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Obtaining Extension Stakeholder Input to Influence Extension Education Programming and Staffing Needs

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Abstract
Cooperative extension has had to adapt communication and outreach efforts for the past several years because of changes in funding, technology, farmer demographics, and overall industry demands and needs. Given decreasing resources, effective program planning is necessary to optimize output and impact. The Michigan State University Extension Beef Team conducted a needs assessment using an online producer survey. As an interdisciplinary team, the Beef Team was able to address all facets of the Michigan beef industry. Specifically, agricultural economists contributed to the needs assessment with core economic concepts, as well as survey design and analysis. Upon data collection, producers identified marketing, profitability, and animal health as the biggest challenges facing their operations in the next 5 to 10 years. The Beef Team utilized these results for program planning and to make staffing recommendations to administration.

1 Introduction

Throughout the past 100 years, cooperative extension has had to continually adapt communication and outreach efforts because of changes in funding, technology, farmer demographics, and overall industry demands and needs. Now more than ever, we see an important economic concept come into play, to optimize extension professionals' output (e.g., presentations, content delivery, and workshops) and impact on their communities, given scarce financial and staffing resources. Donaldson and Franck said it best in their *Needs Assessment Guidebook for Extension Professionals,* "Our world faces unlimited needs, but limited resources (Donaldson and Franck 2016, p. 6)." The purpose of this paper is to identify the needs of the Michigan beef industry and pinpoint how Michigan State University (MSU) Extension can better address such needs through future programing and staffing. Additionally, we highlight the role agricultural economists can play in interdisciplinary teams conducting needs assessments.

Utilizing intentional planning methods is more effective than inflicting change because of an unexpected shock or immediate need (Lyford et al. 2002). According to Seevers and Graham (2012), program plan development is defined as, "a continuous series of complex, interrelated processes which result in the accomplishment of the educational mission and objectives of the organization." There are many different program planning models, including a results-driven model mainly used in education (Tyler 1949), a less structured plan driven by a designed change theory (Lippitt, Watson, and Westley 1958), a model to link the planning organization to the impacted community (Boone, Safrit, and Jones 2002), and many more. By implementing one of the various program planning models, cooperative extension teams can evaluate their programs in a way that allows them to better reach the needs and desires of their constituents using their scarce resources (Diaz, Gusto, and Diehl 2018). By in large, all program planning models are composed of four components—planning, design and implementation, participant-driven needs assessment, and evaluation (Diaz, Gusto, and Diehl 2018).

A key component of program planning models—needs assessments—is the focus of this paper. A need arises when a gap exists between what ought to be, the desirable outcome, and what is, the actual situation (Leagans 1981). The goals of needs assessments are twofold: (1) to learn about stakeholders' problems, issues, and/or concerns, and (2) to understand how to respond with programs, products, and services (Garst and McCawley 2015). Needs assessments of the beef industry have been conducted for Arkansas (Troxel et al. 2007), Arizona (Wright, Greene, and Faulkner 2017), Colorado (Dideriksen 2018), Idaho (Roubal 2017), Iowa (Gunn and Loy 2015) and Michigan (Cowley et al. 2000), as well as for the U.S. cow-calf industry (Martin et al. 2019).

Receiving input from community stakeholders proves highly beneficial in program development and stakeholder buy-in over time (Franz 2011). However, previous needs assessment methods used to gather stakeholder input—including focus groups, in-person or mail surveys, and open listening sessions (Donaldson and Franck 2016) are costly and time consuming. Limited budgets, decreased staffing, and changing technology motivate requisite changes in needs assessment methodology. Given that there has been no increase in funding for extension, as well as a steady decline in extension employee full-time equivalents (FTEs) across the country (Wang 2014), more cost effective and less labor-intensive methods are needed.

