

Risk Information Sufficiency and Seeking of Southeastern U.S. Beef Producers

C. Rourke¹, R. Waggie², N. Hill³, J. D. Ellis⁴, K. Starzec⁵

Abstract

Of all cow-calf producers in the United States, one-third reside in the Southeast where operations face unique challenges and risks due to their geographical location. Cow-calf herds in the region are relatively small in terms of head counts as well as percentage of household incomes, making their operators less likely to participate in risk-reducing programs. Targeted risk communication is one way to help producers better understand and manage the multiple and complex risks they face. This study adapted the risk information seeking and processing model to inform a quantitative survey method that examined southeastern U.S. beef cow-calf producers' perceived risks area knowledge gaps and the communication channels participants used to seek risk information. Participating producers were found to have gaps in knowledge for all risk areas in beef cow-calf management; the largest was economic and marketing/selling animals risks. No matter the risks area, producers prefer their risks information from magazines and Extension publications. Therefore, communication practitioners are encouraged to tailor risk management communications that help southeastern U.S. cow-calf producers fill their largest knowledge gaps in marketing/selling and economic risk management. Furthermore, this information is of the greatest need for producers with more beef production experience and larger herd sizes. Magazines and Extension publications offer communicators the best channels to readily reach southeastern U.S. cow-calf producers as this is where they are currently seeking risks information.

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Introduction and Problem Statement

Beef producers strive to manage a host of interrelated operational risks (Komarek et al., 2020). These factors impact producers' production practices, profits, and their use of risk management tools (Adkins et al., 2012; Drouillard, 2018). Risks are "things, forces, or circumstances that pose danger to people or to what they value" (Stern & Fineberg, 1996, p. 215). Risk communication warns of potential danger with the goal of influencing positive behavior change (McComas, 2006) by empowering the use of pragmatic and constitutive "locally relevant decision support tools" (Rickard, 2021, p. 474). Risk management tools and educational programs have historically targeted crop farmers more than beef producers (Hall et al., 2000). Understanding beef producers' risks information needs would help communication practitioners develop targeted outreach strategies to fill these deficits (Hall et al., 2003).

Risks are beef sector- and region-specific (Adkins et al., 2012). The beef life cycle begins within the cow-calf sector, which uniquely consists of herds with breeding cows and their offspring that must be simultaneously managed (Martinez et al., 2020). Of the national cow herd, 20% reside in the Southeast region and are owned by one-third of the nation's beef cow-calf producers (Asem-Hiablíe et al., 2018; Drouillard, 2018). Smaller than average cow-calf operations, common in the southeast region, are less likely to engage with programs that help mitigate operational risks (Drouillard, 2018; USDA APHIS, 2020). The multiple sources of risks managed simultaneously by beef producers at differing scales have received little scholarly attention (Komarek et al., 2020). The unique risks faced by Southeastern U.S. cow-calf operations necessitated an investigation of their risks information sufficiency and relevant channel beliefs (Asem-Hiablíe et al., 2018).

Theoretical and Conceptual Framework

The risk information seeking and processing (RISP) model served as the conceptual framework for this study. The most studied variables in the model are information gathering capacity, relevant channel beliefs, information sufficiency, and informational subjective norms (Griffin et al., 2013). Variables in the RISP model have been studied as predictors of risk information seeking, risk information avoidance, and systematic and heuristic processing (Griffin et al., 2004). Three factors in the RISP model—information insufficiency, relevant channel beliefs, and information gathering capacity— "are expected to combine to affect individuals' seeking, avoidance, and processing of risk information" (Griffin et al., 2013, p. 333). We pulled data from a larger study to focus on two of those factors: information insufficiency and relevant channel beliefs.

Within the RISP model, information sufficiency is a person's satisfactory level of knowledge and information to cope with the risk, measured as a threshold (Griffin et al., 2013). Alternatively, information insufficiency is the "gap between what one already knows and what one desires to know" (Griffin et al., 1999 as quoted in Kahlor et al., 2019, p. 2). People will strive to fill the gap between their current level of knowledge and their desired level of knowledge to achieve

information sufficiency and inform decision making about risks. Gaps in knowledge, or information insufficiency, drive varying levels of motivation in information seeking (Griffin et al., 1999). Achieving information sufficiency depends on the usefulness and trustworthiness of available information (Griffin et al., 2013).

Relevant communication channel beliefs are usually related to what an individual expects to result from using the specific channel for seeking information about risks (Dunwoody & Griffin, 2014). In the context of the beef industry, channels providing risks information include print magazines, Extension publications, live demonstrations, conferences, and newsletters, among others (Vergot III et al., 2005). Information sufficiency and relevant channel beliefs are impacted at varying levels by the characteristics of the individual (Griffin et al., 2013), which may include relevant hazard experiences, political philosophies, and demographic/sociocultural variables (Griffin et al., 1999). This study focuses on information sufficiency and relevant channel beliefs in an effort to support risk communicators' efforts to target risks area information to beef producers who are attentive to such information through their channels of choice.

