

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 2; February 2025; Page No. 136-139

Received: 28-12-2024
Accepted: 30-01-2025

Indexed Journal
Peer Reviewed Journal

Lead farmer approaches for scaling extension outreach in areas with limited institutional presence

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DOI: <https://www.doi.org/10.33545/26180723.2025.v8.i2b.3294>

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Abstract

While extension agencies concentrate their staff in accessible rural towns, farming communities in remote areas often go years without professional advisory contact. This research evaluated the effectiveness of lead farmer approaches for extending advisory outreach to underserved areas in Uruguay where formal institutional presence is minimal. A matched comparison design tracked 24 lead farmers and 478 follower households across six departments over a 14-month period from February 2022 to March 2023. Lead farmers were selected through community nomination and trained in seven agricultural practices before being supported as voluntary peer advisors. Follower households served by lead farmers achieved technology adoption rates of 43.7% compared to 18.2% in matched control communities without lead farmer access. Lead farmers dedicated an average of 8.6 hours weekly to extension activities, with on-farm demonstrations consuming the largest share (31.6%). The cost per farmer reached through lead farmer networks averaged USD 7.40, roughly one-third the cost of direct agent visits (USD 22.80). However, information accuracy declined by 14.3% between the original training content and what lead farmers transmitted to followers. These findings suggest that lead farmer models offer a cost-effective mechanism for scaling outreach but require ongoing quality assurance measures to maintain information fidelity.

Keywords: Lead farmers, extension outreach, peer advisory, technology adoption, farmer-to-farmer extension, underserved areas, voluntary extension, information fidelity, rural advisory services

Introduction

In well-served farming districts, a farmer might see an extension agent several times per season. In remote areas, that same farmer might wait years for a single professional visit. This contrast between extension abundance and extension absence defines the coverage challenge that lead farmer approaches attempt to address ^[1]. When formal extension systems cannot physically reach all farming communities, they can train selected farmers to serve as local knowledge brokers who carry advisory messages to their neighbors ^[2].

The lead farmer concept isn't new. Versions appear under different names farmer promoters, community agricultural workers, volunteer extension agents across Africa, Asia, and Latin America ^[3]. The logic is consistent: identify motivated, respected individuals, equip them with practical knowledge, and support them as peer advisors who extend formal reach without hiring additional staff ^[4].

Evidence on lead farmer effectiveness remains mixed. Some evaluations report impressive adoption gains and cost advantages ^[5]. Others document information distortion as messages pass through transmission chains, a pattern called the "telephone game effect" ^[6]. Sustainability concerns arise because lead farmers volunteer, and motivation may decline without adequate recognition ^[7]. This research evaluated

whether trained lead farmers can bridge Uruguay's coverage gap while maintaining acceptable information quality and adoption outcomes ^[8, 9].

Theoretical framework: The analysis drew on two complementary frameworks. Rogers' diffusion of innovations theory provided the adoption perspective, positioning lead farmers as opinion leaders who influence peer decisions through social proximity and demonstrated credibility ^[10]. Unlike professional agents who carry institutional authority, lead farmers derive influence from their status within existing social networks they farm the same land, face the same risks, and speak the same practical language as their neighbors. The social learning theory of Bandura complemented this by explaining how observational learning on lead farmer demonstration plots reduces perceived risk for follower households ^[11]. The cost-effectiveness analysis followed standard extension economics methodology, comparing the marginal cost of reaching one additional farming household through lead farmer networks versus direct professional contact ^[12].

Material and Methods

Field research design: A matched comparison design was implemented across six Uruguayan departments: Rivera,

Tacuarembó, Cerro Largo, Treinta y Tres, Lavalleja, and Rocha. These departments were selected based on their classification as extension-underserved areas, defined as having fewer than one extension agent per 500 farming households. Within each department, two communities were matched on farm size distribution, primary commodities, and distance from the nearest extension office. One community in each pair was assigned to the lead farmer treatment while the other served as the comparison site. The research ran from February 2022 to March 2023 [8].

Material: The University of the Republic Faculty of Agricultural Sciences Ethics Committee approved all protocols (Ref: UDELAR-FCA/EC/2022-011, January 2022). Lead farmer selection followed a community nomination process where farming groups identified candidates, from which research teams selected 4 per department (24 total) based on farming experience (minimum 10 years), community respect, willingness to volunteer, and basic literacy. Selected lead farmers received a 5-day residential training covering seven practices:

improved pasture management, soil conservation, integrated pest management, water harvesting, crop diversification, post-harvest handling, and livestock health monitoring [13].

Methods

A total of 478 follower households were monitored in lead farmer communities, along with 312 households in matched comparison communities. Technology adoption was assessed through farm visits at 6 and 14 months using direct observation of practice implementation. Information fidelity was measured by comparing the content accuracy of messages delivered by lead farmers against the original training curriculum, scored by independent evaluators on a 100-point scale. Cost data were collected from extension agency budgets and lead farmer activity logs. Analysis used chi-square tests for adoption comparisons, independent t-tests for continuous outcomes, and cost-effectiveness ratios calculated as total program cost divided by the number of farmers effectively reached [14, 15].

