

Farmers' attitudes toward animal welfare

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Implications

1. Farmers recognize the emotional and natural living aspects of animals as important but tend to prioritize productivity and biological functioning, especially health, when making practical decisions affecting farm animal welfare.
2. Many contextual factors shape farmers' attitudes to animal welfare, including production systems, herd size, culture, animal species, and demographic variables like nationality, age, and gender. Understanding how demographic, regional, cultural, and economic contexts influence farmers' knowledge, practices, and attitudes to animal welfare is essential for developing effective and locally relevant animal welfare policies and practices.
3. National legislations and certification programs are essential in driving positive changes in animal welfare practices. Farmers' attitudes toward these schemes impact their motivation to adopt them. Economic factors are a major driver of participation in welfare certification programs. Programs that engage farmers in the audit process and are perceived as beneficial for both animals and farmers increase participation. Financial incentives, market demands and opportunities, and perceived economic benefits from improved welfare practices further influence farmers' willingness to adopt these practices.
4. Farmers' attitudes toward animal welfare are negatively influenced by their perception that consumers do not sufficiently recognize their efforts or are unwilling to pay for higher welfare standards. This can undermine farmers' motivation to change practices to improve animal welfare.
5. There is growing recognition that farmers' occupational and mental wellbeing and job satisfaction are positively linked to farm animal welfare. Addressing these issues is important for improving animal welfare outcomes.

Key words: animal welfare assurance programs, certification, empathy, husbandry, knowledge, livestock

Introduction

Farm animal production has undergone significant transformations in the last 60 years, associated with globalization,

population growth, increasing affluence, and the resulting demand for animal products. Altogether, this has driven a significant growth in the global number of animals and continuous changes in the production systems in response to different environmental, social, and economic challenges. One of the main transformations can be represented by the intensification of production and a shift from small-scale, diversified, and subsistence-oriented systems to larger-scale, specialized systems that often focus on generating products aimed at competing in national and international markets. The intensification of production systems can directly affect the quality of life of animals, given that it involves loss of naturalness and changes in the animals through genetic selection for increased productivity, as well as the housing environment, diet, and management. In this process, animal welfare has also been affected by changes in the relationship between farmers and animals, in part related to the use of new equipment and technologies that changed the human–animal relationship and the modification of the size and characteristics of herds.

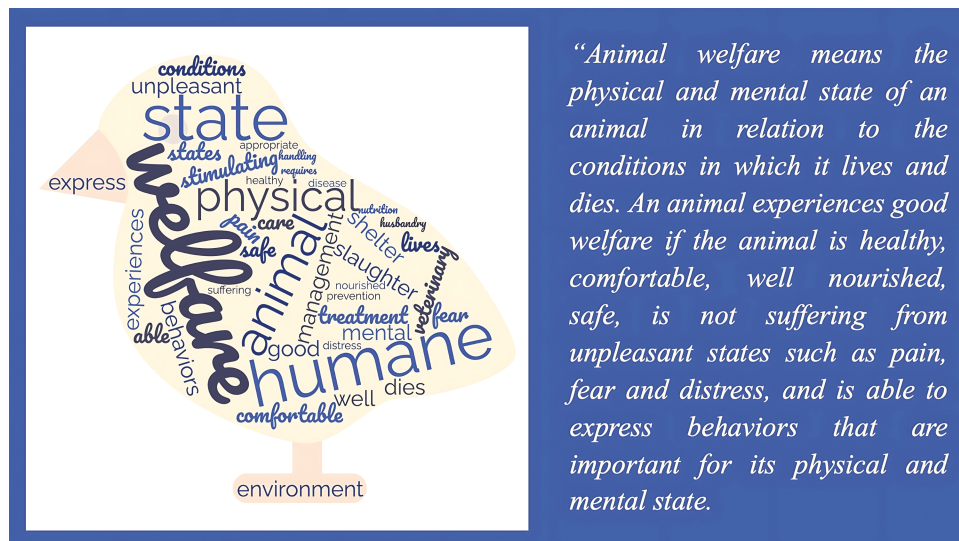
Farmers, as the primary caregivers of animals, play a key role in shaping animal welfare outcomes. Attitudes toward animals and their welfare are intimately associated with the human–animal relationship. Besides attitudes, other factors influence farmers' decisions to adopt management practices and production systems that may influence animal welfare, including knowledge, experience, personal values, cultural norms, economic constraints, and other systemic barriers. Understanding how farmers perceive and prioritize animal welfare can shed light on the factors that encourage or hinder the adoption of welfare-friendly practices. In this review, we explore these attitudes and their implications, identifying gaps and offering insights that could help develop better policies and support systems to contribute to the improvement of farm animal welfare.

