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Advancing Agri-Environmental Policy with Behavioral and Experimental Economics: Insights, Innovations, and Future Directions

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In recent years, behavioral and experimental economics have increasingly shaped agri-environmental research by revealing how farmers navigate complex decisions. This article reviews key developments in three areas: behavioral insights into farmers' social, temporal, and risk preferences and identities, norms, and motivations; experimental methods for assessing behavior and policy impacts; and methodological advances enhancing scientific rigor. We highlight contributions to more behaviorally informed agri-environmental policies, including nudges, participatory approaches, and innovative schemes. Looking forward, priorities include large-scale collaborative studies, stronger stakeholder involvement, and integrating behavioral evidence into policymaking, addressing challenges such as farmer fatigue, to design adaptive, effective, and legitimate policies.


Key words: agricultural economics, agri-environmental measures, behaviorally informed interventions, collaborative research, farmer fatigue, nudges, participatory approaches

Introduction

Over the past decades, behavioral and experimental approaches have profoundly influenced the field of economics. This development has also significantly shaped agricultural economics (Di Falco et al., 2023), where behavioral agricultural economics has emerged as a recognized and respected subdiscipline (Wuepper, Henzmann, and Finger, 2023). This subfield emphasizes the generation and application of behavioral economic insights within the agricultural context. Moreover, experimental methods have become an important complementary tool in advancing evidence-based agricultural and food policy (El Benni, Grovermann, and Finger, 2023). A main reason for this development is the necessity to move beyond the traditional *Homo oeconomicus* model in order to adequately assess policy approaches aimed at influencing the behavior of agricultural actors (Colen et al., 2015). Experiments also offer a cost-effective means of evaluating policies and interventions *ex ante* (Lefebvre et al., 2021). The use of such approaches has yielded valuable and innovative insights for policymaking and contributed to the development and design of more targeted and effective

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policies. This trend was further supported by the rise of inter- and transdisciplinary research, which cross-fertilized and enriched behavioral and experimental approaches by broadening conceptual perspectives and expanding the methodological toolbox.

While much of the literature stems from the Global North, we emphasize that our call for evidence-based, open, and diverse science applies globally. We have made a conscious effort to include studies from the Global South and consider the insights presented relevant across country contexts.

A field that has recently benefited significantly from the “behavioral turn” is agri-environmental economics, which is in the focus of this article. Understanding the behavioral economic determinants of environmentally relevant farmer behavior (Dessart, Barreiro-Hurlé, and Van Bavel, 2019; Klebl, Feindt, and Piorr, 2024) is essential for the design of effective agri-environmental policies (Dessart et al., 2021). Increasingly, the field has employed economic experiments with farmers to evaluate policies and policy approaches, making important methodological contributions to the broader discipline. In this article, we aim to acknowledge and reflect on these developments by highlighting (i) the diversity of behavioral insights that have emerged from behavioral and experimental agri-environmental economics, (ii) the ways in which experiments are used in agri-environmental economics to understand farmer behavior and evaluate policies and policy approaches, and (iii) the methodological innovations that have accompanied these advances, contributing to a greater scientific rigor and professionalism in the field. Moreover, we illustrate how experiments and behavioral economic analyses have led to concrete and valuable insights for the design of agri-environment schemes (AES) and behaviorally informed interventions, such as nudges. Similarly, we highlight the growing relevance of participatory approaches and the related behavioral economic research for the field of agri-environmental economics. Finally, we share our vision for the future of behavioral and experimental agri-environmental economics, outlining how existing trends may evolve and how the community might address the challenges that lie ahead.

Behavioral and Experimental Agri-Environmental Economics

In the following sections we showcase the diversity of behavioral economic insights stemming from and the variety of experimental approaches currently in use within the field of agri-environmental economics. Furthermore, we outline how broader methodological advancements in the domain of economics such as open science and preregistrations have led to greater scientific rigor in this field.

Behavioral Insights for Agri-Environmental Economics

The *Homo oeconomicus* model has long served as a cornerstone of economic (policy) analysis, providing a useful framework for hypothesis development and a benchmark for empirical investigations. However, behavioral economics has shown that *Homo sapiens* does not consistently behave as the *Homo oeconomicus* model assumes. Instead, humans are boundedly rational, boundedly self-controlled, and boundedly self-interested (Mullainathan and Thaler, 2000). This does not imply that humans are incapable of making rational decisions, but rather that it is important to avoid assuming that they always do. Today, the list of behavioral insights and corresponding models is long (DellaVigna, 2009) and still there is no unified and comprehensive model of behavioral decision-making available. Instead, behavioral economics is an inherently empirical field and, given the large variation and context-specificity in how humans make decisions, it is prudent to evaluate behavior on a case-by-case basis (Shogren and Taylor, 2008). The same applies to behavioral agri-environmental economics.

As of today, farmers have been repeatedly subjected to behavioral economic investigations aiming at understanding what makes them behave pro-environmentally and how their behavioral characteristics drive their responses to agri-environmental policies. Results of these studies are highly valuable for policy design, and the community has been piling up a tremendous amount of

behavioral insights on farmer behavior. In the following, we showcase this diversity by highlighting a selection of interesting and relevant studies. Hence, the following list just features examples and is by no means complete.

For the domain of *risk preferences*, a systematic review on risk preferences of European farmers by Iyer et al. (2020) shows that many farmers are risk averse, although such preferences may depend on type (Lefebvre, Midler, and Bontems, 2020) or domain (Meraner and Finger, 2017; Garcia, McCallum, and Finger, 2024) of risk. Furthermore, many European farmers are also averse to losses, with significant sociobiogeographical variation in the degree of loss aversion (Rommel et al., 2023a). The average European farmer furthermore overweights small and underweights large probabilities (Finger et al., 2024b). Data on farmers' risk preferences is also available for non-European contexts, such as the US (Roe, 2015) or China (He, Veronesi, and Engel, 2018). Other related phenomena, such as ambiguity aversion (Ge and Wu, 2023; Barham et al., 2014) and the (in)stability and elicitation method contingency of risk preferences (He, Veronesi, and Engel, 2018; Finger, Wüpper, and McCallum, 2023) have been studied in the field as well.

For the domain of *time preferences*, there is evidence from a systematic review that the average annual discount rate of farmers in the US and Europe is slightly lower than that of the general population, again with larger within-sample variation (Wuepper et al., 2023). Additionally, time preferences seem to be sensitive to the elicitation method and monetary amounts considered (Hermann and Musshoff, 2016). Moreover, present-bias may explain (non-)participation in pro-environmental programs (Duquette, Higgins, and Horowitz, 2012).

For the domain of *social preferences*, fairness (Hellberg-Bahr and Spiller, 2012) and altruistic preferences (Ma et al., 2024), as well as inequality aversion (Ferré, Engel, and Gsottbauer, 2018) have been shown to bear the potential of influencing farmers' decision-making. Nonstandard preferences are also manifested as pro-environmental preferences, for example in the form of values (Klebl et al., 2024), moral (Johansson, Rahm, and Gyllin, 2013), or environmental concern (Toma and Mathijs, 2007; Läpple and Kelley, 2015). Farmers engaging in pro-environmental farming practices frequently hold intrinsic motivations (Greiner and Gregg, 2011; Mills et al., 2018), and farming objectives usually go way beyond profit maximization (Kallas, Serra, and Gil, 2010; Greiner, 2015). In a similar vein, farmers' multifaceted self-identities have been shown to influence pro-environmental decision-making (Burton and Wilson, 2006; McGuire, Morton, and Cast, 2013). Also, the behavior of peer farmers seems to matter, as both descriptive (Defrancesco et al., 2008; Kuhfuss et al., 2016) and injunctive norms (Wauters et al., 2010; Van Dijk et al., 2016) have been found to exert influence in agri-environmental decision contexts.

Generally, farmers tend to also form preferences regarding policies and policy process attributes, beyond the outcomes that these may generate. In other words, they have *procedural preferences* (e.g., Thorpe, 2018). For instance, (some) farmers may prefer agri-environmental measures that provide for capacity building, allow for community participation, and reduce administrative burdens (Schulze et al., 2024). They tend to dislike control (Winter and May, 2001) and highly value their autonomy (Stock and Forney, 2014). Hence, behavioral agri-environmental economic research on participatory approaches has expanded the focus beyond the effects of the policies themselves by explicitly also acknowledging effects of the policy design and implementation process and the degree of stakeholder engagement (Höhler et al., 2024; Schulze et al., 2024; Alif et al., 2024).