The first contribution of this analysis is the development and use of an online survey needs assessment tool. Unlike the needs assessment conducted by MSU Extension in 1999 surveying the beef industry via mail (Cowley et al. 2000), the survey used in this study was administered online via Qualtrics and disseminated via email and on the MSU Extension website to beef producers across the state. All responses were collected online making for more streamlined data collection and analysis, saving money and time (Wright 2005). Furthermore, the online format allowed for broader dissemination, reaching beef producers who had not utilized MSU Extension services before. Given agriculture economists familiarity with survey development and data analysis, they can play a key role in leading needs assessments on extension teams.

The second contribution is our interdisciplinary approach to the needs assessment. According to Stock and Burton (2011), "Interdisciplinary studies focus on addressing specific 'real world' system problems and, as a result, the research process forces participants (from a variety of unrelated disciplines) to cross boundaries to create new knowledge" (p. 1096). For a long time, MSU Extension has relied on an interdisciplinary approach to reach farmers and producers across the state (Michigan State University n.d.; Leholm et al. 1999). Not only are interdisciplinary teams important to maximize outputs with decreasing budgets, but because the needs across the industry are diverse, it is important that extension teams are equipped to address a variety of issues (Redfearn, Parsons, and Drew 2016). Specifically, in this article we highlight how agricultural economists can use their skill sets to help fellow cooperative extension professionals develop needs assessments that effectively determine the needs of stakeholders.

As land-grant institutions across the country operate their extension programs differently, this article begins with an explanation of the MSU Extension structure. We then explain the methods and data collection, including the online survey instrument, followed by our results, and discussion, including a discussion on how agricultural economists can serve their extension teams through needs assessments. We will end with the implications of this process.

1.1 Michigan State University Extension

Michigan State University Extension has played a crucial role in bringing institutional knowledge to counties throughout the state of Michigan since adoption of the Smith-Lever Act in 1914. During the mid-1990s, Michigan's Extension program and research experiment stations underwent significant structural and operational changes when the educational planning and delivery model shifted to self-directed work teams of extension educators and specialists, and experiment station researchers, called area of expertise (AoE) teams. The field crops, dairy, and livestock AoE teams launched in 1994, with

many other teams to follow (Leholm et al. 1999). Over time, the livestock AoE team further subdivided into species work groups.

The interdisciplinary work group that facilitated the current study and serves the Michigan beef industry is referred to herein as the "Beef Team." The Beef Team is composed of both field educators and campus faculty from multiple disciplines, including, agricultural economics, animal welfare, beef production systems, environmental management, farm business management, forages, genetics, meat science, nutrition, program evaluation, and veterinary medicine. The Beef Team meets monthly to discuss industry trends, identify challenges and areas of needed research or educational programming, and coordinate projects among team members. Work group operational logistics have evolved, with additional emphasis on planning and reporting of team activities, including outcomes, impacts, and documentation of clientele's behavioral changes (Bitsch and Thornsbury 2010). Additional expertise is recruited to support team activities on an as-needed basis and the team works closely with industry stakeholders. The interdisciplinary approach of the beef team was core to the development of this needs assessment and study design.

Despite the impressive real social rate of return to public investments in agricultural extension (Jin and Huffman 2016), federal and state investment in extensions has steadily declined over the last three decades in many states. Between 1980 and 2010, field-based educator positions in the United States fell at a faster rate than their campus-based specialist counterparts (Wang 2014). However, starting in 2010, the Michigan system, under even greater financial pressure, had a more dramatic decline in both campus- and field-based personnel. In 2001, following the conversion to an AoE structure, the Beef Team had 3.65 campus-based beef specialist FTEs and 8.0 field-based beef educator FTEs. In 2019, despite serving a larger beef industry, the Beef Team had just 37 percent of both campus faculty and field educator FTEs that it had in 2001 (Buskirk et al. 2020). Because of loss of team members and expertise, the Beef Team has been forced to become more efficient and focused with program design, implementation, delivery, and evaluation.