Animal Sentience and Animal Welfare Concepts

Different audiences have different ways of conceiving animal welfare (von Keyserlingk and Hötzel, 2015; Bergstra et al., 2017). Here we adopt the World Organization for Animal Health's definition of animal welfare (von Keyserlingk and Hötzel, 2015), which includes different dimensions—biological functioning, affect, and naturalness—and acknowledges that the animal is at the center of the debate (see Figure 1).

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“Animal welfare means the physical and mental state of an animal in relation to the conditions in which it lives and dies. An animal experiences good welfare if the animal is healthy, comfortable, well nourished, safe, is not suffering from unpleasant states such as pain, fear and distress, and is able to express behaviors that are important for its physical and mental state.”

Figure 1. The World Organization for Animal Health's definition of animal welfare (WOAH <https://www.woah.org/>).

Studies have shown that farmers generally recognize all these dimensions as important for the animals (Spooner et al., 2014; Bergstra et al., 2017; Anneberg and Sandøe, 2019; Sinclair et al., 2019; Albernaz-Gonçalves et al., 2021; Buddle et al., 2021; Yang et al., 2024). They also consider animal welfare relevant and often express empathy, sensitivity to animal pain and stress, and values emerging as a consequence of human–animal relations, such as care, respect, joy, and sense of purpose (Cardoso et al., 2016; Anneberg and Sandøe, 2019). Animal sentience, arguably the main reason for the public's concerns about animal welfare, is generally acknowledged by farmers. For example, dairy and pig farmers consider their cows intelligent beings capable of experiencing a wide range of positive and negative emotions (e.g. Peden et al., 2020; Albernaz-Gonçalves et al., 2021). Farmers of different countries and production settings refer to positive welfare states and use the term “happy” or contented animals (Spooner et al., 2014; Sinclair et al., 2019; Albernaz-Gonçalves et al., 2021; Buddle et al., 2021; Yang et al., 2024).

However, many studies conclude that, despite broad recognition of aspects relevant to animal welfare, farmers tend to conceive of animal welfare primarily in instrumental terms, placing greater importance on health and performance and lesser emphasis on emotional states and natural behaviors (Kauppinen et al., 2010; Spooner et al., 2014; Anneberg and Sandøe, 2019; Albernaz-Gonçalves et al., 2021; Buddle et al., 2021; Yang et al., 2024). Accordingly, many farmers emphasize aspects of housing and infrastructure as central elements for good welfare, considering them more relevant than animal indicators (Kauppinen et al., 2010; Albernaz-Gonçalves et al., 2021). These views, though, tend to differ among different groups of farmers, as those inserted in animal quality assurance (Van Huik and Bock, 2007), organic markets (Bergstra et al., 2017), or smaller-scale pig farmers (Molnár and Fraser, 2021), who emphasize natural living and freedom as important components of farm animal welfare. Additionally, while

conventional farmers seem more focused on resource efficiency and economic aspects of their activity, organic and outdoor farmers express interest in aspects related to animal health and welfare, human health and the environment, multifunctionality, and ecosystem services (Spooner et al., 2014; Bergstra et al., 2017; Sinclair et al., 2019).