From a broader bounded rationality perspective, there is evidence that sustainable farming decisions may be driven by personality (Austin, Deary, and Willock, 2001) or based on heuristics (McCown et al., 2012) and that farmers' (potentially biased) perceptions of control (Michel-Guillou and Moser, 2006), benefits (Morgan et al., 2015), or risks (Pavlis et al., 2016) are relevant as well. Farmers are furthermore prone to status quo bias (Hermann and Musshoff, 2016) and may therefore be resistant to implement larger changes on their farms.

The great amount of available evidence has led the community to publish major frameworks detailing how behavioral factors underpin or undermine the decision to engage in pro-environmental farming activities (Dessart, Barreiro-Hurlé, and Van Bavel, 2019; Klebl, Feindt, and Piorr, 2024).

On top of that, several attempts have been made to distinguish different profiles or types of farmers, which share similar characteristics and resulting behavioral drivers and responses to policies (Huber et al., 2024; Bartkowski, Schüßler, and Müller, 2022). Others have suggested bridging the gap between behavioral agri-environmental economics and the rich literature on agricultural adoption (Streletskaia et al., 2020). Both avenues will likely enable a much more targeted delivery of policies to different farmer types in the future.

In summary, behavioral economic agri-environmental insights have received considerable attention in the past decades, and they have enriched the set of behavioral factors to consider in policy design. Researchers and policymakers are thus advocating for the increased uptake of relevant insights in the policy cycle (Balmford et al., 2021). In a later section we will showcase how the domain of AES design has benefited from behavioral economic research and how behaviorally informed interventions and participatory approaches have been investigated as potential additions to the agri-environmental policy toolbox.

Economic experiments are a methodological approach that easily allows researchers to elicit behavioral drivers and assess the potential behavioral impacts of specific policy interventions and approaches, even in collaboration with farmers. The experimental approach not only facilitates learning how specific interventions perform but also how behavioral responses are driven by the characteristics of the target population.

Experimentation in Agri-Environmental Economics

Experimental economic methods, such as laboratory or field experiments, are well-established within many fields of economics as a means to generate insightful empirical data under controlled conditions (Koundouri et al., 2023). Apart from their usefulness in testing theories or searching for empirical regularities, these methods fill an important methodological gap, as they allow for the *ex ante* analysis of economic interventions and policies without relying on restrictive *Homo oeconomicus* assumptions. Moreover, coupled with behavioral economic theory, they are a powerful tool to empirically investigate the relevance of behavioral factors in human decision-making. Hence, together with the range of methods designed for *ex post* impact evaluation, experiments are inevitable for getting closer to the ideal of evidence-based policymaking and increasing policy effectiveness by preventing behavioral policy failure (Shogren and Taylor, 2008; Loewenstein and Chater, 2017).

Agri-environmental economics, however, started comparatively late to fully embrace the experimental toolbox and to run experiments with farmers or other stakeholders within the agri-food value-chain or on agri-environmental themes of interest. This has left a huge potential untapped for a long time (Thoyer and Préget, 2019; Lefebvre et al., 2021; Banerjee, 2022). A major reason is that, unlike students, farmers do not constitute a convenience sample, and considerable effort is required to recruit them for experimental studies (Weigel et al., 2021; Rosch et al., 2021; Baaken et al., 2025). Moreover, farmers face higher transaction and opportunity costs compared to standard student subjects, and researchers' access to farmers is usually limited. Nonetheless, the agri-environmental economics community has successfully started to solve many of the practical issues related to conducting experiments with farmers and a variety of experimental methods has been applied to agri-environmental questions of interest (Colen et al., 2016; Palm-Forster and Messer, 2021).

Standard laboratory experiments with student subjects were used relatively early on in the community, though the setting was often in a broader environmental economics context with a focus on the evaluation of payments for environmental services schemes (PES). Since agri-environment schemes (AES) are a variant of PES, it seemed natural for the community to make a link to this particular literature and use the insights also for AES design. The experiments conducted were therefore mostly used to test novel incentive mechanisms, which had been suggested for overcoming issues related to PES effectiveness (Engel, 2016). Well-known examples range from agglomeration bonuses (Parkhurst et al., 2002; Banerjee, Kwasnica, and Shortle, 2012; Panchalingam et al., 2019;

Kuhfuss et al., 2022; Ferré, Engel, and Gsottbauer, 2022) and auctions (Reeson et al., 2011; Schilizzi and Latacz-Lohmann, 2016; Messer et al., 2017) to collective incentive mechanisms (Le Coent, Préget, and Thoyer, 2014).

Online lab-in-the-field experiments with farmers (Baaken et al., 2025) coupled with a broad range of recruitment methods (Weigel et al., 2021) are a commonly used variant to mimic the controlled environment of a proper laboratory at a convenience location, such as the farmers' homes. Especially over the past decade, experimental designs of lab-in-the-field experiments in agri-environmental economics have diversified considerably, and the field is now on a par with other economic disciplines in terms of methodological sophistication. Among the studies published in relevant field journals, we see experiments ranging from those with abstract framings (Bougherara et al., 2017) to those with highly contextualized instructions (Thomas et al., 2019); those applying standard experimental games such as the Public Goods Game (Limbach et al., 2023) to those with complex business management simulations (Hermann, Sauthoff, and Mußhoff, 2017); those with single-round ("one-shot") designs (Grüner et al., 2022) to those with repeated interactions, realized for example with *ex post* matching of decisions to reduce recruitment burden (Rommel et al., 2023b); and, finally, those with simple between-comparisons (Davidson and Goodrich, 2023) to those with nested within-between variations (Bouma et al., 2020). Furthermore, for experiments studying pro-environmental behavior of farmers, the community lately also started to incentivize not only the subjects' personal monetary consequences (as traditionally done in experiments) but also to consider real consequences for the environment (e.g., via donations to environmental NGOs) (Barreiro-Hurlé et al., 2023). In terms of objectives, agri-environmental economists are using lab-in-the-field experiments to evaluate theoretical predictions and establish empirical (ir)regularities (Lefebvre, Midler, and Bontems, 2020), to elicit parameters of behavioral models (Bocquého, Jacquet, and Reynaud, 2014), and to evaluate agricultural policy interventions *ex ante* (e.g., Buchholz and Musshoff, 2021).

Scoring highest in terms of external validity, *field experiments* are also used to evaluate agricultural policies and inform policy design. For example, a strain of randomized field experiments (e.g., Wallander, Ferraro, and Higgins, 2017; Chabé-Ferret et al., 2019, 2023) investigated how behaviorally informed interventions (e.g., nudges) perform when they target farmers. Several of these studies were conducted in close collaboration with policy-makers and involved tens of thousands of farmers. The large potential of randomized evaluations embedded in policy implementation processes has been discussed by Behaghel, Macours, and Subervie (2019), who conclude that such evaluations should be applied more often for the evaluation of agri-environmental policies.

Finally, the community is successfully using *discrete choice experiments* (DCEs) to investigate farmers' preferences for specific attributes of agricultural policies and how they respond to changes in these attributes. DCEs are a multi-attribute stated-preference technique developed in the context of transport and market research (e.g., Green and Srinivasan, 1978; Hensher, 1994) and have become popular in environmental valuation (Adamowicz et al., 1998; Hanley, Mourato, and Wright, 2001; Adamowicz, 2004; Hensher, Rose, and Greene, 2015). Participants in choice experiments are asked hypothetical questions about their preferences for policy designs, which can be used to estimate a model that can help predict participation in various policy options. Most DCEs with farmers have focused on eliciting farmers' willingness to participate in agri-environmental policy programs (Colen et al., 2016; Curzi et al., 2022). Results from these studies have delivered important insights for the design of major agricultural policies (Schulz, Breustedt, and Latacz-Lohmann, 2014) and especially for the design of agri-environmental contracts (Schulze et al., 2024). For the latter, a multitude of design options exists, and a targeted delivery of accepted measures is key to fostering the uptake of those measures by the farmers (Klebl, Feindt, and Piorr, 2024). An outstanding feature of DCEs is that they are able to provide reasonable estimates of farmers' participation costs (in relative terms of various policy design attributes), differentiated by farmer type, farm type, or resource settings. Thus, they allow policy-makers to improve the design of contracts for different

types of farmers and different resource settings (Colen et al., 2016). *Ex ante* evaluation with choice experiments has therefore become a valuable tool to support policymaking in multidimensional policy design as well as enabling forecasts of demands and behavior (Koundouri et al., 2023).

