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TESI DI LAUREA

A 20-year trend in EU citizen perceptions of farm animal welfare from Eurobarometer

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SUMMARY

RIASSUNTO

La tesi si focalizza sull'analisi dell'opinione e della conoscenza dei cittadini europei sul tema del benessere degli animali da reddito, sulla base dei dati raccolti da Eurobarometer nel corso degli ultimi 20 anni attraverso quattro questionari pubblicati nel 2005, 2007, 2016, 2023. Eurobarometer è lo strumento di sondaggio ufficiale delle istituzioni e agenzie dell'Unione Europea (UE) a fini di monitoraggio dell'opinione pubblica europea. L'attitudine del cittadino europeo nei confronti del benessere animale è stata indagata attraverso l'analisi di alcune delle domande dei questionari; in particolare quelle sull'importanza, la conoscenza e il desiderio di voler essere informati sulla tematica da parte dei cittadini europei. Laddove ripetute negli anni, le domande sono state analizzate statisticamente per individuare eventuali tendenze ed evoluzioni nelle risposte date dagli intervistati. Nello specifico, per avere una panoramica europea, sono stati considerati 5 Paesi dell'UE: Germania, Francia, Italia, Polonia e Svezia. Per l'Italia queste tematiche sono state indagate in relazione ai seguenti fattori: fascia d'età, livello di istruzione e categoria occupazionale.

Dallo studio è emerso che, nel 2007, i cittadini svedesi hanno dichiarato di avere il livello più alto di conoscenza del benessere degli animali da allevamento (BAA), mentre l'Italia si è classificata all'ultimo posto per conoscenza. La percentuale più alta di intervistati che dichiarano di non avere alcuna conoscenza del BAA è stata registrata in Italia (30%), rispetto alla più bassa in Svezia (13%). I polacchi hanno riportato una conoscenza superiore rispetto agli italiani ma inferiore rispetto agli svedesi, seguiti da tedeschi e francesi. La domanda posta nel 2016 sulla conoscenza, a causa della sua diversa struttura, non ha reso possibile il confronto diretto con il 2007, ma le tendenze indicano che i cittadini svedesi e italiani hanno mostrato nuovamente una maggiore e minore consapevolezza del tema, rispettivamente. L'importanza più alta attribuita al benessere degli animali allevati è stata rilevata in Svezia dal 2007 al 2023. In Polonia, la percentuale di rispondenti che consideravano il BAA "Molto importante" è diminuita dal 52% nel 2007 al 31% nel 2023, compensata però da un aumento di coloro che lo ritenevano "Abbastanza importante". La maggior parte della popolazione dell'Unione Europea desidera ricevere più informazioni sul benessere degli animali da reddito, e questa tendenza è aumentata nel corso degli anni.

Questi risultati evidenziano differenze significative tra i paesi europei in termini di conoscenza, importanza attribuita e desiderio di informazioni sul benessere degli animali da allevamento, con un maggiore interesse e consapevolezza nei paesi del Nord Europa.

In Italia, le categorie che dichiarano una conoscenza minore sulla tematica sono i giovani e coloro che sono ancora in formazione, mentre i manager dichiarano di saperne di più. Alte percentuali di risposte positive confermano che gli italiani sono molto preoccupati per il BAA, soprattutto i giovani e le persone con livelli d'istruzione più elevati. Le casalinghe, gli anziani, le persone con livelli d'istruzione più bassi e i pensionati tendono a considerare la tematica come meno rilevante o non bisognosa di miglioramenti. In generale, anche per le categorie italiane, il desiderio di ricevere maggiori informazioni sul BAA è aumentato nel tempo, specialmente tra coloro che sono ancora in formazione o lavorano come dirigenti.

In conclusione, i consumatori oggi dichiarano un'attenzione crescente e un desiderio di prodotti che riflettano valori etici, sostenibili e di qualità. La trasparenza e l'onestà delle informazioni fornite dalla filiera, dagli stakeholder e dai decisori politici sono fattori cruciali per guadagnare e mantenere la fiducia dei consumatori. È essenziale continuare a informare e educare i cittadini, specialmente nei paesi e nei gruppi demografici che mostrano meno preoccupazione per il benessere degli animali, per promuovere un miglioramento delle condizioni di vita degli animali allevati e rispondere alle nuove esigenze del mercato.

ABSTRACT

The thesis focuses on the analysis of the European citizens' opinion and knowledge of welfare of livestock animals based on data collected through Eurobarometer over the past 20 years by four surveys published in 2005, 2007, 2016, 2023. Eurobarometer is the official survey tool used by European Union (EU) institutions and agencies to monitor European public opinion. The European citizens' attitude towards farmed animal welfare was investigated by analyzing some of the survey questions; in particular, those focused on the importance placed on, knowledge of, and desire to be informed on such topic by the European citizens. When repeated over the years, these questions were statistically analyzed to highlight possible trends and evolutions in respondents' answers. Specifically, to provide a European overview, 5 EU countries were considered: Germany, France, Italy, Poland, and Sweden. For Italy, these issues were investigated in relation to the following factors: age group, level of education, and occupation scale.

The study revealed that in 2007, Swedish citizens reported having the highest level of knowledge about farmed animal welfare (FAW), while Italy ranked last in terms of knowledge. The highest percentage of respondents who reported having no knowledge of FAW was recorded in Italy (30%), compared to the lowest in Sweden (13%). The Poles reported a higher level of knowledge than the Italians but lower than the Swedes, followed by the Germans and French. The question posed in 2016 regarding knowledge, due to its different structure, did not allow for a direct comparison with 2007, but, again, trends indicate that Swedish and Italian citizens showed higher and lower awareness of the topic, respectively. The highest importance attributed to farmed animal welfare was recorded in Sweden from 2007 to 2023. In Poland, the percentage of respondents who considered FAW as "Very important" decreased from 52% in 2007 to 31% in 2023, compensated by an increase in those who considered it as "Somewhat important." The majority of the European Union population desired more information about farmed animal welfare, and this trend has increased over the years.

These results highlight significant differences among European countries in terms of knowledge, importance attributed, and desire for information on farmed animal welfare, with greater interest and awareness in Northern European countries.

In Italy, the categories that report less knowledge about this topic are young people and those still in education, while managers claim to know more. High percentages of positive responses confirmed that Italians are very concerned about FAW, especially young people

and those with higher levels of education. House people, the elderly, people with lower levels of education, and retirees tend to consider the topic less relevant or not in need of improvement. Overall, also for the Italian categories, the desire for more information on FAW has increased over time, especially among those still in education or working as managers. In conclusion, today's consumers declare an increasing attention and desire for products that reflect ethical, sustainable, and quality values. Transparency and honesty in the information provided by the supply chain, stakeholders, and policymakers are crucial factors for gaining and maintaining consumer trust. It is also essential to continue informing and educating citizens, especially in countries and demographic groups that show less concern for animal welfare, to promote an improvement in the living conditions of farmed animals and meet the new market demands.

1. INTRODUCTION

1.1. Animal Welfare

Animal welfare is a complex concept that pertains to the physical and mental state of animals in relation to the conditions in which they live. Historically, animal welfare was primarily evaluated in terms of health and productivity, with less attention to the feelings and mental states of animals (Broom, 2011; Fraser, 2008). However, in recent decades, the scientific approach to animal welfare has evolved significantly.

One of the first public movements advocating for animal welfare was stimulated by Ruth Harrison's book "Animal Machines" in 1964, which criticized intensive farming. This led to the Brambell Report in 1965 and the formulation of the "Five Freedoms" in 1979 by the UK Farm Animal Welfare Council, fundamental principles internationally recognized for assessing animal welfare (Farm Animal Welfare Council, FAWC, 1979).

The "Five Freedoms" for animal welfare are:

1. Freedom from hunger and thirst
2. Freedom from discomfort
3. Freedom from pain, injury, and disease
4. Freedom to express normal behavior
5. Freedom from fear and distress

In 1994, Mellor and Reid introduced the concept of the "Five Domains," which expand the Five Freedoms by focusing on the physical and mental welfare of animals: Nutrition, Environment, Health, Behavior, and Mental State (Mellor, 2016; Mellor and Reid, 1994).

The Welfare Quality project, funded by the European Union, developed evidence-based tools to assess animal welfare on farms and at slaughterhouses, identifying 12 criteria and four principles to evaluate the main areas of concern (Blokhuis et al., 2010). In the Welfare Quality project, funded by the European Union, 12 criteria and four fundamental principles were identified to assess animal welfare in farms and slaughterhouses. These criteria and principles summarize the main areas of concern that must be evaluated to ensure a high level of animal welfare.

The four principles of animal welfare are:

1. **Good feeding**, ensuring that animals do not suffer from hunger or thirst.
2. **Good housing**, guaranteeing a comfortable environment and adequate space.

3. **Good health**, ensuring the absence of diseases, injuries, and pain caused by management procedures.
4. **Appropriate behavior**, allowing animals to express natural behaviors and preventing fear or stress.

These principles and criteria provide a solid foundation for the systematic evaluation of animal welfare and are used to identify areas needing improvement in farming systems and slaughterhouses.

1.2. Consumer Perception of Animal Welfare

The concept of welfare of animals farmed for food production involves also human and societal opinions since high value of animal health and low incidence of stress factors are ethical concerns for most European citizens (Cembalo et al., 2016).

The adoption of farming systems ensuring appropriate animal treatments and care could increase also the food safety and quality in the consumer's perception. Indeed, the opinion of the European citizens is that there is a close links between animal welfare, animal health, incidence of food-borne diseases and quality of final products (Clark et al., 2016).

According to Cornish et al. (2016), despite the differences between the public, veterinarians, and farmers, in developed countries the strong concern for animal welfare can influence agricultural production methods, with consumers pushing farmers to improve practices. Demographic factors and perceptions of animal intelligence influence this concern, but knowledge is even more crucial. For the most part, public attitudes are based on perceived agricultural practices rather than actual facts and experiences, suggesting a difference between public perception and the reality of agriculture (Clark et al., 2016). The lack of knowledge about animal welfare in food production is notable, so educating the public is essential to improve awareness and redefine acceptable food production methods.

In literature it has been reported that there is a relationship between consumer sensitivity to animal welfare and related food purchase choices, a phenomenon called animal welfarism in food choices (Cembalo et al., 2016). However, the animal-derived food products purchase decision is a complex process, which is affected by many factors related to the farming conditions (i.e., intensive vs. extensive), sustainability of livestock system (i.e., impact on the environment), and animal welfare (Caracciolo et al., 2016).

Nocella et al. (2010) by means of a cross-cultural analysis in five EU countries (England, France, Germany, Spain and Italy) reported that "consumer behaviour *vis-à-vis* animal-

friendly products is affected by cultural differences". The authors explained these differences as different trust in farmers that is lower in northern European than in southern European countries.

Despite the differences in concepts and definitions of animal welfare, which lead to varying perceptions on this topic, in recent years there has been growing concern among citizens and consumers about the effects of intensifying animal production systems on the welfare of farm animals. There is an increasing appreciation of animal welfare parameters compared to other quality attributes of food products. Consumers consider products that respect animal welfare to be healthier, tastier, more hygienic, safer, more acceptable, authentic, environmentally friendly, and traditional. Willingness to pay higher prices to improve the welfare of farm animals should be encouraged through proper information about the management and housing conditions of different livestock species (Alonso et al., 2020). Animal welfare-friendly products should be clearly labeled with transparent and traceable information provided by an internationally accepted monitoring system, thereby increasing consumer trust in the participants of the food supply chain.

1.3. Eurobarometer and trend in farmed animal welfare opinions

Eurobarometer is a survey tool used by the European Commission, the European Parliament, and other European Union (EU) institutions and agencies to monitor the social and political attitudes of citizens in EU member states. It was established in 1974 by the European Commission. Eurobarometer represents a series of surveys that gather data that cover a wide range of topics, including EU policies, health, culture, social issues, information technology, the environment, and more.

The Eurobarometer is managed by the Directorate-General for Communication of the European Commission. This institution oversees the organization of surveys, ensuring that the collected data are representative and reliable. Eurobarometer studies are conducted twice a year, in spring and autumn, and the results are made publicly available, allowing researchers, policymakers, and citizens to access a valuable source of information on trends and opinions within the European Union.

The primary objective of the Eurobarometer is to gauge public opinion to help shape and evaluate EU policies. It provides invaluable insights into how EU citizens perceive various issues and their attitudes towards the EU itself. The findings help policymakers understand public sentiment and trends, facilitating more informed decision-making and improving communication between the EU institutions and the public (European Union, 2024).

Over the past twenty years (2005, 2007, 2016, 2023), reports have been conducted regarding the opinions of European citizens on animal welfare. These surveys, carried out in various nations of the European Union, have gathered significant data on citizens' perceptions and attitudes towards the treatment of animals. The results have shown a consistent interest and growing public concern for animal welfare, especially for farm animals (Alonso et al., 2020). European consumer habits are changing and are moving towards greater sensitivity to health and ethics, preferring ethical production systems that meet their concerns regarding animal welfare (Giannetto et al., 2023). Animal welfare is an emotionally charged topic that elicits a wide range of reactions from the public. Consumer attitudes towards farmed animal welfare (FAW) vary widely across the EU. Residents in northern countries appear to be more sensitive than those living in southern states or new member states. Concerns about FAW can stem from both specific consumer groups (such as vegetarians) and individuals who believe that the way animals are raised is wrong and immoral (Nocella et al., 2010). In light of these trends, the need has arisen to analyze citizens' views more thoroughly, exploring not only their general opinions but also their specific knowledge and desire to be informed about this important issue.

