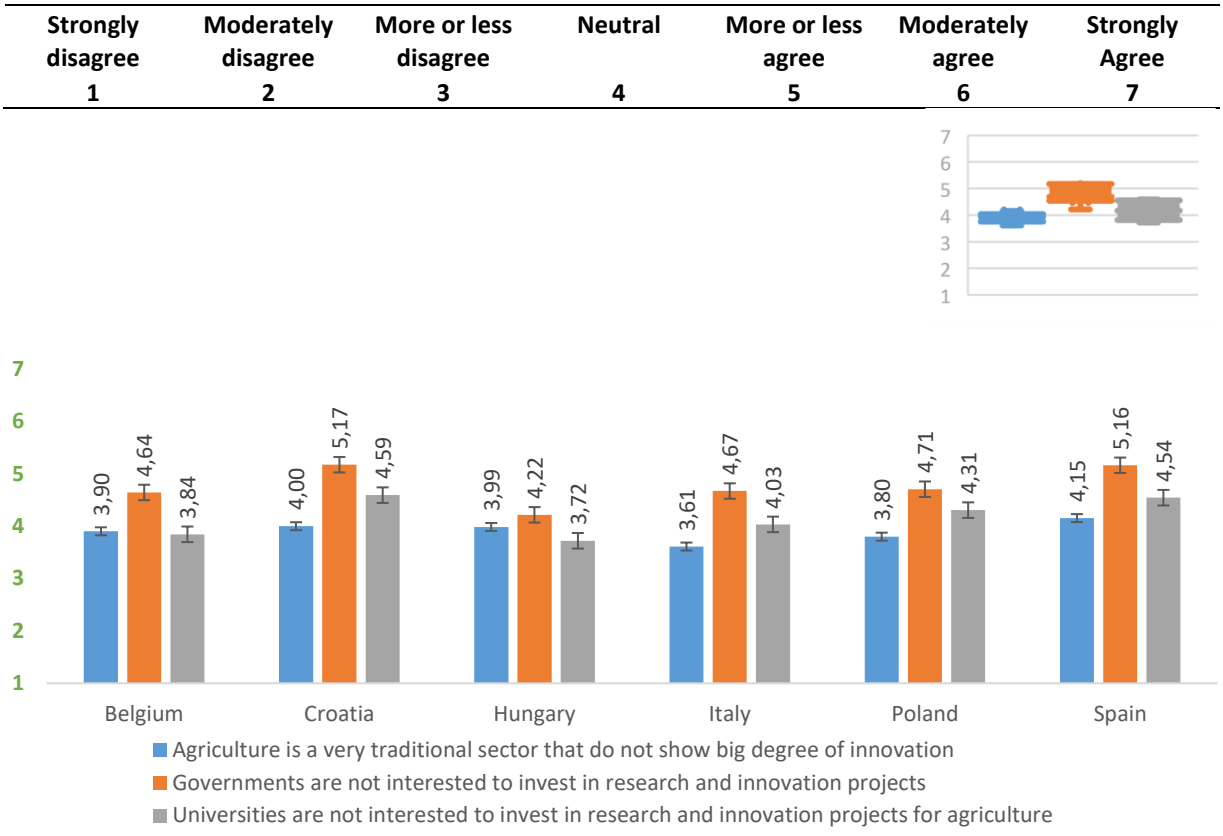

Figure 45: Opinion about agricultural innovation involvement

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In an additional section, respondents were asked to clearly define which type of innovation will be more important for farmers in the future. Results showed that according consumers´ opinion in all countries the innovation about recycling organic waste will the most important for farmers' future followed by the innovation on renewable bioenergy production. The innovation in internet connectivity received the lowest level of importance since consumers point of view.

Much less important 1	Moderately less important 2	Slightly less important 3	Neutral 4	Slightly more Important 5	Moderately More important 6	Much more important 7

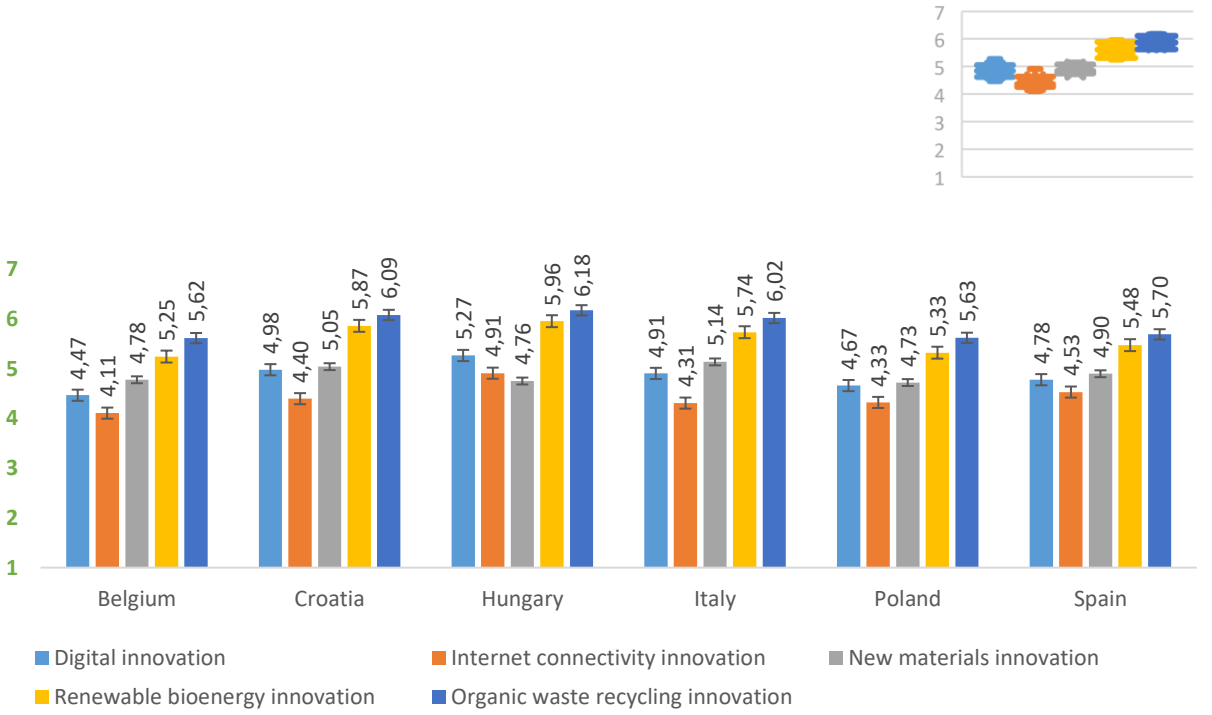

Figure 46: Opinion - Kind of innovation will be the most important for farmers in future

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In this context, according to the previous question, consumers were also asked about which type of innovations they think will make farmers more environmentally friendly in the future. Results showed that organic waste recycling innovation and renewable energy innovation were perceived by consumers like the most ecological innovations compared whit the others. Being internet connectivity the innovation that is perceived (with a neutral level) like the less ecological friendly.