Further Methodological Developments in Behavioral and Experimental Agri-Environmental Economics

Insights from behavioral and experimental agri-environmental research have the potential to inform the design of evidence-based, efficient, and effective agri-environmental policies that account for both synergies and trade-offs between the interests of farmers and environmental objectives (Shogren and Taylor, 2008; Loewenstein and Chater, 2017; Palm-Forster et al., 2019; Baaken et al., 2025). However, over the past decade, as in other fields and disciplines, a range of methodological weaknesses and challenges have been highlighted (e.g., Palm-Forster et al., 2019; Ferraro and Shukla, 2023). Key issues raised include questionable research and publishing practices and incentive structures that may undermine the robustness of empirical findings (Receveur et al., 2024). Specifically, problems such as *p*-hacking and data mining, insufficient data and code transparency, publication bias, limited replication culture, small and underpowered samples, underpowered designs, overreliance on statistical significance, weak external validity, interpretation issues of results and the influence of career pressures and questionable academic incentives have been documented (Arpinon and Lefebvre, 2025). As in many other fields and disciplines, these challenges contributed to a broader credibility and replication crisis in the field of agricultural economics (Baker, 2016; Camerer et al., 2016; Page, Noussair, and Slonim, 2021; Ferraro and Shukla, 2023; Heckelei et al., 2023), raising concerns in the broader agri-environmental community that empirical results may misinform stakeholders and result in suboptimal policy design and resource allocation (El Benni, Grovermann, and Finger, 2023; Finger, Grebitus, and Henningsen, 2023).

Ultimately, these crises led to structural, procedural, and community-level responses aimed at improving research credibility (Korbmacher et al., 2023). In particular, new institutional initiatives and collaborative approaches—such as big team science and adversarial collaborations—have emerged to improve the reliability and replicability of empirical results. In the context of behavioral and experimental economic research on agri-environmental themes, one such initiative is the Center for Behavioral and Experimental Agri-Environmental Research (CBEAR),¹ which was established in 2014 in the US with the aim to test behavioral insights to improve agri-environmental programs. Another notable example in the EU is the Research Network on Economic Experiments for the Common Agricultural Policy (REECAP),² established in 2017. REECAP *inter alia* actively addresses issues of internal and external validity in economic and behavioral experimental research. Among its initiatives are the organization of a replication of risk attitudes in a ManyLabs study of 1,430 farmers over time and across multiple European contexts (Rommel et al., 2023a), which is a step toward embracing a much-needed replication culture (Finger, Grebitus, and Henningsen, 2023). Further REECAP initiatives include the provision of platforms for presenting experimental designs to the research community and the hosting of webinars and conferences on current methodological and substantive topics in the field. In addition to the ManyLabs replication project, there are more recent endeavors to conduct ManyLabs studies, for example an EU-wide project led by the University of Göttingen to evaluate the effectiveness of various information-framing strategies in promoting farmers' support for climate policies.³ These activities support recent calls to strengthen

¹ <https://www.centerbear.org/>

² <https://sites.google.com/view/reecap/about>

³ <https://sites.google.com/view/eucollaborationclimate/home>

the publication of meta-analyses and replication studies in agricultural economics (Palm-Forster et al., 2019; Finger, Grebitus, and Henningsen, 2023).⁴

These efforts are accompanied by studies that provide methodological innovations as well as empirical evidence on the extent and influence of questionable research practices and potential solutions. Methodological advances in experimental agricultural economics include but are not limited to improving research quality and transparency through best-practice guidelines, replication initiatives, preregistration and pre-analysis plans, registered reports, transparent publishing practices, including the increased acceptance of null or “messy” results (e.g., exploratory analyses yielding hypotheses that cannot be tested with the available data), and codesign of experiments with stakeholders (Nosek et al., 2018; Finger, Grebitus, and Henningsen, 2023; Finger et al., 2024a; Arpinon and Lefebvre, 2025). Some of these developments are part of broader open science efforts. Open science encompasses a range of principles and practices, “such as the accessibility of science, transparency of scientific processes, open and findable, accessible, interoperable, and reusable (FAIR) research data and code, and openness in teaching and education” (Finger et al., 2025, p. 1). These principles have increasingly been adopted within the economics and agri-environmental economics communities (Finger et al., 2025), including open-access publishing (Fraser, Brooks, and Bazzani, 2025). The following sections discuss selected aspects of open science and other methodological innovations of (experimental agricultural) economics in more detail.

Guidelines outlining best practices and methodological recommendations have become more common in the field, reflecting growing recognition of their advantages, such as improved credibility, and capacity building of researchers (see, e.g., Hölting et al., 2022; Höhler et al., 2024; Baaken et al., 2025; Finger et al., 2024a). For example, Baaken et al. (2025) present a step-by-step guide for conducting lab-in-the-field experiments with farmers, based on experiences from the REECAP network. Finger et al. (2025) outline best practices and recommendations for implementing open science principles in agricultural economics.

Preregistration and pre-analysis plans, which outline the methods of a study, including data collection and analysis, are becoming more common and are increasingly encouraged in agricultural and experimental economics journals (Finger et al., 2025). Since January 2022, the *Spanish Journal of Agricultural Research* encourages authors using primary data to preregister their analysis (Barreiro-Hurlé, 2021). Additionally, the *German Journal of Agricultural Economics* published an editorial introducing new policies and regulations in response to recent developments in AI and data governance (Hüttel et al., 2025). The journal actively supports open science by, for example, encouraging the open sharing of data and code, welcoming replication studies, and adhering to the Committee on Publication Ethics⁵ position statement on authorship and the use of AI tools. Despite the mixed opinions in different economic journals (e.g., Coffman and Niederle, 2015; Olken, 2015), Rommel, Sagebiel, and Schulze (2021) suggest that preregistration in agricultural economics can improve the validity and credibility of studies by, for instance, reducing political influence and narrowing the scope for flexibility in econometric modeling.

Registered reports offer several advantages over standard preregistration and are a useful tool for increasing transparency and reducing questionable research and publishing practices such as *p*-hacking. Publishing null results still carries a penalty, as they are often perceived as less valuable, important, or publishable and of lower quality compared to statistically significant results (Chopra et al., 2023; Kozlov, 2024). By reviewing the research question, study design, and methodology before data collection, registered reports shift the focus to the quality of the design rather than the (significance of) results. Articles are accepted for publication based on the approved methodology, regardless of the outcomes, as long as the authors follow the agreed-upon protocol. In agri-environmental economics, registered reports can for example help limit underpowered

⁴ A more detailed classification of replications and corresponding recommendations in agricultural economics is provided by Finger, Grebitus, and Henningsen (2023), along with guidance on how to replicate different studies (Anderson and Maxwell, 2016).

⁵ <https://publicationethics.org/>

studies—particularly when working with difficult-to-reach populations such as farmers—by, for example, *ex ante* reviews of the analysis plan and by implementing the most rigorous statistical practices, which often include accurate power calculations (Arpinon and Lefebvre, 2025). They may also limit the selective use or misinterpretation of scientific findings by policymakers influenced by lobbying or personal preferences. Committing to a predefined methodology can help researchers avoid costly mistakes, support riskier study designs, and contribute to a healthier research environment (Ferraro and Shukla, 2023; Arpinon and Lefebvre, 2025). Willroth and Atherton (2024) provide guidance on how to report any deviations from the pre-analysis plan.

Furthermore, stakeholder involvement in the design of agricultural economic experiments is considered important for aligning research with real-world decision-making contexts and for increasing the likelihood that policy-makers will engage with and apply experimental findings (Cárdenas, 2009; Höhler et al., 2024). However, such involvement also poses challenges. Höhler et al. (2024) summarize key advantages and disadvantages of stakeholder participation and provide practical recommendations for researchers. Similarly, Hölting et al. (2022) offer guidance on co-designing experiments with farmers.

