Advancements in Agricultural Development
Volume 7, Issue 4, 2026
agdevresearch.org

Who Farmers Trust and How They Learn about New Technologies: A Modified Delphi Study of Tennessee Producers

D. Morris[1], J. Ricketts[2]

Abstract

Understanding which information sources farmers trust and which delivery methods they prefer is fundamental to designing effective Extension programming and accelerating technology adoption in agriculture. A three-round modified Delphi study was conducted in Tennessee with 22 farmer panelists (12 livestock and 10 row crop) and 2 Extension specialists who only participated in Round 1. Across three rounds (*n* = 24, *n* = 17, *n* = 12), farmers reached consensus that economic benefit is the most important factor driving adoption (80% in Round 3) and that lack of demonstrated return on investment is the greatest barrier (58%). Field days and local meetings emerged as the consensus-preferred delivery method (67%). Although other farmers were the most frequently top-ranked information sources (50% in Round 3), consensus on a single most trusted source was not reached. A comparison between subgroups showed that row crop and livestock farmers diverged on cost vs. ROI framing of barriers and the relative weight of industry representatives as information source, suggesting effective Extension programming may need to target specific commodities. Findings suggest that peer-led field days and on-farm demonstrations, such as test plots, should be part of Extension programming design as institutional sources position themselves as validators rather than primary sources of dissemination.

Article History

Received: January 30, 2026
Accepted: June 29, 2026
Published: August 19, 2026

Keywords

farmer learning methods; content delivery; Delphi; SDG 4: Quality Education.

1. Daniel Morris, Assistant Professor, University of Tennessee at Martin, 554 University Street, Martin, TN 38237, dmorri25@utm.edu, https://orcid.org/0009-0008-0598-9790
2. John Ricketts, Professor, Tennessee State University, 3500 John A. Merritt Blvd., Nashville, TN 37209, jricketts1@tnstate.edu, https://orcid.org/0000-0002-0559-5803

Introduction and Problem Statement

The agricultural information environment has changed substantially over the past twenty years. Where Extension was once seen as the primary source of research-based information to producers, farmers today operate in an information environment that includes industry representatives, independent consultants, social media, podcasts, peer networks, and a growing array of independent content creators (Chivers et al., 2023; Nettle et al., 2024; Stampfl et al., 2025). Within this ever-evolving landscape, Extension programs are asked to demonstrate that their educational efforts actually reach the farmers they aim to serve and that the information provided moves through trusted and utilized channels (Mulungu et al., 2025).

Empirical research on which delivery methods they prefer is limited and potentially outdated. Studies that do exist tend to be commodity-specific, from international sources, and do not include more modern forms of content delivery. Extension staff are often viewed as one of the most trusted sources of information in the eyes of farmers (Franz et al., 2010). However, farmers also utilize online sources of information from their peers to either corroborate information received from Extension or to replace the usage of institutional advice (Rust et al., 2022). Agricultural educators face a dilemma where decisions about programming format, partnerships with private entities, and resource allocation are made with incomplete information about farmer preferences. The result is a gap between what Extension produces and what farmers report finding most useful in a delivery method they prefer.

Prior research has consistently shown that farmers value feedback from fellow farmers and prioritize the experience of their peers when evaluating new production practices (Blair et al., 2013; Franz et al., 2010; Sutherland & Marchand, 2021). The relative importance of peer-to-peer learning versus institutional information sources such as Extension varies by commodity, region, and context. The present study addresses this question for Tennessee producers using a modified Delphi design that builds consensus among expert farmers across the state and for both major commodity sectors – livestock and row crop. By identifying the specific sources Tennessee farmers trust most and the delivery methods they prefer, the study aims to inform Extension educators and contribute to a broader understanding of how farmers prefer to learn.