These differences in understanding and prioritizing animal welfare also reflect broader contextual variations. Farmers in industrialized countries are generally familiar with the concept and discussions surrounding farm animal welfare. In contrast, in some regions where the concept has been introduced more recently or through external influence, it may be less known or intertwined with specific farm practices promoted to improve welfare (Hötzel et al., 2024; Yang et al., 2024). For example, Brazilian pig farmers might associate animal welfare with group gestation (Albernaz-Gonçalves et al., 2021), while Chinese egg producers might use the term cage-free (Yang et al., 2024) to mean animal welfare. Another relevant note regards the understanding and use of terms within a community, for example, “comfort,” which may be understood differently by different farmers (Doyle et al., 2024). Researchers in the field must be aware of these contextual nuances when engaging in conversations with farmers.

Exploring the Attitude-Behavior Gap

The association between farmers' knowledge, beliefs, and attitudes toward animal welfare and behavioral change, as well as the adoption of “welfare-friendly” practices, has been a relevant matter of debate (Hemsworth and Coleman, 2012). Farmers' recognition of animals as sentient beings positively influences attitudes to farm animal welfare and husbandry practices aimed at improving it (Balzani and Hanlon, 2020; Hötzel et al., 2024). Positive attitudes toward animals or specific husbandry practices generally lead to support and adoption of “welfare-friendly” practices (Kauppinen et al., 2010;

Hemsworth and Coleman, 2012; Aluwé et al., 2015; Doyle et al., 2024). However, this is not always the case. For example, farmers who employ management practices they describe as negative for animal welfare, such as restrictive housing for gestating sows that limit movement and the expression of natural behaviors, may still claim to care about animal welfare and believe that their animals experience good welfare (Spooner et al., 2014; Albarnaz-Gonçalves et al., 2021). A study with dairy farmers in the United States found that positive attitudes toward providing resources with potential enrichment value did not lead to farmers employing them (Doyle et al., 2024). Another recent study found that Chinese egg farmers who acknowledged the welfare benefits of cage-free systems did not transition, due to perceived risks of reduced profitability (Yang et al., 2024). Some sheep (Tamioso et al., 2017) and pig (Albarnaz-Gonçalves et al., 2021) farmers believe that the practice of tail docking and castration inflicts pain but continue to use them without intending to change. Similar inconsistencies are observed among dairy farmers regarding dehorning or disbudding, and cattle and pig farmers concerning practices such as hot iron branding and individual gestation housing (Spooner et al., 2014; Cardoso et al., 2016; Bassi et al., 2019). Often farmers argue that the alternatives to these practices involve trade-offs or may even reduce welfare, for example, increasing injuries or aggression. However, some studies show that sometimes farmers use similar arguments to explain their choices to either use or not use these practices (Valros, 2022).

The gap between farmers' recognition of the animal's ability to experience different affective states and motivation or ability to improve the animals' living conditions is a central topic for animal welfare debates (Balzani and Hanlon, 2020; Hötzel et al., 2024). Understanding this disconnection requires considering that individual experiences, attitudes, and behaviors exist within a cultural frame and interact within systemic and structural barriers and enablers (Figure 2).

Cultures may act as barriers or enablers influencing attitudes and behaviors, affecting their causal relationships. The impact of cultural influence is evident in practices like iron branding and cattle castration, which are acknowledged as painful by farmers yet continue to exist due to deeply ingrained shared values, traditional events, rural masculinities, and a culture of toughness (Cardoso et al., 2016; Bassi et al., 2019). Certain conditions that are widespread on farms, such as lameness in dairy cows, pen-sucking in dairy calves, injurious feather pecking in laying hens, or aggression, tail biting, and repetitive abnormal behaviors in pigs, are so normalized that farmers do not see them as problems (Palczynski et al., 2016; Doyle et al., 2024; Hötzel et al., 2024). However, culture also may act as an enabler of farm animal welfare, promoting positive behaviors. For example, belonging to a group such as organic is linked to values like naturalness and environmental care (Van Huik and Bock, 2007). A study showed that most Irish farmers considered that the pasture-based system promotes higher welfare status and is the best option for dairy farming (Shortall and Lorenzo-Arribas, 2022).