In 1999, the Beef Team received internal funding to send a 5-page, printed survey via U.S. mail to 2,327 Michigan beef producers to solicit extension education priorities (Cowley et al. 2000). The survey was an effective instrument to obtain representative industry feedback, but was expensive to print, mail, and provide return postage, and was labor intensive to complete data entry and analysis. Since then, periodic needs assessments of the Michigan beef industry priorities have been obtained through written evaluations or electronic polling at extension events, selected focus groups (organized by MSU Extension and/or Michigan Cattlemen's Association) or using information from secondary data sources, such as surveys by the USDA NASS Census of Agriculture (2017) and USDA APHIS National Animal Health Monitoring System. Internal Beef Team communications have also been used to discuss and monitor industry trends. A more robust and representative method to assess industry needs was desired. The instrument needed to be inexpensive, capture broad and representative input, and require minimal staff time to distribute, acquire the data, and analyze.

2 Data Collection and Methods

A survey was designed by the Beef Team, composed of campus- and field-based personnel from multiple disciplines, with input from the Michigan Cattleman's Association, to solicit responses from affiliates of the Michigan beef cattle industry. An interdisciplinary approach was followed as this project brought together collaborators and ideas from multiple disciplines to frame the problem, decide on an approach, and analyze the data (Stock and Burton 2011). The Beef Team used an iterative research process including multiple virtual meetings to discuss the research questions and design the survey instrument.

The study received Institutional Review Board (IRB) approval (MSU Study ID: STUDY00001942). The survey instrument can be found at https://www.canr.msu.edu/resources/needs-assessment-of-michigan-beef-industries. The survey was administered online via Qualtrics and sent out by the Beef

Team to numerous listservs and posted on the MSU Extension website. Some of these listservs include the MSU Beef Production News Digest, the Beef Team members' email contact lists, as well as Michigan Cattleman's Association membership. In addition, the survey was posted to the MSU Extension website. Paper copies of the survey were available at beef extension meetings, as well as a QR-code handout with the survey link. Paper copies were not used by meeting attendees, and therefore all responses were collected online.[1] This strategy is consistent with other recent producer studies (McKendree, Tonsor and Wolf 2018; Schulz and Tonsor 2010; Martin et al. 2019; Lee, Schulz, and Tonsor 2019) and increase use of technology adoption by producers.

At the outset of the survey, we asked the respondents to identify their affiliation with the beef industry—beef producer, allied industry member, both, or neither. Skip logic was used to direct respondents to three different survey paths (beef producer, allied industry, or neither) based on the category they selected. We received 342 responses—253 beef producers, 25 allied industry members, 38 beef producers and allied industry members (both), and 26 that indicated neither of these affiliations. Those who self-identified as both producer and allied industry member were prompted with the beef producer question path. Given the sampling strategy, the response rate is unknown. For brevity, we present results from those that identified as producers, as well as those who identified as both beef producers and allied industry members to understand the needs and demands of the Michigan beef producers (291 responses).

We designed the survey to gather information on respondent demographics, operation type, perceived industry challenges, and views related to MSU Extension's role in addressing the identified challenges. One of the major goals was to understand Michigan beef producers' past and foreseeable challenges and how MSU could help address these issues. As such, we asked producers both open-ended and Likert-scale questions related to issues and challenges facing their operations. The first two open-ended questions were, "*Considering where you want your beef operation to be in the next 5–10 years, what are the largest issues or challenges that need to be addressed to get you there?*" and "*How could MSU Extension help to address the above issues or challenges?*" Next, we asked producers how concerning 19 different issues, identified by the Beef Team, had been to their operation in the past 5 years, using Likert-scale questions. The scale was, not concerning (1), somewhat concerning (2), and very concerning (3), as well as a "does not apply to my operation" option. We intentionally placed this series of Likert-scale questions after the aforementioned open-ended questions to not introduce bias into producer responses. The final open-ended question in this analysis was "*What type of expertise or specializations are needed within MSU Extension staffing to strengthen the Michigan beef industry? Please list specific suggestions.*"

To analyze the open-ended responses, we categorized the responses into themes using an iterative process (Taylor-Powell and Renner 2003). First, we decided on a list of potential themes for the first round of coding. The 19 issues from the Likert-scale questions were used as the first set of potential themes for the open-ended question about challenges facing producers in the next 5 to 10 years. We then categorized comments into one or more themes, depending on the length and content of the comment, by each of the authors individually. Next, thematic coding from all the authors were compared. We discussed responses with discrepancies and assigned them to their corresponding theme(s) based on group consensus. During the discussion, new themes arose that better summarized the producer's comments, such as facility management. Finally, we checked the open-ended responses again for these new themes. After these steps, we created a master data set that classified all the open-ended responses into a final set of themes.