The RISP model has been applied in varying contexts, including industrial chemical risks (ter Huurne et al., 2009), food choices (Fischer & Frewer, 2009), health risks (Hovick et al., 2011; Hubner & Hovick, 2020; Yang et al., 2022; Zhou et al., 2020), climate change (Yang et al., 2014b), wildlife disease management (Cross et al., 2018), and genetic modification information (Holt et al., 2020). Information sufficiency has been found to be the strongest predictor of information seeking behaviors, even when other variables in the RISP model are controlled (Cross et al., 2018; Liu et al., 2022). Current knowledge, a variable in information sufficiency, has been found to consistently influence behavioral outcomes (Yang et al., 2014a). Relevant channel beliefs can have an interaction effect on the relationship between information sufficiency leading to systematic information processing (Yang et al., 2022). Risks exist outside of informational knowledge gaps, but in this study, we focused on risks related to information insufficiency and relevant channel beliefs in relation to RISP and their connection to successfully seeking and processing new information about risks (Griffin et al., 2013), or what we refer to in this study as "risk areas."

Purpose

The purpose of this study was to identify southeastern U.S. beef cow-calf producers' risks information sufficiency and relevant channel beliefs, guided by these research questions:

1. To what extent did perceived risks area knowledge gaps exist for producers?
2. What communication channels did producers use to seek risks information?

Answers to these research questions add to the current understanding of risks information needs of southeastern U.S. beef cow-calf producers. Answers to these questions also give communication practitioners information needed to (a) better understand on which topics and to what extend risks-related knowledge gaps exist, with an opportunity to better focus their

messaging, and (b) better understand which communication channels to use to reach producers seeking risks information.

Methods

Our population of interest was cow-calf producers who operated in the states of Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia (Adkins et al., 2012). University departments, state Extension systems, and cattlemen's associations sent a recruitment email to producers through their organizations' communication channels. In the 11 states studied, there were 199,106 farms with an inventory of beef cattle (USDA National Agricultural Statistics Service, 2017). Due to the number of operations and logistical and financial restrictions, the sample was compiled using nonprobability sampling, thus the results are not generalizable to a larger population (Baker et al., 2013; Wimmer & Dominick, 2014). Data collection occurred from February 8 to March 16, 2020, resulting in 504 responses. We acknowledge the data is three years old from the time of collection to publishing. However, past research on agricultural producers' information seeking also has a publishing timeframe of 2-3 years (e.g. Diekmann & Batte, 2009; Jensen et al., 2009; Rients et al., 2022). Cases were included in the data analysis of each question if the respondent answered more than half of the variables needed for analysis, resulting in 418 usable responses. Participants' ($n = 355$) ages ranged from 23 to 85, ($M = 52.58$, $SD = 14.10$). Most participants ($n = 325$; 86%) indicated 51% or more of their income is from off-farm sources, consistent with national U.S. statistics (USDA Economic Research Service, 2022). Description of individual characteristics is in Table 1.

Table 1*Individual Characteristics of Respondent Southeastern Beef Cow-Calf Producers*

Characteristics	<i>n</i>	%
Gender (<i>n</i> = 378)		
Male	311	81
Female	67	18
Household income (<i>n</i> = 368)		
Less than \$19,999	1	.2
20-39,999	11	3
40-59,999	36	9
60-79,999	59	17
80-99,999	70	14
Greater than \$100,000	191	46
Source of household income (<i>n</i> = 377)		
51+% off-farm	325	86
51+% on-farm	52	14
Education level (<i>n</i> = 381)		
Some high school	1	.2
High school/GED	63	15
Associate degree	40	10
Trade/technical school	29	7
Bachelor's degree	123	29
Master's degree	69	17
Doctorate degree	56	13
Cattle production experience (<i>n</i> = 418)		
0-9	92	22
10-19	79	19
20-29	60	14
30-39	62	15
40-49	65	16
More than 50	60	14
Herd size (<i>n</i> = 418)		
1-10	24	6
11-25	75	18
26-50	91	22
51-75	68	16
76-100	54	13
101-299	75	18
More than 300	31	7
Race/Ethnicity (<i>n</i> = 383)		
Caucasian	373	89
African American	3	.7
American Indian or Alaska Native	2	.5
Asian	1	.2
Hispanic/Latino	1	.2
Native Hawaiian or Pacific Islander	-	-
Other	3	.7
State of operation (<i>n</i> = 418)		
Alabama	8	2
Florida	24	6
Georgia	25	6
Kentucky	140	33
Louisiana	14	3
Mississippi	2	.5
North Carolina	13	3
South Carolina	1	.2
Tennessee	99	24
Virginia	83	20
West Virginia	9	2