Theoretical and Conceptual Framework

The theoretical framework for this study is grounded in Social Learning Theory (Bandura, 1977), Adult Learning Theory (Knowles, 1980), and Rogers' (2003) Diffusion of Innovations Theory. Each theory explains a different stage of the adoption process, and collectively they form an integrated lens through which the Delphi findings can be interpreted. Social Learning Theory explains how individuals acquire knowledge through observation, interaction, and shared experiences (Bandura, 1977). Research suggests that individuals emphasize social factors when evaluating new technologies (Ugochukwu & Phillips, 2018). Pannell et al. (2006) suggested that social factors such as personal, cultural, and social attributes influence whether and how technology is adopted on the farm. Although the social dimension is rather difficult to quantify, peer influence and observational learning amongst farmers are well supported in the agricultural adoption literature (Rose et al., 2018).

Adult Learning Theory (Andragogy) provides additional insight into why individuals prefer experiential and performance-centered learning (Knowles, 1980). Agricultural educators must provide learning experiences that are practical for adult learners and that suit their preferred learning environments (Franz et al., 2010). The preference for hands-on, in-person educational methods and on-farm experimentation aligns with this theory, as farmers seek learning experiences that simulate what they may experience within their own operations (Sutherland & Marchand, 2021). This theory underscores the importance of identifying how agricultural educators may deliver content in formats that resonate with their audiences.

According to Rogers' (2003) Diffusion of Innovations Theory, adoption is a multistage process that begins with awareness, followed by persuasion, decision, implementation, and evaluation. Crucial attributes of innovations often include relative advantage, compatibility, trialability, observability, and complexity, which shape whether and how quickly farmers adopt new technologies. Together, these three theoretical perspectives form an integrated framework that explains farmers' learning preferences and technology adoption behavior as a social, experiential, and economically driven process. This framework guided the design of the Delphi study, the development of the statewide survey instrument, and the interpretation of findings related to information sources, learning formats, and adoption decisions.

Based on this integrated framework, the Delphi study was designed to test three broad propositions about Tennessee farmers' information preferences and adoption decisions: (a) peer farmers and direct observational channels (on-farm trials, field days) would be ranked above institutional or media sources; (b) experiential, in-person delivery formats would be preferred over passive learning environments, which is consistent with Adult Learning Theory; and (c) economic benefits, particularly technologies that have a positive return on investment, would dominate adoption criteria, consistent with the Rogers' Diffusion of Innovations Theory.

Purpose

The primary purpose of this study was to identify the information sources Tennessee farmers trust most and the delivery methods they prefer to learn about new agricultural technologies, and to build consensus among an expert farmer panel on these preferences. The research objectives included the following:

1. Identify if peer farmers and direct observational channels would outrank institutional sources.
2. Describe farmers' preferred delivery formats for educational content related to new technologies.
3. Evaluate what perceived benefits accelerate adoption and what barriers inhibit adoption.
4. Evaluate the dominance of economic benefit in adoption decisions and whether adoption factors and barriers would differ between farmer types.

Methods

This study used a modified Delphi technique to build consensus among Tennessee farmers regarding trusted information sources, adoption factors, barriers, and delivery method preferences. The Delphi technique elicits expert input through iterative rounds with controlled feedback and is well-suited where expert judgement is preferred over statistical sampling (Drumm et al., 2022; Green, 2014; Linstone & Turoff, 1975; Toillier et al., 2022). Expert farmer panelists were identified through a partnership with four Tennessee commodity organizations: the Tennessee Cattlemen's Association, Tennessee Cotton Council, Tennessee Corn Promotion Board, and Tennessee Soybean Promotion Board. The president of each commodity organization was asked in summer 2023 to nominate farmers of various sizes, regarded as thought leaders, early adopters, and continuous improvers within their fields, with innovativeness weighted over operation size and years of experience (Hsu & Sandford, 2007; Okoli & Pawlowski, 2004). The board presidents were asked to be nominators as they have direct, ongoing relationships with producers in their respective areas of production, giving them insight into farmer expertise that the research team could not have independently assessed. Two Tennessee Extension specialists participated in Round 1 only as scoping informants, ensuring the open-ended Round 1 captured the full range of technologies under evaluation in Tennessee agriculture. They exited the panel after Round 1 by design; Rounds 2 and 3 included farmer panelists exclusively. Of the 30 farmers invited, 24 completed Round 1 (80% response rate), 17 completed Round 2 (12 livestock, 5 row crop), and 12 completed Round 3 (7 livestock, 5 row crop). The participation decline is typical of Delphi studies; reminder emails were sent during each round to encourage continued participation (Hsu & Sandford, 2007).