The quantitative outputs for this paper were generated using SAS software, Version 9.2 of the SAS

[1] In addition, while it may have been possible for an individual to receive the survey more than once, the "prevent ballot box stuffing" feature in Qualtrics, made it possible for only one survey response to be submitted from each computer browser by placing a cookie on their browser when a response is submitted (Qualtrics n.d.).

System for Microsoft Windows 10. Copyright 2014 SAS Institute Inc.[2] The numerical data from the themes were analyzed using frequency tables, similar to Suvedi, Jeong, and Coombs (2010). The Likert-scale and demographic multiple-choice questions were analyzed using simple means.[3] When questions were not answered, or left blank, they were treated as "no response" and did not count toward sample statistics. See McKendree et. al. (2020) for the full survey results.

3 Results

Understanding the demographic makeup of Michigan beef producers and how this makeup has changed over time will help to better target and shape extension efforts. Based on the demographic data collected, our sample was representative of the Michigan beef industry. Nearly half of the respondents were 55 years or older, and 84 percent were male (Table 1). These statistics are consistent with the 2017 USDA Census of Agriculture, identifying that the largest percentage of producers in Michigan were male and over the age of 55 (U.S. Department of Agriculture 2017). Over half of producer respondents had commercial cow calf operations, followed by feedlots at 32 percent, and grass finisher and seedstock, both representing 25 percent of the sample, respectively. Respondents were able to select all of the operation types on their farm yielding a total percentage greater than 100 percent. The most commonly represented operation size was less than 50 head of cattle (48 percent), followed by 25 percent of producers having 51–100 head of cattle, a combined 25 percent of respondents have operations with between 100 and 1,000 head of cattle, and only 3 percent of respondents having more than 1,000 head of cattle.

3.1 Michigan Beef Industry Issues or Challenges

Of the 282 producer responses to the open-ended question, marketing/market access, prices/profitability, and animal health were the top three issues facing beef producers in the next 5–10 years (Table 2). Furthermore, land/pasture availability, input costs, capital availability, and genetics/reproduction were each mentioned by more than 20 percent of respondents. As a follow-up question, we asked producers how MSU Extension could help address these challenges. Education to producers (52 percent), education to consumers (13 percent), and education to policy makers and working with agencies (13 percent) were the most common themes mentioned.

After the open-ended question, the respondents were prompted with a series of Likert-scale questions to deduce issues they have faced in the past 5 years (Table 3). Input costs and government regulations had been the most concerning to producers. Producers were also concerned about pasture availability, environmental issues, animal health, land availability, succession of operation, and capital availability. Producers were the least concerned about lack of custom feeders and livestock transportation.

3.2 Michigan State University Extension Engagement

To better help the MSU Extension Beef Team with potential for filling future position(s), we asked producers an open-ended question on needed expertise or specializations within MSU Extension to help strengthen the Michigan beef industry (Table 4). Expertise in general beef knowledge, economic/finance/marketing, and nutrition were the top three themes producers listed as areas MSU Extension could use to improve the beef industry, followed closely by feedlot management, grazing/forage, and ag literacy/communications.

[2] SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA.