Much less ecological 1	Moderately less ecological 2	Slightly less ecological 3	Neutral 4	Slightly more ecological 5	Moderately More ecological 6	Much more ecological 7

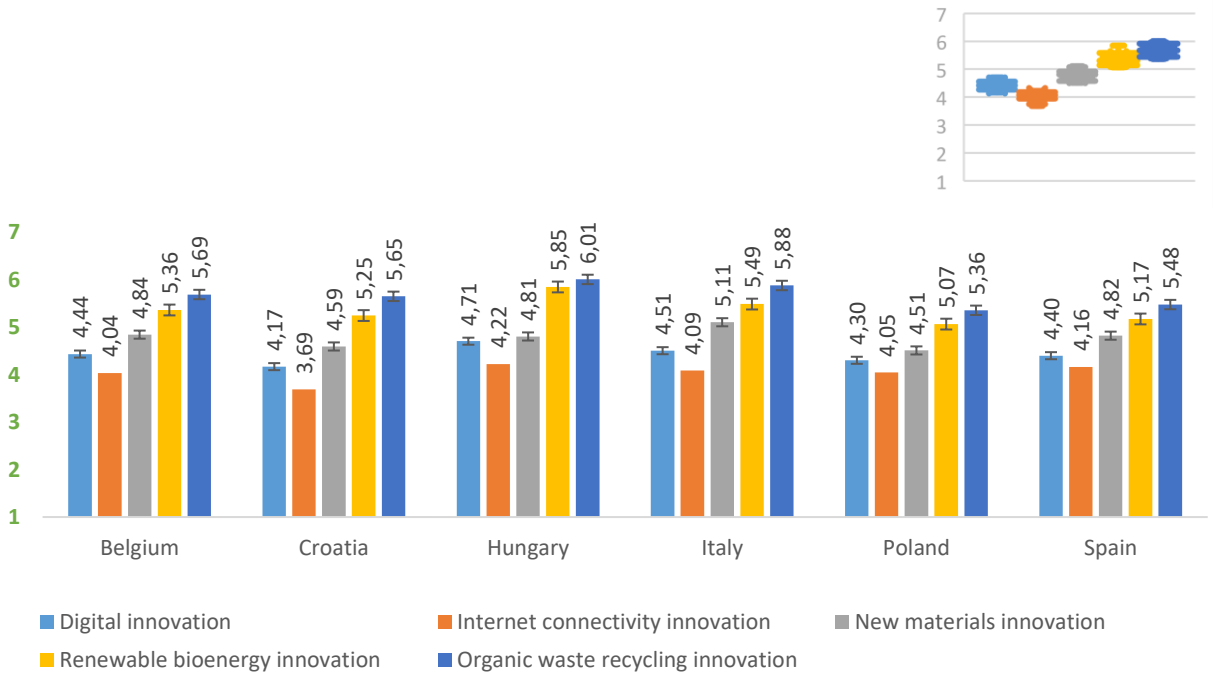

Figure 47: Opinion - Kind of innovation will make farmers more ecological in future

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On a 7 points Likert-scale, respondents were asked if they trust the use of fresh manure and organic waste as fertilizers to fruits and vegetables compared to of conventional one. Results showed (Figure 48) that only consumers from Croatia are more or less afraid about the use of fresh manure and organic waste as fertilizers on fruits and vegetables, while consumers from Hungary, Poland and Spain are more or less confident toward the use of this type of fertilizers (fresh manure and organic waste) rather than the use of conventional fertilizer, such as (urea, ammonium sulphate, ammonium chloride, phosphate and compound fertilizers).

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

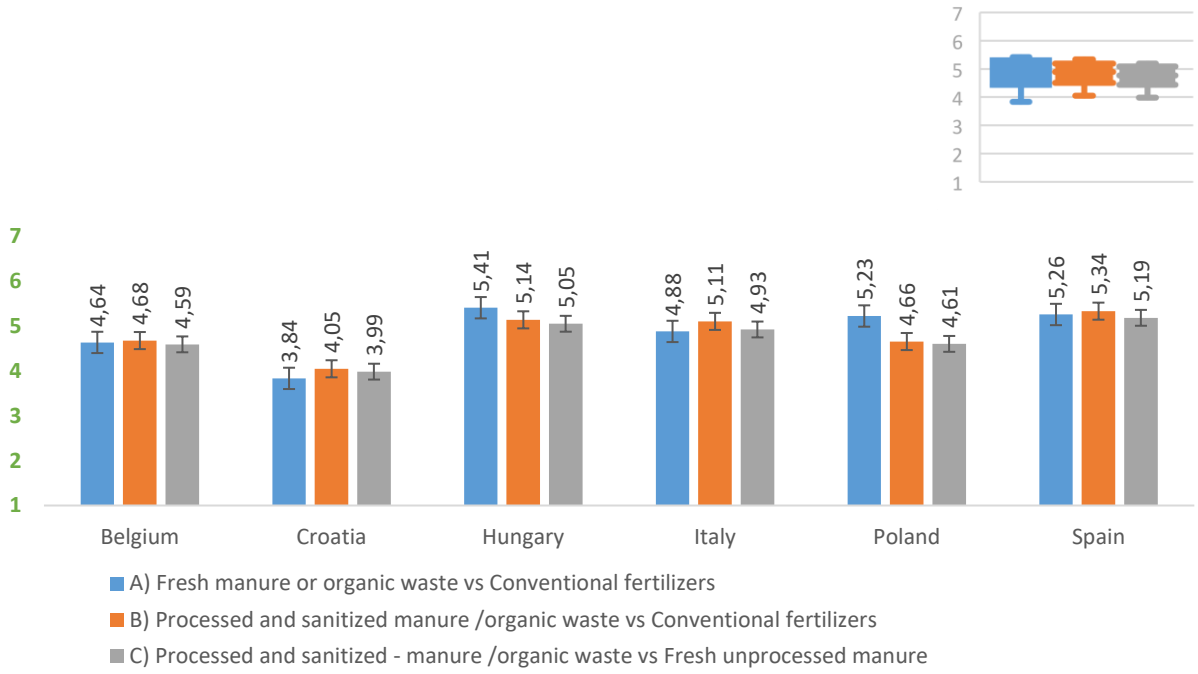

Figure 48: Level of consumer concern to eat the vegetables and fruits using different fertilizers

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773682.

Participants were also asked about the effect of processed and sanitized manure as fertilizers on taste, quality and safety of the food. As can be observed on Figure 49, results in the majority of countries showed that consumers were more or less agree that the use of processed and sanitized manure, and sanitized organic waste to fertilize food affect the safety, quality and taste. Only consumers opinion from Italy were neutral respect to the effect of use processed and sanitized manure on food fertilization.