The online Qualtrics questionnaire consisted of 49 questions in seven sections. Questions were asked using yes/no, multiple choice, checklist, sliding scale, and Likert-type questions. Sections of the questionnaire reported for this study were individual characteristics, beef risks management information channels, as well as current knowledge and perceived needed knowledge levels in the risks areas. The risks areas were animal health, breeding management, calving management, animal growth, weaning, economics, and marketing/selling animals (Hall et al., 2003; Martin et al., 2019a; Martin et al., 2019b).

Individual characteristics questions included cattle production experience, operation location, and herd size. Participants were asked to indicate their use of communication channels for seeking risks management information. Participants were asked to rate their current knowledge level of risk areas on a scale of 0 to 100 (Cross et al., 2018; Griffin et al., 2008). A selection of 100 represented being an expert on the risk area, and zero meant having no knowledge of the risk area. Perceived needed knowledge for the risk areas were also measured on a scale from 0 to 100 (Cross et al., 2018; Griffin et al., 2008). A selection of 100 on the scale represented an expert level of knowledge needed to address a risk area, and zero indicated no knowledge was needed to address a risk area. The survey questions were developed based on the RISP model and a review of beef risks management literature (e.g. Hall et al., 2003; Martin et al., 2019a; Martin et al., 2019b), then reviewed by a panel of experts to confirm face validity. Due to time constraints and the accessibility of an alternative population, the survey was not pilot tested for content validity and reliability. The panel of experts consisted of two agricultural communications professors and one animal science professor with experience in animal health, beef herd management, and risk communication. Panel review resulted in revisions made to the original questionnaire to improve readability and ensure item clarity (Colton & Covert, 2007).

To address question one, knowledge gaps for each risk area were the difference between the current risk area knowledge level and the perceived needed risk area knowledge level, known as sufficiency threshold (Griffin et al., 2013). A negative number result indicated a deficiency. The respondent's current knowledge was insufficient to address operational risks. Descriptive statistics addressed question two. Analysis was conducted using SPSS v28.

Findings

RQ1: To what extent did perceived risks area knowledge gaps exist for producers?

The risk areas producers perceived they had the least current knowledge of were marketing/selling animals ($M = 58.9$) and economic ($M = 58.7$). The risk areas about which producers indicated they had the most current knowledge of were weaning ($M = 71.1$) and calving management ($M = 71.0$).

The risk areas for which producers needed the least amount of knowledge were weaning ($M = 72.3$) and animal growth ($M = 72.9$). The risk areas for which producers needed the most amount of knowledge were marketing/selling animals ($M = 79.0$) and animal health ($M = 77.8$).

Gaps in knowledge were the largest for the marketing/selling animals risk area, with a gap of -20.1, and the economic risk area, with a gap of -18.9. The risk areas with the smallest gap in knowledge were weaning, gap of -1.2, and calving management, gap of -5.0. The risk areas with the largest gaps were the same areas for which respondents reported the lowest current knowledge. The smallest gaps were the same risk areas for which respondents indicated the highest current knowledge, displayed in Table 2.

Table 2

Southeastern U.S. Beef Cow-Calf Producers' Current, Sufficiency, and Gap Knowledge by Risks Area

Risks Area Knowledge	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
Current knowledge				
Animal health	68.72	19.18	-.62	.01
Animal growth	66.15	19.81	-.58	-.33
Breeding management	68.64	20.16	-.71	-.05
Calving management	71.21	19.75	-.80	.13
Economic	58.46	22.19	-.17	-.71
Marketing/selling animals	58.63	22.69	-.29	-.51
Weaning	71.15	20.68	-.91	.19
Sufficiency threshold				
Animal health	78.33	18.46	-1.16	1.51
Animal growth	73.01	20.26	-.82	.28
Breeding management	75.92	19.08	-.95	.76
Calving management	76.25	19.30	-.99	.73
Economic	77.61	19.79	-.98	.63
Marketing/selling animals	79.02	20.20	-1.22	1.22
Weaning	72.47	21.66	-.90	.32
Knowledge gap				
Animal health	-.96	22.30	.51	2.35
Animal growth	-6.86	23.91	.39	1.47
Breeding management	-7.28	22.43	.26	1.72
Calving management	-5.04	23.27	.44	2.07
Economic	-19.15	26.86	-.10	.49
Marketing/selling animals	-20.39	28.39	-.17	.26
Weaning	-1.33	25.03	.24	1.50

Note. $N = 363$. Current knowledge and sufficiency threshold were measured on a scale of 0 to 100 on which 0 means knowing nothing and 100 means knowing everything one could possibly know about the topic (Cross et al., 2018; Griffen et al., 2008).

