

Extended Abstract

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Paper/Poster Title	Carbon offsetting programs and farmers' adoption of methane-mitigating innovations: an economic experiment
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Abstract prepared for presentation at the 98th Annual Conference of The Agricultural Economics Society will be held at The University of Edinburgh, UK, 18th - 20th March 2024.

Abstract	<i>200 words max</i>
<p>Livestock farming substantially contributes to greenhouse gas emissions (GHGEs), predominantly through methane (CH₄) and nitrous oxide (N₂O) emissions. Despite existing mitigation strategies, disparities in adoption persist across EU member states. This study explores possible transition paths from traditional subsidies to innovative result-based payments, directly tied to environmentally sustainable farming practices. We run an incentivized experiment in the Autonomous Province of Trento, Italy, in which we ask local dairy farmers to consider an adoption of specific essential oils to reduce ruminants' enteric methane. Participants are offered two compensation mechanisms - action-based subsidies and result-based instruments. We manipulate the types, amounts, and combinations of these mechanisms and investigate additional factors that could influence decision to adopt sustainable practices. The aim of this work is to address gaps in understanding farmers' preferences and behaviours in adopting methane mitigating practices, with potential implications for crafting more effective and widely accepted policies for sustainable agriculture.</p>	
Keywords	Carbon offsetting, subsidies, carbon credits, dairy sector, methane mitigation
JEL Code	Q18 Agricultural Policy; Food Policy; Animal Welfare Policy Q58 Government Policy
Introduction	<i>100 – 250 words</i>
<p>In the EU, livestock sector accounts for about 70% of the greenhouse gas emissions (GHGEs) in agriculture, predominantly emitting methane (CH₄) and nitrous oxide (N₂O). Despite existing mitigation strategies and technologies in the EU, their uneven adoption across the member states remains an issue. The EU farmers have long been offered incentives to encourage sustainable farming practices through action-based payments co-financed by Pillar 2 of the CAP. Recently discussions have shifted towards the use of result-based payments, which are directly linked to the environmental outcome obtained by a use of a more environmentally sustainable farming practices. However, we need to take into account that a degree of uncertainty about the environmental outcome (i.e., on the reduction in methane emissions) and the related funding mechanism (such as offering result-based subsidies managed by</p>	

the EU or carbon trading at a voluntary carbon market) can affect farmers' willingness to adopt such practices. This study has multiple aims. First, it investigates whether the innovative policies (i.e., result-based subsidy or result-based carbon offsetting) can foster the implementation of methane-reducing innovations in the dairy sector at the farm level as compared to standard policies (i.e., action-based subsidy). Second, it seeks to understand if a mix of result-based policies and result-based ones can gently and efficiently shift dairy farmers towards the implementation of methane-reducing innovations compared to more extreme (either-or) policy options. Finally, it aims to investigate what behavioural factors affect dairy farmers' behaviours towards the implementation of methane-reducing innovations.

Methodology

100 – 250 words

This is an incentivized and contextualised field experiment run with the dairy farmers in the Autonomous Province of Trento, Italy. It asks participants to consider a potential uptake of specific essential oils to reduce ruminants' enteric methane. To implement this novel strategy, farmers are offered two types of compensation mechanisms: an action-based subsidy (i.e. a certain - fixed -payment) or a result-based instrument. The latter offers payments per amount of methane reduced, which can fall into seven pre-defined intervals but is unknown a priori. Study consists of four phases. In phase 1, we investigate participants preferences among standard subsidies of varying amounts and non-standard instrument, which can be framed either as result-based subsidy paid by the EU (treatment 1) or a carbon credit to be traded in the voluntary carbon market (treatment 2). In phase 2, instead of a result-based instrument, participants are offered a payment that consists of both an action-based subsidy (certain payment) and a result-based instrument (uncertain payment). We also vary the composition of this policy mix. In phase 3, we investigate participants' beliefs on the distribution of the methane reduction. In phase 4, farmers are administered a questionnaire on sociodemographic characteristics, farm characteristics, pro-environmental attitudes, self-reported risk attitudes, ambiguity aversion regarding agricultural innovations, and beliefs about the use of essential oils.

Results

100 – 250 words

This is an ongoing study with data collection started in November 2023. We expect to find differences in preferences towards standard subsidy compared with result-based instruments. In particular, we hypothesize that standard subsidy will be the most acceptable instrument while carbon credits will be the least accepted. We also expect the minimum willingness to accept (WTA) level for a standard subsidy to be different in result-based subsidy condition as compared with the carbon credit condition. Moreover, we also expect the minimum WTA level for a standard subsidy to be different in policy mix case (phase 2) compared with singular result-based instrument case (phase 1). Finally, we expect participant choices towards a compensation mechanism to be mediated by socio-demographic and farm characteristics as well as risk, ambiguity, and pro-environmental attitudes.

Discussion and Conclusion

100 – 250 words

This study aims to shed light on the potential of the innovative policies designed to reduce greenhouse gas emissions in the livestock sector. We focus on dairy farmers in the Autonomous Province of Trento (Italy) where, in an incentivized and contextualised field experiment, we offer a choice between traditional action-based subsidies and novel result-based instruments linked directly to the environmental outcomes of sustainable farming practices. This research seeks to discern the efficacy of result-based subsidies and carbon credits in fostering methane-reducing innovations. Furthermore, it intends to explore the impact of mixing action-based subsidies with result-based instruments as well as the potential beliefs and behavioural factors that can mediate the effect. Overall, this project aims to address gaps in understanding farmers' behaviours and preferences regarding compensation mechanisms for adopting methane-reducing innovations. The findings hold the potential to inform more effective policies for sustainable agriculture, contributing to the broader goal of reducing greenhouse gas emissions in the EU's livestock sector.