Surveys were administered using an online survey platform (Qualtrics) across three rounds conducted between September and November of 2023. Round 1 consisted entirely of open-ended questions asking participants to identify: (a) technologies they were currently evaluating or had recently adopted; (b) the factors that most influenced their adoption decisions; (c) the main barriers to adoption; (d) the information sources they relied on and trusted most; and (e) the delivery methods they preferred for learning about new technologies. Open-ended responses were chosen for Round 1 to allow participants to generate items without constraint, consistent with standard Delphi protocols (Hsu & Sandford, 2007).

Round 1 open-ended responses were aggregated through a two-step process. First, the lead author reviewed all responses and grouped similar items (e.g., references to "return on investment," "profitability," and "higher yields" were grouped as economic benefits). Second, a second member of the research team independently reviewed both the original responses and the proposed groupings to verify that the aggregated items fairly represented the underlying open-ended content. The final aggregated item pool for Round 2 was reviewed once more by both authors to ensure that each group of original responses was represented by an item label that participants would recognize. Items were combined only when multiple responses conveyed the same underlying concept.

In Round 2, participants ranked the aggregated Round 1 items within each of four categories (factors influencing adoption, barriers to adoption, trusted information sources, and preferred delivery methods) and one technology they are evaluating for adoption, in order of importance from 1 (most important) to N (least important), where N is the number of items in that category. Rankings were collected using Qualtrics' forced-rank ordering format, requiring participants to assign a rank to each item. In Round 3, participants were provided with the Round 2 aggregate first-rank percentages for each item within each category (e.g., Economic Benefits: 76%, Ease of Use: 12%, Cost of Technology: 6%; Improves Sustainability: 6%). Items that received no first-rank votes in Round 2 were excluded from the Round 3 instrument to streamline the survey. Participants were asked to re-rank the items in light of the group's Round 2 results and provide a written rationale for any rankings that deviated from the group's Round 2 majority. The written rationale field was optional. Several Round 3 participants did not submit a re-ranking for one or more categories. Non-response was interpreted as agreement with the Round 2 group result, and those participants' Round 2 rankings were carried forward (von der Gracht, 2012).

Consensus was operationalized as a simple majority, with at least 51% of respondents agreeing on the top-ranked item in each category. While Delphi studies often use higher thresholds, reported consensus criteria vary substantially in the literature, ranging from 50% to 100% depending on the study purpose and panel size (Diamond et al., 2014; Škrinjar et al., 2026; von der Gracht, 2012). The 51% threshold was selected for this study because the research objective was to identify the majority preference among expert farmer panelists for the purpose of informing agricultural education design, rather than to establish a strict scientific consensus. The forced rank may have suppressed information about items with broad second or third-tier support. Items that did not reach consensus threshold in Round 2 were retained in Round 3 to allow an additional opportunity for consensus, consistent with the iterative logic of the Delphi method (Hsu & Sandford, 2007).

To explore whether information preferences and adoption barriers differed between livestock and row crop farmers, first-rank percentages were also computed separately for the subgroups in both Round 2 and Round 3. Given the small subgroup sizes (Round 2: *n*= 12 livestock, *n* = 5 row crop; Round 3: *n* = 7 livestock, *n* = 5 row crop), subgroup comparisons are presented as exploratory descriptive analysis, not inferential. Subgroup results are in Table 2.

