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Women Farmers: Pulling Up Their Own Educational Boot Straps with Extension

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Abstract: *Women comprise a rapidly growing segment in agriculture. In this article, we examine how a network of women farmers, Extension educators, and researchers responded to the significant increase in women farmers in one state by creating a membership organization that draws on the expertise and resources of the land-grant university and Extension in Pennsylvania to create educational events with networking opportunities. We report 4 years of evaluation data for 37 events indicating educational impact, expansion and enhancement of the network, and marketing strategies for Extension to improve participation of women.*

Introduction

Women farmers, Extension educators, and researchers in Pennsylvania created the Women's Agricultural Network (WAGN) in 2003 in response to a structural shift in agriculture: the significant rise in the number of women farmers. Between 1997 and 2007 in Pennsylvania, the number of *women principal operators* increased 71%, from 5,009 to 8,550. When considering all operators on a farm (not just the principal operator), the number of women operators in Pennsylvania increased from 22,710 in 2002 to 26,405 in 2007. The growth in the number of women farm operators mirrors a national trend in the growing number of women and minority farm operators (Korb, 2005; USDA, 2007; USDA, 2009).

The organizers of WAGN concluded from interactions with farm women, and observation substantiated through research, that women farmers were isolated from other women farmers and from farmers in general and that women wanted educational programs to improve their agricultural skills (Kiernan, 2005; Kiernan, 2007; Trauger et al., 2008; Barbercheck et al., 2009; Brasier et al., 2009). Certain aspects of agricultural education thwarted their attempts to gain skills:

Women farmers found educational programs in agriculture unwelcoming, if not hostile. Participants and instructors did not take women seriously. Unidirectional learning from "experts" predominated with little opportunity for hands-on learning.

- Educational programs focused heavily on a scale of farming that many women did not practice (large operations with single commodities such as swine, beef, dairy, agronomic crops and turf grass).
- Agricultural education lacked a focus on women's farms that are characterized by limited acreage; production of vegetables, fruits, cheese, or flowers; diverse herds; use of alternative marketing strategies; and, organic and sustainable practices.

These women expressed a desire to learn from women who had experience with the same problems (Trauger et al., 2008; Barbercheck et al., 2009). In response, women farmers and Extension formed a hybrid organization housed at the land-grant institution, Penn State University, allowing grants to support staff and programming.

Program

Goals

Four goals emerged from WAgN's early organizers: networking, education, leadership, and research. This article focuses on the findings of a study of the interaction between two of the goals, networking and education.

Goal 1 Networking

In response to the isolation, WAgN established opportunities for women in agriculture to share experiences, listen to other women farmers, get reactions of other women farmers to their ideas, and collaborate on business and other opportunities. The working assumptions were that (1) women in agriculture shared challenges such as access to markets, business leads, loans, and technical information and (2) that these women would share what they knew with one another to create social capital as an outcome of their relationships (Falk & Kilpatrick, 2000; Trauger et al., 2008).

Networks among sustainable and organic farmers draw on peer-to-peer interaction to create an environment conducive to social learning. Research has documented how networks have contributed to agricultural knowledge production and dissemination, especially among marginalized groups, suggesting that the expectation for learning within the women's network would also be feasible (Carolan, 2006; Hassanein, 1999; Kroma, 2006; Warriner & Moul, 1992).

In addition to establishing opportunities for women to share experiences, organizers of WAgN encouraged women to reach out to other women in agriculture; to host networking opportunities such as potluck regional meetings, and educational events focused on their farm experience; and to be educators in agriculture.

Growing the network would form a foundation to achieve the other goals. The objective of 100 women farmers doubled in the first year. By 2011, membership exceeded 1,400.

Goal 2 Education

This goal was two-pronged: (1) arrange educational events on technical topics for women farmers (e.g., cheese making, marketing, and tractor maintenance) based on continuous needs assessments and (2) incorporate networking opportunities as described above, into the educational events.

This article discusses three evaluative questions, and each section of the article is organized around them:

1. To what extent has WAgN achieved its educational goal?
2. How have the educational events expanded and enhanced the network?
3. How can Extension improve women's participation at Extension events?

To answer, we describe the educational events, the measures we used, and the findings from a four-year evaluation study for Extension.