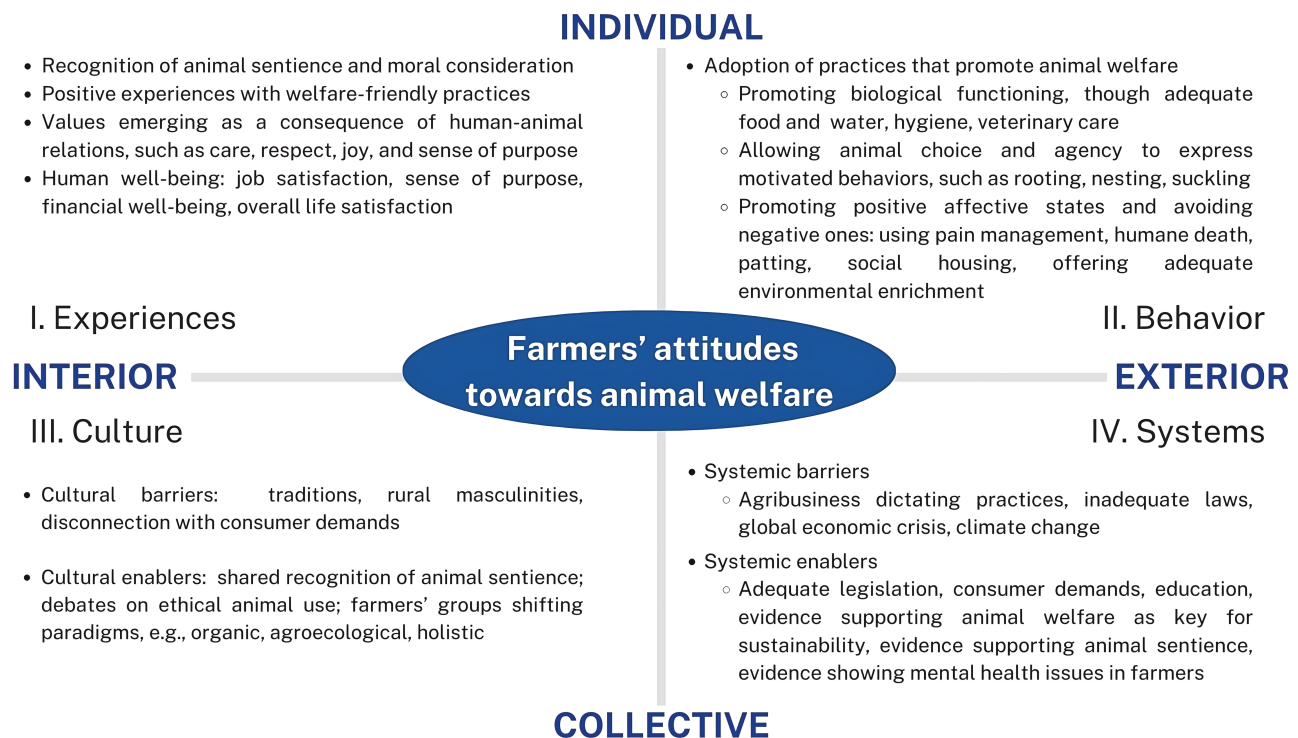


Figure 2. Using Integral Theory (Wilber, 2005) to understanding farmers' attitudes towards animal welfare. The "individual-interior" refers to a person's inner experiences, such as thoughts, experience, and emotions. The "individual-exterior" refers to how these inner experiences manifest externally through behaviors and practices. The "interior-collective" refers to shared experiences and values within a group, while the "exterior-collective" refers to the structural parts of society, like science, laws, and markets. In this figure we provide some examples in each quadrant to examine farmers' attitudes towards animal welfare.

