Journal of Applied Communications

Volume 107 | Issue 3 Article 1

Instagram as a Tool of Diffusion for the Livestock Industry

Savannah Locke
Auburn University

Karen Hiltbrand

Katie Corbitt
Auburn University Main Campus

See next page for additional authors

Follow this and additional works at: https://newprairiepress.org/jac

 Part of the Agricultural Education Commons, Beef Science Commons, and the Public Relations and Advertising Commons

This work is licensed under a Creative Commons Attribution-Noncommercial-Share Alike 4.0 License.

Recommended Citation

Locke, Savannah; Hiltbrand, Karen; Corbitt, Katie; Richburg, Darcey; Shannon, David; Rodning, Soren P.; Sawyer, Jason T.; and Mulvaney, Don (2023) "Instagram as a Tool of Diffusion for the Livestock Industry," *Journal of Applied Communications*: Vol. 107: Iss. 3. https://doi.org/10.4148/1051-0834.2460

This Research is brought to you for free and open access by New Prairie Press. It has been accepted for inclusion in Journal of Applied Communications by an authorized administrator of New Prairie Press. For more information, please contact cads@k-state.edu.

Instagram as a Tool of Diffusion for the Livestock Industry

Abstract

Studies have shown that more people are getting their information through social media (SM). With so much misinformation presented in global media, it is difficult for consumers to distinguish what is true and what isn't. With negative images and minimal context, consumers have a tendency to believe and trust what they see on SM. After IRB approval, a survey study was launched on Qualtrics and accessed via email. Using Instagram as platform, this study presented 5 cognitively and 5 emotionally oriented posts focused on the aspects of animal welfare, diet/health, and environment/sustainability. Prior to viewing the Instagram posts, study participants were given a 5-scale Likert pre survey assessing their opinions about their views of animal welfare, diet/health of consumers of red meat and environment/sustainability for the beef industry. Participants subsequently viewed the posts and then took a post survey. SPSS was used to analyze responses with t-tests and frequencies. ATLAS was used to code for negative and positive key words in open responses. Results showed that participant's views about the beef industry improved ($p < .05$) after viewing the media posts for welfare and that participants favored the suggestions that beef cattle are treated humanely. Participants were unsure of the effects that beef consumption has on consumers' diet and health as well as the environment. Qualitative results suggest that viewing of the posts had a favorable impact on consumer's opinions.

Keywords

Animal Welfare, Beef, Diet/Health, Environment/Sustainability, Social Media

Cover Page Footnote/Acknowledgements

This article has been taken from the thesis titled, "Beef Communication Within the Digital Pasture: Tools that Impact Consumer Perceptions"

Authors

Savannah Locke, Karen Hiltbrand, Katie Corbitt, Darcey Richburg, David Shannon, Soren P. Rodning, Jason T. Sawyer, and Don Mulvaney

This research is available in Journal of Applied Communications: https://newprairiepress.org/jac/vol107/iss3/1

Introduction

Citizens within developed countries have become removed from agriculture and are no longer apart of agrarian societies. Increasingly, people are informed and influenced by social media instead of science-based sources (Raj et al., 2021). Consequently, a knowledge gap has been created between the consumers and the animal agricultural industry.

The public wants to avoid support of a perceived factory farming framework (Raj et al., 2021). In the past, humane slaughter procedures had the most impact on purchaser decisions. However, the public has shifted interest towards making sure livestock are treated more humanely (Edwards-Callaway and Calvo-Lorenz, 2020). With an increasing informational and knowledge gap about the conditions surrounding the origins of animal derived food, consumers are basing purchasing decisions on perceptions about humane management practices, nutritional content and safety as well as perceived contributions of livestock to greenhouse gas output. Increased levels of negativity fosters erosion of social licensure for animal food products. The widening gap around a lack of understanding and science based knowledge between the general public and the livestock industry appears to be caused by ineffectual communication messaging. Consequently, communicating complicated topics which involve animal agriculture should likely consider underlying principles of how ideas spread through social media and factors which contribute to influence opinion.

In the era of social media usage, participants tend to affiliate around familiarity and ultimately gravitate to connect with other people who have similar views or values. In social media interactions, people decide whether someone is similar to themselves and therefore, might be more likely to agree with opined perspectives and share them with others (Kerpen, 2015). The use of alternate social media channels to connect to different tribes or members could be important to understanding how to more effectively communicate to disconnected groups such as the contrast between agricultural and non-agricultural audiences. Social media could very well play a role in bridging this educational gap. There is a justified need for harnessing social media (Morris and James, 2017). Media outlets are readily available to help showcase the livestock industry (Morris and James, 2017). Media outlets can help diffuse some of the misinformation that is spreading about the industry by activist organizations. Rogers (2003) describes diffusion as a sequential process where something is communicated via specific channels by individuals of a group and then becomes widely accepted as truth or fact.