1.4. European legislation on Animal Welfare

The European Union (EU) has developed significant regulations aimed at improving animal welfare, reflecting an increasing focus on ethical treatment of animals.

1.4.1. The First Directives: 1970s and 1980s

The first legislative initiatives date back to the 1970s with Council Directive 74/577/EEC, which introduced the requirement to stun animals before slaughter to reduce their suffering (European Commission, 1974). In 1986, Council Directive 86/609/EEC established standards for the protection of animals used for scientific purposes, marking a significant step towards more humane treatment of laboratory animals (European Commission, 1986).

1.4.2. Minimum Protection Standards: 1990s

In the 1990s, the EU introduced minimum protection standards for various species. Council Directive 91/629/EEC regulated the space and living conditions for calves (European Commission, 1991a), while Council Directive 91/630/EEC introduced standards for pigs, including a ban on permanent gestation cages (European Commission, 1991b).

1.4.3. Improving Transport and Farming Conditions: 2000s

Regulation (EC) No 1/2005, adopted in 2004, improved the transport conditions for animals by introducing detailed rules for long-distance transport and related operations (European Commission, 2005b). In 2007, Directive 2007/43/EC set standards for the protection of broiler chickens (European Commission, 2007a), while Directives 2008/119/EC and 2008/120/EC updated the standards for calves and pigs, respectively (European Commission, 2008a, 2008b).

1.4.4. Stricter Regulations: 2010s

Directive 2010/63/EU introduced more stringent requirements for the use of animals in laboratories, promoting the principles of the 3Rs: Replacement, Reduction, and Refinement (European Commission, 2010). Regulation (EU) No 1099/2009 established detailed rules for the treatment of animals at slaughterhouses, significantly improving their conditions during slaughter (European Commission, 2009).

1.4.5. Recent and Future Initiatives

The 2020 Farm to Fork Strategy, part of the European Green Deal, includes specific objectives for animal welfare, promoting sustainable farming methods (European Commission, 2020). In 2021, the EU started a review of existing legislation to update and further strengthen animal welfare protections (European Commission, 2021).

In conclusion, the evolution of European legislation on animal welfare demonstrates a growing commitment to the ethical treatment of animals. From the first directives of the 1970s to the recent initiatives under the Green Deal, the EU has made significant progress, although many challenges remain.

1.5. *Italian legislation on Animal Welfare*

In parallel with the evolution of European legislation, Italy has also developed a significant regulatory framework for the protection and welfare of animals. Italian regulations have often aligned with European standards, ensuring a level of protection consistent with EU norms. The first Italian regulations on animal welfare began to take shape in the 1990s, primarily through the adoption of European directives. Legislative Decree No. 116 of 1992 adopted

Directive 86/609/EEC, establishing rules for the protection of animals used for experimental or other scientific purposes (Gazzetta Ufficiale, 1992). This law marked the beginning of a more formal commitment by Italy to ensure the welfare of laboratory animals.

With the beginning of the 2000s, Italy continued to strengthen its animal welfare regulations. Legislative Decree No. 146 of 2001 adopted Directive 98/58/EC, establishing minimum standards for the protection of animals kept for farming purposes (Gazzetta Ufficiale, 2001). In 2004, Legislative Decree No. 53 adopted Regulation (EC) No. 1/2005, improving the conditions for animal transport (Gazzetta Ufficiale, 2004),

In the 2010s, Italy further aligned its legislation with more recent European standards. Legislative Decree No. 26 of 2014 adopted Directive 2010/63/EU, introducing stricter requirements for the use of animals for scientific purposes and promoting the 3Rs principles mentioned earlier (Gazzetta Ufficiale, 2014). This decree represented a significant step forward in improving the living conditions of laboratory animals in Italy.

Recently, Italy has continued to promote animal welfare through both legislative initiatives and public awareness campaigns. The National Animal Welfare Plan 2021-2024 introduced specific measures to improve the living conditions of farm animals and those in transport, reflecting the objectives of the EU's Farm to Fork Strategy (Ministero della Salute, 2021). The evolution of Italian legislation on animal welfare shows a consistent commitment to ensuring the ethical treatment of animals, in line with European standards. While significant progress has been made, the path to optimal animal welfare requires continuous updating of regulations and strengthening of enforcement measures.

2. AIM OF MASTER DISSERTATION

The overall aim of this master dissertation is an evaluation of the European citizens' attitudes towards farmed animal welfare over the last two decades on the base of data regarding European citizens' knowledge and perception of farmed animal welfare extracted from Eurobarometer datasets, and the related reports, regarding surveys published in 2005, 2007, 2016, and 2023. From the downloaded datasets, we selected those containing overall data for the entire Europe and those with specific data for each country.

I performed analyses both at European and Italian national level. To examine the evolution of European citizens' attitudes towards farmed animal welfare, we identified specific survey questions probing consumers' opinions and knowledge on this topic. Among these questions, we selected those allowing for a direct comparison between at least two years. For the selected questions, we extracted data regarding responses from five European countries, chosen to be representative of Europe as a whole. The selected countries included Germany (DE), France (FR), Italy (IT), Poland (PL), and Sweden (SE). At the Italian level, for the same selected questions, we compared responses over the years, considering three socio-economic categorizations of participants: age, level of education, and occupation scale.

The analysis of the four Eurobarometer surveys was conducted to investigate these objectives: (1) methodology for data collection and sample design; (2) changes in survey structure and report content over the years, especially what questions on new species and specific practices were introduced; (3) which kind of socio-demographic and socio-economic characteristics were used to group citizens and how the profiling information asked evolved across the surveys; (4) what is the European citizens' attitude towards farmed animal welfare and how it changed over the years, both at European and Italian level. Finally, two further comparisons were made: (5) at European level, among the 5 selected representative countries, and (6) at Italian level, among 3 socio-economic groups of Italian citizens.

3. MATERIALS AND METHODS

3.1. Fieldwork and data collection

The data used in this study were extracted from Eurobarometer datasets coming from surveys related to Europeans' attitudes toward animal welfare and carried out in 2005, 2007, 2016 and 2023 (European Commission, 2005a, 2007b, 2016, 2023). All the reports and datasets related to the surveys were downloaded from the official Eurobarometer website of the European Union[1], where they were made available under the "dataset" section. From the downloaded datasets, those containing overall European data and those with country-specific data were selected, from which we analyzed only the Italian dataset.

3.2. Evolution in the survey structures and reports

To identify what changes and developments occurred in the questions and questionnaire structures, the questions contained in each survey were categorized into two main groups: those profiling the consumer and those concerning animal welfare. The consumer profiling questions have been further divided into two subcategories: objective (e.g., nationality, gender, age, education, occupation, family, residency, technologies owned) and subjective questions (e.g., political position, religion, level of satisfaction with economics and politics). Those regarding animal welfare were divided into three subcategories: opinion and knowledge on animal welfare, food of animal origin (e.g., labelling, willingness to pay more), habits (e.g., purchasing and meat-eating habits).

With the aim of highlighting the key points extrapolated and showcased from the questionnaires by Eurobarometer, the reports produced from each survey were investigated by downloading them in PDF format from the official Eurobarometer website[1].

The index of each report was analyzed to check significant macro-level differences in structure between the years. The introductory part of each report was studied to better understand the regulatory context in which the reports were produced and the specific objectives of each report.

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[1] Eurobarometer. https://europa.eu/eurobarometer/surveys/browse/all [Accessed June 20th, 2024].

3.3. Evolution in citizens' attitude towards farmed animal welfare

To investigate the evolution in European citizens' attitude towards farmed animal welfare the questions specifically probing the consumer's opinion and knowledge of farmed animal welfare were selected across the surveys. Among these, we identified those where a direct comparison between at least two years was possible because question content was the same and the possible multiple answers were comparable.

Four questions on farmed animal welfare were identified:

1. Question on the level of knowledge of citizens on farmed animal welfare; asked in 2007, and 2016.
2. Question on the importance that farmed animal welfare holds for the consumer; asked in 2007, 2016, and 2023.
3. Question on the consumer's perception of current farmed animal welfare protection in their own country; asked across all four years.
4. Question on the consumers' willingness to be more informed on farmed animal welfare conditions in their own country; asked in 2007, 2016, and 2023.

When responses to questions on the same topic differed among years in content, number of possible responses, or both, they were re-grouped to facilitate comparison. Additionally, for all the questions examined, the final groups of answers were assigned an incrementally numbered category.

For questions on the first topic examined (i.e., level of knowledge), although the content was similar, direct comparison between years was not possible as the possible answers varied significantly between years, both in number and content, and in 2016 the respondents could choose up to a maximum of two answers.

3.3.1. European Overview

For the selected questions specifically addressing the attitude towards farmed animal welfare, we extracted the data related to responses from five European countries, chosen in such a way to make them as representative as possible of Europe. The selected countries were Germany (DE), France (FR), Italy (IT), Poland (PL), and Sweden (SE).

3.3.2. Italian Overview

At an Italian level, for the same selected questions, the responses were compared across the years based on the following three socio-economic categorizations of respondents: respondents' age, level of education, and occupation.

3.4. Statistical analysis

For each question, at the European level, responses were analyzed using descriptive statistics, calculating the mean of answer percentages and related standard deviation, and range of percentages for each response category within country and year. At the Italian level, the same analysis was conducted for each response category within age group, level of education, and type of occupation of respondents by each year and across years. For the first question only (i.e., level of knowledge), as responses between years were not comparable, these descriptive statistics were calculated within year at European level. The same procedure was followed at the Italian level, computing mean, standard deviation, and range for each answer category across age groups, education levels, and occupations.

To assess for significant differences between observed and expected data distribution among categories, the parametric k-proportion test was applied for some of the investigated questions. Thus, using the Marascuillo procedure, it was possible to pinpoint which specific sample proportions differed significantly. The Marascuillo approach is used for multiple proportions (i.e., three or more) since it is a procedure that compares all pairs and determine which proportions are statistically significant. The statistical procedure was carried out using XLStat software (Addinsoft of Microsoft Excel®).

4. RESULTS

4.1. Analysis of the Eurobarometer sampling method

The Eurobarometer surveys were conducted face-to-face in people's homes and in the appropriate national language. Data capture was carried out using CAPI (Computer Assisted Personal Interview) in countries where this technique was available. The sampling method was able to cover the population of the respective nationalities of the European Union Member States, residing in each of the Member States and aged 15 years and over. The basic sample design applied in all states is multi-stage, random (probability) sampling. In each country, several sampling points were selected with probability proportional to population size and population density. Over the years, a total of 24,708, 28,652, 27,672, and 26,376 surveys were collected in the EU Member States. At European level, on average, males and females accounted for 48% and 52% of the samples. Most of the sample was made of respondents that studied up until 16 to 19 years old (41.5% on average). While this group of respondents remained highly stable over the years (range: 40-43%), the percentage of individuals that stopped studying at or before 15 years old steadily decreased from 25% to 13% (average: 20%), while those that kept studying after being 20 years old increased from 25% to 33% (average: 28%). The inactive respondents remained stable, 50% on average, with a final decrease in 2023 (45%). The average composition of the inactive respondents was: 26% retired, 10% students, 7% house persons, 6% unemployed. On average across the years, the remaining professional categories were: manual workers (21%), other white collars (12%), managers (11%), and self-employed workers (8%).

4.2. Analysis of Eurobarometer Surveys and Reports

The Eurobarometer surveys and, therefore, the related answer databases contained questions and answers on the European citizens' attitude towards animal welfare. Specifically, the surveys investigated the respondents': knowledge and willingness to become more informed about the conditions under which animals were farmed; access to sources of information to learn more about the conditions under which animals were farmed; perceptions of changes in animal welfare levels over the years; responsibility towards animal welfare; reasons for purchasing food products produced in a more animal-friendly way; perception of the usefulness of labeling information; behavioral intentions and willingness regarding animal welfare; socio-demographic and economic information.

From 2005 to 2023, there was an overall increase in the number of questions, rising from 25 to 33, and the number of questions within the consumer profiling group, growing from 12 to 19. Requests for personal objective details remained largely stable, both in content and in quantity. However, there was a notable increase in questions concerning personal opinions and behaviors, rising from 1 to 10.

Over the years, the number and general themes of questions regarding animal welfare and food of animal origin remained consistent. However, these questions became more detailed and comprehensive, including topics such as specific farming practices, transportation of animals, slaughtering, questions on companion and fur animals.

In the introduction of each report, the legislative context in which the surveys were conducted is described. Over the past 50 years, with the support of EU Member States, the European Commission has promoted animal welfare, improving the lives of farmed animals through legislative norms:

- Council Directive 98/58/EC (1998): set general rules for animal protection.
- Lisbon Treaty (2009): recognized animals as sentient beings.
- EU Strategy for the Protection and Welfare of Animals (2012-2015): aimed to enhance welfare standards.
- Legislation to ban conventional cages for laying hens (2012).
- Legislation to phase out individual stalls for pregnant sows (2013).
- EU Fitness Check (2022): assessed animal welfare standards.
- Farm to Fork Strategy (part of the European Green Deal): plans to revise animal welfare legislation by 2023.
- "End the Cage Age" initiative (2021): aims to phase out cages in intensive farming.