Some systemic barriers and enablers may either facilitate or limit farmers from improving animal welfare on their farms. These include the existence or lack of adequate animal welfare legislation, consumers' demand for better animal welfare, organized markets, and training and education opportunities for farmers (von Keyserlingk and Hötzel, 2015). Inadequate public and private regulations that focus narrowly on the biological functioning of animals or global economic and climate crises that add stress on the systems, decreasing the priority of animal welfare due to a sense of urgency, are examples of systemic barriers limiting farm animal improvement (von Keyserlingk and Hötzel, 2015). Some studies have reported that farmers bound to agroindustries that dictate practices and standards (Albernaz-Gonçalves et al., 2021) as well as farm employees (Anneberg and Sandøe, 2019), often lack the autonomy to implement husbandry practices consistent with their own perceptions and attitudes. Additionally, inadequate legislation can sometimes act as a structural barrier to implementing necessary changes. For example, in 2023, the European Union delayed a relevant review of animal welfare legislation due to prioritization of focus on managing the crisis in Ukraine (Modern Diplomacy, 2024).

A practical example is the mandatory requirement to involve veterinarians when administering pain control drugs, which leads farmers who believe disbudding causes pain in calves to avoid using them (Cardoso et al., 2016). Another example is legislations that exempt the use of pain control in young animals, which reinforces farmers' misconceptions that pain is less important in very young animals; this, added to farmers' perception that the administration of painkillers itself causes stress and pain, not justify its use (Aluwé et al., 2015), contributes to farmers not using pain relief when disbudding calves or castrating and tail docking piglets (Cardoso et al., 2016; Albernaz-Gonçalves et al., 2021). Likewise, despite the emphasis placed by farmers in organic and outdoor systems on animal sentience and naturalness, some employ practices that contradict these ideals, like early or abrupt weaning, early cow-calf separation, and elective painful procedures such as disbudding, with support from local legislation or animal welfare certification bodies. Finally, the lack of technical knowledge or support helps explain the low adoption of practices developed to improve farm animal welfare. One case is farmers who perceive the benefits of group housing for sows but do not intend to adopt the system due to lack of technical support (Spooner et al., 2014; Albernaz-Gonçalves et al., 2021). Similarly, egg producers said that it may be difficult to identify advisors to help with the problem of injurious feather pecking and cited the lack of measures proven to be consistently effective to reduce injurious pecking for not adopting measures in their farms (Palczynski et al., 2016).

Some systemic enablers, in contrast, may facilitate the adoption of welfare-friendly practices. For example, structures including markets, technical, and financial support can enable the viability of alternative production systems like cage-free, outdoor, free-range, and organic systems. In the latter systems, housing and management practices align more with farmers' preferences and attitudes to naturalness or attention

to individual animals (Van Huik and Bock, 2007; Molnár and Fraser, 2021). Participation in animal welfare assurance schemes, access to niche markets, and effective legislation also contribute to the adoption of practices to improve animal welfare (Hötzel et al., 2024). Legislation, coupled with industry involvement and governmental subsidies has incentivized changes in Finish farmers' practices that allowed the successful elimination of tail docking (Valros, 2022). Other examples of structural enablers are the case of agroindustry popularizing the use of immunocastration in pig farms in Brazil (Albernaz-Gonçalves et al., 2021) or supporting cage-free egg systems in China (Yang et al., 2024), and veterinary advisors promoting the use of pain control in Canada (Winder et al., 2016). Farmers cite veterinarians as an important source of information and drivers of change (Cardoso et al., 2016; Winder et al., 2016), although often commercial representatives assume this role (Albernaz-Gonçalves et al., 2021; Moreira et al., 2024), which highlights the importance of considering the views and motivations toward animal welfare within the different groups that may interact with farmers.