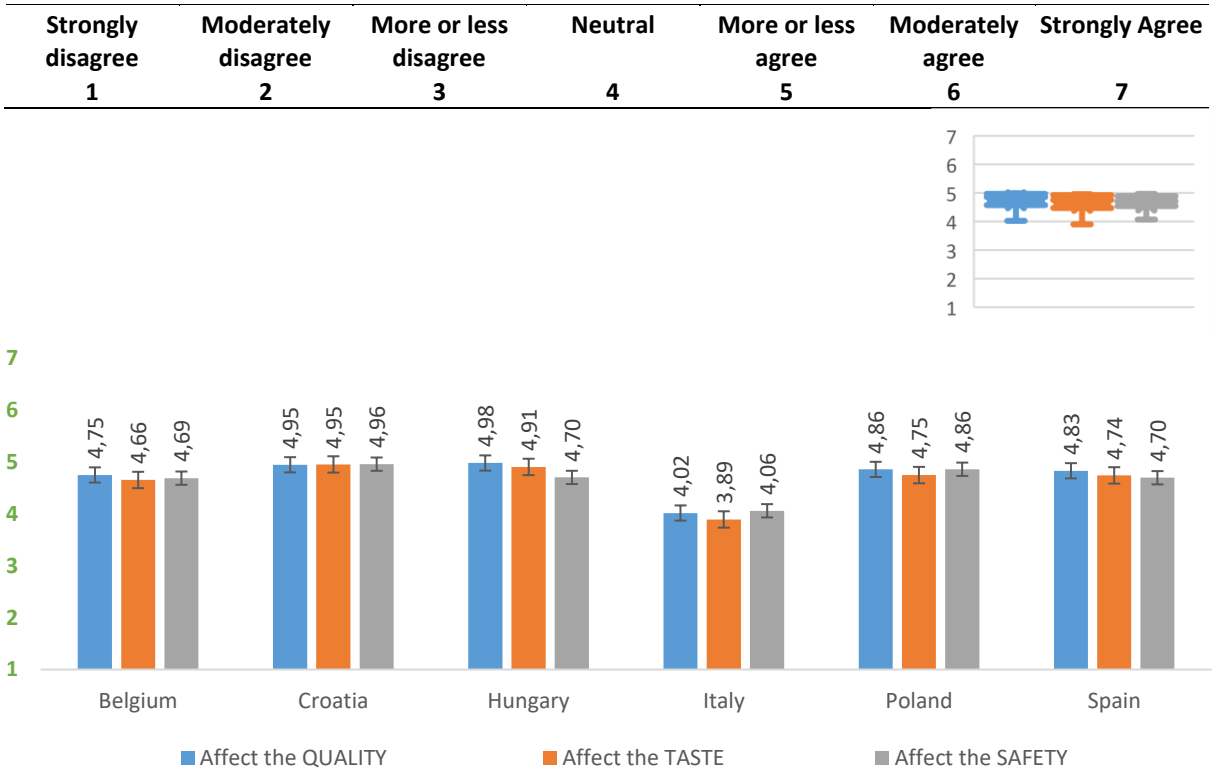

Figure 49: Opinion - Effects of use processed and sanitized manure, and sanitized organic waste to fertilize

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Respect to consumers opinion about which will be the important renewable energy for farmers in the future, results on (Figure 50) also showed that almost all have the same level of importance (from 5 to 6) since consumer point of view, but in this range of importance, solar energy and bioenergy were considered a little bit more important renewable energy sources than the others to farming production in all participant countries .

Much less important 1	Moderately less important 2	Slightly less important 3	Neither more nor less important 4	Slightly more Important 5	Moderately More important 6	Much more important 7

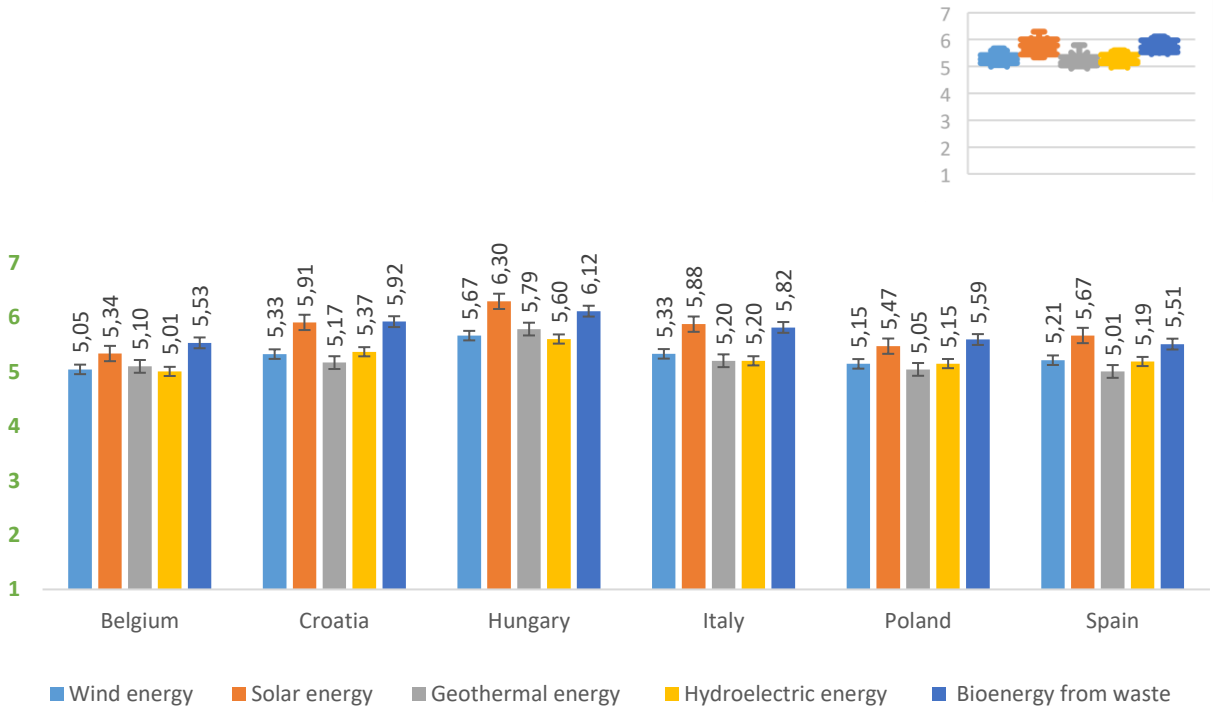

Figure 50: Opinion - Renewable energy that will be the most important for farmers in future.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773682.

Finally, as in the previous results, respondents considered that the 2 most important renewable energies (solar and bio energy) will make agriculture more ecological in the future.

Much less ecological 1	Moderately less ecological 2	Slightly less ecological 3	Neither more nor less ecological 4	Slightly more ecological 5	Moderately more ecological 6	Much more ecological 7

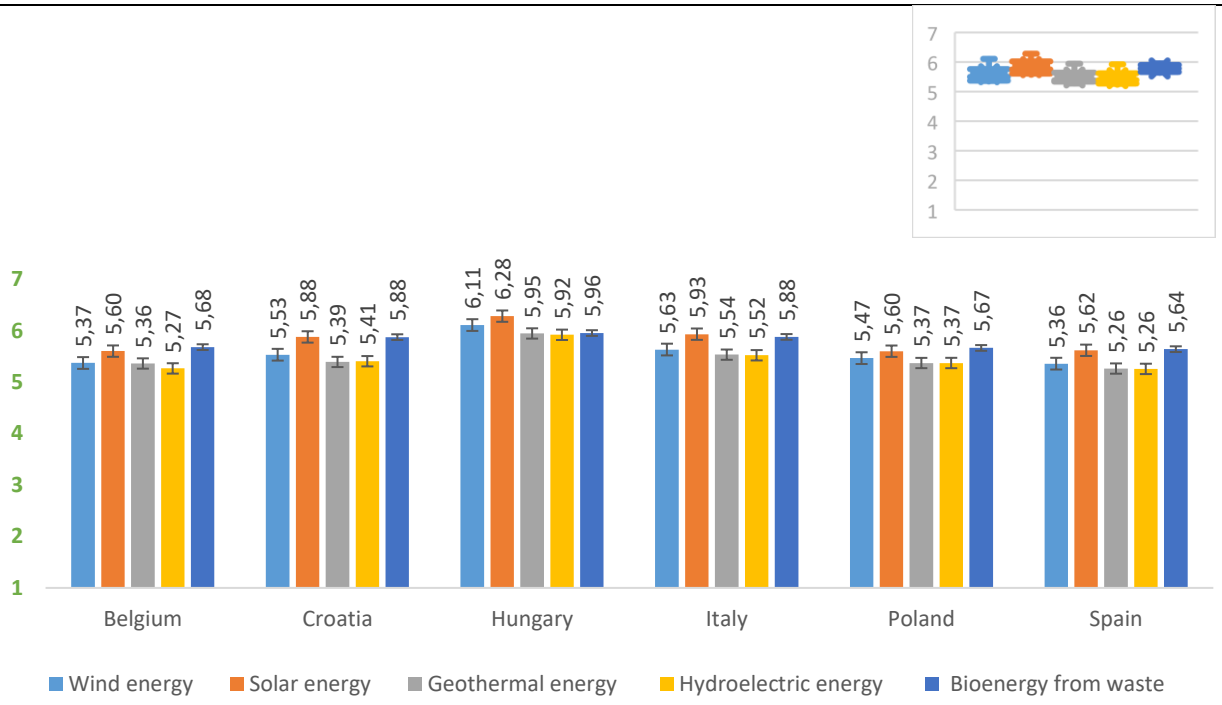

Figure 51: Opinion -Renewable energy that will make agriculture more ecological in future.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773682.

