Scientists' Side of the Microphone: An Examination of Agricultural and Natural Resources Podcast Guests' Experiences

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Abstract

While some food, agricultural, natural resources, and human science (FANRHS) experts participate in a variety of outreach opportunities, many face barriers to public interaction such as lack of incentive, knowledge, or confidence. This study examined scientists' and Extensionists' outreach experiences as guests on science podcasts. Results showed the guests had minimal formal science communication training yet were highly educated individuals and involved with informal education. Future research should examine how peer-modeling can be used to recruit more scientists to science communication opportunities and how institutions can improve training for outreach such as podcasts.

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Introduction and Problem Statement

Prior research and literature describe public outreach as informing, connecting, or gathering feedback from a community on a certain issue, company, or organization (Christensen, 2007; Paisley, 2019; Riccardi et al., 2022). Scientists have often viewed outreach as a voluntary activity that exists outside of their career responsibilities (Andrews et al., 2005). However, Andrews et al. (2005) explained that some view Extension as an essential portion of every scientist's job at a public land grant university in the United States, but a lack of incentives, time, training, administrative support, and hesitation to engage in heated discussions can be key barriers to scientist participation in outreach (Loizzo et al., 2019; Rose et al., 2020). With the public sometimes feeling distrustful of science researchers, many Americans have instead identified alternative information sources such as individuals who are willing to communicate about scientific issues and able to reach diverse audiences. These personas might include, but are not limited to, mass media personalities, community leaders, and other opinion leaders.

Many online opinion leaders share content about food, agriculture, environmental sciences and natural resources (Baker et al., 2021; Long et al., 2011; Matous, 2023). But research has shown that subject matter experts within these areas might not be active in science communication on social media since they prefer the use of traditional websites or meetings (Lamm et al., 2016). Bik (2015) recommended that researchers participating in outreach should utilize a diverse set of media platforms to cross-promote content on digital media channels, such as Facebook, Instagram, Twitter, YouTube, or podcasts (Spencer et al., 2017). Scientists can continue to build trust with public audiences by sharing and discussing information to public audiences directly or mediated through mediums such as social media (Fiske & Dupree, 2014; Huber et al., 2019).

Theoretical and Conceptual Framework

A conceptual framework comprised of Self-Efficacy Theory (SET) and the inreach vs. outreach model guided the study. In this study, self-efficacy was applied to describe scientists' positive motivations and confidence toward participating in science communication and outreach opportunities such as podcasts, and the inreach vs. outreach model provided a framework for how scientists can leverage online platforms to 'sing from the rooftops' for public engagement to move beyond communication in typical scientific echo chambers of peer-reviewed journals and conferences.

Self-Efficacy Theory
SET has been used in an array of social and phycological disciplines including but not limited to education, business, and health to assess individuals' perceived ability and motivation for behavior change or information processing (Bandura, 1986; Schunk & Pajares, 2009). SET explains factors that can influence an individual's likeliness of participating in a given behavior. Factors that affect participation in a desired behavior include past experience, perceived social norms, and confidence to perform the behavior (Bandura, 1989). If scientists have had positive science communication experiences or positive perceptions towards the practice, they may be

more willing to participate in science outreach opportunities including, but not limited to, science podcasts.

Inreach vs. Outreach

The inreach vs. outreach conceptual model examines social media followership to identify whether scientist's online presence is communicating to an internal or external audience (Côté & Darling, 2018). Inreach could be considered as promoting content to individuals already within a given network or in a similar field, such as peers and colleagues (echo chamber). Conversely, outreach entails reaching audiences (i.e., public audiences, scientists in different disciplines, policymakers, etc.) outside of an individual's field and outside their immediate network (Côté & Darling, 2018). Côté and Darling (2018) developed this model when analyzing scientists' Twitter usage for science communication. The researchers determined that accounts with one thousand or more followers successfully conducted outreach. Studies have used Côté and Darling's model to examine the engagement of online audiences (e.g., via Twitter) with ocean science/ocean literacy and to determine the types of audiences being reached and engaging with content (Kopke et al., 2019). Additionally, this model has also been utilized to create new methods for identifying micro-influencers and examining their usefulness (Rakoczy et al., 2018). These approaches can be mimicked and the inreach versus outreach model can be used to assess the impact and reach of science communicators, podcast producers, and guest speakers within FANRHS. The goal of FANRHS podcast producers and science communicators sharing educational content should be potentially both inreach (i.e., to colleagues, etc.) and outreach to public audiences for increasing science literacy, science awareness, and knowledge.