Innovations for the Agri-Environmental Policy Toolbox

We proceed to illustrate how experimental and behavioral economics—and the resulting behavioral insights into farmer decision-making—can significantly advance the agri-environmental policy toolbox. In the following, we show how two relevant policy approaches, agri-environment schemes (AES) and behaviorally informed interventions, have benefited from design adaptations suggested by behavioral insights. Furthermore, we discuss how behavioral insights on participatory policy approaches are relevant for agri-environmental economics.

AES Design

The effectiveness of agri-environmental measures critically depends on their widespread adoption and implementation by farmers across the landscape (Siebert, Toogood, and Knierim, 2006; Hasler et al., 2022; Canessa et al., 2024). In the following, we provide an overview of how experimental and behavioral insights of the agri-environmental community have informed the design of two novel AES options: result-based payments and collective incentives.

Result-Based Payments

Result-based payments, which link payments in AES to the delivery of ecological results rather than adoption of agri-environmental measures, have been proposed as an alternative design to conventional action-based payments, where farmers receive payments based on the adoption of agri-environmental measures regardless of ecological outcomes (Bartkowski et al., 2021; Burton and Schwarz, 2013; Herzon et al., 2018). Conceptually, they are expected to offer several advantages, including greater flexibility for farmers, cost savings when ecological objectives are not met, and the potential to foster more lasting behavioral change (Burton and Schwarz, 2013). However, result-based payments also present certain challenges, including higher risks for farmers or potentially higher monitoring costs compared to action-based payments (Reed et al., 2014; Schaub et al., 2023). Besides result-based and action-based payments, hybrid payments are also possible. Hybrid approaches combine result-based payments with an action-based component. Consequently, experimental methods have been widely applied to test whether, and under what conditions, result-based payments are effective and worthwhile. Two key insights have emerged from this body of research.

First, result-based payments tend to outperform action-based payments in promoting plant biodiversity conservation, particularly in grassland systems, but may be less effective for other

ecological objectives. Dörschner and Musshoff (2015), for example, found higher conservation efforts in an economic experiment with German farmers when payments were linked to plant biodiversity outcomes rather than to farm management measures. Other experiments employing a more abstract agricultural framing, however, demonstrate mixed results (Schilizzi and Latacz-Lohmann, 2016; Rellensmann et al., 2025a,b). Despite the conceptual environmental advantages of result-based payments, stated-preference studies reveal significant preference heterogeneity among farmers between AES with action- and result-based payments (Niskanen et al., 2021; Canessa et al., 2023; Gars et al., 2024; Granado-Díaz, Villanueva, and Colombo, 2024; Villanueva, Granado-Díaz, and Colombo, 2024). However, evidence supports that farmers' preferences for result-based payments depend on the specific environmental objectives of the AES. Farmers typically prefer result-based or hybrid approaches over purely action-based payments when AES target biodiversity (Gars et al., 2024), particularly in grassland systems (Šumrada et al., 2022; Canessa et al., 2023; Granado-Díaz, Villanueva, and Colombo, 2024). If farms already show high levels of biodiversity, farmers tend to prefer result-based schemes and are willing to enroll larger areas of grassland (Canessa et al., 2023). In contrast, AES with action-based payments are more frequently chosen if the objectives focus on carbon sequestration or water quality (Block, Hermann, and Mußhoff, 2024; Gars et al., 2024). However, the pattern is reversed in a study among Spanish olive growers, where action-based payments are preferred when linked to biodiversity improvement rather than carbon sequestration (Villanueva, Granado-Díaz, and Colombo, 2024). The different preferences toward action-based payments between olive growers and farmers conducting grassland management may be rooted in heterogeneous farm characteristics among the participants (Canessa et al., 2024) or in differences in other contractual design features (Schulze et al., 2024). The suitability of plant biodiversity objectives for result-based payments is reflected in real-world applications of result-based AES, which typically focus on grassland systems (Herzon et al., 2018; Hagemann et al., 2025).

Second, result-based payments usually require risk management mechanisms to be effective. Economic experiments consistently show that the risk associated with result-based payments can diminish their effectiveness by discouraging individual conservation efforts (Dörschner and Musshoff, 2015; Rellensmann et al., 2025a,b) and lead to higher drop-out rates (Schilizzi and Latacz-Lohmann, 2016). Similar results are found in the DCE literature, explaining preference heterogeneity between action- and result-based payments with farmers' risk perception. Farmers demand higher compensations to enroll in result-based AES if they perceive a high risk of not meeting the scheme's requirements (Canessa et al., 2023; Gars et al., 2024; Villanueva, Granado-Díaz, and Colombo, 2024). Experimental studies have thus been employed to evaluate risk management mechanisms, such as hybrid AES (Schilizzi and Latacz-Lohmann, 2016) or collective contracts (Rellensmann et al., 2025a,b). Similar to decisions regarding action- and result-based schemes, significant preference heterogeneity for hybrid schemes can be found among farmers (Canessa et al., 2023; Gars et al., 2024). Farmers' preferences for riskier contractual designs, such as result-based or hybrid payments, are influenced by the economic structure of their farms and their awareness of the land's ecological potential (Canessa et al., 2023, 2024). Intensive farmers who are willing to change to extensive land management tend to prefer hybrid payments, whereas extensive farmers show a stronger preference for purely result-based payments (Canessa et al., 2023, 2024). Additional behavioral factors driving preference heterogeneity in the choice between result-based, action-based, and hybrid payment schemes remain to be identified (Gars et al., 2024). Real-world applications of result-based AES have widely adopted hybrid approaches (Hagemann et al., 2025), whereas recent design suggestions, such as combined collective and result-based AES, remain primarily at the experimental stage.

Collective Incentives

The second contract design feature informed by experimental and behavioral studies are collective incentives to motivate farmers to implement AES at a landscape scale (Schulze et al., 2024). For instance, in Europe, collective incentives within AES were implemented in the Netherlands, where contracts are negotiated between farmer collectives and the government (Franks and McGloin, 2007). Collective incentives can enhance the effectiveness of AES by targeting the landscape scale through collaboration (Barghusen et al., 2022) as many ecosystem services are provided at the landscape scale rather than the farm level (Sutherland et al., 2012). In addition, collective approaches can promote closer cooperation among farmers, producers, and consumers (Bredemeier et al., 2022). However, empirical evidence suggests that farmers may incur higher transaction costs when they coordinate their efforts (Westerink et al., 2017). It is therefore reasonable to investigate the performance and acceptability of collective incentives in AES by experimental means.

Economic experiments have been employed to investigate the performance of collective incentives within AES, whereas investigation in stated-preference studies started more recently (Schulze et al., 2024). Frequent design considerations informed by experimental findings include (i) the degree of collective conditionality, (ii) payment differentiation, (iii) endogeneity, and (iv) the point of intervention.

First, the degree of collective conditionality refers to whether payments within AES are paid out partly (e.g., agglomeration bonus) or fully (e.g., agglomeration payment) contingent on a collective outcome. Evidence from economic experiments suggests that fully collective payments can offer gains in cost efficiency (i.e., greater ecological return on investment) but may fail to motivate higher conservation because of the implied social dilemma (Le Coent, Préget, and Thoyer, 2014; Limbach et al., 2023; Rellensmann et al., 2025b). Partially collective payments, such as agglomeration bonuses, have been shown to effectively promote spatial patterns of conservation, particularly when communication is possible (Parkhurst et al., 2002; Warziniack, Shogren, and Parkhurst, 2007; Banerjee et al., 2017), farmer participants have experience with the collective mechanism (Parkhurst and Shogren, 2007), and coordinating groups are not too large (Banerjee, Kwasnica, and Shortle, 2012). Agglomeration bonuses may further be beneficial to maximize the area of a landscape enrolled into a contract (Kuhfuss et al., 2016; Šumrada et al., 2022). DCE evidence from a Spanish case study shows that, under a payment that is fully conditional on enrolling as a group of at least five farmers with farms located in the same municipality (i.e., a threshold payment), farmers require higher monetary compensation compared to individual contracts, indicating reluctance to join such contracts (Villanueva et al., 2015). Real-world examples can be found for both fully and partially collective payments (Zabel, Bostedt, and Engel, 2014; Shimada, 2020; Huber et al., 2021; Limbach and Rozan, 2023; Häusler and Zabel, 2024), although their application remains limited.