[3] "Proc freq" and "proc mean" procedures were used in SAS software version 9.2 to calculate the summary statistics and frequency tables

Table 1. Demographic summary statistics of producer respondents

Demographic Variable	Number Reporting	Percentage
Gender		
Male	174	84%
Female	26	13%
Choose not to provide	7	3%
Total	207	100%
No Response	84	
Age		
18 to 24	5	2%
25 to 34	27	13%
35 to 44	35	17%
45 to 54	42	20%
55 to 64	54	26%
65 and older	42	20%
Choose not to provide	3	1%
Total	208	100%
No response	83	
Enterprises **(*n* = 291)**[a]		
Seedstock	54	25%
Commercial cow calf	120	55%
Stocker/background	22	10%
Feedlot	70	32%
Grass Finisher	54	25%
Total Producers	219	
No responses	72	
Operation Size		
Less than 50	103	48%
51-100	54	25%
101-250	28	13%
251-1000	26	12%
1001-2000	2	1%
>2000	5	2%
No responses	73	

[a]Enterprises were only asked of those that selected beef producer (***n*** = 253) or both (***n*** = 38).

To be effective at reaching producers, it is imperative that producers can identify and reach extension personnel. From 251 responses, 63 percent indicated they have had contact with MSU Extension in the past 5 years, while 28 percent indicated they had not had contact or were not sure if they have had contact (Table 5). Sixty-eight percent of respondents stated the most preferred way to connect with MSU Extension was through organizational events, such as meetings, field days, and field schools. However, just short of that, 63 percent of respondents indicated they preferred to hear from MSU Extension via electronic sources, such as electronic newsletters and social media.

Table 2. Responses to: "Considering where you want your beef operation to be in the next 5–10 years, what are the largest issues or challenges that need to be addressed to get you there?"[a, b]

Theme	Frequency	Percent	Response Examples
Marketing/market access	52	18%	– "Need to be able to do more direct marketing of beef without more regulations." – "Advertising—I use mostly FB right now, and people I work with buy from me."
Prices/profitability	52	18%	– "Economics, finance, business planning." – "Slow return on investment buying or raising heifers."
Animal health	29	10%	– "Producing a healthy herd with quality animals." – "Keeping my herd free of disease, i.e. Johne's, BVD, TB, Tric, FMD, etc. by more positive means than "bio security." These diseases need to be eradicated in the United States, not managed."
Land/pasture availability	28	10%	– "Grazable acreage in close proximity to infrastructure." – "Grow to 40 head of cows. Land will be the greatest challenge."
Input costs	24	9%	– "Managing input costs, namely feed and fertilizer." – "Input costs compared to sale prices up here in MI."
Capital availability	22	8%	– "Capital and land." – "Capital to take the next steps."
Genetics/reproduction	22	8%	– "Genomic education for our clients." – "I am interested in switching to grass-fed beef. Timely rebreeding is a problem nobody even a vet seems to have a solution. We use BSE, vaccinate and use feed supplements, bull breed and AI with unacceptable pregnancy rates."
Government regulations	16	6%	– "Government policy that provides similar support to the sustainable agriculture market segment as it provides to conventional agriculture. Current programs are not equitable." – "Too many regulations that don't always apply to the small producer and don't always have a scientific need for them. Big Corporations shouldn't be putting them on."

Table 2 continued.

Theme	Frequency	Percent	Response Examples
Other	16	6%	– "Profitable herd dispersal and sale of capital investments." – "We primarily sell freezer beef, so we're always looking to improve our beef, marbling, tenderness, etc."
Facilities/fencing	14	5%	– "Getting pens, gates, alley way set up. Would like to get a squeeze chute. Started from scratch. – "Facilities to house livestock."
Ag Literacy/ Communication	14	5%	– "There has also been [too] much negativity in the media in regard to beef production." – "Improve both my own genetics as well as the image of Michigan producers."
Succession of operation	11	4%	– "Successful retirement from farming." – "Succession planning."
Consumer demand	11	4%	– "More demand for beef." – "I am not sure how to convince consumers that natural meat products are better than lab-grown "fake" meat. Nor how to convince them that vegan and vegetarian is not necessarily more healthy."
Environmental issues	11	4%	– "Continuing to improve our beef cow profitability and addressing environmental concerns." – "Environmental sustainability."