Purpose

Podcast usage has become increasingly popular in recent years (Edison Research and Triton Digital, 2023) and has been proven as a useful tool for informal education, reaching new audiences, and communicating about agricultural information (Beattie et al., 2020; Chivers et al., 2023). The purpose of this study was to examine the experiences of food, agricultural, natural resource, and human science (FANRHS) subject matter experts who have served as guests on science podcasts. The following research questions (RQs) guided the study:

- RQ1: What are FANRHS podcast guests' demographics?
- RQ2: How did podcast guests prepare for podcast interviews and outreach opportunities?
- RQ3: What was the reaction of FANRHS podcast guests before, during, and after the podcast?

Methods

This research study was part of a larger study that examined FANRHS podcast production from the perspective of the podcast producers, guests, and podcast listeners. This portion of the project specifically focused on the experiences of guests on FANRHS podcasts and followed a mixed-method approach. Mixed methods research provides both a numerical, broad

examination of a phenomenon, and a more in-depth look at the underlying factors contributing to it (Creswell & Plano Clark, 2017).

Recruitment and Instrumentation

An earlier portion of the larger research project required researchers to purposively sample and contact over 70 FANRHS podcast producers. These producers were then asked to share a survey opportunity with their past podcast guests. The podcast guests' survey consisted of three blocks of questions. Block one included questions about the podcasts that individuals were guest speakers on and included other experiences with science communication opportunities. Block two included a trust in science instrument (results reported in dissertation and a different publication). Block three collected similar demographic information as the producer survey (i.e., age, gender, education level, etc.). The podcast guest survey included a combination of multiple choice, free response, and Likert-type scales ranging from one (strongly disagree) to five (strongly agree). Descriptive statistics were used to answer the research questions. Eighteen participants completed the podcast guest survey in its entirety, and five volunteered to participate in follow-up interviews.

The interviews with podcast guests included a section of questions on their experiences participating in FANRHS science communication and podcasts, and their views on trust in science. Questions within those sections focused on their motivation to participate in podcasts and other science communication efforts, their contributions to science awareness, and their perceptions of the scientific enterprise. Interview questions included: Have you had any science communication training? Why did you choose to participate in a FANRHS podcast? How does podcasting impact science education, communication, engagement, and/or trust?

Reliability and Trustworthiness

An online survey was chosen for the initial portion of this study due to the quick response time and possible reach (Creswell & Creswell, 2018). To increase the trustworthiness of the qualitative portion of this study, results were reported using rich, thick descriptions. Rich, thick descriptions are commonly used in qualitative research to increase the reliability and transferability of results by thoroughly describing experiences, research participants, the research context, and observations (Creswell & Creswell, 2018).

Analysis

Quantitative data were cleaned in Excel and then exported to Statistical Package for Social Sciences (SPSS) where descriptive statistics were calculated. Qualitative interviews were recorded via Zoom then uploaded to Sonix.ai for transcription. Transcriptions were checked for accuracy before coding began (Creswell & Creswell, 2018). Data were analyzed by the primary researcher using the constant comparison method (Glaser, 1965), then another member of the research team reviewed and confirmed the codes identified. The constant comparison method involves simultaneously noting emerging codes while also comparing them to existing codes to determine areas of overlap or divergence (Glaser & Strauss, 1967). Next the primary researcher did a second round of axial coding, where codes were then grouped into larger categories based on the research questions (Corbin & Strauss, 2015).

Limitations

Given the specificity of the population and the use of chain referral sampling, the researcher was unable to obtain a large sample size of participants (18 survey responses and five interview participants). Therefore, generalizations should not be made outside of this population. Additionally, the COVID-19 pandemic heavily impacted the study design. As a result of the pandemic, interviews were held via Zoom instead of in person, which could have impacted interpersonal interactions with the participants.

Findings

RQ 1: What Are the Demographics of FANRHS Podcast Guests?

The gender demographics of survey respondents (n = 18) were split between female (50%), male (44.4%), and individuals who chose to provide their own gender identity (5.6%). Of the respondents, 12 (66.7%) identified as white, three (16.7%) as Hispanic/Latino, two (11.1%) as Asian, and one (5.6%) preferred not to answer (Table 1).

