

What Guides Farmer Participation in Payments for Ecosystem Services Programs and Carbon Markets?



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Introduction

Here at American Farmland Trust, we are committed to improving water quality, building healthy soils, and sequestering carbon by getting more acres of farmland enrolled in climate-smart practices like no-till, cover crops, diversified rotations, and other practices. Yet adoption of many of these practices as of 2017 remained low across the United States, with only 3.9% of crop acres in cover crops and 21% of acres cultivated using continuous no-till.^{7, 23} To improve farmer engagement with and adoption of these practices, our team conducted a synthesis of research findings based on over fifty papers from the past decade (2012–2023) of U.S. agriculture.

These resources will help service providers and agricultural organizations develop programming to support producers in mitigating barriers to the adoption of new practices. Research findings were largely based on surveys, interviews, and focus groups, representing the direct views of farmers. We do not differentiate findings based on the type of producer, crop, or approach to agriculture. However, it is critical to note that much of the research presented was focused on larger scale, often commodity-focused farms, and thus overly represents white male farmers more than other demographic groups and thus, should not be generalized to all farming operations or farmers/ranchers.

Overview

Extensive research has documented a wide range of factors that influence agricultural producers' participation in payments for ecosystem services (PES) programs and/or carbon markets. PES programs are programs that pay farmers for the outcomes of their conservation efforts as opposed to paying them to implement a specific practice. Carbon markets are markets designed to pay farmers/ranchers to mitigate carbon emissions as a greenhouse

gas. Both market-based mechanisms are voluntary efforts to assist farmers/ranchers in reducing environmental externalities associated with their production systems. Understanding the motivations of potential participants can help service providers address barriers and engage more farmers in climate-smart programs that incentivize climate-smart practices.

Key Takeaways

- Farmers prefer shorter contracts with clear pricing mechanisms.
- There is still skepticism and uncertainty about programs.
- Promoting co-benefits and helping farmers experience a diversity of benefits from practice adoption can help them sustain practices.
- Trust matters. Trusted intermediaries can help farmers understand complex programs and support their involvement.

What Influences Engagement

There are some clear barriers to engaging in PES and carbon markets. These barriers result in farmers being less likely to participate in the programs. Some of the biggest barriers include:

- A **lack of awareness** about what PES and carbon markets are leads to farmers being less likely to participate in programs.^{4, 12, 19, 21}
- A lack of understanding of how practices and outcomes are evaluated leads to **uncertainty and skepticism** in the program.^{4, 6, 10, 13, 14, 17, 19, 22}
- **Uncertainty** around the coordinating institutions and their commitment to supporting producers for the long run makes farmers less likely to participate.²¹

- **Trust in the Institutions** administering programs is a crucial factor for farmers. Extensive research explores this dynamic, and most farmers and ranchers have a strong preference for a federal government agency to administer programs versus a private entity.^{4, 9, 18} Intermediary organizations like conservation non-profits and community-based organizations can also play a role in supporting farmers/landowners in navigating complex programs.¹⁰
- **Program design features** also matter, particularly having to do with:
 - ◆ Complexity, which influences the trialability of new practices/integration with existing practices. This leads to uncertainty about how the practice will work for the farmer, creating a barrier to participation.^{5, 10, 18}
 - ◆ Farmers feel that a lack of standards and technical challenges for verification and monitoring create uncertainty in the program.^{2, 8, 21, 22}
 - ◆ However, there is a tradeoff; when credibility standards increase, additional requirements can result in more potential hurdles for farmer participation.^{3, 8, 9, 18, 19, 20, 21, 22}

While there are clearly barriers to engaging in PES/carbon markets, some themes help us better understand what drives engagement among farmers and ranchers. These include:

- **Previous experience** with PES has been found to increase familiarity and willingness to participate.^{12, 1} Farmers who had positive previous experiences with PES programs are more willing to participate again.
- **Higher prices and price transparency** can help with engagement.^{17, 21} Farmers' preferences on pay for practice and pay for performance is not clear in the research, but clarifying how farmers will be paid is important.^{13, 15}
- Farmers preferred **shorter contracts** and were willing to accept less money in return for shorter contracts.^{4, 12, 15}
- **Co-benefits** from the practice they implement are important for producers. These additional benefits can help farmers as they start experiencing benefits other than financial payments.^{2, 3, 4, 5, 10, 11, 12, 13, 16, 17, 18, 19}
- **Farmer demographics**, to the extent they have been studied, don't seem to impact participation other than higher educational levels being predictive in those farmers willing to participate in PES.¹²