Findings

Participants

Round 1 received 24 completed responses (12 livestock farmers, 10 row crop farmers, and 2 Extension specialists). From these open-ended responses, the research team identified candidate items across five domains: technologies under evaluation, factors influencing adoption, barriers to adoption, trusted information sources, and preferred delivery methods. Round 2 received 17 ranked responses from farmer panelists (12 livestock, 5 row crop); Extension specialists did not participate in Round 2 by design. Round 3 received 12 ranked responses (7 livestock, 5 row crop). Findings are reported below by category and, where data permit, by commodity subgroup. Table 1 presents aggregate first-rank percentages across the four ranked categories; Table 2 presents subgroup comparisons.

Factors Influencing Adoption

Tennessee farmer panelists prioritized economic benefits as the most important factor when evaluating new technologies. In Round 2, 76% of respondents ranked Economic Benefits as the most important adoption factor; in Round 3, that share rose to 80%, exceeding the 51% consensus threshold (Table 1). Ease of Use was the only other factor to draw first-rank support in both rounds (12% and 20%), while Cost of Technology and Improves Sustainability each received 6% in Round 2 and no first-rank votes in Round 3. Subgroup comparison (Table 2) suggested that row crop farmers attached even greater first-rank weight to Economic Benefits than did livestock farmers (83% vs. 62% in Round 2; 75% vs. 67% in Round 3), with livestock farmers distributing first-rank votes across Cost, Ease of Use, and Improves Herd Health, which was specific to livestock panelists. In Round 3 written rationales, participants reinforced the importance of economic benefits. One livestock farmer wrote, “If the new tech doesn’t increase profitability, then it’s useless” (Livestock Farmer #1). A row crop farmer echoed these thoughts: “In this day and time, we must look for ROI on any new thing we try” (Row Crop Farmer #1).

Barriers to Adoption

A lack of demonstrated economic benefit emerged as the consensus barrier to adoption. In Round 2, 47% of respondents ranked Lack of Economic Benefit/ROI as the most important barrier; in Round 3, 58% did so, exceeding the consensus threshold (see Table 1). Cost of Technology was the most consistent second-place item, ranked first by 29% in Round 2 and 17% in Round 3. The subgroup comparison revealed a meaningful divergence (see Table 2): row crop farmers shifted between rounds toward ROI as the main barrier (75% Round 3 first-rank), while livestock farmers retained a more even split between ROI loss and cost (43% vs. 29% Round 3). One row crop farmer captured the pattern in a Round 3 comment: "Lack of perceived benefit would clearly be the primary reason producers do not adopt a new technology" (Row Crop Farmer #2). Another reinforced the economic anchor with characteristic plainness: "We must see the economic benefits of any new technology" (Row Crop Farmer #3). Training and skill-set barriers drew modest first-rank support in both rounds, with Lack of Training at 12% and 17% and Limited Skill Set at 12% and 8%. Neither approached consensus, suggesting the expert panel did not view technical knowledge gaps as a primary obstacle for the kinds of innovations under consideration.

Trusted Information Sources

While farmer panelists clearly ranked Other Farmers as the most frequently top-ranked information source, no source achieved the 51% consensus threshold for first-rank support in either round (see Table 1). Other Farmers received 35% first-rank votes in Round 2 and 50% in Round 3, with the remaining first-rank votes distributed across On-Farm Trials, Independent Consultants, Commodity Groups, Industry Representatives, and University Extension. The wide distribution of first-rank choices across multiple sources indicates that farmers do not rely on just one source, but instead receive information from a multitude, which includes their peers and observable evidence, such as field trials, that they can verify within their own social networks. Subgroup comparison (see Table 2) showed that row crop farmers gave somewhat greater first-rank weight to Industry Representatives in Round 3 (33% vs. 14% among livestock farmers), while livestock farmers consistently ranked On-Farm Trials higher. One Round 3 panelist articulated the industry-rep position as follows: “Industry reps are always the best source of information. It’s their job to be a resource.” (Livestock Farmer #2). At the same time, several participants noted in Round 1 the value of institutional sources: “For variety selection standpoint, it would be industry reps and Extension” (Row Crop Farmer #3), suggesting that information sources can be complementary rather than competing.