Lochner and others claim that visuals and images can be used in order to present complex and difficult or unknown information in an easy-to-understand manner (Lochner et al., 2021). A study conducted by Martono and others focused on using Facebook as a platform in order to inform the public about cattle for sale due to the reasoning that more and more people are getting their information from social media (Martono et al., 2016). Olausson (2017) created two articles through Facebook about environmental impacts of beef cattle. One post was negative, focusing on the negative impacts of beef, while one was positive, focusing on the small environmental impact in comparison to airplane travel (Olausson, 2017). The positive post was shared more than the negative posts (Olausson, 2017).

There is a chance that this knowledge gap could be lessened by using social media as a way to bring in truthful and factual information. (Morris and James, 2017). A study presented by Simis and others has shown that scientists don’t necessarily possess the skills to communicate findings and data to the general public in a way that everyone not of the scientific community can understand (Simis et al., 2016).

Consumers are concerned with welfare, diet/health on consumption of red meat, and the impact beef cattle have on the environment/sustainability. With less than 1% directly involved in production agriculture, consumers are relying on what they digest from social media which shapes their perceptions (Rice et al., 2016). Without much regulatory process oversight and citizen journalism, it has become easy and simple to propagate false or misguided information (Mavrodiev et al., 2021). Ultimately, consumers decide for themselves what they choose to trust and believe by relying on "their own internal voice" (Houldsworth et al., 2020).

Social media networking sites such as Instagram are becoming increasingly popular amongst consumers in order to obtain information (Ishani and Seock 2019). Research findings indicate that enjoyable sponsored posts on Instagram by credible influencers can positively affect their purchase intentions as well as influence perceptions (Ishani and Seock 2019). Due to some misleading posts, consumers can base their entire decisions of false facts. In fact, celebrities as well as advertisements can intentionally create misleading posts to influence consumers (Liao et al., 2021). This can affect online rating, purchases, and the spread of information by consumers based on a simple post (Liao et al., 2021).

A key concept to improving relations between the agricultural industry and the general public is the development and maintenance of trust (Houldsworth et al., 2020). If consumers can gain understanding about where their meat is coming from in all stages of production, perhaps it can lead to improved trust. As described by Houldsworth (2020), truth and integrity are related to trust in that all are required for an accurate perception of what we call "the truth." Social media follows a structure of a teacher-student relationship where the teacher is the content creator and the student is the social media user. The teacher-student bond, also described by Houldsworth (2020), inquires that information shared across social media in an educational manner, regardless of positive or negative attitude on a subject, is proven influential enough to craft permanent perceptions.

This background led to a study designed to examine the effectiveness of cognitive and emotional social media posts as modalities to offset the knowledge gap between the beef industry and the general public and if this translates to improved perceptions. As a framework, social judgement theory was used. Social judgement theory is defined as the ways possible in which people can alter, judge, and respond to influences through communication and attitude change (Littlejohn and Foss, 2017).

Research Questions

There were two research questions to answer from this study.

RQ1: How did perceptions of humane treatment of livestock change after viewing the posts?

RQ2: Which post type, cognitive or emotional, was the most influential in perception change?

Methods

The purpose of this research was to measure the effectiveness of five cognitively based and five emotionally based Instagram posts related to the beef industry in altering pre-viewing perceptions. The ten posts contained imagery and content on animal welfare, consumer health, and environmental impact of beef consumption and production. These posts were extracted from

the investigator's Instagram account and for the cognitive content, additional information was inserted. Original images created for emotional appeal were taken from local beef ranchers. To determine whether the posts were emotional or cognitive based, a panel of experts skilled in social media were utilized. The emotional posts consisted of more pleasant imagery while the cognitive posts featured harsher images. For example, one emotional post featured a cow with her calf in a pasture. The description contained no scientific evidence or quotes. An example used for a cognitive post featured a cow in a squeeze chut being given a vaccination and used cited scientific factual evidence to explain the purpose and the importance of vaccinations.

Participant Population

10,000 students (undergraduate and graduate), all above the age of 19, which at the time of the study, were currently enrolled in classes at a southeastern university were asked for voluntary participation. There were no risks or negative consequences involved in taking this survey. Respondents could have exited the survey at any time. Their responses were both anonymous and unidentifiable. In the data cleansing phase, incomplete surveys were omitted and deleted. The recruitment and survey link were completely online, so no face-to-face interactions occurred. The survey was covered by an approved IRB (21-40). The population surveyed was a convenience sample due to the fact that undergraduate and graduate students typically use social media and are more disconnected from agriculture.