[a] Of the 291 producer respondents, 284 responded to this question, and 282 had recordable responses.
[b] Business planning, forage management, feed availability, labor, nutrition, export markets, watering systems, weather/climate changes, manure application/storage, and livestock transportation, in that order, were also common themes, but mentioned 8 times or fewer.

Table 3. Producers' response to "How concerning have the following issues been on your beef operation in the past 5 years?"[a, b, c]

Concern	*N*	Not concerned (1)	Somewhat concerned (2)	Very concerned (3)	Mean	*SD*
Input Costs	217	9%	36%	55%	2.46	0.66
Government Regulations	213	15%	33%	53%	2.38	0.73
Pasture Availability	198	24%	35%	41%	2.18	0.79
Environmental Issues	217	18%	48%	34%	2.16	0.70
Animal health	216	23%	40%	37%	2.14	0.77
Land Availability	209	23%	40%	37%	2.13	0.81
Succession of Operation	213	27%	33%	39%	2.12	0.81
Capital Availability	215	23%	44%	33%	2.11	0.74
Consumer Demand	216	24%	46%	30%	2.06	0.74
Food Safety	211	32%	38%	30%	1.98	0.79
Feed Availability	217	30%	42%	28%	1.97	0.76
Exports Markets	192	36%	32%	32%	1.95	0.83
Labor Availability	202	40%	31%	29%	1.89	0.82
Weather/Climate Changes	212	38%	42%	20%	1.83	0.74
Manure Application/Storage	210	37%	44%	19%	1.81	0.72
Labor Cost	197	40%	31%	29%	1.79	0.81
Watering System	216	45%	36%	18%	1.73	0.75
Lack of Custom Feeders	177	60%	27%	13%	1.53	0.72
Livestock Transportation	206	58%	34%	8%	1.50	0.64

[a] The list of concerns were provided by the researchers on the survey.
[b] Sample size indicated is for individual issue listed.
[c] 1 indicates not concerned, 2 indicates somewhat concerned, and 3 indicates very concerned. Those that selected "does not apply to my operation" were not included in these calculations.

Table 4. Responses to: "What type of expertise or specializations are needed within MSU Extension staffing to strengthen the Michigan beef industry? Please list specific suggestions."[a, b]

Theme	Frequency	Percent	Response Examples
General Beef Knowledge	27	13%	– "Information from individuals with hands-on training, raise cattle, feed cattle, individuals that have fought the elements that come with living in Michigan and managed a feedlot. Individuals that have calved out cows in January Mud and April Freezes." – "Experts to visit my operation to provide suggestions and training."
Economics/finance/marketing	25	12%	– "More on the economics of growing cattle, more on markets and sale opportunities." – "How to market, a lower cost examples of marketing flyers, etc."
Nutrition	20	10%	– "Feeding and nutrition assistance, general animal husbandry recommendations." – "Nutrition Specialist."
Feedlot Management	18	9%	– "Cow Calf, and feedlot management." – "There is a need for increased coverage of the feeding sector. Need an agent with expertise in the feedlot portion of the industry."
Grazing/forge	17	8%	– "Education on soil improvements for hay and pastures with emphasis on organic-type practices." – "More info on nutrition and forage."
Ag literacy/ communications	16	8%	– "Help with teaching the average 'cattle person' how to talk to the public on beef production best practices along with presenting verifiable, scientific information to the nonagricultural public." – "Feeding, marketing, vet, animal husbandry, animal welfare, public education on agriculture, educating in schools."
Genomics/ reproduction	15	7%	– "Understanding of ends and genomic testing." – "EPD knowledge and someone to speak up for cow calf producers not for MI Cattleman's Association."
Animal health	14	7%	– "As the beef industry is losing more veterinarians in our area, some assistance is locating help for the small breeders, and general guidelines on some medical emergencies will be important." – "Getting small producers onboard with vaccines, [pregnancy] checks, etc."

[a]Of the 291 producer respondents, 246 responded to the question, and 209 had useable responses.
[b]Animal welfare/handling, other, meats, and environmental, in that order, had 7 or fewer mentions.