Each report considered specific themes that were addressed by analyzing the results in terms of the European average, considering the breakdown of results by country and socio-demographic variables. Furthermore, the responses to all the questions with additional classification variable were systematically cross analyzed.

Below is the list of topics covered in the reports:

Report 2005:

- The welfare of farmed animals
- Purchasing behavior
- Animal welfare at the European level

Report 2007:

- The importance of animal welfare in the public mind
- Knowledge of animal welfare
- Perceptions of national animal welfare standards
- The impact of higher animal welfare standards on producers
- Consumer shopping habits and labelling

Report 2016:

- Animal welfare: understanding and perceived importance
- Information and education about animal welfare
- International animal welfare standards
- Regulation
- Animal welfare friendly products

Report 2023:

- Europeans' awareness and perception of animal welfare importance
- Evaluation of farming practices and EU standards by Europeans
- Europeans' views on availability and recognition of animal welfare-friendly products

4.3. European-level analysis

Tables 1 to 4 show the results of the analysis of the surveys at European level. Each table is dedicated to the analysis of one question, including its possible response options and their assigned category. Additionally, they display the percentage results by country and by year, along with basic statistical analysis (mean, standard deviation and range) within each country and each year for each response category.

The first question analyzed was the one related to the level of knowledge. This question was asked in 2007 (Table 1A) and in 2016 (Table 1B) and it was formulated differently with a different choice of possible answers between years. Based on the data in Table 1A, it can be observed that responses varied significantly across different countries. Swedish respondents believed they know more about the conditions in which animals are raised in their country compared to the other countries, while Italians declared they know less.

Table 1B highlighted also significantly different k-proportions of percentages within all the answer categories among countries.

The second question analyzed (Table 2) showed that, compared to other countries, almost all respondents in Sweden considered animal welfare to be very important. This trend remained consistent over the years (Table 2, panel b), with very few citizens responding in categories 1 and 0. In contrast, Poland showed higher response rates in categories 1 and especially 0 compared to other examined countries. In Italy and Poland, there has been a progressive decline in responses for category 4 and an increase for category 3, indicating a decreasing emphasis on considering animal welfare protection as "very important." However, categories 4 and 3, when considered together, balance out and remain stable over time (Table 2, panel b), a trend that is also observed at a general level over the years (Table 2, panel c). (Table 2, panel b), a trend observed at a general level over the years as well (Table 2, panel c).

The third question analyzed (Table 3) showed that, from 2005 to 2023, the percentage of citizens who believed that the welfare of farmed animals in their own country had improved and did not need further improvement increased. In particular, there was a progressive decline in the percentage of responses in category 1, especially in Germany, France, and Sweden (Table 3, panel b). For category 3 responses, a positive trend was observed over the years, with the most significant percentage increase occurring from 2005 to 2007 in all countries (Table 3, panel b). However, responses in category 2 remained relatively stable over the years (Table 3, panel b). Comparing the average responses by country, about half of Polish and Italian citizens believed that the welfare of farmed animals probably needed improvement, while only a third of German, French, and Swedish citizens shared this opinion (Table 3, panel c).

From Table 4, we can see how, over the years, there was an increase in citizens' interest in being more informed about the conditions in which farmed animals are raised in their own country (Table 4, panel c).

4.4. Italian-level analysis

For the analysis at Italian level, Tables 5 to 8 contain questions with their corresponding response options, each assigned to a category. They present the percentage results of responses according to age range, level of education, and type of occupation of the respondents for each year.

The analyses at the Italian level revealed that for the first question, in 2007 (Table 5A, panel a), younger people claimed to know significantly less about the conditions in which animals were raised. Regarding the level of education, it was found that those still studying believed

they know significantly less (Table 5A, panel a). In Table 5A, panel b, it can be seen that those working as managers thought they knew significantly more compared to the others.

From Table 6 (panel d), it is evident that young people (15-24 years) had a higher tendency to consider welfare of farmed animals as important. Additionally, the average answers indicated that those with higher education levels or still studying also shared this viewpoint (panel e). Finally, based on occupation scale, it is evident that "House Persons" (HP) considered it less important (panel f).

Regarding the need to improve farmed animal welfare, by comparing the average responses based on the age, level of education, and occupation scale of the respondents, it was found that older individuals (40-54 and 55+; Table 7, panel e), individuals with the lowest level of education (15-; Table 7, panel e), and retirees (Table 7, panel g) believed that the level of welfare protection in Italy did not need improvement.

In general, from Table 8 (panel d, panel e, panel f), it is evident that over the years, the percentage of citizens who want more information on how animals increased, regardless of age, education level, and occupation. This trend is particularly evident among those who were still studying or worked as managers.

Table 1A. Question on level of knowledge of national animal welfare conditions in **2007**, and related answers. Total answers and percentages of answers (%) within country, and European (EU) mean (± standard deviation) and range per answers.

Could you tell me how much do you feel you know about the conditions under which animals are farmed in (OUR COUNTRY)? Would you say that you know…?	DE_2007	FR_2007	IT_2007	PL_2007	SE_2007	P- value	EU_2007	EU_2007
ANSWERS	TOTAL: 1525	TOTAL: 1007	TOTAL: 1006	TOTAL: 1000	TOTAL: 1013		Mean (±SD)	Range
A lot	12 ^{bc}	12 ^{bc}	9 ^{c}	15 ^{ab}	18 ^{a}	<0.001	13 (±3)	9-18
A little	55 ^{c}	63 ^{a}	56 ^{bc}	62 ^{ab}	68 ^{a}	<0.001	61 (±5)	55-68
Nothing at all	29 ^{a}	23 ^{b}	30 ^{a}	21 ^{b}	13 ^{c}	<0.001	23 (±6)	13-30
Don't know	4 ^{ab}	2 ^{bc}	5 ^{a}	2 ^{bc}	1 ^{c}	<0.001	3 (±1)	1-5

DE: Germany; FR: France; IT: Italy; PL: Poland; SE: Sweden. $^{a-c}$ Percentages with different superscripts differ at p-value < 0.05.

Table 1B. Question on level of knowledge of national animal welfare conditions in **2016**, and related answers. Total answers and percentages of answers (%) within country, and European (EU) mean (± standard deviation) and range per answers.

Which of the following statements best describe your understanding of animal welfare?	DE_2016	FR_2016	IT_2016	PL_2016	SE_2016	P-value	EU_2016	EU_2016
ANSWERS*	TOTAL: 1527	TOTAL: 1038	TOTAL: 967	TOTAL: 1006	TOTAL: 1028		Mean (±SD)	Range
It concerns the way farmed animals are treated, providing them with a better quality of life	46 ^{b}	46 ^{b}	32 ^{c}	36 ^{c}	61 ^{a}	<0.001	44 (±10)	32-61
It is the same as animal protection	14 ^{b}	13 ^{bc}	20 ^{a}	17 ^{ab}	10 ^{c}	<0.001	15 (±3)	10-20
It refers to the duty to respect all animals	51 ^{ab}	59 ^{a}	40 ^{b}	33 ^{c}	45 ^{b}	<0.001	46 (±9)	33-59
It contributes to better quality animal products	25 ^{a}	12 ^{b}	16 ^{ab}	12 ^{b}	13 ^{b}	<0.001	16 (±5)	12-25
It goes beyond animal protection	16 ^{bc}	19 ^{b}	14 ^{c}	14 ^{c}	30 ^{a}	<0.001	19 (±6)	14-30
None (SPONTANEOUS)	3	0	2	3	0	n.a.	2 (±1)	0-3
Don't know	1 ^{c}	3 ^{bc}	2 ^{c}	9 ^{a}	1 ^{c}	<0.001	3 (±3)	1-9

* ***Up to a maximum of 2 answers could be given***. DE: Germany; FR: France; IT: Italy; PL: Poland; SE: Sweden. $^{a-c}$ Percentages with different superscripts differ at p-value < 0.05. n.a. not assessed

Table 2. Questions on the importance of animal welfare in **2007**, **2016**, and **2023**, related answers, and category assigned to groups of questions (**a**). Total answers and percentages of answers (%) within category, by country and year (**b**). Mean and range per category, by country and year (**c**).

2007: Please tell me on a scale of 1 to 10 how important is it to you that the welfare of farmed animals is protected? *	2016: In your opinion, how important is it to protect the welfare of farmed animals?	2023: In your opinion, how important is it to protect the welfare of farmed animals (e.g. pigs, cattle, poultry, etc.) to ensure that they have decent living conditions?	Category
GROUPED ANSWERS	ANSWERS	ANSWERS	
8-10	Very important	Very important	4
5-7	Somewhat important	Somewhat important	3
2-4	Not very important	Not very important	2
1 Not at all important	Not at all important	Not at all important	1
Don't know	Don't know	Don't know	0

(**a**)

Category	DE_2007	DE_2016	DE_2023	FR_2007	FR_2016	FR_2023	IT_2007	IT_2016	IT_2023	PL_2007	PL_2016	PL_2023	SE_2007	SE_2016	SE_2023
TOTAL	1525	1527	1531	1007	1038	1001	1006	967	1027	1000	1006	1004	1013	1028	1022
4	67	61	56	60	62	64	60	47	49	52	34	31	84	80	81
3	24	34	36	30	36	32	29	47	41	36	52	57	14	19	17
2	5	3	6	6	1	3	8	3	8	7	7	9	1	1	2
1	2	0	1	2	0	1	1	1	2	1	1	2	1	0	0
0	2	2	1	2	1	0	2	2	0	4	6	1	0	0	0

(**b**)

Country	Category	Mean (±SD; %)	Range (%)
DE	4	61 (±6)	56-67
DE	3	31 (±6)	24-36
DE	2	5 (±2)	3-6
DE	1	1 (±1)	0-2
DE	0	2 (±1)	1-2
FR	4	62(±2)	60-64
FR	3	33 (±3)	30-36
FR	2	3 (±3)	1-6
FR	1	1 (±1)	0-2
FR	0	1 (±1)	0-2
IT	4	52 (±7)	47-60
IT	3	39 (±9)	29-47
IT	2	6 (±3)	3-8
IT	1	1 (±1)	1-2
IT	0	1 (±1)	0-2
PL	4	39 (±11)	31-52
PL	3	48 (±11)	36-57
PL	2	8 (±1)	7-9
PL	1	1 (±1)	1-2
PL	0	4 (±3)	1-6
SE	4	82 (±2)	80-82
SE	3	17 (±3)	14-19
SE	2	1 (±1)	1-2
SE	1	0 (±1)	0-1
SE	0	0 (±0)	0

Year	Category	Mean (±SD; %)	Range (%)
2007	4	65 (±12)	52-84
2007	3	27 (±8)	14-36
2007	2	5 (±3)	1-8
2007	1	1 (±1)	1-2
2007	0	2 (±1)	0-4
2016	4	57 (±17)	34-80
2016	3	38 (±13)	19-52
2016	2	3 (±2)	1-7
2016	1	0 (±1)	0-1
2016	0	2 (±2)	0-6
2023	4	56 (±18)	31-81
2023	3	37 (±15)	17-57
2023	2	6 (±3)	2-9
2023	1	1 (±1)	0-2
2023	0	0 (±1)	0-1

(**C**)

*'1' means that this it "not at all important" to you and '10' means that it is "very important". The responses were consequently grouped together to compare them with those from other years.

DE: Germany; FR: France; IT: Italy; PL: Poland; SE: Sweden; SD: Standard deviation

Table 3. Questions on current protection of animal welfare in **2005**, **2007**, **2016**, and **2023**, related answers, and category assigned to groups of questions (**a**). Total answers and percentages of answers (%) within category, by country and year (**b**). Mean and range per category, by country and year (**c**).