Additionally, aspects such as experience and farmers' wellbeing influence attitudes and behaviors. Positive experience with husbandry practices that improve animal welfare, like social housing and increasing milk allowance to dairy calves (Doyle et al., 2024), alternatives to surgical castration in pigs (Aluwé et al., 2015), increased weaning age (Albernaz-Gonçalves et al., 2021), or raising pigs with tails (Valros, 2022) can foster positive attitudes toward these practices. Farmer's mental wellbeing and job satisfaction are increasingly reported as factors positively associated with the quality of human-animal relationships and farm animal welfare (Hemsworth and Coleman, 2012; Palczynski et al., 2016; Anneberg and Sandøe, 2019; King et al., 2021; Doyle et al., 2024).

In Figure 3, we illustrate the causal relations between the elements discussed above. The diagram underscores that these causal relations often follow bidirectional patterns, and even form feedback loops. It also highlights the significant role of cultural and systemic enablers and barriers in shaping farmers' attitudes and the adoption of welfare-friendly practices, and how these factors are in turn influenced by them.

Promoting Farm Animal Welfare

Bridging the gap between farmers' attitudes and on-farm application of good practices is essential to improve farm animal welfare. Farmers' attitudes and intentions to comply with legislation or participate in animal welfare assurance programs are influenced by several factors, which include their views and attitudes toward animal welfare, knowledge about regulations or certification schemes, the consumer market in which they are inserted, the possibility of active participation in the auditing process, experiences with audits, and personal values (Van Huik and Bock, 2007; Hockenhull et al., 2019; Albernaz-Gonçalves et al., 2021; Moreira et al., 2024).

Even among farmers who consider animal welfare assurance schemes important, some issues can foster negative attitudes

legislation or assurance programs and in countries where farming systems and practices have evolved to meet consumer and market demands. Therefore, further studies across different farming contexts, production systems, and economic and political landscapes are needed to understand better the farmers' knowledge, motivations, and attitudes about improving farm animal welfare, joining voluntary schemes, and complying with legislation (Hötzel et al., 2024).

Here, a short note on farmers' perceptions of consumers' concerns about animal welfare, willingness to pay for differentiated products, and respect and recognition for their work is relevant, as many studies have identified negative views about consumers among farmers. Some shared feelings are that consumers do not know where food comes from and how it is produced at the farm, that urban citizens and consumers are disconnected, ignorant, misinformed, or simply not interested in how farmers care for animals on the farms (Palczynski et al., 2016; Hockenhull et al., 2019; Albernaz-Gonçalves et al., 2021; Buddle et al., 2021; Hötzel et al., 2024). Some feel threatened by what they see as vegan propaganda or argue that lack of contact with farm animals and farming leads to romanticized ideas and anthropomorphizing of animals (Albernaz-Gonçalves et al., 2021; Buddle et al., 2021). These perceptions are often identified as justification for farmers' negative attitudes toward improving farm animal welfare, underscoring the need to bring animal food producers and consumers together to reduce tensions and help build better private and public policies for regulating optimal on-farm practices.

Research Gaps

Some issues less explored in the literature concern the knowledge and attitudes of farmers toward the impacts of climate change and the associated extreme weather events on animal welfare, and emerging technologies proposed to improve farm animal welfare. Developers present gene editing technologies to add, remove, or alter specific genes and phenotypes and precision livestock farming as promising solutions to animal welfare problems. However, there is a debate surrounding the potential impacts of these technologies on human–animal relationships, farmers' wellbeing, consumers' acceptability, and even animal welfare. Some criticisms are that claims about positive effects on animal welfare are unproven and that these technologies may primarily benefit intensive production systems with low welfare standards while failing to contribute to a broader understanding of animal welfare by excluding positive states. While such criticisms are a matter of debate, studies have shown that common concerns among farmers regarding precision technologies are high costs, maintenance of equipment, technical complexity, a lack of specific technical knowledge, and doubts about market and consumer acceptance (Hötzel et al., 2024; Moreira et al., 2024).