4. Conclusions

The questionnaire-research approach followed in this study with the different methodological methods proposed demonstrated its capacity to analyse and understand consumers' preferences, attitudes and behaviours, giving answers to the main objectives of the tasks 5.4 and 5.5. Results showed that there is a **clear potential market** for the products obtained and labelled under the circular farming systems. The **global average rate of purchase intention** for the 3 products categories is **27,24%**. Indicating that consumers are willing to pay for circular products. Results showed that a **market niche exists** for the analysed food products produced from circular farming, where consumers exhibited a **willingness to pay a premium compared to conventional** products. The circular farming innovations introduced and the **information** conveyed to consumers regarding their impact in reducing emission **may contribute to increase consumer acceptance** of circular food products. The estimated willingness to pay for the food product categories proposed under the different farming systems should be related to the information delivered to respondents in the description of the simulated purchase situations. Results highlighted the importance of the consumers' **environmental attitudes** and their **socioeconomic** characteristics in determining their **preferences**.

The **substitutability** rate was highly related to the **product categories** and **countries**, suggesting the need to design **country-specific marketing strategies** and specific **price policies** at **retailer** level to better **position** the products from circular farming jointly with conventional and organic ones **at the market place**. Compared to the price of the same size of conventional pork, consumers in **Spain** were willing to pay a maximum premium of **44.44%** for 500 grams of circular pork, while those in **Italy** paid a premium of **38.10%**, **30.88%** in Poland, **23.13% in Croatia, 15.38% in Belgium and 12.05%** in Hungary. The maximum WTP of respondents in **Spain** for 1 litter of circular milk was the highest with **26.67%**, followed by **Poland** with **24.07%**, **Croatia** with **21.62%**, **Italy** with **19.05%**, and **Belgium** with **10.53%**, while **Hungarian** consumers were willing to pay a premium percentage of **0%**, i.e., the WTP for circular milk was equal to the price of conventional milk. In addition, the maximum WTP premium of participants in **Spain** for circular bread was the highest with **36.36%**, followed by **Poland** with **24.09%**, **Italy** with **21.05%**, **Belgium** with **6.45%**. Respondents in **Hungary** and **Croatia** had the lowest one with **0%**.

Results also **highlighted** in **all countries**, the consumers' **desire to see farmers more committed** with the protection of **environment** by adopting **innovations** in the production of r**enewable bioenergy** and **recycling organic waste**. In this context, respondents agreed with the opinion that **governments** should make additional effort and demonstrate more interest in investing in **research** and **innovation** projects in **agriculture**. These results confirm the **substitutability characteristics across the products from the different production systems** at a potential marketplace, and highlight the **potential acceptance** of the products from circular farming.

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Appendix 1

Labelled Choice Sets – Belgium

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773682.

Labelled Choice sets – Croatia

Q3.2.

KOJI PROIZVOD BISTE RADIJE KUPILI?

SITUACIJA KUPNJE 1

Ekološki uzgoj (52,00 HRK / 500g)	Kružni uzgoj (42,50 HRK / 500g)
Konvencionalni uzgoj (25,00 HRK / 500 g)	Nijedan od navedenih

Q3.3.

KOJI PROIZVOD BISTE RADIJE KUPILI?

SITUACIJA KUPNJE 2

Ekološki uzgoj (56,00 HRK / 500g)	Kružni uzgoj (39,00 HRK / 500g)
Konvencionalni uzgoj (35,50 HRK / 500 g)	Nijedan od navedenih

Q3.4.

KOJI PROIZVOD BISTE RADIJE KUPILI?

SITUACIJA KUPNJE 3

Ekološki uzgoj (50,00 HRK / 500g)	Kružni uzgoj (35,50 HRK / 500g)
Konvencionalni uzgoj (32,00 HRK / 500 g)	Nijedan od navedenih

Q3.5.

KOJI PROIZVOD BISTE RADIJE KUPILI?

SITUACIJA KUPNJE 4

Ekološki uzgoj (54,00 HRK / 500g)	Kružni uzgoj (32,00 HRK / 500g)
Konvencionalni uzgoj (28,50 HRK / 500 g)	Nijedan od navedenih

Q6.2.

KOJI PROIZVOD BISTE RADIJE KUPILI?

SITUACIJA KUPNJE 1

Ekološki uzgoj (15.0 HRK / 1 litra)	Kružni uzgoj (6.2 HRK / 1 litra)
Konvencionalni uzgoj (5.0 HRK / 1 litra)	Nijedan od navedenih

Q6.3.

KOJI PROIZVOD BISTE RADIJE KUPILI?

SITUACIJA KUPNJE 2

Ekološki uzgoj (13.0 HRK / 1 litra)	Kružni uzgoj (9.8 HRK / 1 litra)
Konvencionalni uzgoj (3.8 HRK / 1 litra)	Nijedan od navedenih

Q6.4.

KOJI PROIZVOD BISTE RADIJE KUPILI?

SITUACIJA KUPNJE 3

Ekološki uzgoj (14.0 HRK / 1 litra)	Kružni uzgoj (8.6 HRK / 1 litra)
Konvencionalni uzgoj (7.4 HRK / 1 litra)	Nijedan od navedenih

Q6.5.

KOJI PROIZVOD BISTE RADIJE KUPILI?

SITUACIJA KUPNJE 4

Ekološki uzgoj (12.0 HRK / 1 litra)	Kružni uzgoj (7.4 HRK / 1 litra)
Konvencionalni uzgoj (6.2 HRK / 1 litra)	Nijedan od navedenih

Q9.2.

KOJI PROIZVOD BISTE RADIJE KUPILI?

SITUACIJA KUPNJE 1

Ekološki uzgoj (20.0 HRK / 450g)	Kružni uzgoj (10.4 HRK / 450g)
Konvencionalni uzgoj (8.7 HRK / 450g)	Nijedan od navedenih

Q9.3.

KOJI PROIZVOD BISTE RADIJE KUPILI?

SITUACIJA KUPNJE 2

Ekološki uzgoj (16.0 HRK / 450g)	Kružni uzgoj (12.1 HRK / 450g)
Konvencionalni uzgoj (10.4 HRK / 450g)	Nijedan od navedenih

Q9.4.

KOJI PROIZVOD BISTE RADIJE KUPILI?

SITUACIJA KUPNJE 3

Ekološki uzgoj (22.0 HRK / 450g)	Kružni uzgoj (13.8 HRK / 450g)
Konvencionalni uzgoj (12.1 HRK / 450g)	Nijedan od navedenih

Q9.5.

KOJI PROIZVOD BISTE RADIJE KUPILI?

SITUACIJA KUPNJE 4

Ekološki uzgoj (18.0 HRK / 450g)	Kružni uzgoj (15.5 HRK / 450g)
Konvencionalni uzgoj (7.5 HRK / 450g)	Nijedan od navedenih

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773682.

Labelled Choice sets – Hungary

Q3.2.

Melyik terméket vásárolná meg?

1. Vásárlási helyzet

biogazdálkodásból (2520 HUF/500g)	körkörös gazdálkodásból (1290 HUF/500g)
hagyományos gazdálkodásból (1220 HUF/500g)	egyik sem

Q3.3.

