

South Dakota State University Beef 2020 increases participant knowledge of the beef industry¹

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ABSTRACT: South Dakota State University has developed a hands-on program that addresses the preharvest management factors that influence beef carcass value to aid producers in their management and marketing decisions. The 3-d program includes live cattle and carcass evaluation, beef carcass fabrication, a harvest demonstration, sensory panel, and presentations on topics including live market cattle evaluation, health, and disposition in relation to carcass quality, feeding and management, and value-added beef cuts. To evaluate program effectiveness, data were collected from all programs held between 2013 and 2019. Participants were asked to evaluate their perceived value for each program component, as well as their knowledge of the industry prior to and after completing the program. Upon completion of the 2018 Beef 2020, a focus group of program alumni was assembled to better understand participant experiences, application of the material, and guide future programming. The

recommendations of the focus group were implemented during the 2019 program. Component value scores are reported in a box and whisker plot and participant knowledge was evaluated using a paired *t*-test with significance determined at $P < 0.05$. Special attention was given to the results of 2019 compared to previous years to determine the efficacy of the program changes. Overall, the average value scores for the sessions all ranked above 8 on a scale of 1–10, indicating a relatively large value to participants. Knowledge of carcass traits, carcass value, and management factors that influence those traits increased after participation in the Beef 2020 program (5.18 vs. 7.67 ± 0.16 ; $P < 0.0001$). The use of a focus group was concluded to be an effective means of assessing program value, strengths, and weaknesses. The Beef 2020 program can be used as a model for other Extension professionals to create programs intended to link livestock producers to their end products.

Key words: beef, carcass, evaluation, Extension, focus group, hands-on

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INTRODUCTION

Marketing of fed cattle has changed drastically over the last 20 years. In 1996, an estimated 8.1% of cattle were sold using a grid-based marketing system. By 2001, this number increased to 43.5% and, in 2018, an estimated 90% of cattle were marketed on a carcass grid or formula-based system

(Schroeder et al., 2002; USDA, 2018). Changes in marketing methods mean that producers' economic returns are more impacted by the quality of their cattle than in the past, increasing the importance of understanding the changing marketplace, as well as consumer demands (Bailey et al., 1995). However, the U.S. beef industry is managed by a variety of cattle producers that represent different segments of the industry from seedstock operators to back-grounders and feedlots, with very few producers maintaining ownership from birth to harvest. While these producers may be knowledgeable about their specific segments, they may not be as familiar with other aspects of beef production or understand that management decisions throughout a beef animal's life can affect carcass traits and consumer acceptability. To help bridge these knowledge gaps, South Dakota State University (SDSU) developed Beef 2020. This program is targeted to cattle producers, beef purveyors, and allied industry representatives and addresses the preharvest management factors that influence beef carcass value through a hands-on workshop. The program objectives of Beef 2020 are to provide representatives of the beef industry with 1) hands-on learning activities involving live cattle and carcass evaluation, factors that affect palatability, and carcass fabrication to effectively develop an understanding of factors that create value differences among beef cattle and 2) feeding management and marketing techniques that may be utilized in the raising and marketing of high-value beef cattle. To evaluate program effectiveness and to aid in future programming decisions, participant survey results, as well as results from a focus group, were analyzed.

MATERIALS AND METHODS

SDSU Beef 2020 has been presented 19 times over the past 24 years. Though the program has evolved over the years, the main focus has always been to provide a hands-on experience for beef industry stakeholders to learn about the factors that influence beef carcass value. The program averages 20 participants each year and is presented over a 3-d period. The program includes live cattle and carcass evaluation, beef carcass fabrication and value determination, a harvest demonstration, sensory panel, and presentations. Presentation topics include live market cattle evaluation, health and disposition in relation to carcass quality, feeding and management, fed cattle marketing, export markets, and a discussion of value-added beef cuts. A standard evaluation form was utilized for participants to

provide feedback about the program from 2013 to 2018. Following the 2018 program, a focus group was convened with alumni of the program to more thoroughly evaluate participant experiences, understand long-term application of the material, and guide future programming.