More debate and research on farmers' views is urgent, given that many precision tools are already present in many farms and that gene edition in animals is approved in many countries and is ready to enter commercial herds. The development and

promotion of precision technologies as a way to improve farm animal welfare may reinforce farmers' reliance on health and performance indicators, increasing the gap between industry practices and consumers' and citizens' attitudes and expectations about farm animal welfare. Ensuring that all farming communities are included in this research is essential. It is particularly concerning that there is a lack of research on perceptions about technology among specific groups, such as organic, agroecologists, and regenerative farmers. We bring attention to reports that some farmers who have adopted automatization technologies express sensing changes in their managing skills and autonomy in their work.

The relationship between farmers' wellbeing, job satisfaction, and animal welfare highlights the need for integrated approaches that consider both human and animal needs, which calls for a One Welfare/One Health approach to this area of research.

Importantly, much of the current understanding of farmers' attitudes to animal welfare is largely based on studies concentrated in a few countries and concerning a few species (Figure 4). However, recent estimates by the FAO indicate that more than half a billion farmers worldwide are involved in animal husbandry, with livestock playing a pivotal role in livelihoods and food security in other regions. In the countries where most research about farmers' awareness and attitudes toward farm animal welfare has been conducted, practices such as cage or confined housing, painful procedures, the separation of dairy calves from their mother at birth, or the disposal of the male dairy calf are highly debated or have already been banned. In other countries and entire regions, however, these same practices are still being promoted and introduced to support increased productivity, often under the umbrella of sustainable intensification (von Keyserlingk and Hötzel, 2015). Given this historical context and the interconnectedness among cultural and systemic factors highlighted earlier, and that the understanding and application of welfare concepts can vary significantly across different farming systems and regions, a more comprehensive understanding of farmers' knowledge and attitudes to animal welfare is needed. This requires the inclusion of the views, motivations, aspiration, and life experiences of farmers from regions and countries with different cultural, agricultural, and economic realities (Figure 5). Additionally, future studies should include gender, age, nationality, employment status, or migration status in their analyses, as these demographics may impact views and practices (Anneberg and Sandøe, 2019; King et al., 2021; Doyle et al., 2024).

Final Remarks

Farmers are often seen as directly responsible for improving animal welfare outcomes. However, the wide range of cultural and systemic factors influencing farmers' perceptions, attitudes, and decision-making indicates that while changes in individual and group behaviors are important, addressing the underlying structural factors is essential to effectively improve farm animal welfare. The shift toward intensified animal production and the introduction of technologies—now criticized by