2005: In (OUR COUNTRY)'s current food and agricultural policy, do you believe that animal welfare/protection receives...?	**2007:** Do you believe that in general the welfare–protection of farm animals in (OUR COUNTRY) needs to be improved?	**2016:** Do you believe that in general the welfare of farmed animals in (OUR COUNTRY) should be better protected than it is now?	**2023:** Do you believe that in general the welfare of farmed animals in (OUR COUNTRY) should be better protected than it is now?	Category
ANSWERS	**GROUPED ANSWERS**	**GROUPED ANSWERS**	**GROUPED ANSWERS**	
Too much importance	No, probably not/ No, certainly not	No, probably not/ No, certainly not	No, probably not/ No, certainly not	3
Not enough importance	Yes, probably	Yes, probably	Yes, probably	2
Just about the right level of importance	Yes, certainly	Yes, certainly	Yes, certainly	1
Don't know	Don't know	Don't know	Don't know	0

(a)

Category	DE_ 2005	DE_ 2007	DE_ 2016	DE_ 2023	FR_ 2005	FR_ 2007	FR_ 2016	FR_ 2023	IT_ 2005	IT_ 2007	IT_ 2016	IT_ 2023	PL_ 2005	PL_ 2007	PL_ 2016	PL_ 2023	SE_ 2005	SE_ 2007	SE_ 2016	SE_ 2023
TOTAL	1532	1525	1527	1531	1013	1007	1038	1001	1024	1006	967	1027	1000	1000	1006	1004	1048	1013	1028	1022
3	13	43	55	56	3	39	55	59	6	33	43	44	7	28	22	29	2	29	46	55
2	54	35	28	34	64	46	33	33	53	43	43	44	49	52	50	51	54	40	37	31
1	27	16	11	8	27	8	7	5	31	12	7	11	34	10	16	17	41	30	16	13
0	6	6	6	2	6	7	5	3	10	12	7	1	10	10	12	3	3	1	1	1

(b)

Country	Category	Mean (±SD; %)	Range (%)
DE	3	42 (±20)	13-56
DE	2	38 (±11)	28-54
DE	1	16 (±8)	8-27
DE	0	5 (±2)	2-6
FR	3	39 (±26)	3-59
FR	2	44 (±15)	33-64
FR	1	12 (±10)	5-27
FR	0	5 (±2)	3-7
IT	3	32 (±18)	6-44
IT	2	46 (±5)	43-53
IT	1	15 (±11)	7-31
IT	0	8 (±5)	1-12
PL	3	22 (±10)	7-29
PL	2	51 (±1)	49-52
PL	1	19 (±10)	10-34
PL	0	9 (±4)	3-12
SE	3	33 (±23)	2-55
SE	2	41 (±10)	31-54
SE	1	25 (±13)	13-41
SE	0	2 (±1)	1-3
Year			
2005	3	6 (±4)	2-13
2005	2	55 (±6)	49-64
2005	1	32 (±6)	27-41
2005	0	7 (±3)	3-10
2007	3	34 (±6)	28-43
2007	2	43 (±6)	35-52
2007	1	15 (±9)	8-30
2007	0	7 (±4)	1-12
2016	3	44 (±14)	22-55
2016	2	38 (±9)	28-50
2016	1	11 (±5)	7-16
2016	0	6 (±4)	1-12
2023	3	49 (±12)	29-59
2023	2	39 (±9)	31-51
2023	1	11 (±5)	5-17
2023	0	2 (±1)	1-3

(C)

DE: Germany; FR: France; IT: Italy; PL: Poland; SE: Sweden; SD: Standard deviation

Table 4. Questions on the desire to have more information of animal welfare in **2007**, **2016**, and **2023**, related answers, and category assigned to groups of questions (**a**). Total answers and percentages of answers (%) within category, by country and year (**b**). Mean and range per category, by country and year (**c**).

2007: Would you like to be more informed about the conditions under which animals are farmed in (OUR COUNTRY)?	**2016**: Would you like to have more information about the conditions under which farmed animals are treated in (OUR COUNTRY)?	**2023**: Would you like to have more information about the conditions in which farmed animals are raised in (OUR COUNTRY)?	Category
ANSWERS	**ANSWERS**	**ANSWERS**	
No, certainly not	No, certainly not	No, certainly not	4
No, probably not	No, probably not	No, probably not	3
Yes, probably	Yes, probably	Yes, probably	2
Yes, certainly	Yes, certainly	Yes, certainly	1
Don't know	Don't know	Don't know	0

(**a**)

Category	DE_ 2007	DE_ 2016	DE_ 2023	FR_ 2007	FR_ 2016	FR_ 2023	IT_ 2007	IT_ 2016	IT_ 2023	PL_ 2007	PL_ 2016	PL_ 2023	SE_ 2007	SE_ 2016	SE_ 2023
TOTAL	1525	1527	1531	1007	1038	1001	1006	967	1027	1000	1006	1004	1013	1028	1022
4	14	20	12	11	11	11	8	5	4	9	7	3	6	6	5
3	27	24	23	23	16	18	12	10	17	32	27	26	34	27	23
2	36	26	34	41	30	32	49	44	40	45	44	48	36	31	34
1	20	27	29	22	42	39	28	36	39	8	15	22	23	36	38
0	3	3	2	3	1	0	3	5	0	6	7	1	1	0	0

(**b**)

Country	Category	Mean (±SD; %)	Range (%)
DE	4	15 (±4)	12-20
DE	3	25 (±2)	23-27
DE	2	32 (±5)	26-36
DE	1	25 (±5)	20-29
DE	0	3 (±1)	2-3
FR	4	11 (±0)	11-11
FR	3	19 (±4)	16-23
FR	2	34 (±6)	30-41
FR	1	34 (±11)	22-42
FR	0	1 (±2)	0-3
IT	4	6 (±2)	4-8
IT	3	13 (±4)	10-17
IT	2	44 (±5)	40-49
IT	1	34 (±6)	28-39
IT	0	3 (±3)	0-5
PL	4	6 (±3)	3-9
PL	3	28 (±3)	26-32
PL	2	46 (±2)	44-48
PL	1	15 (±7)	8-22
PL	0	5 (±3)	1-7
SE	4	6 (±1)	5-6
SE	3	28 (±6)	23-34
SE	2	34 (±3)	31-36
SE	1	32 (±8)	23-38
SE	0	0 (±1)	0-1

Year	Category	Mean (±SD; %)	Range (%)
2007	4	10 (±3)	6-14
2007	3	26 (±9)	12-34
2007	2	41 (±6)	36-49
2007	1	20 (±7)	8-28
2007	0	3 (±2)	1-6
2016	4	10 (±6)	5-20
2016	3	21 (±8)	10-27
2016	2	35 (±8)	26-44
2016	1	31 (±11)	15-42
2016	0	3 (±3)	0-7
2023	4	7 (±4)	3-12
2023	3	21 (±4)	17-26
2023	2	38 (±7)	32-48
2023	1	33 (±8)	22-39
2023	0	1 (±1)	0-2

(C)

DE: Germany; FR: France; IT: Italy; PL: Poland; SE: Sweden; SD: Standard deviation

Table 5A. Question and related answers, and percentages of answers (%) (**a**, **b**) on level of knowledge of Italian national animal welfare, according to age and level of education (**a**) and occupation scale (b), and mean (± standard deviation) and range per answer across age, education, and occupation scale groups in **2007** (**a**, **b**).

Could you tell me how much do you feel you know about the conditions under which animals are farmed in (OUR COUNTRY)? Would you say that you know…?	Age (data of 2007)							Education (End of) (data 2007)						
	15-24	25-39	40-54	55+	P-value	IT	IT	15-	16-19	20+	SS	P-value	IT	IT
ANSWERS	TOTAL: 131	TOTAL: 276	TOTAL: 240	TOTAL: 359		Mean (±SD)	Range	TOTAL: 390	TOTAL: 373	TOTAL: 152	TOTAL: 88		Mean (±SD)	Range
A lot	7 ^{b}	7 ^{b}	8 ^{b}	11 ^{a}	0.008	8 (±2)	7-11	7 ^{bc}	10 ^{b}	15 ^{a}	5 ^{c}	<0.001	9 (±4)	5-15
A little	45 ^{b}	58 ^{a}	58 ^{a}	55 ^{a}	<0.001	54 (±6)	45-58	53 ^{b}	59 ^{a}	58 ^{a}	47 ^{c}	<0.001	54 (±6)	47-59
Nothing at all	37 ^{a}	33 ^{ab}	29 ^{b}	28 ^{b}	<0.001	32 (±4)	28-37	32 ^{b}	28 ^{bc}	25 ^{c}	39 ^{a}	<0.001	31 (±6)	25-39
Don't know	11 ^{a}	2 ^{c}	5 ^{b}	6 ^{b}	<0.001	6 (±4)	2-11	8 ^{a}	3 ^{b}	2 ^{b}	9 ^{a}	<0.001	6 (±4)	2-9

(**a**) $^{a-c}$ Percentages with different superscripts differ at p-value < 0.05.

Could you tell me how much do you feel you know about the conditions under which animals are farmed in (OUR COUNTRY)? Would you say that you know…?	Occupation Scale (data of 2007)										
	SE	MGR	OWC	MW	HP	UE	RE	STD	P-value	IT	IT
ANSWERS	TOTAL: 126	TOTAL: 51	TOTAL: 159	TOTAL: 154	TOTAL: 151	TOTAL: 37	TOTAL: 240	TOTAL: 88		Mean (±SD)	Range
A lot	10 ^{b}	21 ^{a}	9 ^{bc}	5 ^{c}	7 ^{bc}	6 ^{c}	12 ^{b}	5 ^{c}	<0.001	9 (±5)	5-21
A little	59 ^{a}	43 ^{c}	62 ^{a}	62 ^{a}	57 ^{ab}	41 ^{c}	51 ^{b}	46 ^{bc}	<0.001	53 (±9)	41-62
Nothing at all	29 ^{bc}	34 ^{b}	26 ^{c}	26 ^{c}	31 ^{bc}	44 ^{a}	31 ^{bc}	40 ^{a}	<0.001	33 (±6)	26-44
Don't know	2 ^{b}	2 ^{b}	3 ^{b}	7 ^{ab}	5 ^{ab}	9 ^{a}	6 ^{ab}	9 ^{a}	<0.001	5 (±3)	2-9

(**b**) $^{a-c}$ Percentages with different superscripts differ at p-value < 0.05.

SS: Still studying; SE: Self-employed; MGR: Managers; OWC: Other white collars, MW: Manual workers; HP: House persons; UE: Unemployed; RE: Retired; STD: Students; SD: Standard deviation

Table 5B. Question and related answers, and percentages of answers (%) (**a**, **b**) on level of knowledge of Italian national animal welfare, according to age and level of education (**a**) and occupation scale (**b**), and mean and range per answer across age, education, and occupation scale groups in **2016** (**a**, **b**).

Which of the following statements best describe your understanding of animal welfare?	Age (data of 2016)							Education (End of) (data of 2016)						
	15-24	25-39	40-54	55+	P-value	IT	IT	15-	16-19	20+	SS	P-value	IT	IT
ANSWERS*	TOTAL: 105	TOTAL: 201	TOTAL: 252	TOTAL: 409		Mean (±SD)	Range	TOTAL: 245	TOTAL: 391	TOTAL: 179	TOTAL: 90		Mean (±SD)	Range
It concerns the way farmed animals are treated, providing them with a better quality of life	34 ^{b}	39 ^{a}	32 ^{bc}	27 ^{c}	<0.001	33 (±5)	27-39	28 ^{b}	33 ^{a}	35 ^{a}	32 ^{ab}	<0.001	32 (±3)	28-35
It is the same as animal protection	22 ^{a}	14 ^{c}	18 ^{b}	23 ^{a}	<0.001	19 (±4)	14-23	24 ^{a}	20 ^{ab}	14 ^{c}	18 ^{b}	<0.001	19 (±4)	14-24
It refers to the duty to respect all animals	37 ^{b}	39 ^{ab}	43 ^{a}	39 ^{ab}	<0.001	40 (±3)	37-43	36 ^{b}	42 ^{a}	43 ^{a}	35 ^{b}	<0.001	39 (±4)	35-43
It contributes to better quality animal products	16	17	16	15	0.158	16 (±1)	15-17	16 ^{ab}	16 ^{ab}	14 ^{b}	19 ^{a}	0.007	16 (±2)	14-19
It goes beyond animal protection	14 ^{ab}	17 ^{a}	14 ^{ab}	11 ^{b}	<0.001	14 (±2)	11-17	7 ^{b}	15 ^{a}	16 ^{a}	16 ^{a}	<0.001	14 (±4)	7-16
None (SPONTANEOUS)	3	1	1	1	n.a.	2 (±1)	1-3	1	1	1	4	n.a.	2 (±2)	1-4
Don't know	0	2	2	5	n.a.	2 (±2)	0-5	6	2	2	0	n.a.	3 (±3)	0-6

(**a**) $^{a-c}$ Percentages with different superscripts differ at p-value < 0.05. n.a. not assessed

Which of the following statements best describe your understanding of animal welfare?	Occupation Scale (data of 2016)										
	SE	MGR	OWC	MW	HP	UE	RE	STD	P-value	IT	IT
ANSWERS*	TOTAL: 110	TOTAL: 60	TOTAL: 168	TOTAL: 134	TOTAL: 97	TOTAL: 36	TOTAL: 272	TOTAL: 90		Mean (±SD)	Range
It concerns the way farmed animals are treated, providing them with a better quality of life	33 ^{bc}	27 ^{c}	36 ^{b}	30 ^{bc}	33 ^{bc}	49 ^{a}	27 ^{c}	32 ^{bc}	<0.001	33 (±7)	27-49
It is the same as animal protection	19 ^{bc}	21 ^{b}	16 ^{c}	17 ^{bc}	28 ^{a}	18 ^{bc}	22 ^{b}	18 ^{bc}	<0.001	20 (±4)	16-28
It refers to the duty to respect all animals	44 ^{a}	38 ^{ab}	43 ^{a}	39 ^{ab}	30 ^{c}	39 ^{ab}	43 ^{a}	35 ^{b}	<0.001	39 (±5)	30-44
It contributes to better quality animal products	20 ^{ab}	17 ^{b}	14 ^{bc}	23 ^{a}	13 ^{c}	12 ^{c}	12 ^{c}	19 ^{ab}	<0.001	16 (±4)	12-23
It goes beyond animal protection	18 ^{a}	13 ^{b}	16 ^{ab}	12 ^{b}	14 ^{ab}	14 ^{ab}	10 ^{b}	16 ^{ab}	<0.001	14 (±3)	10-18
None (SPONTANEOUS)	0	3	1	2	2	0	1	4	n.a.	2 (±1)	0-4
Don't know	1	5	3	2	4	2	5	0	n.a.	3 (±2)	0-5

(**b**) [a-c] Percentages with different superscripts differ at p-value < 0.05. n.a. not assessed

Up to a maximum of 2 answers could be given. SS: Still studying; SE: Self-employed; MGR: Managers; OWC: Other white collars, MW: Manual workers; HP: House persons; UE: Unemployed; RE: Retired; STD: Students, SD: Standard deviation

Table 6. Questions on the importance of Italian national animal welfare in **2007**, **2016**, and **2023**, related answers, and category assigned to groups of answers (**a**). Total answers and percentages of answers (%) per category, by age and level of education (**b**), and occupation scale (**c**). Mean and range per answer category, by age (**d**), level of education (**e**), occupation scale (**f**), and year.