Recruitment and Survey Process

All study participants were recruited via an invitational email from the Office of Institutional Research at a land-grant university. Voluntary participation was asked for students across all 12 colleges of the university.

Upon accepting the invitation to participate, students completed a Qualtrics survey that asked demographic questions. Some of the question asked included: age, race, gender, what college they were enrolled, and if they had any involvement within agriculture. The presurvey asked five questions each about animal welfare, diet/health of red meat for consumers, and environment/sustainability. There were no limitations of who could participate. Upon completion of the presurvey, participants were directed to view 10 social media posts set to an Instagram format all on the aspects of animal welfare, diet/health, and environment/sustainability.

Participants were also asked which posts they preferred, in what ways could the posts be improved, which aspects of the posts really influenced their opinions about the beef industry, have they viewed anything similar to what you were shown today, and after viewing the posts, did they have more of a positive or negative view on beef cattle production.

Statistical Analysis

Materials for this project included ten social media posts, five emotional and five cognitive. All images were taken by the author and were derived from personal Facebook and Instagram profiles. A Qualtrics survey was used to collect the data which included asking for demographics, a presurvey data set, and a posttest survey data set. SPSS was used for data analysis which included the use of a combination of paired-sample t-tests and frequencies. The significance of these calculated scores was measured using of $p = \leq .05$. ATLAS was used for

qualitative data collection. Qualitative data included responses from the question, "After viewing the images, do you have more of a positive or negative view on beef cattle production?" In combination with using ATLAS, three research personnel were used as coding agents that categorized responses as loaded with positive sentiment, negative sentiment, and neutral sentiment. Qualitative sentiment analysis resulted in frequencies of sentiment presented by participants using SPSS.

A combination of t-tests and frequencies to compare the data from the pretest and the post-test groups. Likert type scale was used as a five-point scale, with the response categories: strongly agree (1); somewhat agree (2); neutral (3); somewhat disagree (4); and strongly disagree (5). Questions related to three main topics: animal welfare, diet/health of red meat, and environment/sustainability. In addition to the 15 questions, participants were asked to view and read the 10 social media posts formatted to look simulate real Instagram post. Results allowed determination which type of post had the greatest impact on participants and to determine if the study led to an effective mode of communication with the general public.

Results

The images produced a positive ($p < .05$) attitude alteration regarding the animal welfare practice statements. The data showed what the participant's views were before the viewing the posts and what the participant's views were after having seen the posts. Analysis of the response to the pre- and post-viewing survey statements within the animal welfare category showed a significant increase ($p < 0.001$) of opinion or perception which makes all 5 items significant. Four of the five items shifted in a positive direction in favor of the beef industry. This suggests that after viewing the posts, the participants had an altered perception of farmers treating their beef animals humanely, respectfully, and in a way that meets current welfare expectations (Table 1). Also, after viewing the posts, it is suggested that participants understand that animals should be treated in sickness, through means of rest, antibiotics, or medicine (Table 1).

Table 1. Paired sample statistics for welfare[1,3]

Pair of pre and post	Mean Pre	Mean Post[2]	*t*	*P*
I believe beef cattle are treated humanely.	2.84	1.86	18.669	<.001
I believe that it is necessary to treat sick animals. Such treatments could include rest, antibiotics, or medicine.	1.38	1.28	3.665	<.001
I think farmers treat their beef cattle with respect.	2.29	1.82	9.756	<.001
I believe beef cattle deserve to have access to clean water, fresh grass, and healthy feed.	1.64	1.77	-2.345	.019
I believe farmers treat animals in a way that meets current animal welfare standards.	2.42	1.83	12.386	<.001

[1]Survey of young adult college students about their opinion of welfare of animals prior to and after the viewing of a cognitive and emotionally based posts. N=438.

[2]Mean after viewing the posts.
[3]Results creating using a t-test from SPSS.
[4] A five-point Likert type scale was used with the response categories: strongly agree (1); somewhat agree (2); neutral (3); somewhat disagree (4); and strongly disagree (5).

In regard to diet and health of beef, participants demonstrated a split in decisions through their responses. Two pairs reached statistical significance while all 5 pairs shifted to positive perceptions in favor of the beef industry. After viewing the images, participants indicated that they would purchase more beef ($p < .001$), but also more strongly agreed that red meat products were healthier ($p < .001$)

When asked "I support the sale of beef products" in the pre-test and then asked, "After viewing these posts, I support the sale of beef products" the alpha significance level was .059 which is greater than $p < .05$. Therefore, the consumers' perceptions did not alter after viewing the videos and remained stable.