Melyik terméket vásárolná meg?

2. Vásárlási helyzet

biogazdálkodásból (2340 HUF/500g)	körkörös gazdálkodásból (1360 HUF/500g)
hagyományos gazdálkodásból (1080 HUF/500g)	egyik sem

Q3.4.

Melyik terméket vásárolná meg?

3. Vásárlási helyzet

biogazdálkodásból (1980 HUF/500g)	körkörös gazdálkodásból (1220 HUF/500g)
hagyományos gazdálkodásból (1150 HUF/500g)	egyik sem

Q3.5.

Melyik terméket vásárolná meg?

4. Vásárlási helyzet

biogazdálkodásból (2160 HUF/500g)	körkörös gazdálkodásból (1430 HUF/500g)
hagyományos gazdálkodásból (1290 HUF/500g)	egyik sem

Q6.2.

Melyik terméket vásárolná meg?

1. Vásárlási helyzet

biogazdálkodásból (468 HUF/ 1 liter)	körkörös gazdálkodásból (360 HUF/1 liter)
hagyományos gazdálkodásból (324 HUF/1 liter)	egyik sem

Q6.3.

Melyik terméket vásárolná meg?

2. Vásárlási helyzet

biogazdálkodásból (540 HUF/ 1 liter)	körkörös gazdálkodásból (324 HUF/1 liter)
hagyományos gazdálkodásból (288 HUF/1 liter)	egyik sem

Q6.4.

Melyik terméket vásárolná meg?

3. Vásárlási helyzet

biogazdálkodásból (504 HUF/ 1 liter)	körkörös gazdálkodásból (432 HUF/1 liter)
hagyományos gazdálkodásból (252 HUF/1 liter)	egyik sem

Q6.5.

Melyik terméket vásárolná meg?

4. Vásárlási helyzet

biogazdálkodásból (576 HUF/ 1 liter)	körkörös gazdálkodásból (396 HUF/1 liter)
hagyományos gazdálkodásból (360 HUF/1 liter)	egyik sem

Q9.2.

Melyik terméket vásárolná meg?

1. Vásárlási helyzet

Biogazdálkodás (576 HUF/450g)	körkörös gazdálkodásból (432 HUF/ 450g)
Hagyományos gazdálkodás (396 HUF/450g)	egyik sem

Q9.3.

Melyik terméket vásárolná meg?

2. Vásárlási helyzet

Biogazdálkodás (540 HUF/450g)	körkörös gazdálkodásból (468 HUF/450g)
Hagyományos gazdálkodás (432 HUF/450g)	egyik sem

Q9.4.

Melyik terméket vásárolná meg?

3. Vásárlási helyzet

Biogazdálkodás (648 HUF/450g)	körkörös gazdálkodásból (504 HUF/ 450g)
Hagyományos gazdálkodás (324 HUF/450g)	egyik sem

Q9.5.

Melyik terméket vásárolná meg?

4. Vásárlási helyzet

Biogazdálkodás (612 HUF/450g)	körkörös gazdálkodásból (396 HUF/ 450g)
Hagyományos gazdálkodás (360 HUF/450g)	egyik sem

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773682.

Labelled Choice sets – Italy

Q3.2.

QUALE PRODOTTO preferirebbe acquistare?

SITUAZIONE DI ACQUISTO 1

Agricoltura biologica (8.00 €/500g)	Agricoltura circolare (6.20 €/500g)
Agricoltura convenzionale (5.40 €/500g)	Nessuno di questi

Q3.3.

QUALE PRODOTTO preferirebbe acquistare?

SITUAZIONE DI ACQUISTO 2

Agricoltura biologica (14.00 €/500g)	Agricoltura circolar (7.00 €/500g)
Agricoltura convenzional (3.80 €/500g)	Nessuno di questi

Q3.4.

QUALE PRODOTTO preferirebbe acquistare?

SITUAZIONE DI ACQUISTO 3

Agricoltura biologica (10.00 €/500g)	Agricoltura circolar (4.60 €/500g)
Agricoltura convenzional (3.00 €/500g)	Nessuno di questi

Q3.5.

QUALE PRODOTTO preferirebbe acquistare?

SITUAZIONE DI ACQUISTO 4

Agricoltura biologica (12.00 €/500g)	Agricoltura circolar (5.40 €/500g)
Agricoltura convenzional (4.60 €/500g)	Nessuno di questi

Q6.2.

QUALE PRODOTTO preferirebbe acquistare?

SITUAZIONE DI ACQUISTO 1

Agricoltura biologica (1.70 €/ 1 litro)	Agricoltura circolare (1.10 €/1 litro)
Agricoltura convenzionale (1.00 €/1 litro)	Nessuno di questi

Q6.3.

QUALE PRODOTTO preferirebbe acquistare?

SITUAZIONE DI ACQUISTO 2

Agricoltura biologica (1.50 €/1 litro)	Agricoltura circolare (1.20 €/1 litro)
Agricoltura convenzionale (1.10 €/1 litro)	Nessuno di questi

Q6.4.

QUALE PRODOTTO preferirebbe acquistare?

SITUAZIONE DI ACQUISTO 3

Agricoltura biologica (1.80 €/1 litro)	Agricoltura circolare (1.30 €/1 litro)
Agricoltura convenzionale (1.20 €/1 litro)	Nessuno di questi

Q6.5.

QUALE PRODOTTO preferirebbe acquistare?

SITUAZIONE DI ACQUISTO 4

Agricoltura biologica (1.60 €/1 litro)	Agricoltura circolare (1.40 €/1 litro)
Agricoltura convenzionale (0.90 €/1 litro)	Nessuno di questi

Q9.2.

QUALE PRODOTTO preferirebbe acquistare?

SITUAZIONE DI ACQUISTO 1

Agricoltura biologica (2.00 €/450g)	Agricoltura circolare (1.00 €/450g)
Agricoltura convenzionale (0.90 €/450g)	Nessuno di questi

Q9.3.

QUALE PRODOTTO preferirebbe acquistare?

SITUAZIONE DI ACQUISTO 2

Agricoltura biologica (1.40 €/450g)	Agricoltura circolare (1.10 €/500g)
Agricoltura convenzionale (1.00 €/500g)	Nessuno di questi

Q9.4.

QUALE PRODOTTO preferirebbe acquistare?

SITUAZIONE DI ACQUISTO 3

Agricoltura biologica (1.80 €/450g)	Agricoltura circolare (1.30 €/450g)
Agricoltura convenzionale (1.10 €/500g)	Nessuno di questi

Q9.5.

QUALE PRODOTTO preferirebbe acquistare?

SITUAZIONE DI ACQUISTO 4

Agricoltura biologica (1.60 €/450g)	Agricoltura circolare (1.20 €/450g)
Agricoltura convenzionale (0.80 €/450g)	Nessuno di questi

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Labelled Choice sets – Poland

Q3.2.

KTÓRY PRODUKT wolałby/aby Pan/i kupić?

SYTUACJA ZAKUPOWA 1

Rolnictwo ekologiczne (35.00 PLN/500g)	Rolnictwo w obiegu zamkniętym (14.00 PLN/500g)
Rolnictwo konwencjonalne (12.00 PLN/500g)	Żadne z powyższych

Q3.3.

KTÓRY PRODUKT wolałby/aby Pan/i kupić?

SYTUACJA ZAKUPOWA 2

Rolnictwo ekologiczne (26.00 PLN/500g)	Rolnictwo w obiegu zamkniętym (16.00 PLN/500g)
Rolnictwo konwencjonalne (10.00 PLN/500g)	Żadne z powyższych

Q3.4.

KTÓRY PRODUKT wolałby/aby Pan/i kupić?