Educational Events

A senior Extension associate at the land-grant university working with WAgN regional reps, women farmers who volunteered to represent other women farmers in Extension regions, and county Extension educators arranged the educational events. Topics for the events came from results of formal needs assessments, continuous evaluations, and the perspective of the WAgN steering committee and did not replicate topics in other Extension programs (Kiernan, 2007; Barbercheck et al., 2009). To address how the women wanted to learn, from multidirectional learning especially from their peers rather than unidirectional teaching from a sole "expert," the events highlighted the farm experience of women farmers and practical learning. Almost all programs were on a woman's farm and co-taught by the woman farmer. Research has long demonstrated that farmers prefer learning from other farmers (Seevers, Graham, Gamon, & Conklin, 1997).

From 2006-2009, WAgN had 1651 participants at 55 events, 37 of which were educational and sponsored solely by WAgN. Other events were either cosponsored with other groups such as the Pennsylvania Association for Sustainable Agriculture (PASA) and The Rodale Institute, networking activities such as potlucks, or Steering Committee 2-day retreats twice a year. The educational events geared toward certain enterprises included small ruminants, sheep to fiber, grass fed meat, dairy, poultry, pastured lamb, soils, high tunnels, vericomposting, and fencing. Events geared to all enterprises included value-adding, use of a kitchen incubator, direct marketing, business planning, grant writing, farm tools, tractor maintenance, and leadership training. The WAgN office at the university systematically marketed each event on the WAgN website, by email or postcard to all WAgN and Pennsylvania Association of Sustainable Agriculture (PASA) members, and to local Extension educators to market the event in the county where the event took place. Participants registered on line.

Methodology

Over the 4 years, WAgN systematically evaluated the 37 WAgN-sponsored events using an end-of-event paper evaluation. From the measures detailed below, we obtained data on demographics, educational impact, expansion and enhancement of the network, and future marketing strategies. Of the 891 participants, 452 participated in the evaluation (51%).

Demographics

For a profile of the participants in order to monitor if we were reaching our target audience and for bivariate analyses, WAgN asked their age, gender, occupation, and location of residence/farm.

To What Extent Has WAgN Achieved Its Educational Goal?

To measure whether participants increased their *knowledge* on three-four specific topics at each event, WAgN used a retrospective pre-post question with four answer categories for each of the pre-post sections (Figure 1). This type of retrospective question had been used in the evaluation of many Pennsylvania extension programs and had previously demonstrated sensitivity to change among adults in these programs (Swackhamer & Kiernan, 2005).

Figure 1.

Example of Pre-Post Evaluation Question to Elicit Change in Knowledge

Listed below are specific topics presented at this event on HANDS-ON BUILDING. On the *LEFT*, circle your understanding of each topic *before* the event. On the *RIGHT*, circle your understanding of each topic now, *after* the event.

	BEFORE today's event				AFTER today's event			
How to choose a site location	Non-existent	Minimal	Moderate	Considerable	Non-existent	Minimal	Moderate	Considerable
How to develop a building plan	Non-existent	Minimal	Moderate	Considerable	Non-existent	Minimal	Moderate	Considerable

How to determine a materials list	Non-existent	Minimal	Moderate	Considerable	Non-existent	Minimal	Moderate	Considerable
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To measure *intention* to take action, WAgN used a four-point scale from "not inspired" to "very inspired," asking if the event inspired them to "modify my operation in the next two years" and "seek information and people with expertise related to my farm business."

How Have the Educational Events Expanded and Enhanced the Network?

To measure the effect of an educational event on the expansion and enhancement of WAgN, we asked four questions:

- If participants met someone with whom they would "stay in contact over the next year."
- If so, what benefits they expected from this contact? Based on the literature, WAgN provided these four options: "give you technical information," "provide business leads," "listen and react to your ideas," and "collaborate and share experiences."
- If the farmers would create learning opportunities for women farmers in future. Using the four point scale "not inspired" to "very inspired," we asked if the event inspired them to "organize and present an educational event on your farm experience" and "become more involved in WAgN."

How Can Extension Improve Women's Participation at Extension Events?

To investigate this marketing issue, we asked three questions:

- The reasons the participants had for attending. They had five options: one related to subject matter, "learn about farming and business practices;" three related to women's isolation and WAgN's goals, "meet other women farmers in my area," "be a better educator for women in agriculture," and "become more involved in WAgN;" and, "Other."
- The extent to which participants felt they were integrated into agricultural information channels, asking
- If they had attended an educational program in the past year sponsored by an agricultural organization. Participants had four options: "Cooperative Extension," "PASA," "WAgN," and "Other."
- How they heard about the WAgN event. Participants had four options: "local (newspaper/website)," "Extension (educator, newsletter, website other than WAgN)," "WAgN (member, news-letter, website, staff)," and "Other."