Table 5. MSU Extension communication and preferred methods of contact[a]

	Number of Times Selected	Percent of Total Respondents
Communication with MSU Extension		
Yes, within last 5 years	157	63
Yes, more than 5 years ago	23	9
No	61	24
Not sure	10	4
Total	251	100
No response	91	
Preferred method of obtaining information[a]		
Personal farm call	68	28
Electronic source (e.g., electronic newsletter, social media)	150	63
Meeting at different locations throughout MI	129	54
Meetings—MSU campus	33	14
Publication mailings (e.g., paid subscription to hard copy newsletter)	70	29
Organizational events (e.g., meetings, field days, field schools, etc.)	164	68
Other	9	4
Total respondents	247	
No response	95	

[a]The number reporting does not sum to total respondents because respondents were able to select all that apply.

4 Discussion

The needs of beef producers across the country are ever changing and evolving. In 2010, the educational needs of Michigan farmers focused on business practices and sustainable farming practices (Suvedi, Lapinski, and Campo 2010). Presently, producers are concerned with market/market access, prices, input costs, pasture availability, environmental issues, and animal health. These concerns are consistent with a 2019 survey of U.S. cow-calf producers that found that the top five issues facing producers are animal and reproductive health, export markets, pasture availability, and biosecurity and disease (Martin et al. 2019). In addition, rising input costs and animal health issues were identified as a potential threat to the beef industry for Arkansas producers (Troxel et al. 2007). In a 1999 survey conducted to elicit the needs of the Michigan beef industry, animal health, beef quality, and food safety were the most identified issues facing producers (Cowley et al. 2000). While animal health appears in today's assessment, food safety and beef quality were not listed as being major concerns for producers in this assessment. Since 1994, Michigan has had a prevalence of bovine tuberculosis in wildlife and cattle within the state (Schmitt et al. 1997; Verteramo Chiu et al. 2019). Because of this, it is of no surprise that animal health is of high priority to today's producers. An issue that arose in this assessment that was not prominent in past studies was government regulations. Producers indicated that government regulations were an issue that had faced the industry over the past 5 years in a Likert-scale question; however, it was only listed 16 times in the open-ended responses for the next 5 to 10 years. Potentially, government regulations are of more concern to larger operations in Michigan and thus a smaller percentage of the respondents.

Looking further into the results, we see that there are some issues that do not appear often in the open-ended format but were listed as having some level of concern when prompted in the Likert-scale questions—often long run strategic issues. For example, succession planning appeared 11 times when

producers were asked to list issues facing their operation in the next 5 to 10 years. However, succession planning had an average of 2.12 in the Likert-scale question, indicating on average producers were somewhat concerned about operation succession in the past five to ten years. Longer term or strategic issues like succession planning may be more important to producers, especially as the average age of producers increases. We asked the open-ended questions prior to Likert-scale questions, to not bias responses to the open-ended questions. By allowing producers to type what their concerns were for the next 5 years, we likely gathered the issues that were at the forefront of their minds, issues they were currently facing. However, when we asked similar questions, in Likert-scale form, we were able to present possible issues that could arise on operations in the next 5 years that albeit important, might not be at the forefront of producers' minds given the day-to-day problems they may be dealing with. Thus, extension programing should continue to focus on helping producers meet current challenges, but also longer-term strategic decisions that can easily get overlooked given the many hats producers wear. We suggest that future needs assessments include a mix of questions types to gain a more complete view of issues facing agricultural producers.

In a study conducted in 1999 to evaluate MSU Extension, 10 percent of respondents from the overall Michigan livestock community indicated they had received information from the internet (Suvedi, Lapinski, and Campo 2000). However, in a similarly timed study surveying the Michigan beef industry, it was found that 41 percent of producers received information from the internet (Cowley et al. 2000). Nearly 20 years later, we see the trend for communication shifting significantly, with most farmers using the internet and the adoption of communication methods like conversational user interfaces (Burke and Sewake 2008; Kobielus 2018). Our study shows that while 63 percent of producers wish to receive information via electronic sources, 68 percent of producers responded that they like receiving information via organizational meetings. This data indicates that while there is a trend shifting to electronic communication, there is still a need for in-person, field-based programming, and interaction with producers. This finding is consistent with an Iowa Extension summary report from 2016, indicating that producers still prefer in-person meetings and events with extension personnel (Arbunkle 2017).