2007: Please tell me on a scale of 1 to 10 how important is it to you that the welfare of farmed animals is protected? *	**2016:** In your opinion, how important is it to protect the welfare of farmed animals?	**2023:** In your opinion, how important is it to protect the welfare of farmed animals (e.g. pigs, cattle, poultry, etc.) to ensure that they have decent living conditions?	**Category**
GROUPED ANSWERS	**ANSWERS**	**ANSWERS**	
8-10	Very important	Very important	4
5-7	Somewhat important	Somewhat important	3
2-4	Not very important	Not very important	2
1 Not at all important	Not at all important	Not at all important	1
Don't know	Don't know	Don't know	0

(**a**)

Category	Age												Education (End of)											
	15-24 2007	15-24 2016	15-24 2023	25-39 2007	25-39 2016	25-39 2023	40-54 2007	40-54 2016	40-54 2023	55+ 2007	55+ 2016	55+ 2023	15- 2007	15- 2016	15- 2023	16-19 2007	16-19 2016	16-19 2023	20+ 2007	20+ 2016	20+ 2023	SS 2007	SS 2016	SS 2023
TOTAL	131	105	119	276	201	193	240	252	268	359	409	446	390	245	186	373	391	462	152	179	240	88	90	118
4	66	55	60	59	47	47	62	46	43	58	46	50	56	46	47	62	48	45	66	51	53	60	47	62
3	21	41	35	29	47	45	26	49	45	31	47	40	31	47	40	28	46	45	25	44	40	26	50	34
2	6	3	4	9	4	7	10	3	10	6	3	8	9	2	10	8	4	8	5	2	6	8	1	4
1	1	0	1	1	1	1	0	1	2	2	2	2	1	2	3	1	1	2	2	1	1	1	0	0
0	6	1	0	2	1	0	2	1	0	3	2	0	3	3	0	1	1	0	2	2	0	5	2	0

(**b**)

Occupation scale

Category	SE 2007	SE 2016	SE 2023	MGR 2007	MGR 2016	MGR 2023	OWC 2007	OWC 2016	OWC 2023	MW 2007	MW 2016	MW 2023	HP 2007	HP 2016	HP 2023	UE 2007	UE 2016	UE 2023	RE 2007	RE 2016	RE 2023	STD 2007	STD 2016	STD 2023
TOTAL	126	110	112	51	60	121	159	168	180	154	134	169	151	97	77	37	36	26	240	272	224	88	90	118
4	63	51	41	52	49	52	66	47	50	63	47	42	62	38	35	59	62	44	56	46	52	60	47	62
3	25	43	49	30	46	40	24	50	41	30	44	44	27	55	50	30	34	41	32	46	38	26	50	34
2	8	6	10	13	1	7	9	2	8	6	6	10	9	4	9	5	4	15	7	3	7	8	1	4
1	2	0	0	0	1	1	0	0	1	1	1	4	1	3	6	1	0	0	2	2	2	1	0	0
0	2	0	0	5	3	0	1	1	0	0	2	0	1	0	0	5	0	0	3	3	1	5	2	0

(C)

Age	Category	Mean (±SD; %)	Range (%)
15-24	4	60 (±6)	55-66
15-24	3	35 (±10)	21-41
15-24	2	4 (±2)	3-6
15-24	1	1 (±1)	0-1
15-24	0	0 (±3)	0-6
25-39	4	51 (±7)	47-59
25-39	3	40 (±10)	29-47
25-39	2	7 (±3)	4-9
25-39	1	1 (±0)	0
25-39	0	1 (±1)	0-2
40-54	4	50 (±10)	43-62
40-54	3	40 (±12)	26-49
40-54	2	8 (±4)	3-10
40-54	1	1 (±1)	0-2
40-54	0	1 (±1)	0-2
55+	4	51 (±6)	46-58
55+	3	39 (±8)	31-47
55+	2	6 (±3)	3-8
55+	1	2 (±0)	0
55+	0	2 (±2)	0-3

Year	Category	Mean (±SD; %)	Range (%)
2007	4	61 (±4)	58-66
2007	3	27 (±4)	21-31
2007	2	8 (±2)	6-10
2007	1	1 (±1)	0-2
2007	0	3 (±2)	2-6
2016	4	49 (±4)	46-55
2016	3	46 (±3)	41-49
2016	2	3 (±1)	3-4
2016	1	1 (±1)	0-2
2016	0	1 (±1)	1-2
2023	4	50 (±7)	43-60
2023	3	41 (±5)	35-45
2023	2	7 (±3)	4-10
2023	1	2 (±1)	1-2
2023	0	0 (±0)	0

(d)

Education (End of)	Category	Mean (±SD; %)	Range (%)
15-	4	50 (±6)	46-56
15-	3	39 (±8)	31-47
15-	2	7 (±4)	2-10
15-	1	2 (±1)	1-3
15-	0	2 (±2)	0-3
16-19	4	52 (±9)	45-62
16-19	3	40 (±10)	28-46
16-19	2	7 (±2)	4-8
16-19	1	1 (±1)	1-2
16-19	0	1 (±1)	0-1
20+	4	57 (±8)	51-66
20+	3	36 (±10)	25-44
20+	2	4 (±2)	2-6
20+	1	1 (±1)	1-2
20+	0	1 (±1)	0-2
Still Studying	4	56 (±8)	47-62
Still Studying	3	37 (±12)	26-50
Still Studying	2	4 (±4)	1-8
Still Studying	1	0 (±1)	0-1
Still Studying	0	2 (±3)	0-5

Year	Category	Mean (±SD; %)	Range (%)
2007	4	61 (±4)	56-66
2007	3	28 (±3)	25-31
2007	2	8 (±2)	5-9
2007	1	1 (±1)	1-2
2007	0	3 (±2)	1-5
2016	4	48 (±2)	46-51
2016	3	47 (±3)	44-50
2016	2	2 (±1)	1-4
2016	1	1 (±1)	0-2
2016	0	2 (±1)	1-3
2023	4	52 (±8)	45-62
2023	3	40 (±5)	34-45
2023	2	7 (±3)	4-10
2023	1	2 (±1)	0-3
2023	0	0 (±0)	0

(e)

Occupation	Category	Mean (±SD; %)	Range (%)
Self employed	4	52 (±11)	41-63
Self employed	3	39 (±12)	25-49
Self employed	2	8 (±2)	6-10
Self employed	1	1 (±1)	0-2
Self employed	0	1 (±1)	0-2
Managers	4	51 (±2)	49-52
Managers	3	39 (±8)	30-46
Managers	2	7 (±6)	1-13
Managers	1	1 (±1)	0-1
Managers	0	3 (±3)	0-5
Other white collars	4	54 (±10)	47-66
Other white collars	3	38 (±13)	24-50
Other white collars	2	6 (±4)	2-9
Other white collars	1	0 (±1)	0-1
Other white collars	0	1 (±1)	0-1
Manual workers	4	51 (±11)	42-63
Manual workers	3	39 (±8)	30-44
Manual workers	2	7 (±2)	6-10
Manual workers	1	2 (±2)	1-4
Manual workers	0	1 (±1)	0-2
House persons	4	45 (±15)	35-62
House persons	3	44 (±15)	27-55
House persons	2	7 (±3)	4-9
House persons	1	3 (±3)	1-6
House persons	0	0 (±1)	0-1
Unemployed	4	55 (±10)	44-62
Unemployed	3	35 (±6)	30-41
Unemployed	3	8 (±6)	4-15
Unemployed	1	0 (±1)	0-1
Unemployed	0	2 (±3)	0-5
Retired	4	51 (±5)	46-56
Retired	3	39 (±7)	32-46
Retired	2	6 (±2)	3-7
Retired	1	2 (±0)	0
Retired	0	2 (±1)	1-3
Students	4	56 (±8)	47-62
Students	3	37 (±12)	26-50
Students	2	4 (±4)	1-8
Students	1	0 (±1)	0-1
Students	0	2 (±3)	0-5

Year

Year	Category	Mean (±SD; %)	Range (%)
2007	4	60 (±4)	52-66
2007	3	26 (±3)	24-32
2007	2	8 (±2)	5-13
2007	1	1 (±1)	0-2
2007	0	3 (±2)	0-5
2016	4	48 (±7)	38-62
2016	3	46 (±6)	34-55
2016	2	3 (±2)	1-6
2016	1	1 (±1)	0-3
2016	0	1 (±1)	0-3
2023	4	47 (±8)	35-62
2023	3	42 (±5)	34-50
2023	2	9 (±3)	4-15
2023	1	2 (±2)	0-6
2023	0	0 (±0)	0-1

(**f**)

* From '1':"not at all important", to '10': "very important". The responses were grouped together to compare them with those from other years.

SS: Still studying; SE: Self-employed; MGR: Managers; OWC: Other white collars, MW: Manual workers; HP: House persons; UE: Unemployed; RE: Retired; STD: Students; SD: Standard deviation

Table 7. Questions on current protection of Italian national animal welfare in **2007**, **2016**, and **2023**, related answers, and category assigned to groups of answers (**a**). Total answers and percentages of answers (%) per category, by age (**b**), and level of education (**c**), and occupation scale (**d**). Mean and range per category, by age (**e**), level of education (**f**), occupation scale (**g**), and year.

2005: In (OUR COUNTRY)'s current food and agricultural policy, do you believe that animal welfare/protection receives...?	**2007:** Do you believe that in general the welfare–protection of farm animals in (OUR COUNTRY) needs to be improved?	**2016:** Do you believe that in general the welfare of farmed animals in (OUR COUNTRY) should be better protected than it is now?	**2023:** Do you believe that in general the welfare of farmed animals in (OUR COUNTRY) should be better protected than it is now?	**Category**
ANSWERS	**GROUPED ANSWERS**	**GROUPED ANSWERS**	**GROUPED ANSWERS**	
Too much importance	No, probably not/ No, certainly not	No, probably not/ No, certainly not	No, probably not/ No, certainly not	3
Not enough importance	Yes, probably	Yes, probably	Yes, probably	2
Just about the right level of importance	Yes, certainly	Yes, certainly	Yes, certainly	1
Don't know	Don't know	Don't know	Don't know	0

(**a**)

Category	15-24 2005	15-24 2007	15-24 2016	15-24 2023	25-39 2005	25-39 2007	25-39 2016	25-39 2023	40-54 2007	40-54 2007	40-54 2016	40-54 2023	55+ 2005	55+ 2007	55+ 2016	55+ 2023
TOTAL	133	131	105	119	287	276	201	193	246	240	252	268	358	359	409	446
3	8	7	4	3	6	11	8	8	6	13	6	13	6	15	9	13
2	60	44	32	42	56	42	46	50	50	41	48	48	49	44	42	40
1	21	35	58	53	28	34	44	40	36	35	42	39	34	32	39	46
0	11	14	6	2	10	13	2	2	8	11	4	0	11	9	10	1

(**b**)

Category	15-2005	15-2007	15-2016	15-2023	16-19 2005	16-19 2007	16-19 2016	16-19 2023	20+ 2005	20+ 2007	20+ 2016	20+ 2023	SS 2005	SS 2007	SS 2016	SS 2023
TOTAL	377	390	245	186	355	373	391	462	174	152	179	240	89	88	90	118
3	7	17	7	16	7	10	7	11	5	6	5	6	6	11	5	5
2	48	43	43	39	54	37	46	47	54	53	43	48	68	48	34	35
1	32	28	38	44	31	43	43	41	33	29	48	45	16	23	56	57
0	13	12	12	1	8	10	4	1	8	12	4	1	10	18	5	3

(C)

Category	SE_2005	SE_2007	SE_2016	SE_2023	MGR_2005	MGR_2007	MGR_2016	MGR_2023	OWC_2005	OWC_2007	OWC_2016	OWC_2023	MW_2005	MW_2007	MW_2016	MW_2023	HP_2005	HP_2007	HP_2016	HP_2023	UE_2005	UE_2007	UE_2016	UE_2023	RE_2005	RE_2007	RE2016	RE_2023	STD_2005	STD_2007	STD_2016	STD_2023
TOTAL	147	126	110	112	58	51	60	121	158	159	168	180	147	154	134	169	160	151	97	77	29	37	36	26	237	240	272	224	89	88	90	118
3	7	13	6	13	2	9	7	5	6	9	4	9	6	12	10	13	7	12	6	19	8	9	7	13	8	16	10	12	6	11	5	5
2	50	40	40	45	55	52	37	53	55	42	53	43	49	44	41	51	56	38	62	37	56	36	24	53	45	44	40	41	68	48	34	35
1	32	37	50	42	34	25	52	41	30	37	39	48	34	37	44	35	29	39	27	44	26	42	64	34	36	28	39	45	16	23	56	57
0	11	10	4	0	9	14	4	1	9	12	4	0	11	9	5	1	8	11	5	0	10	13	5	0	12	12	11	2	10	18	5	3

Occupation scale

(d)