References

1. Banerjee, S., Cason, T., de Vries, F., Hanley, N. (2017). Transaction costs, communication and spatial coordination in Payment for Ecosystem Services Schemes. *Journal of Environmental Economics and Management*, 83: 68–89.
2. Biggs, B., Hafner, J., Mashiri, F., Huntsinger, L., & Lambin, E. (2021). Payments for ecosystem services within the hybrid governance model: evaluating policy alignment and complementarity on California rangelands. *Ecology and Society*, 26(1): 19.
3. Buck, H. & Palumbo-Compton, A. (2022). Soil Carbon Sequestration as a Climate Strategy: What Do Farmers Think? *Biogeochemistry*, 161: 59–70.
4. Canales, E., Bergtold, J., & Williams, J. (2024). Conservation Intensification under Risk: An Assessment of Adoption, Additionality, and Farmer Preferences. *American Journal of Agricultural Economics*, 106(1): 45–75.
5. Cook, S. & Ma, Z. (2014) The interconnectedness between landowner knowledge, value, belief, attitude, and willingness to act: policy implications for carbon sequestration on private rangelands. *Journal of Environmental Management*, 134: 90–99.
6. Conte, M. & Griffin, R. (2017). Quality Information and Procurement Auction Outcomes: Evidence from a Payment for Ecosystem Services Laboratory Experiment. *American Journal of Agricultural Economics*, 99(3): 571–591.
7. Creech, E. (2017). Saving Money, Time and Soil: The Economics of No-Till Farming. *USDA*
8. Gosnell, H., Robinson-Maness, N., & Charnley, S. (2011). Engaging ranchers in market-based approaches to climate change mitigation: opportunities, challenges, and policy implications. *Rangelands*, 33(5): 20–24.
9. Gramig, B., & Widmar, N. 2018. "Farmer Preferences for Agricultural Soil Carbon Sequestration Schemes." *Applied Economic Perspectives and Policy*, 40(3): 502–21.
10. Gwin, L., & Pomeroy, A. (2015). Linking Agricultural Landowners with Payments for Ecosystem Services in the Interior Northwest: Resources for Extension. *The Journal of Extension*, 53(4), Article 25.
11. Kalcic, M., Prokopy, L., Frankenberger, J. et al. (2014). An In-depth Examination of Farmers' Perceptions of Targeting Conservation Practices. *Environmental Management* 54: 795–813 (2014).
12. Hansen, K., Duke, E., Bond, C., Purcell, M., & Paige, G. (2018). Rancher preferences for a payment for ecosystem services program in southwestern Wyoming. *Ecological Economics*, 146: 240–249.
13. Kelemen, S. (2022). *Improving Use of Soil Health Practices in Kansas: a Study of Barriers to Adoption and Novel Incentive Programs*. (3742). [Master's Thesis, University of Maine] Electronic Theses and Dissertations.
14. Kolinjivadi, V., Van Hecken, G., Merlet, P. 2023. Fifteen years of research on payments for ecosystem services (PES): Piercing the bubble of success as defined by a Northern-driven agenda. *Global Environmental Change*, 83.
15. Kreye, M., Pienaar, E., Soto, J., & Adams, D. (2017). Creating Voluntary Payment Programs: Effective Program Design and Ranchers' Willingness to Conserve Florida Panther Habitat. *Land Economics*, 93(3), 459–480.
16. Kuhfuss, L., Préget, R., Thoyer, S., de Vries, F., & Hanley, N. (2022). Enhancing spatial coordination in payment for ecosystem services schemes with non-pecuniary preferences. *Ecological Economics*.
17. Niles, M., & Han, G. 2021. Interested but Uncertain: Carbon markets and data sharing among US row crop farmers. *Working paper*.
18. Ogieriakhi, M. & Woodward, R. (2022). Understanding why farmers adopt soil conservation tillage: A systematic review. *Soil Security*.
19. Page, G., & Bellotti, B. (2015) Farmers value on-farm ecosystem services as important, but what are the impediments to participation in PES schemes? *Sci Total Environ* 515–516 (May): 12–19.
20. Peterson, J., Smith, C., Leatherman, J., Hendricks, N., & Fox, J. (2015). Transaction Costs in Payment for Environmental Service Contracts. *American Journal of Agricultural Economics*, 97(1): 219–38.
21. Thompson, N. M., M. N. Hughes, E. K. M. Nuworsu, C. J. Reeling, S. D. Armstrong, J. R. Mintert, M. R. Langemeier, N. D. DeLay, and K. A. Fostertry. 2022. "Opportunities and Challenges Associated with "Carbon Farming" for U.S. Row-Crop Producers." *Choices* 37(3): 1–10.
22. Wongpiyabovorn, O, Plastina, A. & Lence, S. H. 2021. "Futures Market for Ag Carbon Offsets Under Mandatory and Voluntary Emission Targets" *Agricultural Policy Review*. Ames, Iowa: Center for Agricultural and Rural Development, Iowa State University.
23. Zulauf, C. & Brown, B. (2019). Tillage Practices, 2017 US Census of Agriculture. *farmdoc daily* (9): 136.