Preferred Delivery Methods

Field Days and Local Meetings emerged as the consensus-preferred delivery method, with the strongest Round 2 to Round 3 movement in the entire dataset. In Round 2, 35% of respondents ranked Field Days first; in Round 3, that share rose to 67%, exceeding the consensus threshold (see Table 1). On-Farm Visits from Industry Representatives held second place in both rounds at 18% and 33%, respectively. Notably, Social Media, Word of Mouth, and Printed/Digital Media, which had some first-rank Round 2 votes, were not ranked first by any participant in Round 3, consistent with consolidation of preference around in-person, experiential formats. Subgroup analysis (see Table 2) confirmed the cross-commodity strength of this consensus: 71% of livestock farmers and 67% of row crop farmers ranked Field Days first in Round 3. The cleanest articulation in the written rationales came from a row crop farmer: "I am not surprised that field days/local meetings/tradeshows are the most effective means of demonstrating new technologies" (Row Crop Farmer #6).

Subgroup Comparison: Row Crop vs. Livestock

Subgroup analysis (see Table 2) showed three distinct patterns of interest for agricultural educators: row crop farmers weighted economic concerns more uniformly than livestock farmers, row crop farmers placed greater weight on industry reps as both source and delivery method, and livestock farmers placed greater weight on on-farm trials. Field days achieved consensus among both farmer types in Round 3 (71% livestock, 67% row crop), resulting in the strongest cross-group finding. These patterns are descriptive rather than inferential, given the small Round 3 subgroup sizes (n = 7 livestock; n = 5 row crop).

Drawing the main themes together, an organizing framework emerges. Farmers' initial exposure to new technologies flows through a trusted peer network via other farmers and on-farm trials, with industry representatives and Extension serving as complementary but secondary sources. Farmers engage with information through experiential, in-person formats (e.g., field days and local meetings), evaluation is dominated by economic returns, and outcomes feed back into the peer-learning network through partial or trial adoption**.**

Table 1

Rounds 2 and 3 Rankings for Adoption Factors, Barriers, Information Sources, and Delivery Methods

Item	Round 2 % Ranked #1	Round 3 % Ranked #1	Consensus Reached
Factors Influencing Adoption (*n*= 17 Round 2; *n*= 12 Round 3)			
Economic Benefits	76%	80%	**Yes**
Ease of Use	12%	20%	No
Cost of Technology	6%	—	No
Improves Sustainability	6%	—	No
Barriers to Adoption (*n*= 17 Round 2; *n*= 12 Round 3)			
Lack of Economic Benefit	47%	58%	Yes
Cost of Technology	29%	17%	No
Lack of Training / Education	12%	17%	No
Limited Skill Set / Knowledge	12%	8%	No
Most Important Information Source (*n*= 17 Round 2; *n*= 12 Round 3)			
Other Farmers	35%	50%	No
Commodity Groups	18%	—	No
Independent Consultants	18%	8%	No
On-Farm Trials	18%	25%	No
Industry Reps	6%	17%	No
University Extension Service	6%	—	No
Preferred Delivery Method (*n*= 17 Round 2; *n*= 12 Round 3)			
Field Days/Local Meetings	35%	67%	Yes
On-Farm Visits/Industry Reps	18%	33%	No
Social Media	18%	—	No
Word of Mouth	18%	—	No
Printed or Digital Media	12%	—	No

Note. % Ranked #1 = percentage of respondents who ranked the item first. Consensus is defined as ≥51% of respondents ranking an item first.