SYTUACJA ZAKUPOWA 3

Ekologiczne rolnictwo (29.00 PLN/500g)	Rolnictwo w obiegu zamkniętym (18.00 PLN /500g)
Rolnictwo konwencjonalne (16.00 PLN/500g)	Żadne z powyższych

Q3.5.

KTÓRY PRODUKT wolałby/aby Pan/i kupić?

SYTUACJA ZAKUPOWA 4

Rolnictwo ekologiczne (32.00 PLN/500g)	Rolnictwo w obiegu zamkniętym (20.00 PLN/500g)
Rolnictwo konwencjonalne (14.00 PLN/500g)	Żadne z powyższych

Q6.2.

KTÓRY PRODUKT wolałby/aby Pan/i kupić?

SYTUACJA ZAKUPOWA 1

Rolnictwo ekologiczne (10.00 PLN/ 1 litr)	Rolnictwo w obiegu zamkniętym (2.60 PLN/1 litr)
Rolnictwo konwencjonalne (2.30 PLN1 litr)	Żadne z powyższych

Q6.3.

KTÓRY PRODUKT wolałby/aby Pan/i kupić?

SYTUACJA ZAKUPOWA 2

Rolnictwo ekologiczne (12.00 PLN/1 litr)	Rolnictwo w obiegu zamkniętym (3.20 PLN/1 litr)
Rolnictwo konwencjonalne (2.90 PLN/1 litr)	Żadne z powyższych

Q6.4.

KTÓRY PRODUKT wolałby/aby Pan/i kupić?

SYTUACJA ZAKUPOWA 3

Rolnictwo ekologiczn (4.00 PLN/1 litr)	Rolnictwo w obiegu zamkniętym (2.90 PLN/1 litr)
Rolnictwo konwencjonalne (2.60 PLN/1 litr)	Żadne z powyższych

Q6.5.

KTÓRY PRODUKT wolałby/aby Pan/i kupić?

SYTUACJA ZAKUPOWA 4

Rolnictwo ekologiczne (8.00 PLN/1 litr)	Rolnictwo w obiegu zamkniętym (3.50 PLN/1 litr)
Rolnictwo konwencjonalne (2.00 PLN/1 litr)	Żadne z powyższych

Q9.2.

KTÓRY PRODUKT wolałby/aby Pan/i kupić?

SYTUACJA ZAKUPOWA 1

Rolnictwo ekologiczne (15.00 PLN/450g)	Rolnictwo w obiegu zamkniętym (11.50 PLN/450g)
Rolnictwo konwencjonalne (5.50 PLN/450g)	Żadne z powyższych

Q9.3.

KTÓRY PRODUKT wolałby/aby Pan/i kupić?

SYTUACJA ZAKUPOWA 2

Rolnictwo ekologiczne (17.50 PLN/450g)	Rolnictwo w obiegu zamkniętym (7.00 PLN/500g)
Rolnictwo konwencjonalne (4.00 PLN/500g)	Żadne z powyższych

Q9.4.

KTÓRY PRODUKT wolałby/aby Pan/i kupić?

SYTUACJA ZAKUPOWA 3

Rolnictwo ekologiczne (12.50 PLN/450g)	Rolnictwo w obiegu zamkniętym (8.50 PLN/450g)
Rolnictwo konwencjonalne (7.00 PLN/500g)	Żadne z powyższych

Q9.4.

KTÓRY PRODUKT wolałby/aby Pan/i kupić?

SYTUACJA ZAKUPOWA 3

Rolnictwo ekologiczne (12.50 PLN/450g)	Rolnictwo w obiegu zamkniętym (8.50 PLN/450g)
Rolnictwo konwencjonalne (7.00 PLN/500g)	Żadne z powyższych

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Labelled Choice sets – Spain

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

Q3.3.

¿QUÉ PRODUCTO preferiría comprar?

SITUACIÓN DE COMPRA 2

Agricultura Ecológica (10.00 €/500g)	Agricultura Circular (8.00 €/500g)
Agricultura Convencional (3.00 €/500g)	NINGUNO de estos

Q3.4.

¿QUÉ PRODUCTO preferiría comprar?

SITUACIÓN DE COMPRA 3

Agricultura Ecológica (12.00 €/500g)	Agricultura Circular (6.00 €/500g)
Agricultura Convencional (5.00 €/500g)	NINGUNO de estos

Q3.5.

¿QUÉ PRODUCTO preferiría comprar?

SITUACIÓN DE COMPRA 4

Agricultura Ecológica (9.00 €/500g)	Agricultura Circular (7.00 €/500g)
Agricultura Convencional (6.00 €/500g)	NINGUNO de estos

Q6.2.

¿QUÉ PRODUCTO preferiría comprar?

SITUACIÓN DE COMPRA 1

Agricultura Ecológica (1.40 €/ 1 litro)	Agricultura Circular (1.20 €/1 litro)
Agricultura Convencional (0.70 €/1 litro)	NINGUNO de estos

Q6.3.

¿QUÉ PRODUCTO preferiría comprar?

SITUACIÓN DE COMPRA 2

Agricultura Ecológica (1.20 €/1 litro)	Agricultura Circular (1.10 €/1 litro)
Agricultura Convencional (0.90 €/1 litro)	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

Q6.5.

¿QUÉ PRODUCTO preferiría comprar?

SITUACIÓN DE COMPRA 4

Agricultura Ecológica (1.50 €/1 litro)	Agricultura Circular (1.00 €/1 litro)
Agricultura Convencional (0.80 €/1 litro)	NINGUNO de estos

Q9.2.

¿QUÉ PRODUCTO preferiría comprar?

SITUACIÓN DE COMPRA 1

Agricultura Ecológica (4.00 €/450g)	Agricultura Circular (1.20 €/450g)
Agricultura Convencional (1.00 €/450g)	NINGUNO de estos

Q9.3.

¿QUÉ PRODUCTO preferiría comprar?

SITUACIÓN DE COMPRA 2

Agricultura Ecológica (2.50 €/450g)	Agricultura Circular (1.40 €/500g)
Agricultura Convencional (1.20 €/500g)	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

Q9.5.

¿QUÉ PRODUCTO preferiría comprar?

SITUACIÓN DE COMPRA 4

Agricultura Ecológica (3.50 €/450g)	Agricultura Circular (1.60 €/450g)
Agricultura Convencional (1.40 €/450g)	NINGUNO de estos

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Appendix 2

Open-Ended Choice Experiment – Belgium

Tegen de volgende gegeven prijzen, HOEVEEL eenheden / verpakkingen (van 500 g) van ELK TYPE VARKENSLENDE zou u in elke aankoopsituatie kopen?

	Kringloop landbouw	Conventionele landbouw	Biologische landbouw
	€4.50/ 500g	€6.50/ 500g	€15.00/ 500g
Aankoop situatie 1			

Q4.2.

	Kringloop landbouw	Conventionele landbouw	Biologische landbouw
	€5.50/ 500g	€6.50/ 500g	€15.00/ 500g
Aankoop situatie 2			

Q4.3.

	Kringloop landbouw	Conventionele landbouw	Biologische landbouw
	€6.50/ 500g	€6.50/ 500g	€15.00/ 500g
Aankoop situatie 3			

Q4.4.

	Kringloop landbouw	Conventionele landbouw	Biologische landbouw
	€7.50/ 500g	€6.50/ 500g	€15.00/ 500g
Aankoop situatie 4			

Q4.5.

	Kringloop landbouw	Conventionele landbouw	Biologische landbouw
	€8.50/ 500g	€6.50/ 500g	€15.00/ 500g
Aankoop situatie 5			

Tegen de volgende vermelde prijzen, HOEVEEL liter van ELK MELKTYPE zou u in elke aankoopsituatie kopen?