Table 1

Demographics of FANRHS podcast guests (n = 18)

Variable		*f*	%
Gender	Male	8	44.4
	Female	9	50.0
	I would like to contribute my own personal gender identity	1	5.6
Race	White	12	66.7
	Asian	2	11.1
	Hispanic/Latino	3	16.7
	Prefer not to answer	1	5.6
Location	California	1	5.6
	Florida	9	50
	Georgia	1	5.6
	Illinois	1	5.6
	North Carolina	1	5.6
	Pennsylvania	1	5.6
	Texas	1	5.6
	Washington	1	5.6
	Does not reside in the United States	2	11.1
Age	25-31	7	38.9
	32-38	5	27.8
	39-45	4	22.2
	46-51	1	5.6
	52-58	1	5.6
Level of Education	Four-year college degree	1	5.6
	Some graduate school or advanced degree	17	94.4
Self-identify as part of the food, agriculture, or natural resource industry	Yes	17	94.4
	No	1	5.6
Years in industry	0-5	8	44.4
	6-10	1	5.6
	10+	8	44.4

Most respondents (77.8%, *f* = 14) participated in various types of science communication efforts, including podcasting, for more than five years (Table 2). Nine of the respondents (50%) were in Texas, and 88.9% (*f* = 16) were between the ages of 18-45. Most podcast guests had completed either some graduate school or an advanced degree (94.4%, *f* = 17), or a four-year college degree (5.6%, *f* = 1) as their highest level of education (Table 1). Podcast guests had

spoken on podcasts about agriculture (77%, f = 14), environmental science (38.9%, f = 7), food (27.8 %, f = 5), natural resources (27.8 %, f = 5), and human sciences (16.7%, f = 3).

Table 2

Time (Years and Hours/Week) Spent Participating in Science Communication (n = 18)

Variable		F	%
Years spent participating in science	2-3	3	16.7
communication efforts.	4-5	1	5.6
	5+	14	77.8
Hours per week spent participating in	0-5	8	44.4
science communication.	6-10	6	33.3
	11-20	2	11.1
	21-40	2	11.1
Is science communication time per week	Yes	13	72.7
included in your job?	No	5	27.8

RQ 2: How Did Podcast Guests Prepare for Podcast Interviews and Outreach Opportunities?

The following section outlines responses participants shared during the qualitative interview portion of the study. A total of five survey respondents opted-in to follow-up semi-structured interviews. These guests were either university scientists, educators, or Extension professionals. Interview participants were a mixture of females and males, most of which resided in the southeastern United States. When guests discussed the ways in which they prepared for FANRHS podcast interviews, several themes emerged. Guests described strategies for preparing for individual interviews and how producers helped them prepare.

FANRHS podcast guests prepared for interviews by researching the podcast, preparing key points, and understanding the tone of the podcast.

All guests mentioned being invited for podcast interviews via an email invitation. Before a podcast interview, guests were sometimes invited to a pre-interview meeting either via phone or email. Three of the guests mentioned that one topic discussed during the pre-meeting was the objectives of the episode. Guest 2 explained:

> My questions are geared around allowing myself to prepare and make sure that they're getting what they want out of the podcast, but also making sure that I'm the right person to do the podcast because there's a lot of people at [my university]. And if it's not me, I am happy to recommend somebody else.

Once guests have established that the podcast is a good fit for them, they then typically decide on talking points to include. When discussing important pieces of their preparation, Guest 1 said:

> I laid out three key points or three key pillars that I wanted to come through, but not too much preparation because it wasn't a formula…It was more conversational, so it was more preparing: what are the key themes I need to have come through? And making sure I was able to do that.

Lastly, guests typically liked to know about the tone of the podcasts and whether they would be more formal or more casual and conversational. Guest 3 reflected on two podcast interview experiences and explained that the first one was more casual which differed greatly from the second. Guest 3 said:

> The [second] one felt very formal, and I don't know if that was just the differences in those options, and the [second] one I didn't prepare. I mean, no, the [second] one I prepared a lot for, the [first] one I didn't prepare as much for.

In summary, guests prepared for podcast interviews by gathering detailed information about the podcast in general, understanding the objectives and tone of the episode, and compiling a list of talking points.

RQ 3: What was the Reaction of FANRHS Podcast Guests Before, During, and After the Podcast?

FANRHS podcast guests expressed feelings of caution before a podcast experience. Later they described positive aspects of the experience and an appreciation for the final product of the podcast interviews.

FANRHS podcast guests were sometimes cautious when preparing for an interview.

