

Professional Identity, Disciplinary Knowledge, and Problem Framing in Interdisciplinary Collaboration: An Exploratory Case Study of a Science Faculty Member

Need for Research

Faculty in colleges of agriculture increasingly address complex, real-world problems such as food insecurity, sustainability, and climate change, which require integrated food, environmental, and social solutions (Burch et al., 2023; Freeth & Caniglia, 2020; Knobloch et al., 2020). Addressing these problems often requires interdisciplinary or transdisciplinary collaboration across STEM and social science fields (Burch et al., 2023; Knobloch et al., 2020; Zheng et al., 2024). Faculty enter these collaborations with professional identities shaped by their disciplinary training, institutional roles, career experiences, and relationships, which can affect the responsibilities they assume and the knowledge they prioritize (Regan & Henchion, 2020; Roberts-Hill et al., 2023).

Differences in disciplinary language, culture, research norms, and problem-solving practices can create cognitive, relational, and identity-based tensions during collaboration (Kolmos et al., 2025; Pooley et al., 2014). Although these tensions are increasingly recognized, less is known about how an individual faculty member brings professional identity and disciplinary expertise to the framing of a concrete, interdisciplinary agricultural problem. An in-depth pilot case can provide preliminary, contextual insight while also testing whether an interview protocol elicits the evidence needed for a larger multiple-case investigation.

Accordingly, this pilot study had two objectives: (a) examine how one dairy nutrition and herd management faculty member described the ways her professional identity and disciplinary knowledge informed the framing of an interdisciplinary dairy-production problem, and (b) evaluate and refine the semi-structured interview protocol for a subsequent multiple-case study. The study was designed as a single, information-rich pilot case and not as a representation of animal science or AFNR faculty broadly.

Theoretical Perspective

Identity theory guided the study by conceptualizing professional identity as a dynamic, socially constructed sense of self shaped by roles, disciplinary membership, and institutional expectations (Bentley et al., 2019; Solari & Martín Ortega, 2022). In this case, the framework directed attention to how the participant's dairy-science training and her roles as scientist, extension specialist, teacher, and project principal investigator provided identity, epistemic, and methodological resources for interpreting the production problem, engaging stakeholders, and negotiating disciplinary boundaries (Burk & Larson, 2025; Simula & Scott, 2021).

Methods

An exploratory qualitative case-study approach was used to pursue the two objectives. Purposive sampling identified one animal sciences faculty member as an information-rich pilot participant. She specialized in dairy nutrition and herd management and held responsibilities across research, teaching, and extension. Her background included growing up in a dairy-farming family, formal preparation in animal science and dairy nutrition, early college teaching, approximately two and one-half years of dairy-nutrition industry experience, producer engagement, and an academic career integrating research and extension. She also led an interdisciplinary dairy project involving animal science, engineering, computer vision and video analytics, data integration, and science communication. These experiences closely matched the constructs and collaborative context the

interview protocol was designed to explore. Her selection served protocol refinement and case-level inquiry; it was not intended to establish saturation or disciplinary representativeness.

Data were collected through one semi-structured interview lasting approximately 58 minutes. Questions addressed the participant's educational and professional background, identity development, dairy-science perspectives, approach to complex problem framing, and experiences on interdisciplinary research teams. The interview was audio-recorded and transcribed verbatim. Analysis used descriptive and in vivo coding, iterative comparison across coded segments, and analytic memoing. The protocol was evaluated for question clarity, sequencing, response depth, and alignment with the study objectives; the review of interview evidence informed revisions to question wording, flow, and follow-up probes.

Results

Four case-specific patterns emerged. First, the participant's professional identity as a scientist and extension specialist developed through her dairy-farm upbringing, mentorship, formal education, industry work, and transition into academia. Second, her disciplinary knowledge supported an applied, producer-centered lens. She assessed research questions according to their usefulness across diverse dairy operations and emphasized translating technical outputs into decisions producers could use. Third, she framed the dairy-production problem through listening, questioning, stakeholder understanding, and collaborative objective setting rather than moving immediately to a predetermined solution. Her role as principal investigator involved coordinating expertise and developing a cohesive problem narrative with collaborators.

Fourth, interdisciplinary collaboration exposed differences in terminology, publication conventions, expectations, and research logics. The participant contrasted the structured experimental orientation of animal science with the iterative development common in engineering. Technical and farm-level constraints, including data volume and the conditions of commercial production settings, required the team to pivot while retaining the core problem. Regarding the second objective, the interview generated detailed accounts linking identity, disciplinary reasoning, stakeholder relationships, and problem framing. It also identified opportunities to clarify terminology, improve question sequence, and strengthen probes before the larger study.

Conclusions

Within this single pilot case, dairy-farm experience, dairy nutrition and management expertise, industry practice, extension responsibilities, and interdisciplinary leadership were intertwined in how the participant understood and framed a complex dairy-production problem. The pilot also showed that the revised protocol could elicit a nuanced narrative connecting professional identity, disciplinary knowledge, and collaborative framing. These findings are contextual and case-specific; they do not establish how animal science faculty generally, or AFNR faculty more broadly, frame complex problems.

Future Directions/Implications for the Profession

The next phase should apply the revised protocol to multiple science and engineering faculty engaged in a shared interdisciplinary food-systems project and use within-case and cross-case analysis to examine similarities and differences in framing. Research intended to characterize animal science should also purposively include multiple species and areas such as nutrition, breeding and genetics, reproduction, physiology, welfare, and production management. This

broader sampling will support more credible conclusions about variation within animal science and across AFNR disciplines. Until such evidence is collected, professional-development and team-science implications should be treated as questions for further investigation rather than field-wide recommendations.

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