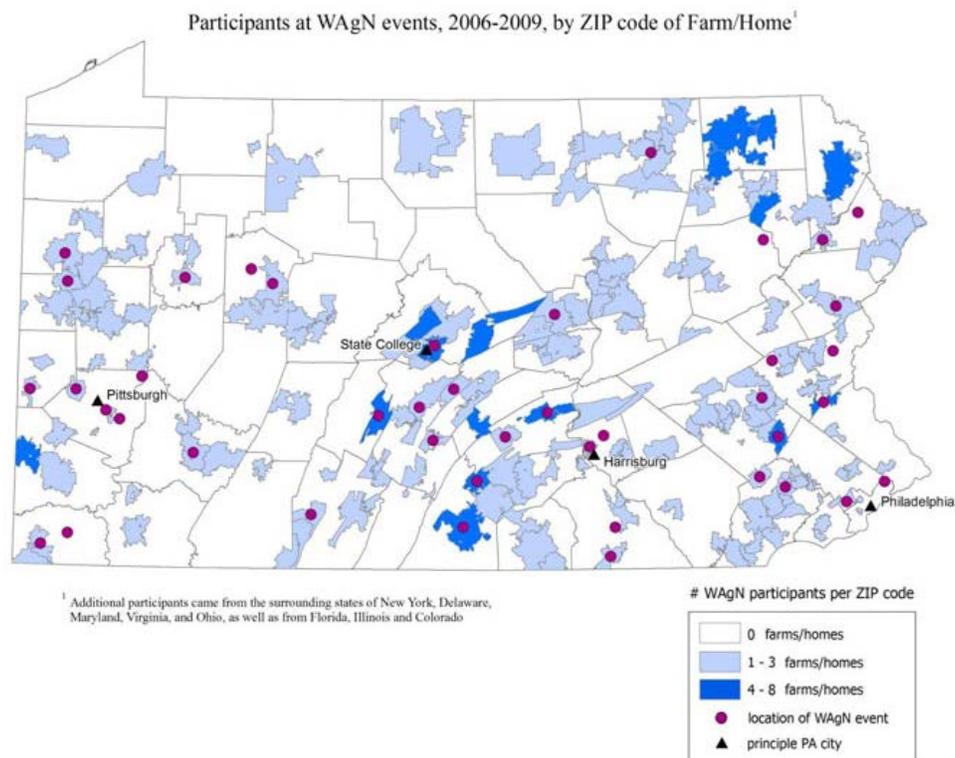
Findings

Demographics

Respondents came from 63 of Pennsylvania's 67 counties and from eight other states (Figure 2). The highest concentration reflects the proximity of where the events were held and WAgN regional leadership.

Figure 2.

Distribution of Participants in Pennsylvania



Women, the focus of the research, comprised most participants (85%, N=419). Although a small segment of the participants, men increased the percentage of events they attended over the 4 years from 43% to 75% of the events. The women reflected a broad age distribution, with a majority (53%) middle age or older (45-64yr), and a full third (38%), younger (25-44yr) (N=318), a pattern found among farmers and non-farmers alike. These women farmers are younger than the average age of farmers, 57.1 nationally (NASS, 2007) 66% of the women were farmers (N=306). Educators comprised the next largest occupational group (20%). The remainder included representatives from NGOs, Ag business (supplier, lender, consultant, and vet), the food and restaurant industry (food processors, buyers, and restaurant owners), the media, students, public officials, and interested consumers (N=313).

To What Extent Has WAgN Achieved Its Educational Goal?

WAgN analyzed the data in two ways. First we looked at the educational impact topic by topic for each event, comparing the percentage of women on their level of knowledge ("considerable or "moderate") *before* each event and *after*. The findings reveal a substantial increase in knowledge on almost all topics, with no difference among age groups either on these or other findings. Table 1 characterizes that increase with a representative sample of 13 events chosen for their range in educational impact (from best to less so) and the range in topics. The findings reveal a substantial increase in knowledge on almost all topics.