Podcast guests typically also participated in other communication and outreach opportunities that they said were not always the best experience, which has made them cautious and encouraged them to ask more questions when approached with communication opportunities. Guest 3 described how their words could have been altered in interviews or written communication pieces in such a way that the information would be misrepresented:

> We all get nervous about what will happen once [the communication] leaves our hands. And so, we may go in with the best of intentions, we lay out all of the elements of what we know and how people should proceed. And the element that is shared on the podcast only focuses on our level of uncertainty or it pulls out those pieces. So, I think podcasting maybe is a little better than traditional media, where it's only a sound bite. For the most part, podcasts can include much longer conversations, more background, more details.

Guest 2 shared similar concerns for their words and meanings being misconstrued:

> You know, I don't want to just put it right out there. I'm going to be cautious if my words can be twisted or if the end goal is X, and that's not in line with the science, or I'm worried that they're going to portray me in a way that is not going to. Sometimes people take things out of context on purpose.

To mitigate these concerns, before agreeing to an interview, the guest will investigate the person or organization supporting the episode to better understand their background and objectives.

Well-produced podcasts should include an engaging host, timely content, have an appropriate length, and present their topic as a narrative

Four of the podcast guests mentioned several characteristics that set well-produced podcasts apart from others. For example, when discussing the qualities of an engaging host of FANRHS podcasts, Guest 2 said:

> To be a good presenter, and they need to speak the science. And the person who's doing the podcast has to know the difference, you know, which is tough because they're not necessarily an expert in that area. I think it's on both ends. The guest is presenting their information, and it's the podcast person's role to make them look good. It's got to be timely, people have to be interested in the subject. So, sometimes it comes down to a catchy title. Just to get people to actually push the button and want to listen to the podcast. And then sometimes it's somebody that has a following, you know, like certain people will just command an audience.

In addition, Guest 1 discussed the importance of the podcast content and format:

> I mean, I guess from my own perspective, you're telling a really engaging story that you are getting my attention, that beginning and pulling me in, and then willing to not constantly chop and change directions, but to spend time in the story, if that makes sense. Those tend to be my favorite podcasts.

Similarly, Guest 2 also mentioned the impact of podcast length and speaker ability:

> I'm a short and sweet person, so, I'm not going to listen to an hour podcast. You can't make me do it, but if it's entertaining, and if it's well done, if it's accurate, and you have really good speakers because you have no visuals, so you have to have somebody who's not monotone and can carry out a conversation. I think it's another avenue and probably one that we're not tapping enough.

Podcast guests believed that a well-made podcast includes an engaging host, a narrative format, and that they are concise.

Podcast guests enjoyed listening to the final product

Podcast guests appeared to be happy with the final products of the podcasts they were featured on. Some guests were even allowed to pre-listen and approve the podcast track, before it was published. Guest 1 said, "The first one I did, they did send a proof. It was great." For other podcast experiences, Guest 1 did not get a proof of the episode before the track was released, but they did get a chance to verify that the content they shared was accurate. Guest 1 explained that:

> I was a guest on their show. And when we got done, they said, 'Hey, was there anything that you think you'd want to clarify on that?' I said, 'No, I think this went really well,' so it may have been they would have sent it. I'm kind of a believer in so long as there's a level of trust in what we're putting together, I don't necessarily have to approve it.

One recommendation for a podcast guest was to give more details and guidance before a podcast interview. Guest 3 said:

> I think that the final product of both of those experiences was good. I think on the front end, I just didn't quite know how to prepare for the first one. I prepared so many notes, like a ridiculous amount of notes, and in fact, when they edited, it became two episodes—so many, so many things.

In conclusion, podcast guests enjoyed hearing the final product of their podcast interviews. In addition, they appreciated it when producers notified them when the episodes were published.

Institutions can better support FANRHS science communicators by providing additional training and professional development opportunities

Many podcast guests frequently participated in a variety of science outreach efforts, but they did not have any formal training in science communication. Guest 5 discussed their experiences learning about communication and said, "None of this is formal. None of our training in biomedical sciences taught us to be good communicators."

When asked about past training, Guest 4 said, "I will start by saying that historically, no, I didn't have any training on this. A lot of my training was like, like thrown in the fire, go communicate and then, we'll see how you do." Outside of experiential learning experiences, many guests also learned about science communication from watching mentors or other skilled communicators. Guest 1 mentioned that they had the opportunity to work with experienced communicators at their institution and learned to respect the discipline and science of communication. Similarly, Guest 4 said:

> I, in my graduate degrees, worked for people who are very strong science communicators who interacted very frequently with industry members in taking hard scientific topics and really trying to communicate them to our stakeholders in the food industry. I was able to watch them, and then sort of emulate their style as I sort of came into my own degree.