Results

Table 1: Technology adoption and outreach indicators: lead farmer versus comparison communities

Indicator	Lead farmer	Comparison	P-value
Adoption at 6 months (%)	36.4	14.7	<0.001
Adoption at 14 months (%)	43.7	18.2	<0.001
Households reached per LF	19.9		
Weekly LF hours on extension	8.6 (±2.3)		
Cost per farmer reached (USD)	7.40	22.80	<0.001
Information fidelity score (/100)	85.7 (±6.4)		

Lead farmer communities achieved adoption rates 2.4 times higher than comparison areas at 14 months. Each lead farmer reached an average of 19.9 follower households at

roughly one-third the per-farmer cost of direct professional extension. Information fidelity averaged 85.7/100, meaning a 14.3% content accuracy loss from original training.

Table 2: Lead farmer activity time allocation and follower satisfaction

Activity / indicator	% of time	Follower rating (1-5)	Sd
On-farm demonstrations	31.6	4.18	±0.47
Peer advisory visits	24.8	3.94	±0.53
Group training facilitation	19.3	3.71	±0.62
Input supply coordination	13.7	3.42	±0.71
Information relay to agency	10.6		

On-farm demonstrations consumed the largest share of lead farmer time (31.6%) and received the highest follower satisfaction rating (4.18/5). Activities involving direct

practical showing consistently outscored those based on verbal instruction alone.

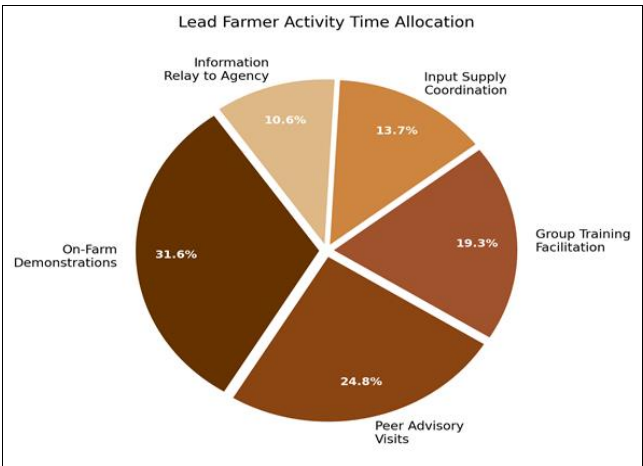


Fig 1: Distribution of lead farmer time across extension activity categories

Demonstration-based and individual advisory activities together accounted for 56.4% of lead farmer time, reflecting

their emphasis on practical, hands-on knowledge sharing over classroom-style group instruction.

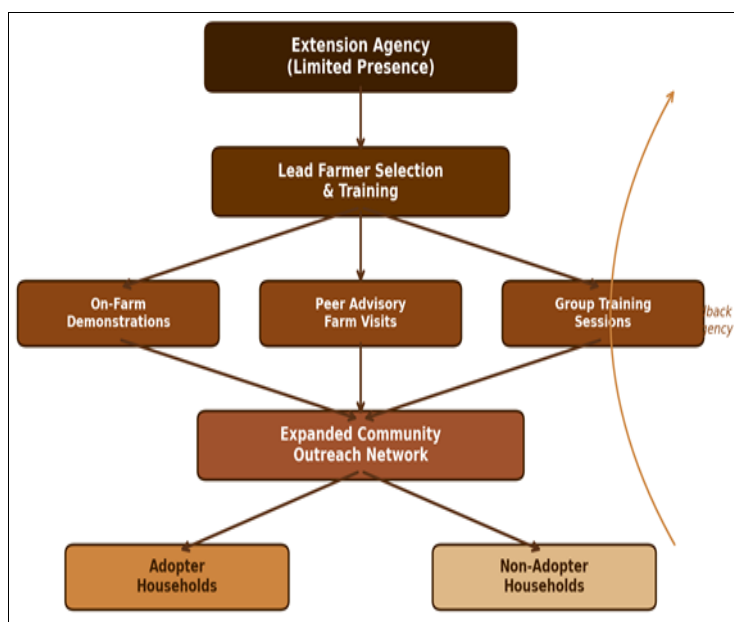


Fig 2: Lead farmer extension model showing information flow from agency to farming households

The model shows how extension agencies with limited field presence channel advisory content through trained lead farmers who reach communities via demonstrations, peer visits, and group sessions, with a feedback loop relaying farmer responses back to the agency.

Discussion

The 43.7% adoption rate in lead farmer communities compared to 18.2% in areas without this support confirms that peer-based extension can produce meaningful practice change even without professional agent presence [3]. The cost advantage is equally striking: reaching one farmer through lead farmer networks cost USD 7.40 versus USD 22.80 through direct professional visits, a 67.5% saving that matters greatly for resource-constrained extension systems [5, 16].