Table 1.
Percent of Participants with "Considerable" or "Moderate" Knowledge of Topics *Before* & *After* 13 Events

Event	Topic	% Considerable/Moderate Knowledge		N
		Before Event	After Event	
Apiary (Bee)	Determining Hive Location	33	83	12
	Building an Apiary	25	75	12

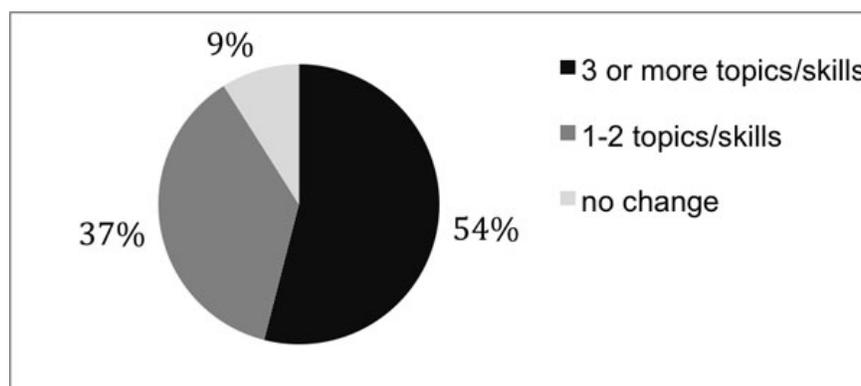
colonies)	Installing a Nucleus Colony	8	92	12
	Maintaining Hive Health	25	75	12
Sheep and Fiber	Improving Pastures for Grazing Sheep	38	75	8
	Marketing Strategies for Sheep and Sheep Products	43	86	8
	Providing On-Farm Educational Programs	88	100	8
Direct Marketing	Direct Marketing Your Farm Product	67	100	9
	Value-Added Options for Your Product	44	78	9
	Farm Diversification Options	44	89	9
Cheese Making	Equipment Needed for Farmstead Cheese Making	21	100	14
	Basic Procedures for Making Farmstead Cheeses	21	100	14
	PA Regulations for On-Farm Cheese Production/Sales	7	100	14
	Marketing Needs for Farmstead Cheese Makers	7	100	14
Equipment Practicum	Basic Equipment Safety	31	94	16
	Equipment Operations	13	87	15
	Equipment Mechanics	0	53	17
	Equipment Maintenance	6	71	17
Business Plan	Writing a Business Plan	0	100	5
	Creating a Mission Statement	20	100	5
	Direct Marketing Strategies	33	100	3
Fencing	Basics of Fence Building	25	100	8
	Rotational Grazing Fencing Systems	63	100	8
	Opportunities for Funding Rotational Grazing Systems	13	50	8
Soil Quality	Hands-On Tools for Assessing Soil Quality	25	100	8
	Energy Efficient Construction	38	100	8
	Pasture Management for Beef Production	25	50	8
	Use of Cover Crops in Grain Rotations	25	100	8
Farming Alternatives	Potential Opportunities for Value-Added Agricultural Production	67	80	5-6
	Benefits of Rotational Grazing for Producers of Grass-Fed Meat	83	100	5-6
	Challenges and Opportunities Involved in On-Farm Milk Bottling and Sales	40	100	4-5
	Evaluating Alternatives to Reduce Feed Costs	50	83	6

Holistic/Frugal Farm Management	Economic and Environmental Benefits of Managed Grazing	33	83	6
	Farm Management Strategies to Reduce Costs	67	100	6
High Tunnel Construction	What to Consider When Designing a High Tunnel	43	100	6-7
	Steps for Constructing Simple High-Tunnel	43	100	6-7
	Benefits to Farmers of Community Supported Agriculture Programs	71	100	6-7
The Right Tool	Anatomical Differences of Men & Women Impacting Safe & Effective Use	27	100	10-11
	Connection of Properly Sized, Correctly Used Tools, and Health and Safety	27	100	10-11
	Characteristics of Tools to Better Fit Women's Bodies	18	100	10
	Importance of Health And Wellbeing	91	100	10
Tractor Maintenance	Engine Maintenance	43	100	7
	Differences Between Gasoline and Diesel Engines	43	71	7
	Air, Fuel, and Oil Filter Changing	43	100	7
	Equipment Winterization	43	86	7

Besides analyzing the educational impact topic by topic, we analyzed it by participant, calculating the number of topics on which each participant increased her knowledge. We found that a majority of women increased their understanding on three or more topics at each event (Figure 3).