Table 2

Subgroup Comparison of First-Rank Percentages by Farmer Type

Item	Livestock Round 2	Row Crop Round 2	Livestock Round 3	Row Crop Round 3
Factors Influencing Adoption				
Economic Benefits	62%	83%	67%	75%
Cost of Technology	15%	0%	17%	0%
Barriers to Adoption				
Lack of Economic Benefit	50%	33%	43%	75%
Cost of Technology	29%	50%	29%	0%
Limited Skill/Knowledge	7%	17%	14%	0%
Most Important Information Sources				
Other Farmers	36%	33%	29%	33%
On-Farm Trials	29%	17%	29%	0%
Industry Reps	0%	17%	14%	33%
Independent Consultants	14%	17%	14%	0%
Preferred Delivery Method				
Field Days/Local Meetings	36%	33%	71%	67%
On-farm/Industry Rep Visits	14%	33%	14%	0%

Note. Round 2 livestock: n = 12; Round 2 row crop: n = 5; Round 3 livestock: n = 7; Round 3 row crop: n = 5. Items shown are those retained for the Round 3 ranking.

Conclusions, Discussion, and Recommendations

Discussion

Diffusion of Innovation theory predicts that innovators rely heavily on more authoritative sources such as industry representatives (Rogers, 2003). Findings only partially support that prediction. The most consistently top-ranked source across subgroups was Other Farmers, which indicates that peer-to-peer information dissemination remains of primary importance even among innovators. Bandura’s (1977) Social Learning Theory states observational learning predicts that individuals attend to behavior modeled by others perceived as similar, credible, and replicable. The strength of Field Days and On-Farm Trials as the preferred delivery formats fits this prediction, as both formats allow producers to directly observe outcomes on operations similar to their own. Findings indicate that credibility is derived from observing demonstrable results from peers rather than from authoritative sources alone. Adult Learning Theory also finds direct support. Andragogical principles emphasize learner-centered, experiential, and immediately applicable content (Knowles, 1980). The Round 3 consolidation around in-person, demonstrative formats aligns with what Knowles’ framework predicts adult agricultural learners would prefer. The subgroup divergence on the importance of industry reps (Table 2) likely reflects differences between row crop and livestock production systems rather than different learning styles between farmer types, indicating that information source preferences are influenced by production dynamics as well as individual characteristics.

Recommendations for Practice

Extension educators should develop educational programming that fosters peer-led, on-farm formats. Field days should feature producers with on-farm trial experience, with Extension serving as the credible curator of independent trials and unbiased research. Second, public-private partnerships need to continue. Industry representatives ranked highly as both information source and delivery method, particularly among row crop farmers. Instead of treating industry sources as competitors to Extension, agricultural educators should design programming that incorporates industry expertise while preserving Extension's independent validator role. Lastly, adoption efforts should prioritize economic benefits from local farms at in-person meetings, with digital and remote formats acting as supplements rather than replacements. Economic benefits were found to be a factor and barrier to adoption, and programming that does not emphasize economic returns may face greater scrutiny from farmers.

Recommendations for Research

Three lines of further research would extend this work. First, quantitative validation using a larger, more representative sample of Tennessee producers would test whether the preferences identified here generalize beyond the expert farmer panel. Second, comparative research across additional commodity types (e.g., specialty crops, dairy, swine) would test whether the row crop/livestock divergence on industry-representative reliance generalizes or whether it is specific to the commodities included here. Third, longitudinal research tracking shifts in source trust and delivery preference as digital agricultural tools become more pervasive would help Extension anticipate rather than react to information-environment change.

Limitations

Several limitations must be acknowledged. The Delphi panel was a small, non-random sample of farmers who were viewed as innovators. Findings reflect the preferences of early adopters and opinion leaders, and may not generalize to farmers who fall in later adopter categories. The 51% consensus threshold is below conventional Delphi practice, with consensus reached in three of four categories. Extension specialist participation was confined to Round 1 by design, precluding direct comparison of farmer and specialist consensus. Attrition from invitation (n=30) to Round 3 (n=12) was substantial; the analysis cannot determine whether completers differed systematically from non-completers. Findings should be cautiously applied to other farmer populations, given differences in production practices and commodity production.