But the 14.3% accuracy loss between original training and lead farmer delivery introduces necessary caution. For simple practices like improved spacing or basic pest identification, this distortion may be tolerable. For technical recommendations involving chemical dosing or complex timing, even small errors could produce poor outcomes or safety risks [17, 18].

The time allocation data reveal that lead farmers gravitate toward practical demonstration the activity where their farming experience gives them the strongest advantage. This aligns with diffusion theory predicting that observability and trialability accelerate adoption [10]. Extension programs should structure lead farmer training around demonstrable practices rather than abstract concepts [19, 20].

Limitations

The matched comparison design cannot fully control for community-level differences that might influence adoption independently of lead farmer activity. Self-selection of lead farmers through community nomination may identify individuals whose social influence would promote change

regardless of formal training. The 14-month observation window captures initial adoption but not long-term sustainability of practice changes or lead farmer motivation. Six departments in Uruguay may not represent the broader Latin American extension context. Future research should use randomized cluster designs, extend follow-up periods to at least three years, and examine the motivational sustainability of voluntary lead farmer roles.

Conclusion

This research demonstrated that lead farmer approaches can effectively scale extension outreach to areas where formal institutional presence is limited. Adoption rates more than doubled in lead farmer communities at one-third the per-farmer cost of direct professional visits. The model works best for practically demonstrable technologies where lead farmers' hands-on experience carries natural credibility with their peers. The 14.3% information accuracy loss requires attention through periodic refresher training and quality monitoring protocols. Extension agencies operating in large, sparsely populated territories like Uruguay should consider lead farmer networks as a cost-effective complement to not replacement for professional advisory services.

References

1. Franzel S, Sinja J, Simpson B. Farmer-to-farmer extension in Africa: Scope, role, and key issues. ICRAF Working Paper 248. 2017;1-44.
2. Kiptot E, Franzel S. Farmer-to-farmer extension: Opportunities and constraints of the approach. ICRAF Working Paper 175. 2013;1-36.
3. Simpson BM, Franzel S, Degrande A, Nkongmeneck BA, Teklehaimanot Z. Farmer-to-farmer extension in sub-Saharan Africa. *Journal of International Agricultural and Extension Education*. 2015;22(1):21-34.
4. Lukuyu B, Place F, Franzel S, Kiptot E. Disseminating

- improved practices: Are volunteer farmer trainers effective? *Journal of Agricultural Education and Extension*. 2012;18(5):525-540.
5. Kiptot E, Franzel S. Voluntarism as an investment in human, social, and financial capital. *Agriculture and Human Values*. 2014;31(2):231-243.
 6. Feder G, Savastano S. The role of opinion leaders in the diffusion of new knowledge: The case of integrated pest management. *World Development*. 2006;34(7):1287-1300.
 7. Davis K, Nkonya E, Kato E, Mekonnen DA, Odendo M, Miiro R, et al. Impact of farmer field schools on agricultural productivity. *World Development*. 2012;40(2):402-413.
 8. Vassallo M. Agricultural extension and rural development in Uruguay: Institutional evolution and current challenges. *Agrociencia Uruguay*. 2017;21(2):134-148.
 9. Ragasa C, Mazunda J. The impact of agricultural extension services in heavily subsidized input systems. *World Development*. 2018;105:25-47.
 10. Rogers EM. *Diffusion of Innovations*. Free Press, New York. 2003;5th edition:1-551.
 11. Bandura A. *Social Learning Theory*. Prentice Hall. 1977;1-247.
 12. Anderson JR, Feder G. Agricultural extension. *Handbook of Agricultural Economics*. 2007;3:2343-2378.
 13. Feder G, Anderson JR, Birner R, Deininger K. Promises and realities of community-based agricultural extension. *IFPRI Discussion Paper 959*. 2010;1-30.
 14. Swanson BE, Rajalahti R. Strengthening agricultural extension and advisory systems. *World Bank Agriculture and Rural Development Discussion Paper 45*. 2010;1-182.
 15. Birner R, Davis K, Pender J, Nkonya E. From best practice to best fit: A framework for designing pluralistic advisory services. *Journal of Agricultural Education and Extension*. 2009;15(4):341-355.
 16. Hellin J, Dixon J. Operationalizing participatory research and farmer-to-farmer extension. *Development in Practice*. 2008;18(4-5):502-515.
 17. Waddington H, Snilstveit B, Hombrados J, Vojtkova M, Phillips D, Davies P, et al. Farmer field schools for improving farming practices and farmer outcomes: A systematic review. *Campbell Systematic Reviews*. 2014;10(6):1-335.
 18. Spielman DJ, Ekboir J, Davis K. The art and science of innovation systems inquiry. *Technology in Society*. 2009;31(4):399-405.
 19. Leeuwis C. *Communication for Rural Innovation: Rethinking Agricultural Extension*. Blackwell Science Publishing. 2004;3rd edition:1-412.
 20. Klerkx L, Leeuwis C. Matching demand and supply in the agricultural knowledge infrastructure. *Food Policy*. 2008;33(3):260-276.