	Kringloop landbouw	Conventionele landbouw	Biologische landbouw
	€0.75/ 1 liter	€0.95/ 1 liter	€1.55/ 1 liter
Aankoop situatie 1			

Q7.2.

	Kringloop landbouw	Conventionele landbouw	Biologische landbouw
	€0.85/ 1 liter	€0.95/ 1 liter	€1.55/ 1 lite
Aankoop situatie 2			

Q7.3.

	Kringloop landbouw	Conventionele landbouw	Biologische landbouw
	€0.95/ 1 liter	€0.95/ 1 liter	€1.55/ 1 lite
Aankoop situatie 3			

Q7.4.

	Kringloop landbouw	Conventionele landbouw	Biologische landbouw
	€1.05/ 1 liter	€0.95/ 1 liter	€1.55/ 1 lite
Aankoop situatie 4			

Q7.5.

	Kringloop landbouw	Conventionele landbouw	Biologische landbouw
	€1.15/ 1 liter	€0.95/ 1 liter	€1.55/ 1 lite
Aankoop situatie 5			

Bij volgende opgegeven prijzen, hoeveel eenheden van ELK BROODSOORT zou u kopen in elke aankoopsituatie?

	Kringloop landbouw	Conventionele landbouw	Biologische landbouw
	€1.35/ 450g	€1.55/ 450g	€2.40/ 450g
Aankoop situatie 1			

Q10.2.

	Kringloop landbouw	Conventionele landbouw	Biologische landbouw
	€1.45/ 450g	€1.55/ 450g	€2.40/ 450g
Aankoop situatie 2			

Q10.3.

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	9.7 HRK / 450g	9.7 HRK/ 450g	19.0 HRK / 450g
Situacija kupnje 3			

Q10.4.

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	11.3 HRK / 450g	9.7 HRK/ 450g	19.0 HRK / 450g
Situacija kupnje 4			

Q10.5.

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	12.95 HRK / 450g	9.7 HRK/ 450g	19.0 HRK / 450g
Situacija kupnje 5			

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Open-Ended Choice Experiment – Croatia

Po sljedećim danim cijenama, KOLIKO komada / pakiranja (od 500g) od SVAKE VRSTE SVINJ. LUNGIĆA biste kupili u pojedinoj situaciji?

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	23.25 HRK / 500g	30.25 HRK/ 500g	53.0 HRK / 500g
Situacija kupnje 1			

Q4.2.

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	26.75 HRK / 500g	30.25 HRK/ 500g	53.0 HRK / 500g
Situacija kupnje 2			

Q4.3.

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	30.25 HRK / 500g	30.25 HRK/ 500g	53.0 HRK / 500g
Situacija kupnje 3			

Q4.4.

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	33.75 HRK / 500g	30.25 HRK/ 500g	53.0 HRK / 500g
Situacija kupnje 4			

Q4.5.

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	37.25 HRK / 500g	30.25 HRK/ 500g	53.0 HRK / 500g
Situacija kupnje 5			

Po sljedećim danim cijenama, KOLIKO litara od SVAKE VRSTE MLIJEKA biste kupili u pojedinoj situaciji?

	farmingKružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	3.2 HRK / 1 litra	5.6 HRK/ 1 litra	13.5 HRK/ 1 litra
Situacija kupnje 1			

Q7.2.

	farmingKružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	4.4 HRK / 1 litra	5.6 HRK/ 1 litra	13.5 HRK/ 1 litra
Situacija kupnje 2			

Q7.3.

	farmingKružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	5.6 HRK / 1 litra	5.6 HRK/ 1 litra	13.5 HRK/ 1 litra
Situacija kupnje 3			

Q7.4.

	farmingKružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	6.8 HRK / 1 litra	5.6 HRK/ 1 litra	13.5 HRK/ 1 litra
Situacija kupnje 4			

Q7.5.

	farmingKružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	8.0 HRK / 1 litra	5.6 HRK/ 1 litra	13.5 HRK/ 1 litra
Situacija kupnje 5			

Po sljedećim danim cijenama, KOLIKO pakiranja od SVAKE VRSTE KRUHA biste kupili u pojedinoj situaciji?

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	6.45 HRK / 450g	9.7 HRK/ 450g	19.0 HRK / 450g
Situacija kupnje 1			

Q10.2.

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	8.08 HRK / 450g	9.7 HRK/ 450g	19.0 HRK / 450g
Situacija kupnje 2			

Q10.3.

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	9.7 HRK / 450g	9.7 HRK/ 450g	19.0 HRK / 450g
Situacija kupnje 3			

Q10.4.

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	11.3 HRK / 450g	9.7 HRK/ 450g	19.0 HRK / 450g
Situacija kupnje 4			

Q10.5.

	Kružni uzgoj	Konvencionalni uzgoj	Ekološki uzgoj
	12.95 HRK / 450g	9.7 HRK/ 450g	19.0 HRK / 450g
Situacija kupnje 5			

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Open-Ended Choice Experiment – Hungary

Az alábbi árakon hány 500g csomagot vásárolna mindenik sonka típusból a különböző vásárlási helyzetekben?

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	1045 HUF / 500g	1185 HUF / 500g	2250 HUF / 500g
1. vásárlási helyzet			

Q4.2.

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	1115 HUF / 500g	1185 HUF / 500g	2250 HUF / 500g
2. vásárlási helyzet			

Q4.3.

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	1185 HUF / 500g	1185 HUF / 500g	2250 HUF / 500g
3. vásárlási helyzet			

Q4.4.

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	1255 HUF / 500g	1185 HUF / 500g	2250 HUF / 500g
4. vásárlási helyzet			

Q4.5.

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	1325 HUF / 500g	1185 HUF / 500g	2250 HUF / 500g
5. vásárlási helyzet			

Az alábbi árakon hány liter tejet vásárolna mindenik tejtípusból a különböző vásárlási helyzetekben?

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	234 HUF / 1 liter	306 HUF / 1 liter	522 HUF / 1 liter
1. vásárlási helyzet			

Q7.2.

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	270 HUF / 1 liter	306 HUF / 1 lite	522 HUF / 1 liter
2. vásárlási helyzet			

Q7.3.

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	306 HUF / 1 liter	306 HUF / 1 liter	522 HUF / 1 liter
3. vásárlási helyzet			

Q7.4.

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	342 HUF / 1 liter	306 HUF / 1 liter	522 HUF / 1 liter
4. vásárlási helyzet			

Q7.5.

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	378 HUF / 1 liter	306 HUF / 1 liter	522 HUF / 1 liter liter
5. vásárlási helyzet			

Az alábbi árakon hány csomag kenyeret vásárolna mindenik kenyértípusból a különböző vásárlási helyzetekben?

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	306 HUF / 450g	378 HUF / 450g	594 HUF / 450g
1. vásárlási helyzet			

Q10.2.

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	342 HUF / 450g	378 HUF / 450g	594 HUF / 450g
2. vásárlási helyzet			

Q10.3.

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	378 HUF / 450g	378 HUF / 450g	594 HUF / 450g
3. vásárlási helyzet			

Q10.4.

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	414 HUF / 450g	378 HUF / 450g	594 HUF / 450g
4. vásárlási helyzet			

Q10.5.

	Körkörös gazdálkodás	Hagyományos gazdálkodás	Biogazdálkodás
	450 HUF / 450g	378 HUF / 450g	594 HUF / 450gg
5. vásárlási helyzet			

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Open-Ended Choice Experiment – Italy

Di seguenti prezzi, quante unità /confezioni (da 500g) di OGNI TIPO DI LONZA comprerebbe in ogni situazione di acquisto?