RQ2: What communication channels did Southeastern U.S. beef cow-calf producers use to seek risk information?

Participants were asked to select all the communication channels they used to collect information on each risk area. As shown in Table 3, frequencies and percentages were calculated from this data to determine the use of communication channels by risks area. Magazines and Extension publications were consistently chosen by respondents as their preferred communication channels, regardless of risk area. The only category of difference was the animal health risk area, in which respondents indicated they also preferred live demonstrations and newsletters.

Table 3

Communication Channels Used by Southeastern U.S. Beef Cow-Calf Producers to Seek Risks Area Information

Communication Channels	Animal health	Animal growth	Breeding mgmt.	Calving mgmt.	Economic	Marketing/ selling animals	Weaning
	%	%	%	%	%	%	%
Conferences	44	32	33	32	34	30	30
DTN or similar service	1	1	1	1	3	4	1
Extension publications	68	50	54	57	51	44	51
Live demonstrations	61	21	27	25	14	15	21
Magazines	75	56	60	60	58	45	52
Newsletters	52	35	36	38	43	37	34
Podcasts	7	5	5	5	6	6	5
Social network channels	21	13	14	15	18	23	13
Research journals	26	25	22	22	18	14	23
Does not use a channel	2	12	10	10	10	15	17

Note. $N = 418$. Percentages reflect the proportion of respondents who reported using the channel.

Conclusions, Discussion, and Recommendations

Our findings suggest responding southeastern U.S. cow-calf producers perceived their current levels of knowledge were not enough to address any of the potential risks studied (Griffin et al., 2013). In agreement with previous research (Hall et al., 2003; Martin et al., 2019a), *marketing/selling* and *economics* were areas the participants expressed needing more knowledge to effectively manage those potential risks. In addition to having the largest knowledge gaps, these two risk areas had the lowest average levels of current knowledge.

This study updated understanding of the communication channels cow-calf producers use to acquire risk information in the southeastern portion of the U.S. As previously found, the primary communication channels producers used for seeking risk information were magazines and Extension publications (Vergot III et al., 2005). Podcasts and social networks were the least used channels. This finding aligns with Yang et al. (2022), who found traditional media channels were viewed more positively than social media channels. Traditional channels may be seen as more trustworthy than social media channels, leading to higher relevant channel beliefs (Griffin et al., 2013; Yang et al., 2022). While most respondents sought risks-related information, a few did not, as was most evident in the areas of *weaning*, *marketing/selling*, and *animal growth*. Further investigation should identify if producers perceive they have the information-gathering capacity to use channels for reaching information sufficiency and how individuals' characteristics impact relevant channel beliefs (Griffin et al., 2013).

This study was limited to beef cow-calf producers located in the defined southeastern region of the U.S. who had internet and were accessible through relationships with the organizations who disseminated the study. A pilot study was not possible but would improve instrument validity. This study's instrument contained no multi-item constructs and respondents were not tested/retested, so data reliability could not be determined (Netermeyer et al., 2003). Additionally, the data was collected in 2020, three years prior to publishing. The COVID-19 pandemic may have changed participants' information seeking behaviors. However, our results reflect long-term trends in information channels used by livestock producers. Jensen et al. (2009) found that in addition to veterinarians, main channels of information collection among Tennessee livestock producers were Extension and magazines. Though it is unlikely that channels used have changed, the types of information beef producers are seeking related to marketing and economics may have as the pandemic affected marketing and selling of beef (Langusch et al., 2023).

Future research should measure the RISP model constructs holistically to assess interactive affects and outcomes for cow-calf producers (Griffin et al., 2013; Yang et al., 2022). Expanding the sample to include all U.S. beef cow-calf producers could enhance understanding of the differences in risk information seeking and processing habits and needs of producers (Adkins et al., 2012; Drouillard, 2018). Practitioners and researchers should seek to understand beef producers within their contexts through audience segmentation to develop tailored education and outreach strategies (Hall et al., 2003; Warner et al., 2017).

We suggest practitioners provide risks management information, especially in the areas of marketing/selling animals and economics, through the channels most used by respondents: magazines and Extension publications. Marketing/selling topics may include value-added marketing and when to sell cattle versus when to retain ownership based on the producer's aversion to risk (Martin et al., 2019b). Economic management risk topics include managing price variability risk related to cattle prices and inputs (Hall et al., 2003; Martin et al., 2019b). While social networks and podcasts are trending, these beef cattle producers were still using traditional media for their risk management information needs.

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