Live Cattle Evaluation

SDSU Beef 2020 provides participants the opportunity to determine the value of a beef animal on a carcass basis. The program begins with an introduction to live cattle evaluation, followed by the opportunity to evaluate a group of live cattle and estimate their yield and quality grade, thus mimicking the job of a packer or order buyer. To more accurately mimic real-world situations, the cattle used for this exercise represent a variety of breeds, yield grades, and estimated quality grades. Animal procedures were reviewed and approved by the SDSU Institutional Animal Care and Use Committee (approval number 18-012A). Estimation of yield grade is conducted through group discussion where participants are encouraged to provide their opinions regarding factors that impact fat deposition and muscling. Quality grades are estimated after consideration of fat cover, breed type, and any structural issues the animals may have.

Carcass Value Determination

The participants are divided into groups to view previously recorded videos of live cattle that have been harvested prior to the program. Each group is asked to bid on the animals in a mock auction setting. Participants are provided with a bid ceiling and floor that is determined based on actual market prices. They are allowed 15 min after watching the videos to submit their bids in a sealed bid format. Starting with the first animal on the bid list, the top two bidders for that animal are allowed to increase their bids until one group prevails. Once each group purchases an animal, they participate in a hands-on evaluation of the quality and yield grade of their animal's carcass.

The following day, the groups participate in the fabrication of one side of their animal's carcass. The value of the carcass is determined by weighing each wholesale cut and multiplying the weight by the current market price for that cut based on the quality grade of the carcass. The overall value of the carcass is determined after subtracting standard harvest and processing costs. Participants then compare the overall value of

the carcass to their purchase price to determine if they had a profit or loss with the purchase of that animal.

Presentations

In addition to the carcass value activities, participants are also exposed to other beef industry topics. Since its inception, Beef 2020 has evolved and the combination of presentation topics is subject to change based on speaker availability, although topics from 2013 to 2019 had very little variation. Presentation topics have included beef quality assurance, genetic prediction of carcass merit, impact of health and disposition on carcass quality, feeding and management decisions for improved carcass quality, beef carcass grading and pricing, marketing slaughter cattle, factors that affect beef eating quality, natural and organic beef production, preweaning and postweaning management strategies for improved carcass quality, value-added cuts, import/export balance, and industry perspectives on beef value. Each topic is scheduled for a 45-min time slot allowing for the presentation and questions. On the last day of the program, all presenters are brought back for an open discussion where participants can ask any questions that they have about the beef industry.

Demonstrations and Hands-on Activities

On the first day of Beef 2020, participants take part in a carcass grading activity. Participants are provided with five to six ribbed carcasses to grade and measure. Following the session, participant measurements and grades are compared to the official calls made by the presenters.

A harvest demonstration is provided by the SDSU Meat Laboratory during the morning of the second day of the program. A discussion is led by SDSU personnel and comparisons between small plant and large plant harvest methods are highlighted. Additionally, the South Dakota state inspector overseeing harvest speaks to the group about their duties regarding meat safety.

The second demonstration occurs during the fabrication activities previously described. One side of a beef carcass is fabricated by SDSU personnel as a demonstration before groups are able to fabricate their own carcasses. To ensure continuity among the cuts made from each carcass, cutting instructors circulate throughout the fabrication room answering questions and aiding participants when needed.

The final hands-on activity during the program is a consumer sensory panel conducted at the end of the second day. Striploin steaks are collected from each carcass utilized in the group exercise, cooked to a consistent internal temperature, and cut into cubes. Participants evaluate each sample using an eight-point hedonic scale for tenderness, juiciness, and beef flavor intensity (1 = extremely dry, tough, or bland flavor; 8 = extremely juicy, tender, or intense flavor). The results for all participants are compiled and revealed to the group along with the identity of the carcass each steak comes from. As a supplement to the tenderness score, Warner–Bratzler shear force is evaluated for each of the carcasses to provide an objective measure of tenderness. A comparison of sensory tenderness scores and Warner–Bratzler shear force value is used to bridge the gap between subjective and objective tenderness measurements.