Figure 3.

Percent of Women Who Increased Their Understanding of Topics/Skills at a WAgN Event (N=303)



In addition to the knowledge women acquired, WAgN analyzed the *intention* of women farmers to take action in the next 2 years. A high percentage planned to take action: 77% of women farmers were "very" or "moderately inspired" to modify their own farm operation and 89%, to seek information and people with expertise related to their farm (N=196; 199).

How Have the Educational Events Expanded and Enhanced the Network?

These findings demonstrate on three measures that WAgN events had a positive impact on the WAgN network. Supporting

the idea that an educational event can do more than educate, three-quarters of the women (76%) said they had met someone with whom they would stay in contact over the next year, specifying which benefits they expected from this contact (Table 2) (N=293).

Table 2.
Percent of Women Who Identified Four Benefits of Networking at WAgN Events

Benefits Over the Next Year from Meeting a Person at a WAgN Event	% of Women	N
Collaborate and Share Experiences	66	169
Receive Technical Information	61	218
Listen and React to Your Ideas	42	218
Provide Business Leads	37	218 B

Additionally, the women farmers said they would create learning opportunities for other women farmers. More than half to three-quarters were "very" or "moderately inspired" to take two actions (Table 3). This finding is conservative as only the farmers were asked this question, just 66% of the participants.

Table 3.
Percent of Farmers Inspired to Take Action Within 2 Years

Actions to Help Create Learning Opportunities in Future for Women Farmers	% Women Farmers "Very" or "Moderately Inspired" to Take Action Within 2 Years.	N
Organize and Present an Educational Event on Your Farm Experience	58	195
Be More Involved with WAgN in the Future	76	197

The strong interest of women farmers (58%) to "organize and present an educational event on their farm experience" indicates the effect of WAgN events on the participants' intentions. Only a quarter of the women farmers (28%) indicated at the beginning of the event they came to be "a better educator for women in agriculture" (N=201). Participating in a WAgN event increased interest by women in the education of other women by 30%.

The high percentage of women farmers (76%) who said that they would "be more involved in WAgN in future," also points to the effect of WAgN events on participants. Only about one third of the women farmers (36%) indicated at the beginning of an event that they came to "be more involved in WAgN" (N=201). Participating in a WAgN event increased the percentage of farmers interested in being involved in WAgN by 40%.

How Can Extension Improve Women's Participation at Extension Events?

Reasons for Attending

To more thoroughly understand the reasons women had for attending events, we examined differences between women and men. Although the number of men in attendance is not as great as women and we must be cautious until further research is conducted, the findings are valid for the men who did come to the events. Women had a multiplicity of reasons for attending, whereas men had a single reason. Both shared the primary interest, "to learn about farming and business practices," although men reflected this reason significantly more than women (Table 4)(N=379). Women, however, were significantly more likely than men to choose the three reasons related to networking: "meet women farmers in my area," "become more involved in WAgN," and "be a better educator for women in agriculture."

Similarly, comparison between women farmers and non-farmers provided insight into reasons for attending WAgN events. Table 4 demonstrates that almost all the women farmers and non-farmers shared a primary interest "to learn about

farming and business practices" (N=306). But they differed, too. Women farmers were significantly more likely than non-farmers to choose the networking reasons for attending and also to "meet women farmers in my area" and "become more involved in WAgN." Women farmers and non-farmers demonstrated similar interest in becoming "a better educator for women."

Table 4.

Percent of Men, Women, Farmers and Non-farmers by Reasons for Attending a WAgN Event

Reasons for Attending Event	% Women	% Men	% Women Farmers	% Women Non-farmers
Learn About Farming and Business Practices	85	95*	88	80
Meet Women Farmers in My Area	46**	12	50***	37
Become More Involved in WAgN	32**	2	36****	25
Be a Better Educator for Women in Agriculture	29**	2	28	31
Statistical significance levels: *p = .045 **p = .000 ***p = .029 ****p = .040				

Information Channels: Other Organizations

We examined participation by women at educational programs in agricultural groups in the past year, whether farmers or non-farmers. Only about half attended a program conducted by agricultural organizations: PASA (53%), Extension, (45%) and WAgN (40%) (N=293).