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Age	Category	Mean (±SD; %)	Range (%)
15-24	3	6 (±2)	3-8
15-24	2	45 (±12)	32-60
15-24	1	42 (±17)	21-58
15-24	0	8 (±5)	2-14
25-39	3	8 (±2)	6-11
25-39	2	49 (±6)	42-56
25-39	1	37 (±7)	28-44
25-39	0	7 (±6)	2-13
40-54	3	10 (±4)	6-13
40-54	2	47 (±4)	41-50
40-54	1	38 (±3)	35-42
40-54	0	6 (±5)	0-11
55+	3	11 (±4)	6-15
55+	2	44 (±4)	40-49
55+	1	38 (±6)	32-46
55+	0	8 (±5)	1-11

Year	Category	Mean (±SD; %)	Range (%)
2005	3	8 (±1)	6-8
2005	2	54 (±5)	49-60
2005	1	30 (±7)	21-36
2005	0	10 (±1)	8-11
2007	3	12 (±3)	7-15
2007	2	43 (±2)	41-44
2007	1	34 (±1)	32-35
2007	0	12 (±2)	9-14
2016	3	7 (±2)	4-9
2016	2	42 (±7)	32-48
2016	1	46 (±8)	39-58
2016	0	6 (±3)	2-10
2023	3	9 (±5)	3-13
2023	2	45 (±5)	40-50
2023	1	45 (±6)	39-53
2023	0	1 (±1)	0-2

(e)

Education (End of)	Category	Mean (±SD; %)	Range (%)
15-	3	12 (±6)	7-17
15-	2	43 (±4)	39-48
15-	1	36 (±7)	28-44
15-	0	10 (±6)	1-13
16-19	3	9 (±2)	7-11
16-19	2	46 (±7)	37-54
16-19	1	40 (±6)	31-43
16-19	0	6 (±4)	1-10
20+	3	6 (±1)	5-6
20+	2	50 (±5)	43-54
20+	1	39 (±9)	29-48
20+	0	6 (±5)	1-12
Still Studying	3	7 (±3)	5-11
Still Studying	2	46 (±16)	34-68
Still Studying	1	38 (±22)	16-57
Still Studying	0	9 (±7)	3-18
Year			
2005	3	6 (±1)	6-8
2005	2	56 (±8)	48-68
2005	1	28 (±8)	16-33
2005	0	10 (±2)	8-13
2007	3	11 (±5)	6-17
2007	2	48 (±7)	37-53
2007	1	31 (±9)	23-43
2007	0	13 (±3)	10-18
2016	3	6 (±1)	5-7
2016	2	42 (±5)	34-46
2016	1	46 (±8)	38-56
2016	0	6 (±4)	4-12
2023	3	10 (±5)	5-16
2023	2	42 (±6)	35-48
2023	1	47 (±7)	41-57
2023	0	2 (±1)	1-3

(f)

Occupation	Category	Mean (±SD; %)	Range (%)
Self employed	3	10 (±4)	6-13
Self employed	2	44 (±5)	40-50
Self employed	1	40 (±8)	32-50
Self employed	0	6 (±5)	0-11
Managers	3	6 (±3)	2-9
Managers	2	49 (±8)	37-55
Managers	1	38 (±11)	25-52
Managers	0	7 (±6)	1-14
Other white collars	3	7 (±2)	4-9
Other white collars	2	48 (±7)	42-55
Other white collars	1	39 (±7)	30-48
Other white collars	0	6 (±5)	0-12
Manual workers	3	10 (±3)	6-13
Manual workers	2	41 (±5)	41-51
Manual workers	1	38 (±5)	34-44
Manual workers	0	7 (±4)	1-11
House persons	3	11 (±6)	6-19
House persons	2	48 (±13)	37-62
House persons	1	35 (±8)	27-44
House persons	0	6 (±5)	0-11
Unemployed	3	9 (±3)	7-13
Unemployed	3	42 (±15)	24-56
Unemployed	1	42 (±16)	26-64
Unemployed	0	7 (±6)	0-13
Retired	3	12 (±3)	8-16
Retired	2	43 (±2)	40-45
Retired	1	37 (±7)	28-45
Retired	0	9 (±5)	2-12
Students	3	7 (±3)	5-11
Students	2	46 (±16)	34-68
Students	1	38 (±22)	16-57
Students	0	9 (±7)	3-18

Year	Category	Mean (±SD; %)	Range (%)
2005	3	6 (±2)	2-8
2005	2	54 (±7)	45-68
2005	1	30 (±6)	16-36
2005	0	10 (±1)	8-12
2007	3	11 (±2)	9-16
2007	2	43 (±5)	36-52
2007	1	34 (±7)	23-42
2007	0	12 (±3)	9-18
2016	3	7 (±2)	4-10
2016	2	41 (±12)	24-62
2016	1	46 (±12)	27-64
2016	0	5 (±2)	4-11
2023	3	11 (±5)	5-19
2023	2	45 (±7)	35-53
2023	1	43 (±7)	34-57
2023	0	1 (±1)	0-3

(g)

SS: Still studying; SE: Self-employed; MGR: Managers; OWC: Other white collars, MW: Manual workers; HP: House persons; UE: Unemployed; RE: Retired; STD: Students: SD: Standard deviation

Table 8. Questions on the desire to have more information of Italian national animal welfare in **2007**, **2016**, and **2023**, related answers, and category assigned to groups of answers (**a**). Total answers and percentages of answers (%) per category, by age and level of education (**b**), and occupation scale (**c**). Mean and range per category, by age (**d**), level of education (**e**), occupation scale (**f**), and year.

2007: Would you like to be more informed about the conditions under which animals are farmed in (OUR COUNTRY)?	**2016:** Would you like to have more information about the conditions under which farmed animals are treated in (OUR COUNTRY)?	**2023:** Would you like to have more information about the conditions in which farmed animals are raised in (OUR COUNTRY)?	Category
ANSWERS	**ANSWERS**	**ANSWERS**	
No, certainly not	No, certainly not	No, certainly not	4
No, probably not	No, probably not	No, probably not	3
Yes, probably	Yes, probably	Yes, probably	2
Yes, certainly	Yes, certainly	Yes, certainly	1
Don't know	Don't know	Don't know	0

(**a**)

Category	Age												Education (End of)											
	15-24 2007	15-24 2016	15-24 2023	25-39 2007	25-39 2016	25-39 2023	40-54 2007	40-54 2016	40-54 2023	55+ 2007	55+ 2016	55+ 2023	15- 2007	15- 2016	15- 2023	16-19 2007	16-19 2016	16-19 2023	20+ 2007	20+ 2016	20+ 2023	SS 2007	SS 2016	SS 2023
TOTAL	131	105	119	276	201	193	240	252	268	359	409	446	390	245	186	373	391	462	152	179	240	88	90	118
4	12	0	1	8	2	2	8	4	3	6	9	5	8	9	8	7	3	3	5	2	2	9	0	0
3	17	4	11	13	10	13	11	7	18	12	14	20	14	16	20	12	8	20	9	7	11	15	4	9
2	47	45	39	51	48	45	45	48	44	50	38	36	49	40	38	47	47	40	52	44	46	50	44	36
1	20	46	47	26	35	39	33	37	35	28	33	39	25	29	34	31	37	37	31	43	41	19	49	52
0	4	5	2	2	5	1	3	4	0	4	6	0	4	6	0	3	5	0	3	4	0	7	3	3

(**b**)

Occupation scale

Category	SE 2007	SE 2016	SE 2023	MGR 2007	MGR 2016	MGR 2023	OWC 2007	OWC 2016	OWC 2023	MW 2007	MW 2016	MW 2023	HP 2007	HP 2016	HP 2023	UE 2007	UE 2016	UE 2023	RE 2007	RE 2016	RE 2023	STD 2007	STD 2016	STD 2023
TOTAL	126	110	112	51	60	121	159	168	180	154	134	169	151	97	77	37	36	26	240	272	224	88	90	118
4	9	4	3	8	1	1	7	3	1	8	3	5	7	6	6	11	0	7	6	11	6	9	0	0
3	8	9	20	16	4	11	13	5	14	14	12	16	8	16	30	28	18	36	12	14	21	15	4	9
2	54	44	45	42	37	48	47	49	41	51	52	42	47	51	37	39	27	32	50	36	35	50	44	36
1	26	41	32	30	50	40	31	38	44	27	30	36	33	22	27	20	44	25	27	32	38	19	49	52
0	3	2	0	4	8	0	2	5	0	0	3	1	5	5	0	2	11	0	5	7	0	7	3	3

(C)

Age	Category	Mean (±SD; %)	Range (%)
15-24	4	4 (±7)	0-12
15-24	3	11 (±7)	4-17
15-24	2	44 (±4)	39-47
15-24	1	38 (±15)	20-47
15-24	0	4 (±2)	2-5
25-39	4	4 (±3)	2-8
25-39	3	12 (±2)	10-13
25-39	2	48 (±3)	45-51
25-39	1	33 (±7)	26-39
25-39	0	3 (±2)	1-5
40-54	4	5 (±3)	3-8
40-54	3	12 (±6)	7-18
40-54	2	46 (±2)	44-48
40-54	1	35 (±2)	33-37
40-54	0	2 (±2)	0-4
55+	4	7 (±2)	5-9
55+	3	15 (±4)	12-20
55+	2	41 (±8)	36-50
55+	1	33 (±6)	28-39
55+	0	3 (±3)	0-6

Year	Category	Mean (±SD; %)	Range (%)
2007	4	9 (±3)	6-12
2007	3	13 (±3)	11-17
2007	2	48 (±3)	45-51
2007	1	27 (±5)	20-33
2007	0	3 (±1)	2-4
2016	4	4 (±4)	0-9
2016	3	9 (±4)	4-14
2016	2	45 (±5)	38-48
2016	1	38 (±6)	33-46
2016	0	5 (±1)	4-6
2023	4	3 (±2)	1-5
2023	3	16 (±4)	11-20
2023	2	41 (±4)	36-45
2023	1	40 (±5)	35-47
2023	0	1 (±1)	0-2

(d)

Education (End of)	Category	Mean (±SD; %)	Range (%)
15-	4	8 (±1)	8-9
15-	3	17 (±3)	14-20
15-	2	42 (±6)	38-49
15-	1	29 (±5)	25-34
15-	0	3 (±3)	0-6
16-19	4	4 (±2)	3-7
16-19	3	13 (±6)	8-20
16-19	2	45 (±4)	40-47
16-19	1	35 (±3)	31-37
16-19	0	3 (±3)	0-5
20+	4	3 (±2)	2-5
20+	3	9 (±2)	7-11
20+	2	47 (±4)	44-52
20+	1	38 (±6)	31-43
20+	0	2 (±2)	0-4
Still Studying	4	3 (±5)	0-9
Still Studying	3	9 (±2)	4-15
Still Studying	2	43 (±7)	36-50
Still Studying	1	40 (±18)	19-52
Still Studying	0	4 (±2)	3-7
Year			
2007	4	7 (±2)	5-9
2007	3	13 (±3)	9-15
2007	2	50 (±2)	47-52
2007	1	27 (±6)	19-31
2007	0	4 (±2)	3-7
2016	4	4 (±4)	0-9
2016	3	9 (±5)	4-16
2016	2	44 (±3)	40-47
2016	1	40 (±9)	29-49
2016	0	5 (±1)	3-6
2023	4	3 (±3)	0-8
2023	3	15 (±6)	9-20
2023	2	40 (±4)	36-46
2023	1	41 (±8)	34-52
2023	0	1 (±2)	0-3

(e)

Occupation	Category	Mean (±SD; %)	Range (%)
Self employed	4	5 (±3)	3-9
Self employed	3	12 (±7)	8-20
Self employed	2	48 (±6)	44-54
Self employed	1	33 (±8)	26-41
Self employed	0	2 (±2)	0-3
Managers	4	3 (±4)	1-8
Managers	3	10 (±6)	4-16
Managers	2	42 (±6)	37-48
Managers	1	40 (±10)	30-50
Managers	0	4 (±4)	0-8
Other white collars	4	4 (±3)	1-7
Other white collars	3	11 (±5)	5-14
Other white collars	2	46 (±4)	41-49
Other white collars	1	38 (±7)	31-44
Other white collars	0	2 (±3)	0-5
Manual workers	4	5 (±3)	3-8
Manual workers	3	14 (±2)	12-16
Manual workers	2	48 (±6)	42-52
Manual workers	1	31 (±5)	27-36
Manual workers	0	1 (±2)	0-3
House persons	4	6 (±1)	6-7
House persons	3	18 (±11)	8-30
House persons	2	45 (±7)	37-51
House persons	1	27 (±6)	22-33
House persons	0	3 (±3)	0-5
Unemployed	4	6 (±6)	0-11
Unemployed	3	27 (±9)	18-36
Unemployed	3	33 (±6)	27-39
Unemployed	1	30 (±13)	20-44
Unemployed	0	4 (±6)	0-11
Retired	4	8 (±3)	6-11
Retired	3	16 (±5)	12-21
Retired	2	40 (±8)	35-50
Retired	1	32 (±6)	27-38
Retired	0	4 (±4)	0-7
Students	4	3 (±5)	0-9
Students	3	9 (±6)	4-15
Students	2	43 (±7)	36-50
Students	1	40 (±18)	19-52
Students	0	4 (±2)	3-7