The second design option concerns the payment differentiation. Payment levels in collective AES may be adapted to reflect heterogeneous opportunity costs (Ferré, Engel, and Gsottbauer, 2018; Bouma et al., 2020) or differences in individual contributions to the collective outcome (Midler et al., 2015; Rellensmann et al., 2025a). Differentiated payments may be more acceptable to farmers because they mitigate the collective action dilemma implied by collective incentives (Midler et al., 2015), albeit at the cost of additional monitoring at the individual level. Experimental evidence suggests that differentiated payments may be more effective when collective action capacities are relatively weak (Midler et al., 2015) or little variation in individual conservation efforts is required (Rellensmann et al., 2025a). Real-world collective programs in Europe typically implement differentiated payments that are, at least partly, linked to individual efforts. Limbach and Rozan (2023), for example, present a threshold payment for hamster conservation in France that is proportional to both individual and collective conservation efforts. Other collective incentives, such as the Countryside Stewardship Facilitation Fund in England (Franks, 2019) or the collective AES administration in the Netherlands (Boonstra et al., 2021), rely on individual payments and contracts that are coordinated at the landscape level.

Third, decision-making authority (e.g., over selecting ecological targets or payment allocation) may be devolved from governmental bodies to farmers (Gallier, Kesternich, and Sturm, 2017; Narloch, Drucker, and Pascual, 2017; Bouma et al., 2020). Experimental results show that endogeneity can generally improve collective action outcomes (e.g., Dal Bó, Foster, and Putterman, 2010; DeCaro, Janssen, and Lee, 2015; Kaczan et al., 2017; Dannenberg and Gallier, 2020) but often requires farmers to have experience in working together (Narloch, Drucker, and Pascual, 2017). If collective decision-making fails, however, endogeneity may have adverse effects (Gallier, Kesternich, and Sturm, 2017). In line with the experimental evidence, DCE results point to collaboration benefits if their goals are pre-agreed among farmers rather than imposed from the top down (Tyllianakis et al., 2023). Real-world applications include attempts in the Netherlands, France, and England to involve farmer groups more directly in conservation projects and AES (Prager, 2015, 2022; Limbach, 2024; Westerink, Termeer, and Manhoudt, 2020). Moreover, in a collective and result-based carnivore conservation program in Sweden, farmer villages internally decide on the payment distribution (Zabel, Bostedt, and Engel, 2014).

Last, experimental studies have investigated varying points of intervention for collective incentives. Collective incentives may promote collective action at the stage of enrollment or contract allocation (e.g., agglomeration bonus, collective conservation auction) or at the stage of implementation and delivery (e.g., collective contracts). While a late point of intervention may be beneficial to ensure landscape-scale impacts from conservation, it requires more sustained collective efforts of farmers and may thus be met with reluctance. A DCE from Villamayor-Tomas, Sagebiel, and Olschewski (2019); Villamayor-Tomas et al. (2021), for example, shows that farmers have little interest in coordinating conservation efforts after the contract is closed. The interest in coordination strongly depends upon beliefs about the interest of the other farmers in coordinating actions. If the farmers do not believe that other farmers would coordinate, they require higher payments for joining the contracts (Villamayor-Tomas, Sagebiel, and Olschewski, 2019; Villamayor-Tomas et al., 2021). Similarly, applications for collective incentives typically rely on collaboration at the stage of contract allocation. Examples include agglomeration bonus schemes in Switzerland and Malawi and threshold bonus programs in the US, Australia, and Mexico (Nguyen et al., 2022). The Swedish collective program for carnivore conservation, however, demonstrates that collective incentives can also effectively target conservation outcomes rather than enrollment, particularly if payments are allocated individually (Zabel, Bostedt, and Engel, 2014).

Behaviorally Informed Interventions Targeting Farmers

Another field of interest to the broader agri-environmental economics community is behaviorally informed interventions, such as nudges, which have recently received a lot of attention in neighboring fields like education, health, and finance (Vlaev et al., 2016; Cai, 2020; Damgaard and Nielsen, 2018). These types of instruments make extensive use of behavioral insights to develop relatively subtle and often comparatively cost-effective interventions to change individual behavior in predictable ways (Thaler, 2016). They are primarily based on the notions of cognitive limits and erroneous behavior that needs to be corrected (Thaler, 2016). Consequently, behaviorally informed interventions would not be effective for the rational actor model of *Homo oeconomicus*. For example, the most well-known variant, “nudges,” alters the choice architecture in subtle ways while incorporating established behavioral insights relevant to the decision-making process (Thaler and Sunstein, 2008). Nudges may highlight specific information, modify default settings, or alter the visibility or order of choices, but they do not alter financial incentives or structurally change the set of available options. To date, many studies have documented the effectiveness of nudges in the environmental domain (Byerly et al., 2018), although generally effect sizes are small and effect persistence low (Congiu and Moscati, 2022; DellaVigna and Linos, 2022). Nevertheless, there are compelling arguments in favor of their use: They are cheap, easy to implement, and can function as either stand-alone measures or as a complement to other policy instruments. This

gives rise to the idea of fine-tuning behavioral responses to commonly used policy instruments, thereby effectively preventing behavioral policy failure. For example, a subsidy scheme may fail to achieve its goals because humans misperceive its benefits. A simple salience nudge could correct these misperceptions via the targeted delivery of framed information on its benefits and increase enrollment rates closer to the optimal level.

Despite the increased use of behaviorally informed interventions in other fields and high expectations (Ferrari et al., 2019; Reisch, 2021), such approaches remain scarce in agri-environmental contexts (Dessart, Barreiro-Hurlé, and Van Bavel, 2019). This may be partly due to ongoing debates about the suitability of nudges in settings of (professional) producer decisions, where decisions are expected to be closer to optimal given repeated market interactions with considerable stakes (Ferraro et al., 2024). Additionally, there is a controversial debate around the ethics of nudging (Schubert, 2017; Bovens, 2009), primarily due to its perceived manipulative character and often untransparent use. As a result, public support for nudges is mixed (Loibl et al., 2018; Sunstein, Reisch, and Rauber, 2018), with farmers shown to be particularly resistant to their use (Colen, Englberger, and Rommel, 2024). Through a series of experimental studies, the agri-environmental economics community has contributed empirical insights to this debate, helping to clarify which types of interventions are most effective with farmers.

One of the most promising candidates are social comparisons or social norm nudges, which have shown strong results in the areas of pro-environmental behavior, such as household energy (Allcott, 2011) or water use (Brick, De Martino, and Visser, 2023). The idea is that by making a descriptive norm (i.e., what most people are doing) salient, a significant number of individuals tend to conform and adjust their behavior toward the average behavior of their peers. However, caution is needed in situations where a social descriptive norm conflicts with the socially desirable behavior, as emphasizing the norm in such cases can undermine regulatory objectives. In those instances, incorporating an injunctive norm in the form of simple signs of social approval for the “correct” behavior can effectively mitigate potential rebound effects (Schultz et al., 2007; Le Coent, Préget, and Thoyer, 2021). Given the promising results in other domains and existing evidence on the influence of peer behavior on agricultural adoption decisions (Defrancesco et al., 2008), the agri-environmental economics community was eager to replicate such interventions in this field.