Though most had no previous training, they did show interest in future training opportunities. Guest 4 said:

> I think that I am not opposed to going and participating and learning more of how to communicate science better… We are busy people. So, I think for me, it's taking a whole day away to do something, probably not something I'm going to find the time to do. Finding a way to do it in an hour, two-hour segments, even asynchronously, that is something that I would absolutely be able to participate in.

Guests discussed various ways in which institutions can better support science communication efforts. First, guests could use support in identifying potential podcasts on which to speak. Guest 3 said, "I think more broad training and professional development in how they would find the right podcasts for their work." Guest 1 said that it would be helpful to learn better ways to interact with public audiences: "How do I speak to the different kind of audiences? And then, how do I get feedback back?" Several other guests felt that they could use some additional preparation for handling negative feedback on digital platforms. As Guest 4 explained:

Part of the problem when you put yourself out there as a science communicator is you open yourself up to trolling and sort of negative people out there in the interwebs. Information on how to deal with that would be helpful.

When discussing other opportunities for support, guests saw many opportunities for leadership at universities which could be utilized to support their outreach efforts. Guest 4 said: "I think support from administrators all the way from a department chair through the dean level, support for them to be able to be open and honest in their communication is probably something that is needed." To summarize, producers described various ways academic professionals and universities could better support FANRHS podcasts, including serving as expert guests and joining practitioner communities to share their research and best practice recommendations.

Conclusions, Discussion, and Recommendations

This study examined FANRHS podcast guests' demographics and experiences speaking on podcasts. Guests identified as white, Hispanic/Latino, and Asian and were balanced between males and females. Podcast guests were highly educated individuals, involved with formal or informal education, and had spoken on podcasts about agriculture and occasionally topics such as environmental science, food, natural resources, and human sciences. The pattern of experts who have already participated in science communication, choosing to continue to do so is congruent with the principles of self-efficacy.

Guests had several years of experience in science communication and outreach. It appeared they opted in to participating in this study, and previously to serve as guest speakers on podcasts, in part because they had higher levels of self-efficacy than individuals with fewer years of speaking experience and sharing science information with public audiences (e.g., SET; Bandura, 2010). An opportunity exists to recruit and train experts who are less experienced in science communication. The training should include technical skill development to produce high-quality podcasts and leverage social platforms. But it should also include best practices and tips designed to use persuasive narratives to share information, instructions on how to connect content and interviews to explain the nature of science and the scientific worldview, and guidance on how to dialogue with listeners, especially about complex and heated issues. Future trainings can continue to incorporate workshops that advance science-based educational programs on science communication and science literacy (Schoerning, 2018). Organizations and institutions can support the creation of collaborative groups that demonstrate how to build science communication into research, navigate science communication barriers (i.e., feelings of exclusion), and share knowledge with broader public audiences outside of typical academic circles (Devonshire & Hathway, 2014; Rose et al., 2020).

To increase science communicators' self-efficacy and recruit more experts and scientists to communicate, universities, academic organizations, or current communicators can better showcase experts already actively participating in science communication efforts. New science

communicators can be recruited following peer modeling principles and by using social cues from other scientists to prompt their participation (Bandura, 1986; Schunk, 2020). Experts can both increase public trust in science (Fiske & Dupree, 2014; Huber et al., 2019) and satisfy the land-grant mission of making knowledge more accessible (Rasmussen, 1989) through these digital outreach opportunities.

Several best practices for podcast guests arose through this study. Before recording an interview, guests should have a good sense of the objective and tone of the podcast and have an idea of what content they will share during the interview. Guests should share information within their area of expertise and avoid speaking on topics outside their area of expertise. It is beneficial for guests to also provide the producers with additional resources (i.e., papers, infographics, short videos, etc.) to strengthen the podcast's credibility. Guests should speak to their particular area of expertise and nothing outside of it (Fiske & Dupree, 2014). And lastly, guests can use podcasts to promote their own research, organizations, programs, or platforms to new audiences (e.g., Inreach vs Outreach Model; Côté & Darling, 2018) and as a method for increasing informed decision-making about FANRHS topics. The future of science communication will include recruiting and training well-rounded science communicators to addressing wicked problems and misconceptions held by consumers. The results of this study can be used by communication specialists or program coordinators who wish to engage and train experts to contribute to their outreach programs. Future research should explore how institutions can better collaborate with scientists and support their outreach programs through training opportunities across disciplines in order to share knowledge and increase impact. Future research should also focus on gathering data from a larger sample of the population to be able to explore more generalizable findings and trends.

Acknowledgements

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