Conclusion

As agriculture evolves with rapid technological advances, the human element of trust and communication is as important as ever. Farmers prefer learning from others who have experience doing what they do and can offer real-world solutions that can be applied on the farm (Knowles, 1980; Sutherland & Marchand, 2021). Farmers are actively searching for new technologies that enhance profitability, reduce costs, and are well-suited to their current production practices. For educators, the most important finding from this study was how farmers want to learn and receive information (Pannell et al., 2006; Ugochukwu & Phillips, 2018). Even expert farmers, often viewed as innovators, still prefer to learn from their peers. By facilitating peer learning and delivering knowledge through the channels that resonate with farmers, agricultural educators can enhance their impact and help producers adopt beneficial new technologies with confidence.

Acknowledgments

Funding Information: This work is supported by the From Learning to Leading: Cultivating the Next Generation of Food and Agriculture Professionals (NextGen) Program, project award no. 2023-70440-40157, from the U.S. Department of Agriculture's National Institute of Food and Agriculture.

Conflict of interest: The authors declare no conflicts of interest related to this research.

Previous Dissemination: Components of this manuscript were presented at the 2025 Tennessee Academy of Science Annual Meeting, Knoxville, TN.

Artificial Intelligence: The authors of this content used Claude by Anthropic and Grammarly to assist with basic editing of grammar, punctuation, and citation formatting. Authors reviewed and edited the content provided by these AI tools and take full responsibility for the content.

Author Contribution Statement: **D. Morris** – formal analysis, investigation, and writing original draft; **J. Ricketts** – formal analysis, writing, reviewing, and editing.

References

Bandura, A. (1977). *Social learning theory*. Prentice-Hall.

Blair, H. T., Sewell, A. M., Corner-Thomas, R. A., Kemp, P., Wood, B. A., Gray, D. I., Morris, S. T., Greer, A. W., Logan, C. M., Ridler, A. L., Hickson, R. E., & Kenyon, P. R. (2013). Understanding how farmers learn. In *Proceedings of the Association for the Advancement of Animal Breeding and Genetics, 20,* 1-5. https://www.aaabg.org/aaabghome/proceedings20.php

Chivers, C. A., Bliss, K., de Boon, A., Lishman, L., Schillings, J., Smith, R., & Rose, D. C. (2023). Videos and podcasts for delivering agricultural extension: Achieving credibility, relevance, legitimacy and accessibility. *The Journal of Agricultural Education and Extension*, *29*(2), 173–197. https://doi.org/10.1080/1389224X.2021.1997771

Diamond, I. R., Grant, R. C., Feldman, B. M., Pencharz, P. B., Ling, S. C., Moore, A. M., & Wales, P. W. (2014). Defining consensus: A systematic review recommends methodologic criteria for reporting of Delphi studies. *Journal of Clinical Epidemiology*, *67*(4), 401-409. https://doi.org/10.1016/j.jclinepi.2013.12.002

Drumm, S., Bradley, C., & Moriarty, F. (2022). ‘More of an art than a science’? The development, design and mechanics of the Delphi Technique. *Research in Social and Administrative Pharmacy*, *18*(1), 2230-2236. https://doi.org/10.1016/j.sapharm.2021.06.027

Franz, N., Piercy, F., Donaldson, J., Richard, R., & Westbrook, J. (2010). How farmers learn: Implications for agricultural educators. *Journal of Rural Social Sciences*, *25*(1), 4. https://egrove.olemiss.edu/jrss/vol25/iss1/4

Green, R. A. (2014). The Delphi technique in educational research. *Sage Open*, *4*(2), 2158244014529773. https://doi.org/10.1177/2158244014529773

Hsu, C.-C., & Sandford, B. A. (2007). The Delphi technique: Making sense of consensus. *Practical Assessment, Research, and Evaluation*, *12*(10). https://doi.org/10.7275/pdz9-th90

Knowles, M. S. (1980). From pedagogy to andragogy. *Religious Education*, *75*(4), 202-211.