Kuhfuss et al. (2016) were the first to test a social norm nudge in a lab-in-the-field setting with French farmers. Addressing the end-of-contract problem, they propose a social norm intervention in both positively and negatively framed variants to convey peer farmers’ willingness to voluntarily continue agri-environmental practices after the expiration of agri-environmental commitments. The intervention was highly successful, regardless of the framing used. Since then, further studies have tested the effectiveness of social comparisons in other contexts. Wallander, Ferraro, and Higgins (2017), in a large-scale randomized field experiment related to the US Conservation Reserve Program, found no additional effect of a letter enhanced with a descriptive norm to a standard reminder letter. Similarly, Byerly et al. (2019), using a comparable methodological approach with forest owners, reported a negative effect when a social comparison was added to a solicitation letter for a bird habitat conservation program. Chabé-Ferret et al. (2019) reported small effects in a randomized experimental setting with French irrigators, who received weekly information on peers’ water use. In another lab-in-the-field experiment employing a business simulation game on preharvest interval rules, Michels et al. (2023) found no difference in the behavior of farmers subjected to an additional social comparison compared to those who received an informational nudge alone, which had been effective in increasing compliance with preharvest rules in the game. More promising results were found by Hrozencik et al. (2024), who tested an annual social comparison intervention among irrigators in Colorado and Kansas; their study showed an average reduction of approximately 4% in annual groundwater use. In Europe, Howley and Ocean (2021) demonstrated the potential of descriptive norms to enhance farmers’ interest in wildlife-related activities through a randomized stated-preference survey experiment. By and large, given the rather mixed evidence, farmers appear less susceptible to simple social comparisons that highlight a social norm than,

for example, consumers. Instead, they sometimes seem to be more responsive to social nudges employing other techniques, such as testimonials and suasion strategies (Brown, 2018; Ouyard et al., 2023) or empathy-based normative appeals (Peth et al., 2018), but these techniques do not seem to be effective in all contexts (Massfeller et al., 2022; Chabé-Ferret et al., 2023).

Other types of behaviorally informed interventions have so far received considerably less attention within the agri-environmental economics community. Evidence regarding salience interventions and message framing is mixed when tested in experiments with farmers. For instance, Buchholz and Musshoff (2021) successfully demonstrated the effectiveness of a salience intervention using traffic light coded warning signs for pesticide applications in a lab-in-the-field experiment. Andrews et al. (2013) and Reddy et al. (2020) found no effects of framed messages in larger scale field experiments on soil conservation and AES uptake, respectively, while Thomas et al. (2019) found an effect of negatively framed messages in an incentivized lab-in-the-field experiment asking farmers to conserve hectares on their hypothetical farm. Another intervention that has received significant attention in other domains due to relatively large effect sizes is the use of default settings. Ferraro et al. (2024) tested a default option in the setting of cost-share conservation auctions and found a strong positive effect.

Taken together, for the domain of agri-environmental policy this means that it is probably wise for policymakers to carefully consider which behaviorally informed interventions to apply in which contexts. While it seems that these types of interventions can be effective in changing farmers' behavior when they are appropriately tailored to the context, findings from other domains of application do not necessarily replicate in agricultural settings. More research is needed, in the best case in close collaboration with policymakers. While experimental and behavioral agricultural economics alone can be of particular help in identifying behavioral drivers of policy-relevant behaviors and in developing tailored interventions, understanding policy needs in the first place and thoroughly testing the policies developed before or after implementation works best in a collaborative science-policy setting.

Participatory Approaches

Beyond adequate policy designs, sound policy processes also matter in promoting desirable social-environmental outcomes, as they can influence policy suitability, legitimacy, and behavioral responses (Engel, 2004; Ostrom, 2007, 2010b; Dal Bó, 2014; Weible and Sabatier, 2018). As highlighted previously, farmers—like other individuals—often value not only the outcomes but also the features of the decision-making. Such procedural preferences (e.g., being control averse or striving for self-determination) may lead to socially undesirable reactions against policies that are externally imposed and insensitive to the relevant context (Cárdenas, Stranlund, and Willis, 2000; Ostrom, 2000; Frey, Benz, and Stutzer, 2004; Bowles, 2008, 2016; Dhami, 2016, cf. Abatayo and Lynham, 2016). Furthermore, the relevant stakeholders, such as farmers, can contribute not only to suitable and legitimate policy designs (e.g., co-designing AES) but also through effective monitoring and implementation (e.g., Cox, Arnold, and Villamayor Tomás, 2010; Ostrom, 2010b; Rustagi, Engel, and Kosfeld, 2010; Lliso et al., 2020b,a; Bazzan, Candel, and Daughjerg, 2023; Sattler et al., 2023). They can also contribute to enhancing access to the best available knowledge, fine-tune research designs and data collection instruments, increase internal and external validity, nurture problem-solving capabilities, and effectively contribute to solving real-world agri-environmental issues (Fals-Borda, 1987; Reed, 2008; Cárdenas, 2009; Lang et al., 2012; Tribaldos, Oberlack, and Schneider, 2020; Höhler et al., 2024).

Meta-analysis and extensive literature reviews of case study research have shown the potential of participatory processes to enhance environmental standards in policies, foster trust, reduce conflict, and facilitate social learning among relevant stakeholders involved in environmental and natural resource management (Beierle, 2002; National Research Council, 2008; Reed, 2008; Newig et al., 2019, 2023). Ultimately, however, the outcomes depend on the preferences of the involved

stakeholders (e.g., farmers) and the process design, including the specific participatory methods (ibid., Prager, 2022). In general, granting stakeholders the authority to craft their own solutions and providing them with opportunities to communicate face-to-face recurrently appear instrumental in delivering adequate environmental provisions (National Research Council, 2008; Newig et al., 2023, see also Ostrom, 1990, 2006 and Cox et al., 2010). Similarly, participatory (agri-environmental) research projects can facilitate learning, knowledge generation, and real-world transformations, provided there is high recurrence and intensity in interactions (Tribaldos, Oberlack, and Schneider, 2020). Recently, experimental research has provided additional insights into the potential of participatory processes for influencing cooperation levels and cooperation determinants in collective action challenges, such as those common in agri-environmental management (Dannenberg and Gallier, 2020, 2023; Falk et al., 2023; Ortiz-Riomalo, Koessler, and Engel, 2023a). In particular, the experimental approach allows us to disentangle the causal impacts of participatory approaches and specific participatory methods and to examine the behavioral mechanisms underlying such impacts. Although most of these experiments have been conducted with student populations (DeCaro, Janssen, and Lee, 2015; Dannenberg and Gallier, 2020), several experiments have involved actual farmers and resource users from social-ecological systems in which agriculture is a primary source of ecosystem transformation, livelihoods, and cultural identity (Ortiz-Riomalo, Koessler, and Engel, 2021; Ortiz-Riomalo, Engel, and Koessler, 2024; Bartels et al., 2022; Bernal-Escobar et al., 2025). The experimental results have confirmed the importance of repeated (face-to-face) interactions and communication for nurturing cooperation in collective action dilemmas (e.g., Ostrom, Gardner, and Walker, 1994; Ostrom, 2006, 2010a; Balliet, 2010). They have also shown that cooperation tends to be higher under endogenous than exogenous policies (Dal Bó, 2014; Dannenberg and Gallier, 2020, cf. Abatayo and Lynham, 2016) or programs (Cavalcanti, Engel, and Leibbrandt, 2013). However, not all individuals may make good use of their opportunities to communicate (Cárdenas, Rodriguez, and Johnson, 2011; Janssen, Tyson, and Lee, 2014; Schill et al., 2016) or vote (Dannenberg and Gallier, 2020, 2023) to choose suitable solutions. (Perceptions about) group composition (e.g., other participants' preferences and beliefs), the available information, the distribution of costs and benefits of available options, and the lack of participation of relevant actors seem to shape the prospects of participatory decision-making (Dannenberg and Gallier, 2020, 2023; Schmitt, Swope, and Walker, 2000; Kosfeld, Okada, and Riedl, 2009; Janssen, 2013). In this context, external facilitation (e.g., through participatory processes) can be helpful (Cavalcanti, Schläpfer, and Schmid, 2010; Cárdenas, Rodriguez, and Johnson, 2011; Meinzen-Dick et al., 2018; Falk et al., 2023; Ortiz-Riomalo, Koessler, and Engel, 2023b).

Indeed, experiments have shown that participatory interventions can influence perceptions about the collective problem faced by all (Meinzen-Dick et al., 2018; Alif et al., 2024), promote trust (Cavalcanti, Schläpfer, and Schmid, 2010; Koessler et al., 2021) and other-regarding preferences (Ortiz-Riomalo, Koessler, and Engel, 2021), affect emotions (Ortiz-Riomalo, Koessler, and Engel, 2020; Ortiz-Riomalo, Engel, and Koessler, 2024) and intentions (Alif et al., 2024), and ultimately foster cooperative behavior (Koessler et al., 2021; Ortiz-Riomalo, Koessler, and Engel, 2021; Falk et al., 2023; Bernal-Escobar et al., 2025).