When asked, "I believe beef is safe to consume" in the pretest then asked, "After viewing these posts, I believe beef is safe to consume" it was not significant ($p = .901$). Their stances on whether to support the sale of beef products remained stable after viewing the posts. When asked "I support the sale of beef products" in the pretest and then asked, "After viewing these images, I support the sale of beef products" it was not statistically significant ($p = 0.059$) since it is greater than $p \leq 0.05$. Therefore, the views remained stable on whether to support the sale of beef products. The results suggest that the images did not shift participants' perception of support in the sale of beef products and that their opinions remained indifferent after viewing the images because they were already strongly supportive of beef.

Table 2. Paired sample statistics for diet/health[1,3]

Pair of pre and post	Mean Pre	Mean Post[2]	*t*	*P*
I purchase beef products weekly.	2.54	1.67	15.724	<.001
I believe that beef cattle should not be consumed.	4.33	4.32	.403	.687
I support the sale of beef products.	1.59	1.65	-1.892	.059
I believe that plant-based proteins are healthier than red meat.	3.15	2.46	7.596	<.001
I believe that beef is safe to consume.	1.50	1.50	.125	.901

[1]Survey of young adult college students about their opinion of diet/health of animals prior to and after the viewing of a cognitive and emotionally based posts. N=438.
[2]Mean after viewing the posts.
[3]Results creating using a t-test from SPSS.
[4] A five-point Likert type scale was used with the response categories: strongly agree (1); somewhat agree (2); neutral (3); somewhat disagree (4); and strongly disagree (5).

The respondents had mixed perceptions regarding environment and sustainability. Four of the following were significant. Out of the following, 2 shifted negatively while three shifted

positively. The negative shifts ($p \leq .05$) in perception regarding the environmental area of research or the sustainability of producing beef. The data suggests that participants feel that farmers do not care about the environment, the production of beef contributes to pollution, is unsustainable, and the industry should be phased out after viewing the posts (Table 3). The results suggest after viewing the posts, participants want farmers to communicate about their farming practices ($p < 0.321$).

Table 3. Paired sample statistics for environment/sustainability[1,3]

Pair of pre and post	Mean Pre	Mean Post[2]	*t*	*P*
I believe farmers do not care about the environment.	3.46	3.42	.993	.321
I believe farmers are the main contributors to pollution.	4.18	2.93	13.359	<.001
I believe the beef cattle industry is not sustainable.	2.16	3.95	11.477	<.001
I believe animal agriculture is a large contributor to pollution and should be phased out.	3.95	4.20	-5.487	<.001
I believe that farmers should communicate with the general public about their farming practices.	1.95	1.66	7.421	<.001

[1]Survey of young adult college students about their opinion of environment/sustainability of animals prior to and after the viewing of a cognitive and emotionally based posts. N=438.
[2]Mean after viewing the posts.
[3]Results creating using a t-test from SPSS.
[4] A five-point Likert type scale was used with the response categories: strongly agree (1); somewhat agree (2); neutral (3); somewhat disagree (4); and strongly disagree (5).

The results from the paired samples t-test provided us with insights on perception shifts from participants after viewing the posts. Though the results showed the posts producing both positive and negative shifts in perception, this provides us with understanding of what is best communicated through images where we can improve the images produced about the beef industry. Specifically, animal welfare practices are communicated effectively, while some aspects of the environment and especially the diet/health aspects of the beef industry could be improved to produce positive shifts in opinion.

A frequency table was used for the question, “Have you been exposed to posts like these before?” Out of the 438 participants, 50.7% said yes. This shows how easy it can be to upload and share information, whether it’s true or not about the beef industry.

Table 4. Frequency response to the question, “Have you been exposed to posts like these before?”[1,2]

Response	Frequency	Percent
Yes	222	50.7
No	216	49.3
Total	438	100

[1]Survey of young adult college students on perceptions about beef animals topics after viewing a cognitive and an emotionally based video.
[2]Results creating using a frequency from SPSS.

For the question, "After viewing these images, do you have more of a positive or negative view on the beef industry?", out of the 438 respondents, 64.4% had a more positive response. The initial hypothesis was proven correct in the fact that majority of responders were left with a positive view after completing the survey.

Table 5. Frequency response to the question, "After viewing the images, do you have more of a positive or negative view on beef cattle production?"

Response	Frequency	Percent
Positive	282	64.4
Negative	29	6.6
Neutral	127	29.0
Total	438	100

[1]Survey of young adult college students on perceptions about beef animals topics after viewing a cognitive and an emotionally based video.
[2]Results creating using a frequency from SPSS.

For emerging themes in response to the question, "In what ways could the posts you viewed be improved?" Responses were coded as either positive or negative or neutral for themes. As far as positive themes go, the top three common codes were that "The posts represented real-life beef farms" (1) "The presence of sources reinforced the credibility of the posts" (2) and "Farmers take care of their beef animals" (3). When asked for negative factors, the top three common responses were, "The formatting of the social media posts were not representative of Instagram (1), "The information was fake and staged" (2) and "More sources would have provided more credibility" (3).