Understanding what producers' needs are and the best way to reach them is only the beginning of extension program development. Extension program development should be a carefully planned process through which extension professionals design, implement, and evaluate educational programs that address identified needs. The initial and key step in the process is assessing clientele needs. As such, needs assessments serve as the foundation for overall program personnel management, as well as the educational program development cycle. A needs assessment may be completed to determine extension personnel expertise needs, educational program needs, or both. In times of organizational growth, the needs assessment may inform position expertise requirements in hiring decisions, whereas during organizational contraction with dwindling resources, it may elucidate strategic areas of focus.

The needs assessment results were used for both informing hiring decisions and to focus educational programming efforts. Based on producer responses to the survey, and the judgments and knowledge of Beef Team members, the team developed a prioritized list of needed expertise. Team judgements were based on knowledge of existing expertise and consideration of recent and upcoming retirements. This list of needed positions included specialization in feedlot systems, grazing systems, cow-calf production, animal health, livestock marketing, and meat science. The needs assessment accompanied a Beef Team staffing plan which was presented to MSU Extension administration. Ultimately, a feedlot educator position was approved given the size of the Michigan Feedlot industry (32 percent of our sample) and lack of expertise on the Beef Team. Although this position is mainly focused on the feedlot industry, the educator will also be well versed in general beef knowledge. A successful national search was conducted with the new educator starting in Fall 2020.

The Beef Team also used the highest priorities revealed in the assessment to develop educational programs in the identified areas during their annual and future planning cycles. Furthermore, the results of the needs assessment were published on the MSU Extension website (2020) and published in *The*

Michigan Cattleman (Schweihofer, McKendree, and Lineback 2020). The results were also presented at the Michigan Cattlemen's Association summer meeting to kickstart a strategic planning session held with membership.

The interdisciplinary approach, including agricultural economists, to this needs assessment was unique. Agricultural economists can bring multiple skills sets to interdisciplinary needs assessments including survey design, statistical analysis, core economic concepts, and economic impact evaluations. Agricultural economists commonly use online surveys for consumer and producer research that could be applied in these contexts. Foreseeably, future needs assessment surveys could include best-worst or maximum difference scaling (McKendree, Tonsor, and Wolf 2018; Lusk and Briggeman 2009) to understand the most and least important challenges facing producers, for example. Discrete choice experiments could also be used to understand willingness to pay for fee-based extension services moving forward given budget constraints, such as those used by Ellison et al. (2017). Agricultural economists can also contribute to the conversation about needs assessments and programming using their basic economic concepts, such as opportunity costs. Additionally, many of the programming needs identified included agricultural economic and farm management topics including marketing, profitability, and business planning. For example, many respondents indicated that they were concerned with, "how to market," their products to local consumers or how to find sales opportunities. Another area of concern was understanding the true cost of production. Topics like these are great opportunities for agricultural economists with extension or research appointments to assist producers in their day-to-day operations.

5 Implications

Online needs assessments are useful for determining stakeholder needs and are just one tool in an extension educator's toolbox to determine the best way to serve their constituents. The results can be used to develop relevant extension programming and to prioritize additional specializations in needed team expertise. Extension teams can utilize producer and industry desires with team needs to advocate for critical positions needed with extension administration. It is important for extension personnel to conduct needs assessments and maintain an understanding of producers' needs, as well as those in the industry. More periodic needs surveys may reveal industry trends, educational advancements or deficits, and highlight potential areas for strategic focus. Agricultural economists can use their skills in survey development and statistical analysis, as well as their economic foundations to assist in such needs assessments.

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