Nevertheless, the outcomes depend on the process features. Features assessed by experimental studies include the elements and structure of communication (Cavalcanti, Schläpfer, and Schmid, 2010; Lopez and Villamayor-Tomas, 2017; Koessler et al., 2021; Koessler, Page, and Dulleck, 2021), consultation (Handberg, 2018), information provision and training (Alpízar et al., 2019; Alif et al., 2024), perspective-taking (Ortiz-Riomalo, Koessler, and Engel, 2020, 2021), vision-building (Ortiz-Riomalo, Engel, and Koessler, 2024) and experiential learning (Meinzen-Dick et al., 2018; Falk et al., 2023; Bernal-Escobar et al., 2025). Insights from these experiments suggest that merely informing stakeholders about their collective problem (Alpízar et al., 2019; Koessler et al., 2021) or consulting their preferences (e.g., Abatayo and Lynham, 2016; Handberg, 2018) may not be enough to trigger significantly better outcomes. Furthermore, the impacts on cooperation determinants, such as emotions (cf. Van Winden, 2015), may not necessarily translate into more sustainable outcomes

(Ortiz-Riomalo, Koessler, and Engel, 2023b; Ortiz-Riomalo, Engel, and Koessler, 2024). Ultimately, interactive processes geared toward sustaining trust-building and collective agreements on desirable policies supplemented with follow-up, monitoring, and enforcing mechanisms make it more likely to maintain cooperation in favor of socially desirable policies, actions, and outcomes (e.g., Ostrom, 2006; Hilbe et al., 2014; DeCaro, Janssen, and Lee, 2015, 2021; Abatayo and Lynham, 2016; Palmer et al., 2020; Ferraro and Agrawal, 2021; Koessler et al., 2021; Ortiz-Riomalo, Koessler, and Engel, 2023b,a).

In sum, studies from experimental and behavioral economics, together with institutional economics, have contributed to the understanding of features of the policy process and participatory methods that have been largely understudied and generally neglected in traditional discussions of (agri-)environmental policy. They have helped to integrate different types of evidence, expand the set of research methods and assess impacts on an array of (intermediate and final) outcome variables, which are often difficult to measure and track in field studies. More research is warranted given that farmers face agri-environmental dilemmas embedded in different configurations of complex social, ecological, and governance systems. A mixed-method approach could draw on experiments to disentangle subtle impacts and mechanisms. Complementarily, in-depth, participatory field research could help unearth the relevant contextual aspects, such as participants' previous experiences and power dynamics, that moderate the potential of participatory processes and which sound process design should consider upfront (Fischer and Qaim, 2014; Turnhout et al., 2020).

The Way Ahead: Evidence-Based, Open and Diverse

Our review has shown that economic experiments, grounded in behavioral economics, are a powerful addition to the methodological toolbox for agri-environmental policy design and evaluation. By avoiding restrictive *Homo oeconomicus* assumptions, experiments can meaningfully complement and also inform the traditionally dominant approach of modeling. We expect that eventually experiments will become a commonly applied approach for evidence-based agri-environmental policy-making, thus complementing more conventional modeling approaches. To achieve this, we consider the following five thematic areas important: (i) ManyLabs experiments with farmers, (ii) overcoming farmer fatigue, (iii) closer cooperation with policymakers and stakeholders, (iv) expanding the policy toolbox, and (v) higher quality standards.

ManyLabs Experiments with Farmers

As agri-environmental behavioral insights accumulate from different conceptual angles, methods and sub-disciplines, and as they are often dependent on a specific context, we must find ways to meaningfully synthesize and systematize the available evidence to make it more accessible and digestible for both researchers and policymakers. Our review has shown that the existing experimental evidence on agri-environmental policy impacts—though insightful—is often sketchy, with heterogeneous results likely due to heterogeneity in study contexts and designs. Comparable and comparative designs implemented in ManyLabs and cross-country studies will be important to systematically disentangle how the effectiveness of alternative policy approaches, participatory methods and design features depends on socio-ecological context. Formalized communities and networks such as CBEAR and REECAP will make it easier to run such large, comparative ManyLabs studies. Studies testing novel incentive designs, governance arrangements, participatory processes or behaviorally informed interventions may be run in different EU Member States or under different overarching agricultural policy contexts (EU vs. US, or even Global North and Global South in parallel). In the latter regard, cross-network initiatives, connecting networks such as CBEAR, REECAP, Environment for Development (EfD), and others could be useful. Also, mapping the “unknowns” can effectively induce research toward closing major knowledge gaps relevant for policy-making. In terms of experimental designs, we expect that innovations from experimental

economics will be applied in the agri-environmental domain as well. Latest additions to the experimental toolbox are, for example, adaptive experimental designs (Kasy and Sautmann, 2021) or basket-based choice models (Caputo and Lusk, 2022).

Overcoming Farmer Fatigue

A major challenge in expanding the use of economic experiments will be securing access to farmers for research purposes. With more experiments being conducted, recruitment needs will rise, as well. The challenge is about not only obtaining large enough sample sizes but also being able to apply necessary sampling and assignment procedures. While one aspect of the solution could obviously (again) be harnessing research networks and tightening collaboration with policymakers and practitioners, research fatigue of the farmers themselves seems to be a major threat if left unattended (Bohnet et al., 2025). Farmers are often full-time professionals who lack time and willingness to engage in research activities (Bohnet et al., 2025). This seems to be especially pronounced for experimental economic research (Englberger, Colen, and Rommel, 2025) and for research on environmental policies (Finger et al., 2024a). Even if farmers decide to participate in experiments, they may drop out if they disagree with the framing or may refuse payments, which ruins proper incentivization and violates one of the core principles of economic experimentation (Baaken et al., 2025; Colen, Englberger, and Rommel, 2024). The community has suggested several ways to deal with farmer fatigue, mostly based on (i) making it easy for the farmers to participate, (ii) getting them mentally invested to create ownership, and (iii) highlighting possible gains from participation or subsequent policy insights (Glas et al., 2019; Weigel et al., 2021; Baaken et al., 2025; Englberger, Colen, and Rommel, 2025). None of them, it seems, is a silver bullet (Bohnet et al., 2025), and researchers—in collaboration with the relevant stakeholders—may need to think through the specific gains that participation will bring to the experiment participants, collaborators, and other relevant stakeholders.

Two major workarounds are conducting experiments with students of agriculture and recruiting farmers from (marketing) panel providers. The suitability of agricultural students as a substitute for proper farmers is subject to ongoing scientific investigation and debates (Rellensmann, 2025). It seems that while in some circumstances farming students can be used to approximate farmer behavior with regards to the direction of a policy's effect (Peth and Mußhoff, 2020), effect sizes and social preferences can differ substantially (Maart-Noelck and Musshoff, 2014; Peth and Mußhoff, 2020; Grüner et al., 2022; Ferré, Engel, and Gsottbauer, 2023). The most common workaround the community is currently applying is recruiting farmers from panel providers. What looks like an easy fix at first sight may pose challenges. In the short run, exact sampling and recruitment procedures often remain black-boxed for researchers, and panel providers may fail to understand and implement the scientific requirements of economic experimentation (e.g., careful consideration of framing effects when advertising studies, proper incentivization of subjects). In the long run, it remains to be seen in how far panel farmers approximate the average farmer and whether and how learning and adaptation effects occur in the often low- to mid-sized panels subjected to repeated studies.

Closer Cooperation with Policymakers and Stakeholders

Behavioral insights from experimental and behavioral agricultural economics that identify the drivers of agri-environmental decision-making and effective policy design will be taken up more systematically in the policymaking process in the future. The European Commission for example, has already taken into account behavioral insights in the last CAP reform cycle (European Commission, 2017b,a). Furthermore, it actively seeks stakeholder consultation (European Commission, 2018) and frequently commissions research dealing with behavioral policy evaluation (Colen et al., 2015; Dessart et al., 2021) in the agricultural policy domain.