Emerging themes in response to the question, "Which aspects of the videos really influenced your opinions about the beef industry?" 82% were positive, 11% were neutral, and 7% were negative. The top 3 positive themes were "The videos provided a transparent view about the beef industry" (1), "food animals are raised wholesomely, respectfully, and humanely" (2) and "the videos influenced me to have a more positive outlook on beef" (3). The top negative 3 were "my opinions did not change" (1) "the information provided was staged and biased" (2), and "more facts and statistics would help explain beef production" (3).

Discussion

With many people removed from agriculture a lack of knowledge and understanding has occurred (Rice, et al., 2020). In this study, Instagram was used as a model to display information about the industry alongside images of functioning cattle operations as it has high popularity among social media users as indicated in this study. Animal activism can promote negative ideas about the livestock industry of animal industries and can change perceptions in a negative manner (Cardoso, et al., 2016). Even in this study, a few images that consumers may perceive as negative images were used such as a calf being tagged, and a calf being vaccinated. Both ear

tagging and vaccinations are necessary procedures but to the non-ag audience can be perceived as inhumane.

Godfrey and others claim that those who are uninformed, or anti-agriculture argue more intensive farming practices can harm the environment (Godfrey, et al., 2010). A social media post can only fit so much information on it. Despite the intentions of the survey to inform consumers of sustainable farming practices, they remain unsure of the actual impact of agriculture on contribution of carbon to the environment. Much like the Olausson (2017) study, environment along with red meat were the biggest concerns for participants of this study. Participants in both studies as well as Olausson's preferred images that had positive elements displayed such as people and cows with their calves, more than the perceived negative images such as those where the calves are restrained.

Diet and health are another area of concern for consumers specifically regarding red meat's nutritional value. Ensuring consumers are informed correctly is extremely important because their beliefs directly impact purchasing decisions (Oesterreicher et al., 2018). Currently, people have many choices as alternatives to red meat especially with the introduction of plant-based proteins (Mann 2018) which is a reason why communication and education is extremely important. This study utilized Instagram to generate posts while other studies have investigated using farmer's preference of Facebook according to Raj and others (2020) as their choice of social media platform. According to Raj and others, "The WhatsApp, YouTube and Facebook were the most commonly used social media tools by majority of the livestock farmers" (Raj, et al., 2020 p.4).

Increasing availability of virtual media and consequently increasing use of social media as a vector for sharing information has allowed propagation of misinformation regarding animal agriculture. As a test of mitigation, this study was created to measure perception shifts after viewing 2 different kinds of social media posts: cognitive Instagram posts and emotional Instagram posts. In this study, participants indicated their affability of statements regarding the beef industry focused in three areas including animal welfare, diet and health of beef, and sustainability of beef production. The project social media posts were created and approved by a team of experts in the field, where five emotionally charged posts and five cognitively charged posts were generated to reflect similar structure to Instagram. Each post had an image and a caption describing the image below it. Emotional post captions reflected the wholesomeness of beef, family values amongst industry producers, and the values of motivations for farmers to provide food for the world. Cognitive post captions introduced factual information and sources to back up the claims. It was anticipated that emotionally charged posts would influence participant perceptions greater than cognitively charged posts because people tend to lean on their emotions when using social media.

It was hypothesized that intervention of cognitive and emotional social media posts will both shift opinions regarding production of beef positively, especially the emotional posts, and the data suggests this is true. As a result of viewing these posts, participants had a more positive outlook on the beef industry. Each question subset produced significant changes in perception after viewing the posts. Overall, concepts of animal welfare were best translated in contrast to diet and health of beef or sustainability of beef. Considering this, the results reinforce the idea that social media can be an effective tool for sharing information about the beef industry and has a massive potential to cultivate appreciation for animal agriculture.

As commonly seen in other non-scientific areas, social media has the power to motivate specific audiences to fit their agenda (Kerpen D., 2015). Both the descriptive statistics and paired

samples t-test conducted demonstrate this concept, where after viewing the posts, participants had altered perceptions regarding animal welfare of beef animals, diet and health of beef products, and the environmental impact or sustainability of beef production. The data suggest that animal welfare topics have the greatest potential for application in real-life situations, such as communicating the safety and wholesomeness of raising beef cattle. Participant understanding of health of beef products and sustainability of beef production are less conclusive, but still very important in understanding their confidence in the beef industry. In compliment to quantitative measures explored, qualitative measures from the results provide details on participants' level of influence through social media. For example, participants thoroughly enjoyed the posts regardless of emotional or cognitive status, but participants were suspicious of the photos being staged. This is interesting because though people tend to trust what they see on social media, true statements about animal agriculture is suspected to be false. Though suspicions and other negative comments were discovered throughout the data analysis, there were a plethora of positive comments as well. The posts influenced participants positively and helped shift their opinion of the beef industry to a more positive and supportive perspective.