Program Evaluation

Participants are provided with an evaluation form at the beginning of Beef 2020. The first section of the evaluation asks participants to rate each portion of the program according to its value to them or their operation on a scale of 1 = not valuable to 10 = highly valuable. The second section asks participants to rate their knowledge of carcass traits, carcass value, and management factors that influence those traits prior to and after attending Beef 2020 on a scale of 1 = extremely limited to 10 = extremely knowledgeable. The final section consists of open-ended questions to gather information about potential changes participants might make in their operation based on their attendance, if participants would recommend the program to others, what other topics participants would suggest, and general comments. Due to the open-ended nature of the session value scores, simple averages are reported, but no inference can be made regarding the nominal level of the scores. A paired *t*-test was used to evaluate the before and after program knowledge values. Statistical analysis was conducted using SAS version 9.4. Significance was indicated at $P < 0.05$.

Focus Group

Following the 2018 Beef 2020 program, the planning committee decided to closely assess the program to determine if objectives were being met. A focus group format was utilized because focus groups are effective at identifying needs that other assessments, such as postprogram evaluation, may miss (Gamon,

1992). During the summer of 2018, 13 program alumni that completed the program in 2017 or 2018 were invited to participate in the focus group. The purpose of the focus group was to evaluate the effectiveness of the Beef 2020 program and to determine what changes may need to be implemented to improve the program. The participants were divided into three approximately equal-sized groups.

Four moderators that did not participate in the 2017 or 2018 Beef 2020 programs were chosen to moderate because focus groups are more effective when the moderator is not familiar to participants (Gamon, 1992). Moderators were provided with two questions on one of four specific sections of Beef 2020, including 1) presentations, 2) beef carcass fabrication, 3) grading and pricing, or 4) live cattle evaluation. The questions asked by each moderator are listed in Table 1. Each moderator was instructed to present each question and ask for clarification of points made by panelists but not to influence panelists with their own opinions of the program. Moderators recorded responses to each question to be used in the second portion of the focus group. Each group was with each moderator for a total of 10 min to ensure that the discussions stayed on topic and so that the focus group would stay under the 2-h recommendation (Gamon, 1992). After each group met with all moderators, the moderators reviewed the responses to look for trends among groups. Then, each moderator addressed the whole group to ask for any other points of clarification or additions to the responses after participants were able to view the points made by other groups. The focus group ended with an open discussion to allow participants to answer more general program questions and to provide any other insight about the program. After the focus group was concluded, results were compiled and a set of recommendations for the 2019 Beef 2020 program was established.

RESULTS AND DISCUSSION

Focus Group and 2019 Program Changes

The completion of the 2018 focus group resulted in the following primary recommendations future Beef 2020 programs: 1) continue offering the Beef 2020 program, 2) reorganize the schedule to allow for a grading lecture to precede the live animal grading exercise and to split the fabrication session into two parts, 3) increase the focus on retaining ownership of cattle through the entire marketing chain, 4) include more material on beef labeling and marketing, 5) and include more perspectives from the industry.

The 2019 schedule was rearranged to allow for a lecture on beef grading to familiarize participants with yield grading calculations and terminology prior to the live animal portion. To improve familiarity with yield and quality grading, the carcass grading activity was split into two separate group sessions. One group was provided with a set of carcass characteristics, including maturity score, marbling score, hot carcass weight, percentage of kidney, pelvic, and heart fat, ribeye area, and backfat thickness, which they used to determine USDA yield and quality grades. The other group practiced taking the carcass measurements used in those determinations. Once each group finished their activity, they were rotated. Splitting the group into two parts allowed participants more one-on-one time with instructors and increased opportunities to grade more beef carcasses compared to previous years.

Fabrication was split into morning (forequarter) and afternoon (hindquarter) sessions. This break in the schedule gave participants an opportunity to take a break to warm up and sit down, resulting in less fatigue. Second, breaking up the classroom time reduced the duration of time participants were asked to sit and listen to

Table 1. Focus group questions asked to a subsample of Beef 2020 alumni who participated in the program in 2017 or 2018

Topic	Question
Grading and pricing	What did you learn about the purpose and use of the USDA grading system?
Grading and pricing	What do you understand about how grading is used to price cattle?
Beef carcass fabrication	What did you learn about variations in carcasses and how that affects value?
Beef carcass fabrication	What understanding did you gain about challenges the packing industry faces?
Presentations	What practices introduced in the presentations have you implemented or do you plan to implement in your operation?
Presentations	What additional topics should be included in the presentations?
Live cattle evaluation	What did you learn from the live evaluation portion of Beef 2020 that could affect your management decisions?
Live cattle evaluation	Explain how live animal evaluation relates to carcass value.