Linstone, H. A., & Turoff, M. (Eds.). (1975). *The Delphi method* (Vol. 1975, pp. 3-12). Addison-Wesley.

Mulungu, K., Kassie, M., & Tschopp, M. (2025). The role of information and communication technologies-based extension in agriculture: Application, opportunities and challenges. *Information Technology for Development, 31*(4), 1117–1146. https://doi.org/10.1080/02681102.2025.2456232

Nettle, R., Major, J., Turner, L., & Harris, J. (2024). Selecting methods of agricultural extension to support diverse adoption pathways: A review and case studies. *Animal Production Science*, *64*(1). https://doi.org/10.1071/an22329

Okoli, C., & Pawlowski, S. D. (2004). The Delphi method as a research tool: An example, design considerations and applications. *Information & Management*, *42*(1), 15-29. https://doi.org/10.1016/j.im.2003.11.002

Pannell, D. J., Marshall, G. R., Barr, N., Curtis, A., Vanclay, F., & Wilkinson, R. (2006). Understanding and promoting adoption of conservation practices by rural landholders. *Australian Journal of Experimental Agriculture, 46*(11), 1407-1424. https://doi.org/10.1071/EA05037

Rogers, E. (2003). *Diffusion of innovations* (5th ed.). The Free Press.

Rose, D. C., Keating, C., & Morris, C. (2018). *Understanding how to influence farmers' decision-making behaviour: A social science literature review.* Agriculture and Horticulture Development Board. https://ueaeprints.uea.ac.uk/id/eprint/67271/1/FarmersDecisionMaking_2018_09_18.pdf

Rust, N. A., Stankovics, P., Jarvis, R. M., Morris-Trainor, Z., de Vries, J. R., Ingram, J., ... & Reed, M. S. (2022). Have farmers had enough of experts? *Environmental Management*, *69*(1), 31-44. https://link.springer.com/article/10.1007/s00267-021-01546-y

Škrinjar, I., Vučić, K., & Puljak, L. (2026). Sample size and consensus methods used in Delphi studies are heterogeneous: Meta-research study. *Journal of Clinical Epidemiology*, 112262. https://pubmed.ncbi.nlm.nih.gov/41921829/

Stampfl, R., Prodinger, M., & Prodinger, J. (2025). Innovative paths to education: The effect of digital media on agricultural training in Austria. *Social Sciences & Humanities Open, 12*, 101654. https://doi.org/10.1016/j.ssaho.2025.101654

Sutherland, L. A., & Marchand, F. (2021). On-farm demonstration: Enabling peer-to-peer learning. *The Journal of Agricultural Education and Extension*, *27*(5), 573-590. https://doi.org/10.1080/1389224X.2021.1959716

Toillier, A., Mathé, S., Saley Moussa, A., & Faure, G. (2022). How to assess agricultural innovation systems in a transformation perspective: A Delphi consensus study. *The Journal of Agricultural Education and Extension*, *28*(2), 163–185. https://doi.org/10.1080/1389224X.2021.1953548

Ugochukwu, A. I., & Phillips, P. W. B. (2018). Technology adoption by agricultural producers: A review of the literature. In N. Kalaitzandonakes, E. G. Carayannis, E. Grigoroudis, & S. Rozakis (Eds.), *From Agriscience to Agribusiness* (pp. 361–377). Springer International Publishing. https://doi.org/10.1007/978-3-319-67958-7_17

von der Gracht, H. A. (2012). Consensus measurement in Delphi studies: Review and implications for future quality assurance. *Technological Forecasting and Social Change, 79*(8), 1525-1536. https://doi.org/10.1016/j.techfore.2012.04.013