Social media is an excellent way to communicate between different groups of people (Randolph et al., 2021). Within this study transparency was another area that participants preferred to see in posts which can lead consumers to have a clearer view of the beef industry. Lochner and others claim that visuals and images can be used to present complex and difficult or unknown information in an easy-to-understand manner (Lochner, et al., 2021). When Lochner and others used social media to distribute posts about the industry, their findings concluded that posts that contained images or infographics faired far better than just informational materials (Lochner, et al., 2021) which is consistent with the results of the present study.

Limitations and Future Research

Should this study be repeated, it would be important to factor in different forms of social media. Perhaps, participants would have better responses if the posts were used through Facebook or Twitter. Additional studies should include more diversity in the images of the posts. Another limitation is that Instagram posts can only have so many words and a limit of pictures used per post. It would also be encouraged to include sources where the images were taken should this study be repeated.

Conclusion

In order to relay scientific information to the general public, an easier form of communication is needed. Social media is a necessary tool in combatting the lack of knowledge consumers face due to being so far removed from the farm. Instagram posts seem to be effective in helping lessen this knowledge gap yet more research is needed around image management and content on the latest data on environment and sustainability topics. More information is needed on most effective communication messaging and modalities in order to strengthen perceptions of the beef industry among non-agricultural audiences. More social media platforms should also be utilized in order to test this theory. Should this study be repeated, Facebook, TikTok, or Twitter would be excellent platforms to use due to having wide user bases. This study was also aimed at college undergraduates currently using social media platforms. Future research opportunities

could include targeting a wider range of audiences or expanding to different platforms. Something other than a convenience sample may also be used.

References

Amos, N., Sullivan, R., Romanowicz, B., & van de Weerd, H. (2021). The business benchmark on farm animal welfare report 2021. *BBFAW*. https://www.bbfaw.com/

Arrieta, E. M., & González, A. D. (2018). Impact of current, national dietary guidelines and alternative diets on greenhouse gas emissions in Argentina. *Food Policy*. https://www.sciencedirect.com/science/article/abs/pii/S0306919217303627

Beef Board. (2015). 2016-2020 Beef industry long range plan final report. [Pamphlet]. https://www.beefboard.org/blog/2015 Summer Conference/2016-2020 Beef Industry LRP Final Report - for printing.pdf

Carfora, V., Conner, M., Caso, D., & Catellani, P. (2020). Rational and moral motives to reduce red and processed meat consumption. *Journal of Applied Social Psychology*, *50*(12), 744. https://doi.org/10.1111/jasp.12710

Cardoso, C. S., Hötzel, M. J., Weary, D. M., Robbins, J. A., & von Keyserlingk, M. A. G. (2016). Imagining the ideal dairy farm. *Journal of Dairy Science*, 99(2), 1663–1671. https://doiorg.spot.lib.auburn.edu/10. 3168/jds.2015-9925

Cezimbra, I. M., de Albuquerque Nunes, P. A., de Souza Filho, W., Tischler, M.R., Genro, T. C. M., Bayer, C., Savian, J. V., Bonnet, O. J. F., Soussana, J.-F., & de Faccio Carvalho, P. C. (2021). Potential of grazing management to improve beef cattle production and mitigate methane emissions in native grasslands of the Pampa biome. *The Science of the Total Environment*, *780*, 1-8. https://doi.org/10.1016/j.scitotenv.2021.146582

Cooke, A., Mullan, S., Morten., Hockenhull, J., Lee, M., Cardenas, L., & Rivero., L. (2022). V QBA vs. QBA—How do video and live analysis compare for qualitative behaviour assessment? *Frontiers in Veterinary Science*, *9*. https://doi.org/10.3389/fvets.2022.832239

Coulter, K., & Campbell, B. (2020). Public investment in animal protection work: data from Manitoba, Canada. *Animals*, *10*(3) 1-14. https://doi.org/10.3390/ani10030516

Edwards-Callaway, L. N., & Calvo-Lorenzo, M. S. (2020). Animal welfare in the US slaughter industry-a focus on fed cattle. *Journal Of Animal Science*, *98*(4). https://doi.org/10.1 093/jas/skaa040

Fischer, L. M., Opat, K., Jennings, K., & Meyers, C. (2021). Visualizing values: a content analysis to conceptualize value congruent video messages used in agricultural communications. *Journal of Applied Communications*, *105*(2), 1–18. https://doi.org/10.4148/1051-0834.2368