In a similar vein, the close partnership between CBEAR and the US Department of Agriculture (USDA) has already resulted in opportunities for large-scale randomized field experiments (e.g., Wallander, Ferraro, and Higgins, 2017; Hrozencik et al., 2024). Recently, Kent Messer, the director of CBEAR, has received the Bruce Gardner Visiting Economist Award from the USDA,⁶ a strong signal of appreciation of the value of behavioral and experimental contributions to agricultural policy-making. We believe such partnerships will become more frequent and more in-depth in the future and pave the way for the expanded use of behavioral insights and experimental methods in the domain of agri-environmental policy-making. This may also include the embedding of randomized evaluations into actual policy rollouts, harnessing, for example, designs with partial or delayed rollouts to ease legal and ethical constraints of experimentation. Such efforts will lead to a greater evidence base (e.g., Schaub et al., 2023) and more adapted policy designs (e.g., Dessart et al., 2021) accounting for these behavioral insights. This may positively affect the fields described in section three but also other domains of agri-environmental policy-making. This way, also limiting factors such as farmers' resistance against specific policy approaches (Colen, Englberger, and Rommel, 2024) may be more effectively addressed. Furthermore, increasing digitization offers opportunities to improve agri-environmental policy by enabling tailored policy instruments, novel designs, and a shift toward information-based governance (Ehlers, Huber, and Finger, 2021).

As noted previously, co-design of experiments with relevant stakeholders can further increase the acceptance and trust among farmers, thereby supporting democratically legitimate agri-environmental policies. This is also in the interest of researchers as, for example, pre-implementation focus groups have been shown to bear the potential to address fatigue and increase internal validity and thereby prevent inefficient treatment design and a waste of resources (Davies and Laing, 2002; Höhler et al., 2024; Fritschle, Kuhfuss, and Vorlaufer, 2025). Research networks also play a crucial role in enabling contact to relevant stakeholder groups in different countries.

However, challenges remain. There is a pressing need to establish a culture of causal evaluation. This requires building trust and cooperation among stakeholders, scientists, and policymakers to overcome practical, legal, and ethical barriers to experimentation, generally, and implementing real-world experiments and RCTs, specifically (Ferraro and Messer, 2025). This will entail a process of mutual learning and adaptation and require the permanent commitment of all parties involved. It also requires ways to deal with unfavorable evaluation results and unilateral capture of the research process to push or avoid specific research foci.

Often, changes in the global geopolitical climate may divert attention from urgent agricultural and environmental issues. When policymakers prioritize short-term strategic or political goals, funding for research in these areas is frequently reduced or withdrawn, marginalizing critical agri-environmental challenges in policy agendas. Additionally, rising antiscience sentiment and radicalization within agriculture and society contribute to the declining influence of scientific knowledge (Larson and Bersoff, 2025). As Bartkowski et al. (2025) discuss, discrepancies among farmers, the public, and scientists in sustainable agriculture debates highlight key challenges. These include shortcomings in science communication and limited public receptiveness to research findings. At the same time, science often fails to adequately consider the perspectives and priorities of farmers and the broader public. This disconnect poses significant obstacles to developing democratically legitimate agri-environmental policies. As stressed previously, participatory approaches and enhanced science communication are essential tools for bridging these divides.

Thus, to promote greater uptake of behavioral insights in policy, improved outreach strategies are needed. These include (i) collaborating with trusted intermediaries such as farmer organizations and local leaders, (ii) engaging stakeholders through participatory research, (iii) building long-term relationships and creating effective science-policy interfaces, (iv) tailoring communication to diverse audiences using clear and accessible language, and (v) using digital platforms to disseminate

⁶ https://www.centerbear.org/_files/ugd/631d12_c20870e54bd641669fa09f32e54207d9.pdf

findings widely. Furthermore, if participatory approaches are to be systematically incorporated in the research and policy processes, more research on the participatory methods and process design features that make stakeholder participation in the context of agri-environmental challenges effective is therefore warranted. Participatory approaches could deliver pitfalls if not properly designed and implemented (Arnstein, 1969; Pretty, 1995; National Research Council, 2008; Bodin, 2017). As highlighted previously, suitable process design could be informed by economic experiments as well.

Expanding the Policy Toolbox

In terms of behavioral insights, the bulk of agri-environmental experimental research so far has focused on economic incentive design. We expect that future research will help to expand the agri-environmental policy toolbox by providing more systematic evidence on other policy approaches. In particular, research on behaviorally informed interventions will likely continue as well, despite rather disappointing first evidence at scale (Wallander, Ferraro, and Higgins, 2017; Byerly et al., 2019). A multitude of behavioral factors have not yet been addressed in policy design, creating ample opportunities for tailored interventions. Moreover, nudges are just one class of intervention in this field. Moreover, classical nudges are just one class of intervention in this field, and with type-2 nudges (Sunstein, 2016), nudge+ (Banerjee and John, 2024), and boosts (Hertwig and Grüne-Yanoff, 2017), new variants are waiting evaluation in the domain of agri-environmental economics as well.

Tackling major environmental challenges such as climate change mitigation and biodiversity crisis will require more than marginal adjustments in farmer behavior. Fundamental changes in production practices and trade-offs of current gains to avoid future losses will require the collective action and policy support of multiple stakeholders such as farmers, retailers, and consumers. As recent farmer protests in the EU illustrate, procedural and fairness preferences are likely quite prominent among farmers. Thus, more research on how well-designed participatory approaches can increase policy acceptance and compliance would be warranted. Specific participatory interventions that promote taking others' perspectives (e.g., Pahl-Wostl and Hare, 2004) and building joint positive visions (e.g., Kallis et al., 2009) of the future could play a potentially important role in overcoming inter-group conflict and polarization (see Dryzek et al., 2019) and promoting collective action among heterogeneous stakeholders (e.g., conventional and organic farmers, retailers, traders, consumers), an area which experimental research can also contribute to (e.g., Ortiz-Riomalo, Koessler, and Engel, 2021, 2023a).

Higher Quality Standards in the Field

In the future, methodological advances in experimental agricultural economics, along with the current early trends toward greater adoption of open science, are expected to continue. Open science practices are not only becoming more widespread but also increasingly obligatory for publishing research findings. As mentioned above, such practices include preregistration and pre-analysis plans, replication studies, registered reports, transparent publication processes, and participatory approaches such as co-designing experiments with stakeholders (Nosek et al., 2018; Finger, Grebitus, and Henningsen, 2023; Finger et al., 2024a; Höhler et al., 2024; Arpinon and Lefebvre, 2025). Furthermore, the publication and discussion of null results—such as the planned organized session at the EAAE Annual Conference 2025 in Bonn—will gain more prominence, thereby reducing the associated penalty. Research quality and transparency will also improve through the development and dissemination of best-practice guidelines and the broader use of these practices within the agri-environmental research community. Professional networks such as REECAP in the EU and CBEAR in the US will continue to advocate for the adoption of these innovations and contribute to capacity building in the field through workshops and organized conference sessions on topics such as experimental design, statistics, causal inference, null results, open science, and

emerging issues. Additionally, we can expect the establishment of more such professional networks outside Europe and the US.

However, several ongoing and emerging challenges must be addressed by the community. First, a suitable system of incentives is needed to encourage researchers to adopt these higher standards of research quality. While some journals have begun to introduce requirements—such as the inclusion of ethical statements, data, code, and pre-analysis plans—a more systemic transformation is necessary. Preregistrations of choice experiments for example, are not yet established and remain rare in environmental economics (e.g., Welling, Sagebiel, and Rommel, 2023) and agricultural economics (e.g., Fritschle, Kuhfuss, and Vorlauffer, 2023b,a). A possible reason for the limited number of preregistered choice experiments may be that a preregistration template designed explicitly for DCEs has only recently been introduced and is still undergoing further development (Sagebiel, Schulze, and Rommel, 2025). More generally, concerns are still high among researchers that pre-analysis plans restrict knowledge generation and prevent the development of new ideas during analysis (Grebitus and Hu, 2025). Second, the rise of predatory journals, which promote problematic or low-quality science, must be confronted. A crucial first step is the development of a clear definition of predatory journals (Cobey et al., 2018) and greater visibility of lists identifying such journals and publishers (e.g., Beall's List⁷) to raise awareness within the academic community. Third and finally, a related concern is the unregulated and opaque use of artificial intelligence (AI). The increasing presence of AI-generated content, such as from models like ChatGPT, is already visible in high-ranking journals. Current peer review systems are often not equipped to detect such content, raising concerns about the integrity of scientific publications (Strzelecki, 2025). The agri-environmental community and beyond must therefore establish improved monitoring and publication practices to prevent misuse while promoting responsible and transparent use of AI technologies (Bell, 2023).

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⁷ <https://beallslist.net/>

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