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€2.80/ 500g	€4.20/ 500g	€11.00/ 500g
Situazione di acquisto 1			

Q4.2.

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€3.40/ 500g	€4.20/ 500g	€11.00/ 500g
Situazione di acquisto 2			

Q4.3.

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€4.20/ 500g	€4.20/ 500g	€11.00/ 500g
Situazione di acquisto 3			

Q4.4.

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€5.00/ 500g	€4.20/ 500g	€11.00/ 500g0g
Situazione di acquisto 4			

Q4.5.

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€5.80/ 500g	€4.20/ 500g	€11.00/ 500g
Situazione di acquisto 5			

Ai seguenti prezzi, quanti litri da OGNI TIPO DI LATTE comprerebbe in ogni situazione di acquisto?

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€0.85/ 1 litro	€1.05/ 1 litro	€1.65/ 1 litro
Situazione di acquisto 1			

Q7.2.

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€0.95/ 1 litro	€1.05/ 1 litro	€1.65/ 1 litro
Situazione di acquisto 2			

Q7.3.

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€1.05/ 1 litro	€1.05/ 1 litro	€1.65/ 1 litro
Situazione di acquisto 3			

Q7.4.

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€1.15/ 1 litro	€1.05/ 1 litro	€1.65/ 1 litro
Situazione di acquisto 4			

Q7.5.

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€1.25/ 1 litro	€1.05/ 1 litro	€1.65/ 1 litro
Situazione di acquisto 5			

Ai seguenti prezzi, quante unità/confezioni di OGNI TIPO DI PANE comprerebbe in ogni situazione di acquisto?

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€0.75/ 450g	€0.95/ 450g	€1.70/ 450g
Situazione di acquisto 1			

Q10.2.

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€0.85/ 450g	€0.95/ 450g	€1.70/ 450g
Situazione di acquisto 2			

Q10.3.

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€0.95/ 450g	€0.95/ 450g	€1.70/ 450g
Situazione di acquisto 3			

Q10.4.

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€1.05/ 450g	€0.95/ 450g	€1.70/ 450g
Situazione di acquisto 4			

Q10.5.

	Agricoltura circolare	Agricoltura convenzionale	Agricoltura biologica
	€1.15/ 450g	€0.95/ 450g	€1.70/ 450g
Situazione di acquisto 5			

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Open-Ended Choice Experiment – Poland

ILE jednostek / paczek (po 500g) z KAŻDEGO RODZAJU POLĘDWICY Pan/i kupiłby/a w każdej sytuacji przy podanych poniżej cenach?

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	9.00 PLN/ 500g	13.00 PLN/ 500g	30.50 PLN/ 500g
Sytuacja zakupowa 1			

Q4.2.

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	11.00 PLN/ 500g	13.00 PLN/ 500g	30.50 PLN/ 500g
Sytuacja zakupowa 2			

Q4.3.

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	13.00 PLN/ 500g	13.00 PLN/ 500g	30.50 PLN/ 500g
Sytuacja zakupowa 3			

Q4.4.

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	15.00 PLN/ 500g	13.00 PLN/ 500g	30.50 PLN/ 500g
Sytuacja zakupowa 4			

Q4.5.

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	17.00 PLN/ 500g	13.00 PLN/ 500g	30.50 PLN/ 500g
Sytuacja zakupowa 5			

ILE litrów KAŻDEGO RODZAJU MLEKA Pan/i kupiłby/aby w każdej sytuacji przy poniższych cenach?

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	1.95 PLN/ 1 litr	2.45 PLN/ 1 litr	8.50 PLN/ 1 litr
Sytuacja zakupowa 1			

Q7.2.

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	2.15 PLN/ 1 litr	2.45 PLN/ 1 litr	8.50 PLN/ 1 litr
Sytuacja zakupowa 2			

Q7.3.

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	2.45 PLN/ 1 litr	2.45 PLN/ 1 litr	8.50 PLN/ 1 litr
Sytuacja zakupowa 3			

Q7.4.

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	2.75 PLN/ 1 litr	2.45 PLN/ 1 litr	8.50 PLN/ 1 litr
Sytuacja zakupowa 4			

Q7.5.

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	3.05 PLN/ 1 litr	2.45 PLN/ 1 litr	8.50 PLN/ 1 litr
Sytuacja zakupowa 5			

Ile jednostek / opakowań KAŻDEGO RODZAJU CHLEBA Pan/i kupiłby/aby w każdej sytuacji przy podanych poniżej cenach?

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	3.25 PLN/ 450g	6.25 PLN/ 450g	16.25 PLN/ 450g
Sytuacja zakupowa 1			

Q10.2.

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	4.75 PLN/ 450g	6.25 PLN/ 450g	16.25 PLN/ 450g
Sytuacja zakupowa 2			

Q10.3.

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	6.25 PLN/ 450g	6.25 PLN/ 450g	16.25 PLN/ 450g
Sytuacja zakupowa 3			

Q10.4.

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	7.75 PLN/ 450g	6.25 PLN/ 450g	16.25 PLN/ 450g
Sytuacja zakupowa 4			

Q10.5.

	Rolnictwo w obiegu zamkniętym	Rolnictwo konwencjonalne	Rolnictwo ekologiczne
	9.25 PLN/ 450g	6.25 PLN/ 450g	16.25 PLN/ 450g
Sytuacja zakupowa 5			

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Open-Ended Choice Experiment - Spain

A los siguientes precios dados, ¿CUÁNTAS unidades/paquetes (de 500g) de CADA TIPO CERDO en filetes compraría en cada situación de compra?

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€2.50/ 500g	€4.50/ 500g	€10.50/ 500g
Situación de compra 1			

Q4.2.

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€3.50/ 500g	€4.50/ 500g	€10.50/ 500g
Situación de compra 2			

Q4.3.

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€4.50/ 500g	€4.50/ 500g	€10.50/ 500g
Situación de compra 3			

Q4.4.

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€5.50/ 500g	€4.50/ 500g	€10.50/ 500g
Situación de compra 4			

Q4.5.

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€6.50/ 500g	€4.50/ 500g	€10.50/ 500g
Situación de compra 5			

A los siguientes precios dados, ¿CUÁNTOS litros de CADA TIPO DE LECHE compraría en cada situación de compra?

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€0.55/ 1 litro	€0.75/ 1 litro	€1.35/ 1 litro
Situación de compra 1			

Q7.2.

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€0.65/ 1 litro	€0.75/ 1 litro	€1.35/ 1 litro
Situación de compra 2			

Q7.3.

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€0.75/ 1 litro	€0.75/ 1 litro	€1.35/ 1 litro
Situación de compra 3			

Q7.4.

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€0.85/ 1 litro	€0.75/ 1 litro	€1.35/ 1 litro
Situación de compra 4			

Q7.5.

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€0.95/ 1 litro	€0.75/ 1 litro	€1.35/ 1 litro
Situación de compra 5			

A los siguientes precios dados, ¿CUÁNTAS unidades/paquetes de cada tipo de PAN DE MOLDE compraría en cada situación de compra?

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€0.70/ 450g	€1.10/ 450g	€3.25/ 450g
Situación de compra 1			

Q10.2.

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€0.90/ 450g	€1.10/ 450g	€3.25/ 450g
Situación de compra 2			

Q10.3.

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€1.10/ 450g	€1.10/ 450g	€3.25/ 450g
Situación de compra 3			

Q10.4.

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€1.30/ 450g	€1.10/ 450g	€3.25/ 450g
Situación de compra 4			

Q10.5.

	Agricultura Circular	Agricultura Convencional	Agricultura Ecológica
	€1.50/ 450g	€1.10/ 450g	€3.25/ 450g
Situación de compra 5			

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