Fusi, F., Lorenzi, V., Franceschini, G., Compiani, R., Harper, V., Ginestreti, J., Ferrara, G., Sgoifo Rossi, C. A., & Bertocchi, L. (2021). Animal welfare and biosecurity assessment: a comparison between Italian and Irish beef cattle rearing systems. *Animal Production Science*, 61(1), 55–63. https://doi.org/10.1071/AN19611

Godfray, H. C. J., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F., Nisbett, N., Pretty, J., Robinson, S., Toulmin, C., & Whiteley, R. (2010). Introduction: The future of the global food system. *Philosophical Transactions: Biological Sciences*, *365*(1554), 2769–2777.

Grunert, K. G., Hieke, S., & Wills, J. (2014). Sustainability labels on food products: consumer motivation, understanding and use. *Food Policy*, *44*, 177–189. https://doi.org/10.1016/j.foodpol.2013.12.001

Houldsworth, A. (2020). Trust me I'm a doctor; the importance of trust in promoting high performance learning in medical education. *MedEdPublish*, *9*(1). https://doi.org/10.15694/mep.2020.000184.1

Ishani, F., & Seock, Y.-K. (2019). Instagram influencer's sponsored posts: measuring users' attitude towards sponsored posts and purchase intentions in the United States. University of Georgia.

Kerpen, D. (2015). Likeable social media: how to delight your customers, create an irresistible brand, and be amazing on Facebook, Twitter, LinkedIn, Instagram, Pinterest, and more (2nd ed.). New York, NY: McGraw Hill.

Klurfeld, D. (2018). What is the role of meat in a healthy diet? *Animal Frontiers*, *8*: 5–1. https://doi.org/10.1093/af/vfy009

Kubacak, K., Meyers, C., Ford, H. L., Nan Li, & Irlbeck, E. (2022). Influence of Message Theme on Consumer Perceptions of Lab Grown Meat. *Journal of Applied Communications*, *106*(1), 1–15. https://doi.org/10.4148/1051-0834.2401

Liao, X., Zheng, D., Wu, Y., & Cao, X. (2021). Should We Trust Influencers on Social Networks? On Instagram Sponsored Post Analysis. *2021 International Conference on Computer Communications and Networks (ICCCN), Computer Communications and Networks (ICCCN), 2021 International Conference On*, 1–8. https://doi.org/10.1109/ICCCN52240.2021.9522209

Littlejohn, S.W. & Foss, K.A. (2017). Theories of Human Communication (11th ed.). Long Grove, IL: Waveland Press.

Lochner, H. L., Swenson, R. D., & Martinson, K. L. (2021). Audience engagement when disseminating livestock information through infographics on social media. *Natural Sciences Education*, *50*(2), 1–9. https://doi.org/10.1002/nse2.20074

Locke, S. (2022). Beef communication within the digital pasture: Tools that impact consumer perceptions. AUETD Home. https://etd.auburn.edu//handle/10415/8236

Malik, P. K., Trivedi, S., Mohapatra, A., Kolte, A. P., Sejian, V., Bhatta, R., & Rahman, H. (2021). Comparison of enteric methane yield and diversity of ruminal methanogens in cattle and buffaloes fed on the same diet. *PLoS ONE*, 1–19. https://doi.org/10.1371/journal.pone.0256048

Mann, N. J. (2018). A brief history of meat in the human diet and current health implications. *Meat Science*, *144*, 169–179. https://doi.org/10.1016/j.meatsci.2018.06.008

Marshalsey, L., & Sclater, M. (2019). Arts-based educational research: the challenges of social media and video-based research methods in communication design Education. *International Journal of Art & Design Education*, *38*(3), 723–739.

Martono, K. T., Utama, C. S., Sulistiyanto, B., & Christiyanto, M. (2016). Utilization of social media in livestock product marketing group of cattle. *2016 3rd International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE), Information Technology, Computer, and Electrical Engineering (ICITACEE), 2016 3rd International Conference On*, 1–5. https://doi.org/10.1109/ICITACEE.2016.7892464

Mavrodiev, P., & Schweitzer, F. (2021). The ambiguous role of social influence on the wisdom of crowds: An analytic approach. *Physica A: Statistical Mechanics and Its Applications*, *567*. https://doi.org/10.1016/j.physa.2020.125624

Meyer, R. (2015). Physiologic measures of animal stress during transitional states of consciousness. *Animals*, *5*(3), 702–716. https://doi.org/10.3390/ani5030380

Mulvaney, D., (2020). Addressing urgency: if opportunity doesn't knock, build a door of leadership. *Journal of Animal Science, 98*, 41-42. https://doi.org/10.1093/jas/skaa278.134