Year			
2007	4	8 (±2)	6-11
2007	3	14 (±6)	8-28
2007	2	48 (±5)	39-54
2007	1	27 (±5)	19-33
2007	0	4 (±2)	0-7
2016	4	4 (±4)	0-11
2016	3	10 (±6)	4-18
2016	2	43 (±9)	27-52
2016	1	38 (±10)	22-50
2016	0	6 (±3)	2-11
2023	4	4 (±3)	0-7
2023	3	20 (±9)	9-36
2023	2	40 (±5)	32-48
2023	1	37 (±9)	25-52
2023	0	1 (±1)	0-3

(**f**)
SS: Still studying; SE: Self-employed; MGR: Managers; OWC: Other white collars, MW: Manual workers; HP: House persons; UE: Unemployed; RE: Retired; STD: Students; SD: Standard deviation

5. DISCUSSION

5.1. Analysis of the Eurobarometer sampling method

On average, the total number of respondents accounted for the 0.00665% (on average 26,852 over 403,740,307) of the total European population over 15 years old in the EU Member States, ranging from 0.00645% to 0.00674%. It is interesting to note that the opinions of citizens starting from the age of 15 were considered overall, even though the age of maturity is generally considered to be 18 across Europe. By looking at the selected socio-economic variables, if compared with the Eurostat data[2], it appears that the final European respondent sample was highly representative of the socio-economic composition of the actual 15-and-over population. Not only was the gender proportion and age distribution in line with the Eurostat data but also the educational attainment level seemed to be comparable among datasets. Despite the fact that a direct comparison among data regarding every occupational category was not possible, the proportion of inactive, unemployed, and self-employed individuals overlapped. In fact, a stratified multistage sampling appears to be the most suitable choice for large-scale monitoring surveys that aim at assessing status, change and trends of one or more parameters within a highly geographically diverse group, such as the 15-and-over European population; being both practical and effective and cost and time saving (Sedgwick, 2015; Aubry et al., 2023). As a multistage random approach, where nested or hierarchical structure of the members within the population is taken into account, and then arranged in clusters that will be randomly sampled at each stage, it ensured a representative final sample of the original population (Sedgwick, 2013; Sedgwick, 2015). Instead, as a stratified sampling designed according to the EUROSTAT NUTS II (or equivalent) and the DEGURBA Urban Rural classification it ensured representative coverage on the base of the whole national territories (Sedgwick, 2013; Sedgwick, 2015; European Commission, 2023).

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[2] Eurostat databases. https://ec.europa.eu/eurostat/data/database [Accessed June 20th, 2024].

5.2. Analysis of Eurobarometer Surveys and Reports

Research highlighted an increasing awareness and importance attributed to animal welfare in the EU, with significant differences between countries and demographic groups. The fact that, from 2005 to 2023, questions on farmed animal welfare became more detailed and comprehensive, including topics such as specific farming practices, transportation and slaughtering, shows that EU authorities are aware of the growing public interest in animal welfare. This reflects a rising awareness of the living conditions of farmed animals and a greater consciousness among EU citizens. Recent research on the main research topics carried out about the welfare of beef cattle during the last three decades (from 1990 to 2019) and using a text mining approach showed increasing interest by stakeholders and market opportunities for added-value beef products (Nalon et al., 2021). Before 1990, research on animal welfare was not found; since then, it gradually became a topic discussed in the literature from an animal and farmer perspective, exclusively. The study highlighted a pronounced upward trend over time concerning topics dealing with the attitudes, beliefs, expectations, and preferences of both citizens and stakeholders involved in production (e.g., farmers and veterinarians) towards many beef welfare aspects that could affected animal treatment on the farm side, and consumers' purchase decisions on the market side. They also identified a growing trend in the number of articles addressing health risk factors and mortality across all categories of beef cattle, demonstrating an increasing interest in improving animal health and welfare as well as protecting public health. Nalon et al. (2021), also showed that current studies are increasingly focusing on environmental and social issues, which will become more fundamental in the future.

This trend is also highlighted by Alonso et al. (2020). In the current global socioeconomic situation, there is strong evidence of public concern regarding the moral implications of current animal production systems on the welfare of farmed animals. Over the past two decades, a growing number of consumers and citizens have demanded more ethical production systems and have stated they refuse to purchase products that do not meet their animal welfare concerns (Alonso et al., 2020). This growing sensitivity among European citizens regarding animal welfare is also reflected in the results presented by Caracciolo et al. (2016), where European consumers attributed increasing importance to production practices that improve animal welfare.

In our study, we also analyzed the evolution of surveys in terms of topics covered. It emerged that questions on companion animals were introduced as of 2016. Although addressing this

topic was not the main objective of the thesis, we observed that existing literature does not often draw a parallel between companion animals and farmed animals. This is likely because they belong to two different realms. However, in the study conducted by Clark et al. (2016), it was found that owning pets is associated with more negative views of modern farming and greater concern for animal welfare, driven by stronger ethical principles.

5.3. European-level analysis: Eurobarometer questions

At the European level, our analysis revealed that Sweden significantly stands out for its greater knowledge (Tables 1A) of animal welfare. In the 2007 survey, the SE respondents declared the highest (p-value < 0.001) level of knowledge about farmed animal welfare (FAW)[3], both for category 3 ("A lot") and category 2 ("A little"); while IT respondents showed the lowest values for these categories (Table 1A). For category 3 ("Nothing at all") the significantly highest value (30%) was recorded in Italy and the lowest one (13%) in Sweden (Table 1A). In between, especially as regards the "A lot" answer, results showed the Poles declaring a higher knowledge, followed by the Germans and French. As already mentioned, the same topic was addressed in 2016. However, as both question structure and possible answers were very different from the ones provided in 2007, a direct comparison could not be made. Nonetheless, a statistical trend overlapping with the one in 2007 could be observed as regards the following possible answers: "It concerns the way farmed animals are treated, providing them with a better quality of life", "It goes beyond animal protection"; where SE and IT respondents showed the highest and the lowest values, respectively, with DE and FR respondents in between. The Poles, however, statistically disagreed with these answers, as the Italians. The previous results were mirrored by the level of agreement with the following possible answer: "It is the same as animal protection"; where an opposite trend could be seen. This is line with a study conducted by Pejman et al. (2019), which showed that countries like Italy had a lower knowledge of animal welfare (below 50%), while Poland and Sweden showed higher values. The results of the study by Pejman et al. also highlighted that respondents tended to show higher subjective knowledge compared to objective knowledge. In particular, Sweden and Poland showed a greater discrepancy between subjective and objective knowledge compared to Italy. Unfortunately, a question addressing the level of citizens' knowledge of FAW was not included in the survey conducted in 2023.

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[3] Could you tell me how much do you feel you know about the conditions under which animals are farmed in (OUR COUNTRY)? Would you say that you know…?

With regard to the importance placed on FAW, Table 2 describes the EU citizens' answers in the selected countries and across the surveyed years. It was possible to carry out a comparison among countries and across the 2007, 2016 and 2023 surveys (Tables 2a, 2b and 2c). As reported in Table 2, the assessing of the importance to protect the welfare of farmed animals was categorized from category 4 ("Very important" or "8 to 10") to category 1 ("Not at all important" or "1 to 10"). According to this criterium, category 4 tended to be higher in Sweden over the time considered (from 2007 to 2023) and lower in Poland, where the percentage decreased from 52% (in 2007) to 31% in 2023 (Figure 1). The reduction of the weight of category 4 ("Very important") was partially compensated by the increase of the weight of category 3 ("Somewhat important"), especially in Poland (Figure 1). It should also be noted that there are no differences among countries for categories 2 and 1 ("Not very important" and "Not at all important"), since their percentages were around 10% in total. In Sweden, however, less than 2% of respondents declared FAW is "Not very important" and "Not at all important" (Table 2b). As indicated by a preliminary k-proportion test among countries the percentage of Swedish respondents were always significantly different from others (output not tabulated to avoid misunderstanding in the comparison of the percentages reported in Table 2b). Northern Europe, therefore, appears to place greater importance on and be more attentive to issues related to FAW compared to Southern Europe.
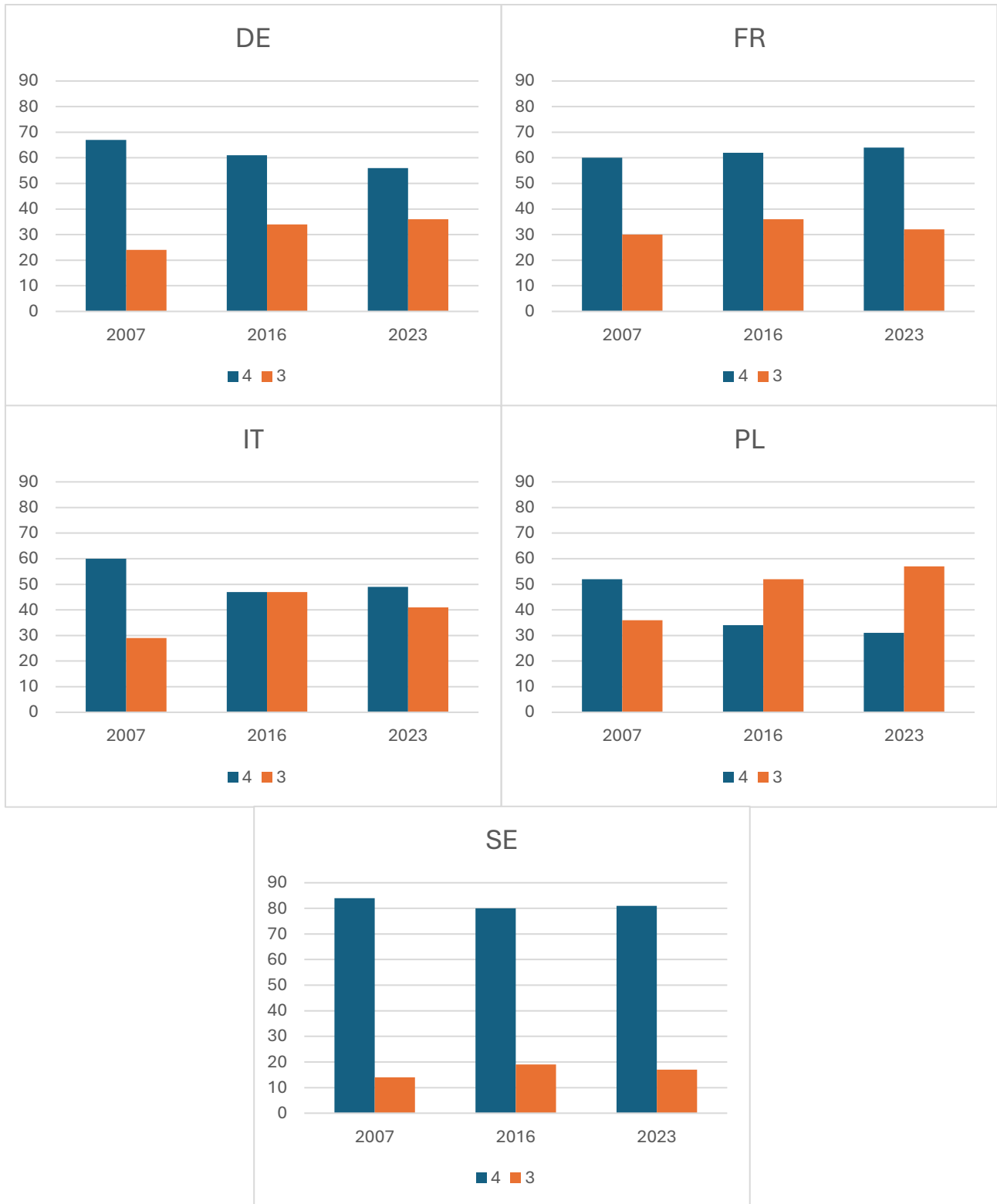
Figure 1. Importance placed on farmed animal welfare among countries and from 2007 to 2023. Percentage (%) of responses for Category 4, "Very important"; category 3, "Somewhat important". See also Table 2.

In Poland, initially, there is a higher percentage of undecided citizens on this issue, but, over time, this percentage appeared to decrease, aligning more closely with the levels of the other countries considered. The study by Cembalo et al. (2016) highlighted that Polish

respondents pay less attention to animal welfare in their food choices compared to other analyzed countries.

When it came to their opinion on the current levels of protection of farmed animal welfare in their own countries, questions were included over all the years (2005 to 2023). While a decreasing trend for answer category 1 ("Yes, certainly") in DE, FR and SE could be noted, in Poland and Italy, respondents were less inclined to ask for an improvement in FAW. This might be due to the fact that citizens of the first three countries perceived an actual implementation of the regulations on FAW and, therefore, an improvement in the conditions farmed animals lived in. This interesting consideration should be further investigated to shed more light on the reasons behind these trends. Percentages of negative answers (category 3, ''Too much importance'', "No, probably not" and "No, certainly not") increased over the years with a first high raise between 2005 and 2007 across all the countries. Indeed, food scandals related to BSE, salmonella, dioxins, and other safety issues led to a decrease in the consumption of animal-based foods between the late 20th and early 21st centuries (Alonso et al., 2020). This likely contributed to a negative perception of animal welfare during that period, which has since improved significantly over the years. Percentages of answer category 2 remained rather stable over the years, indicating the persistence of a relatively big layer of population (in 2023, 39±9% on average, Table 3c) that does not show awareness in providing their opinion on the necessity of improvement in FAW. By looking at the overall results shown in Table 3, the EU population does not appear to be highly concerned about the current farming conditions in their own countries and, therefore, does not call for improvement in FAW. Indeed, a growing number of citizens believed that the welfare of farmed animals has improved in their own countries, although many Italians and Poles still thought that further improvements were needed. This sentiment is also echoed by Alonso et al. (2020), indicating a general positive consensus regarding the enhancement of farmed animal welfare, regardless of the specific animal type or welfare issue considered. Consequently, adopting a comprehensive approach to address animal welfare needs, including aspects such as housing conditions, environment, and transportation, would be beneficial in the political decision-making process. Furthermore, a study by Clark et al. (2017) confirms that Swedish consumers appear to be less concerned and have more trust in national animal production systems (Clark et al., 2017).