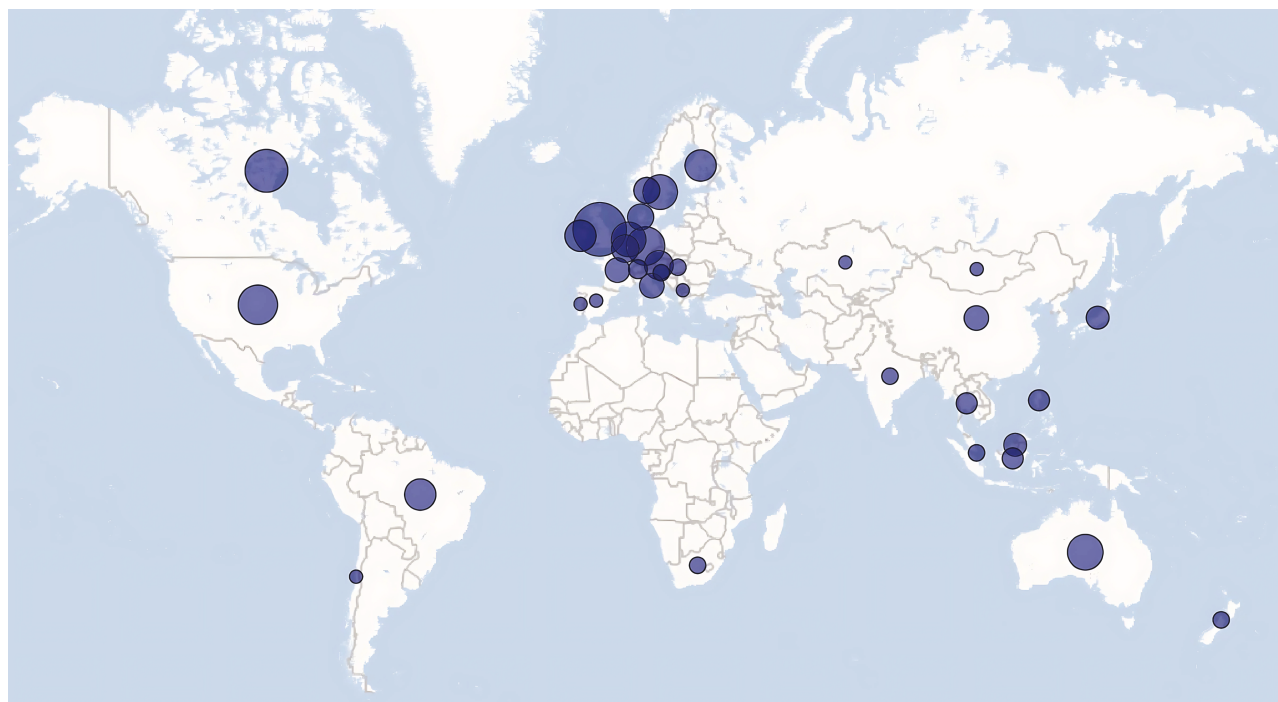


Figure 4. Chart illustrating the distribution of empirical studies published on farmers' attitudes towards animal welfare, from a total 266, identified in a search in the Web of Science platform using the terms (farmer* or producer*) (Title) and (attitude* or perspective* or perception* or opinion* or belief* or view* or frame*) (Topic) and animal welfare (Topic). Circles size indicate the number of articles published in the country. Most studies focus on dairy cattle and pigs, followed by research on laying hens, beef cattle, and sheep, with only a handful addressing turkey, goat, rabbit, mink, and fish producers. Papers' included farmers' perceptions about animal sentience, pain and intrinsic value, motivations towards adopting welfarefriendly practices and production systems and farmers' perceptions about consumers' views on farm animal welfare.



Figure 5. Interviewing a dairy farmer. Photo from the authors, published with permission.

some sectors of society for their impacts on animal welfare—was introduced in a top-down manner, by external influences including market and consumer demands, government policies and industry developers. Consequently, farmers are expected to solve problems they did not historically create, bearing the burden of producing cheap, healthy, and abundant food while contending with broader structural issues, including food security, environmental sustainability, and public health. Additionally, many analyses depict farmers as “lacking knowledge,” similar to the knowledge deficit model used to explain low public support for science and technology. However, our review identified that farmers often lack the freedom, autonomy, and decision-making power to align their practices with their values, which include pride, empathy, and sensitivity toward animals and nature. Greater involvement of farmers in defining, creating indicators for, and evaluating animal welfare is necessary to ensure that policies are fairer, more effective, and in line with sustainable and ethical practices. These changes may include policies aimed at improving and supporting production systems that are forced by intensification pressures to compete on a production scale, leaving limited space for changes that favor animal welfare.

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Conflict of interest statement

The authors declare no real or perceived conflicts of interest.

Author Contributions

Maria Hötzel (Conceptualization, Supervision, Writing—original draft, Writing—review & editing), Leticia Nogueira (Investigation, Writing—original draft, Writing—review & editing), Elisa Stadnick (Writing—original draft, Writing—review & editing), and Matías Hargreaves-Méndez (Conceptualization, Writing—original draft, Writing—review & editing)

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