Olausson, U. (2018). "Stop Blaming the Cows!": How Livestock Production is Legitimized in Everyday Discourse on Facebook. *Environmental Communication*, *12*(1), 28–43. https://doi-org.spot.lib.auburn.edu/10.1080/17524032.2017.1406385

Ortega, D. L., & Wolf, C. A. (2018). Demand for farm animal welfare and producer implications: results from a field experiment in Michigan. *Food Policy*, *74*, 74–81. https://doi.org/10.1016/j.foodpol.2017.11.006

Powers, R., Li, N., Gibson, C., & Irlbeck, E. (2020). Consumers' evaluation of animal welfare labels on poultry products. *Journal of Applied Communications*, *104*(1), 1a. https://doi.org/10.4148/1051-0834.2310

Privitera, G. J., & Ahlgrim-Delzell, L. (2019). Research methods for education. SAGE Publications

Raj, U. M. R., Satyanarayan, K., Jagadeeswary, V., Rathod, P., Kumar, S. N., & Mahadevappa, D. G. (2020). Utilization of Social Media for Accessing Scientific Information by Livestock Farmers in Karnataka State. *Indian Journal of Veterinary Sciences & Biotechnology*, *15*(4), 80–83. https://doi.org/10.21887/ijvsbt.15.4.17

Rice, M., Hemsworth, L. M., Hemsworth, P. H., & Coleman, G. J. (2020). The impact of a negative media event on public attitudes towards animal welfare in the red meat industry. *Animals*, *10*(4). https://doi.org/10.3390/ani10040619

Robbins, J. A., Franks, B., Weary, D. M., & von Keyserlingk, M. A. G. (2016). Awareness of ag-gag laws erodes trust in farmers and increases support for animal welfare regulations. *Food Policy*, *61*, 121–125. https://doi.org/10.1016/j.foodpol.2016.02.008

Rogers, Everett. (2003) 5th edition. Diffusion of Innovations. *Free Press*. New York, NY.

Schwartzkopf-Genswein, K. S., Stookey, J. M., Crowe, T. G., & Genswein, B. M. A. (1998). Comparison of image analysis, exertion force, and behavior measurements for use in the assessment of beef cattle responses to hot-iron and freeze branding. *Journal of Animal Science*, *76*(4), 972.

Simis, M. J., Madden, H., Cacciatore, M. A., & Yeo, S. K. (2016). The lure of rationality: why does the deficit model persist in science communication? *Public Understanding of Science*, *25*(4), 400–414. https://doi.org/10.1177/0963662516629749

de Souza, D. M., Petre, R., Jackson, F., Hadarits, M., Pogue, S., Carlyle, C. N., Bork, E., & McAllister, T. (2017). A review of sustainability enhancements in the beef value chain: state-of-the-art and recommendations for future improvements. *Animals* (2076-2615), 7(3), 26. https://doi.org/10.3390/ani7030026

Spain, C. V., Freund, D., Mohan-Gibbons, H., Meadow, R. G., & Beacham, L. (2018). Are they buying it? United states consumers' changing attitudes toward more humanely raised meat, eggs, and dairy. *Animals*, *8*(8). https://doi.org/10.3390/ani8080128

Specht, A., J. Rumble, and E. Buck. (2020). "You call that meat?" investigating social media conversations and influencers surrounding cultured meat. *Journal of Applied Communications. 104*(1). https://doi.org/10.4148/1051-0834.2303.

Van Elswyk, M. E., & McNeill, S. H. (2014). Impact of grass/forage feeding versus grain finishing on beef nutrients and sensory quality: The U.S. experience. *Meat Science*, *96*(1), 535–540. https://doi.org/10.1016/j.meatsci.2013.08.010

Ventura, B. A., von Keyserlingk, M. A. G., Wittman, H., & Weary, D. M. (2016). What difference does a visit make? changes in animal welfare perceptions after interested citizens tour a dairy farm. *PLoS ONE*, *11*(5), 1–18. https://doi.org/10.1371/journal.pone.0154733

Wickman, A., Duysen, E., Cheyney, M., Pennington, W., Mazur, J., & Yoder, A. (2021). Development of an Educational YouTube Channel: A Collaboration between U.S. Agricultural Safety and Health Centers. *Journal of Agromedicine*, *26*(1), 75–84. https://doi.org/10.1080/1059924X.2020.1845269

Wyn Morris, & Penri James. (2017). Social media, an entrepreneurial opportunity for agriculture-based enterprises. *Journal of Small Business and Enterprise Development*, *24*(4), 1028–1045. https://doi.org/10.1108/JSBED-01-2017-0018