Finally, Table 4 displays the EU citizens' willingness of having more information on animal welfare in 2007, 2016, and 2023. By considering the percentages of positive answers

(categories 1 and 2, "Yes, certainly" and "Yes, probably"), the majority of the EU population in those countries wanted to be more informed (Figure 2) and this proportion kept increasing over the years recording a 71±8% on average in 2023.
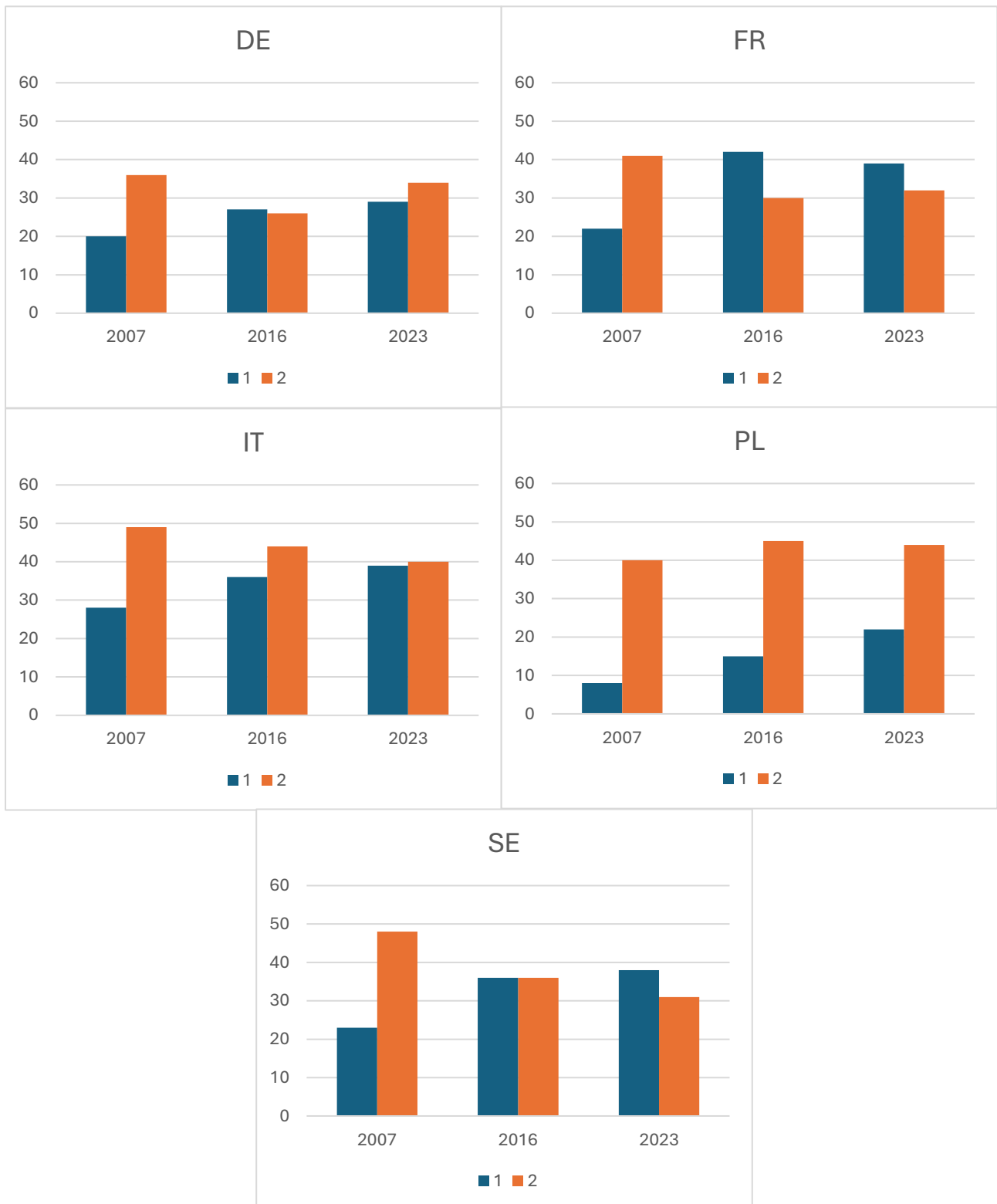
Figure 2. Desire to have more information on farmed animal welfare from 2007 to 2023. Percentage (%) of responses for Category 1, "Yes, certainly" and category 2, "Yes, probably". See also Table 4.

5.3.1. European-level analysis: overview

The results of the present study highlighted both shared and different trends across the selected representative EU countries, all of which with important implications regarding the perception and knowledge of FAW in Europe. As reported by Merlino et al. (2019), the geographical context is an important factor that influences how consumers make their decisions, especially regarding meat. Indeed, for consumers in Northern Europe, animal welfare-friendly meat is perceived as a better product even at an ethical level, which is not always the case in Italy. Pejman et al. (2019) investigated the opinions of citizens in eight European countries, including Poland, Sweden, and Italy, regarding the need for stricter animal welfare regulations. The study found that respondents from Northern European countries, such as Poland and Sweden, are more willing to accept stricter regulations compared to the current minimum standards than respondents from Southern European countries, like Italy. Furthermore, the greater knowledge and consideration of animal welfare in Sweden compared to countries like Italy and Poland suggest that cultural, educational, and legislative factors can significantly influence citizens' awareness and attitudes. Sweden, thanks to an educational system focused on animal welfare, has more informed and aware citizens. Consumers in Sweden trust animal production systems that ensure animal welfare standards through collaborative efforts with public institutions (Pejman et al., 2019).

Another interesting aspect that emerged from my research is that those who believed improvements in farming conditions are necessary might not be fully informed about the actual conditions of the animals. This lack of information can lead to distorted perceptions and greater dissatisfaction with current standards. Better access to accurate and updated information about farming practices and the advancements made in animal welfare could help change these perceptions, reducing the gap between reality and citizens' opinions. The increasing interest in more information about farming conditions reflects a growing importance placed on animal welfare compared to other aspects of food quality. As defined by Alonso et al. (2020), consumers perceive animal-friendly products as healthier, tastier, more hygienic, safer, acceptable, authentic, environmentally friendly, and traditional. Furthermore, increased awareness could also contribute to a greater willingness to pay for products that adhere to animal welfare standards (Alonso et al., 2020). A research trial of Risius et al. (2017), conducted on 676 consumers in six grocery stores in three German cities showed that perceptions of the beef cattle farming conditions is constantly changing,

and there is an increasing percentage of willingness to pay for meat produced and marketed. In the study by El Benni et al. (2024), citizens' perceptions of the goals of agricultural policy in Switzerland were analyzed. Improving animal welfare is the main goal for citizens, while the least important seems to be reducing food prices, even though all agricultural policy goals are considered important. Additionally, also cultural differences emerged in the responses from El Benni et al. (2024), although it is known that stated preferences can differ substantially from revealed preferences. Alonso et al. (2020) suggested that, to promote willingness to pay higher prices for products that adhere to higher animal welfare standards, clear information about the management and housing conditions of farmed species is crucial. This trend could influence market policies, pushing producers towards more transparent and animal-friendly practices, thereby enhancing consumer trust in the food chain.

5.4. Italian-level analysis: Eurobarometer questions

From my analysis on the Italians' level of knowledge of FAW in 2007 (Table 5a), it emerged that young people and those still in education reported knowing less about farming conditions, while managers believed they knew more. Table 5b, instead, indicates that, despite the same topic was included in the survey in 2016, a clear trend cannot be highlighted in the answers according to age group, level of education, and occupation scale.

With regard to the importance placed on FAW (Table 6), the high percentages of positive answers (categories 3 and 4, "Somewhat important" and "Very important"; always above 86% across years, Tables 6d, 6e, and 6f) confirmed that also the Italian population was very concerned about FAW. Young Italians and those with higher levels of education considered FAW highly important, while house persons considered it less relevant. At the same time, older people, those with lower levels of education, and retirees believed that animal welfare does not need improvement (Table 7). To summarize the results shown in Table 8, the desire to receive more information has increased, especially among those still in education or working as managers.

5.4.1. Italian-level analysis: overview

Our study at the Italian level has identified different trends based on the socio-economic categories of the citizens. Similar socio-economic tendencies were found by Toma et al. (2010, 2012), who examined the impact of access to information on animal welfare and consumer behavior in nine European countries. The studies demonstrated that more educated individuals and those with higher incomes are more inclined to improve their behavior towards animal welfare.

In Italy, the differences in responses across various age groups and education levels highlighted the importance of education in understanding animal welfare. Young people and students, who have access to more modern and updated information sources, show greater interest and heightened sensitivity towards these issues (Clark et al., 2016). Conversely, older generations and people with lower levels of education tend to consider the improvement of animal welfare less important, likely due to less exposure to recent information and a more traditional view of farming.

The study by Clark et al. (2016) further supported our findings, showing that concerns about farmed animal welfare vary based on socio-demographic characteristics such as age, gender, education, income, and rural residence. The importance attributed to welfare tends to decrease with age, with older individuals more readily accepting current welfare standards. Additionally, people with higher levels of education are generally more aware of the issue and more concerned about the conditions of farmed animals, regardless of their income.

Similarly, the research by Cornish et al. (2016) revealed a negative correlation between age and public concern for animals. According to this study, younger people are more involved and concerned with issues related to animal welfare compared to older individuals, who tend to have a more utilitarian view of animals.

6. CONCLUSIONS

This master dissertation explored the opinions and knowledge of European citizens on the welfare of farmed animals, based on data collected from Eurobarometer through four surveys published in 2005, 2007, 2016, and 2023. Six key points have emerged that summarize the essence of the conducted research.

First, the sample analyzed through the Eurobarometer survey seemed to be representative of the considered socio-economic groups into which the population was divided. This ensured that the collected data and observations could be considered reliable and applicable to a broader context both a European and national level.

Secondly, a relevant evolution in the reports over time has been observed. 2016 and 2023 reports are more detailed and consumer-oriented compared to the past, as it is demonstrated by the increase in questions about personal opinions and behaviors in the surveys. This evolution reflects a greater awareness of the living conditions of farmed animals and growing sensitivity among EU citizens. This increasing sensitivity is mirrored in the content of the surveys, which, over the years, have explored not only the welfare of farmed animals but also that of companion animals, addressing increasingly controversial topics such as fur farming and the practice of killing male chicks in the laying sector.

Regarding consumers' expectations and preferences, today's citizens declare an increasing attention and desire for products that reflect ethical, sustainable, and quality values. The research highlighted how transparency and honesty in the information provided by the supply chain, stakeholders, and policymakers are crucial factors for gaining and maintaining consumer trust.

The comparative analysis of responses across various European countries revealed some significant differences. Sweden stands out as the country with greater declared knowledge and concern for animal welfare compared to other countries, such as Italy. Additionally, Italian citizens seem to declare a more superficial understanding of the topic, attributing less importance to it over the years. However, overall, all five analyzed countries have shown considerable interest in being more informed about the topic. The differences observed between countries can be attributed to the different farming conditions within those countries and/or to cultural, economic, and social factors specific to each nation. This is expected to be a future challenge to be explored by the scientific community through further research.

The Italian demographic analysis revealed that young people and students are more sensitive to animal welfare, despite having less knowledge about farming conditions. In contrast, older individuals, those with lower education levels, and retirees are less likely to see the need for improving animal welfare protection. However, all demographic categories in Italy showed an increasing desire for detailed information, especially among students and managers, indicating a growing interest in understanding the conditions in which animals are raised.

On the base of the overall Eurobarometer results, a willingness to pay higher prices for products that reflect ethical and sustainable values is emerging. Consumers declared their availability to invest more in products they perceive as better in terms of ethics and quality. This phenomenon indicates a shift in evaluation and purchasing decision criteria, pushing farmers and food producers to adapt their production systems and communication strategies to meet these new market demands. However, such further production factor related to ensuring high animal welfare standards need to be assessed and certified within quality assessment frameworks. Ensuring such production factor should then correspond to an actual increase in the price of food products as wished within the so called "integrated quality" including animal welfare and environmental protection as positive external ecosystem services.

In summary, my MSc dissertation highlighted several key elements for understanding current market dynamics and future challenges in the context of farmed animal welfare. Based on a representative European sample and on a comparative national analysis among representative European countries, my study has demonstrated that animal welfare is increasingly important, despite variations between countries and social classes. It is imperative that mandatory adherence to animal welfare standards is promoted and implemented by improving actual farming conditions and enhancing consumer information and awareness, particularly in countries where these aspects are currently lacking, such as Italy. It is therefore essential to continue informing and educating citizens, especially in countries and demographic groups that show less concern for this issue.

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