Information Channels: Hearing About the Event

We can understand more clearly how well women are integrated into information channels if we compare them to men. Women were significantly more likely to hear about a WAgN event through WAgN (Table 5). Men, however, were significantly more likely than women to hear through Extension. Additionally, the "Other" category revealed that women and men heard through other sources, principally one-to-one interactions and from PASA.

Table 5.

Percent Participants Who Heard About the Event from Different Sources (N=380)

Heard About Event from	% Women	% Men
WAgN (Member, Newsletter, Website, Staff)	64*	38
Other (Mostly One-On-One from Friends/ Peers, and PASA)	34	42
Extension (Educator, Newsletter, Website Other than WAgN)	9	23**
Local (Newspaper/Website)	5	3
Statistical significance levels: *p = .000 **p = .001		

Conclusions and Implications for Extension

In the research reported here, we examined how a network of women farmers, Extension educators, and researchers

responded to the significant increase in women farmers in Pennsylvania by creating a membership organization that draws on the expertise and resources of Penn State University and Extension. We examined 4 years of evaluation data, indicating educational impact, expansion and enhancement of the network, and future marketing strategies to improve participation.

To What Extent Has WAgN Achieved Its Educational Goal?

We found that women came to an array of agricultural events that featured topics that they identified through needs assessments and that fostered peer-to-peer learning from other women farmers. These women reported substantially increasing their knowledge and intentions, demonstrating that a network among women in agriculture supported by Extension can create events that contribute to agricultural knowledge production and dissemination, similar to networks in other agricultural groups (Kroma, 2006; Warriner & Moul, 1992).

Given the substantial increase in women farmers across the country, Extension educators in other states may want to consider implementing educational events focused on the needs of women in agriculture and incorporating peer-to-peer education (Korb, 2005; NASS, 2007). Not only can such events attract women farmers, a rapidly growing segment of farm operators, the events support the diversification of agriculture, crucial to sustaining U.S. agriculture.

How Have the Educational Events Expanded and Enhanced the Network?

We found that educational events with networking opportunities lead to new contacts for most women, contacts leading to immediate social and entrepreneurial benefits such as collaboration, technical information, and business leads. These contacts, made in a context of trust, may have otherwise taken years, if ever, to make (Carolan, 2006). To foster entrepreneurial success across participants, Extension educators may want to integrate networking opportunities into educational events and evaluate the effect.

We also found that the number of women who said they would create learning opportunities for other women and get more involved with WAgN increased substantially as a result of WAgN events. These findings validate one of the assumptions on which the network was organized, that women would be willing to share what they knew with one another to create what Falk and Kilpatrick (2000) call "social capital." These findings demonstrate that women in agriculture can be strong supporters of education for women and represent a potential audience for Extension programs.

How Can Extension Improve Women's Participation at Extension Events?

We discovered that the reasons women have for coming to agricultural events have implications for how Extension may want to design and market events. The reason women want to attend educational events, just as men do, is for the subject matter, but women also look for other benefits: to meet women farmers in their area; hear from other women farmers as part of the learning process; become a better educator; and network. Research has demonstrated dramatic differences in participation in studies if *what is important to the target audience* is included in the advertisement (Kiernan, Phillips, Fair, & King, 2000; Brown et al., 2012). If it is important to Extension to attract women, it is not sufficient for Extension to simply advertise the topic of an event coming up. Rather, Extension may want to draw upon this research to plan and advertise an event as an opportunity to obtain the networking benefits women seek.

What we discovered about the integration of women into agricultural information channels is troubling from a marketing perspective and has implications for Extension.

- First, the data confirm the isolation that women experience, also documented above in other studies. Just one-third to one-half attended educational programs given by Extension and other groups in the past year and thus, only those small percentages had the potential of hearing about WAgN events through those programs. These data illuminate that Extension is missing out on a rapidly growing target audience in agriculture, and Extension may want to undertake other forms of marketing to attract these women to programs.
- Second, the data reveal that although men heard about WAgN events through Extension, women did not, suggesting yet another measure, Extension's lack of engagement with women in agriculture and the potential for that engagement in future.

In summary, the research reported here examined how a network of women farmers, Extension educators, and researchers designed educational events and evaluated them over 4 years for educational impact, expansion and enhancement of a

network, and future marketing strategies. We used a set of pretested questions and answer categories proven successful in the past in many Extension programs. We integrated the evaluation question and answer categories so that other Extension educators can draw on them for replication in measuring the impact of education, networking and marketing strategies in their programs.

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