Participants were divided into four groups and asked two questions per topic. Feedback was used to establish recommendations for the 2019 program.

lectures and, thereby, improved their ability to maintain attention and focus. Overall, this change improved workflow for the second day and benefitted both the fabrication activity and response to presentations.

To address the third suggestion, information about the SDSU Calf Value Discovery Program was provided in 2019. Calf Value Discovery is a separate program that allows producers to retain ownership of their calves to harvest and receive the feedlot performance and carcass data of their animals. This information provides participants an opportunity to understand the process of retaining ownership and an option to explore if they chose to do so in the future.

The fourth recommendation was to include a presentation discussing labeling and marketing programs, while the final recommendation from the focus group was to bring in more industry perspectives. To address these points, two representatives from the industry were invited to interact with participants. A cattle buyer from a major packing plant in the region assisted with the live cattle evaluation and shared pricing examples, and a representative from one of the major branded beef programs provided a perspective on marketing in an industry with an increasing emphasis on product quality and consistency.

Evaluation Results

Evaluations were compiled from 2013 to 2019 ($n = 138$). Participants in the Beef 2020 program were not required to submit an evaluation at the end of a program, nor were they required to answer all questions. Therefore, some scores may have fewer than 138 responses and were analyzed accordingly. Due to the changes made as a result of the focus group in 2018, changes in value scores from 2018 to 2019 are of interest. Therefore, results are reported as an overall average from 2013 to 2017, as well as specific year averages for 2018 and 2019.

Session value scores are shown in [Fig. 1](#). From 2013 to 2017, average session value scores ranged from 8.1 (Marketing Slaughter Cattle Presentation) to 9.0 (Beef Fabrication Activity).

The overall average score for the live cattle evaluation portion was 8.3; in 2019, the score increased to 9.0. Adding the live cattle buyer expertise and an increased focus on understanding grading factors and terminology likely contributed to the observed score increase.

The value of the carcass grading activity increased from 8.6 in 2018 to 8.8 in 2019. From 2018 to 2019, the program was modified to split the carcass grading session into two rotations to improve the understanding of yield and quality grading. One rotation involved a worksheet where participants calculated yield grades from a set of carcass characteristics with the addition of a yield grading “cheat sheet” to help them solve the calculations. The other rotation allowed participants to measure carcass characteristics of six beef carcass sides to increase the understanding of how those measurements are collected. It is likely that the increase in value score for carcass grading was the result of increased attention in the instruction of working through grading calculations.

The marketing slaughter cattle session score increased from 7.6 in 2018 to 8.5 in 2019. The participants in the 2019 program seemed extremely interested in the marketing session and how following their own calves through to harvest can impact their bottom line. Five participants specifically indicated on the evaluation that they will enroll in the SDSU Calf Value Discovery Program in 2019. Another seven participants indicated that the most important information they took from the 2019 program was knowledge about marketing grids and the marketing of slaughter cattle. Thus, the increase in session score is not surprising as it appears that the group of participants in the 2019 program were highly interested in this information. These data support the results from a statewide needs assessment conducted by Iowa State University that concluded that increased education efforts on risk management and price discovery would be necessary for cattle producers to position themselves to ensure a profit each year ([Gunn and Loy, 2015](#)).

The beef fabrication exercise score increased from 8.3 in 2017 to 8.6 in 2019. However, it was still below the 2013–2017 average of 9.0. A recurring theme identified in the focus group for carcass fabrication was that spending 4 h cutting with only a small break in the middle was overwhelming. As a result, carcass fabrication was split into two 2.5-h sessions with a 2-h break in between. Five participants in 2019 indicated on their evaluations that splitting the fabrication portion was a good way to break up the classroom portion and helped keep them interested in the fabrication exercise.

Value scores for the harvest demonstration decreased from 8.8 in 2018 to 8.1 in 2019. In 2019, the harvest demonstration obtained five scores

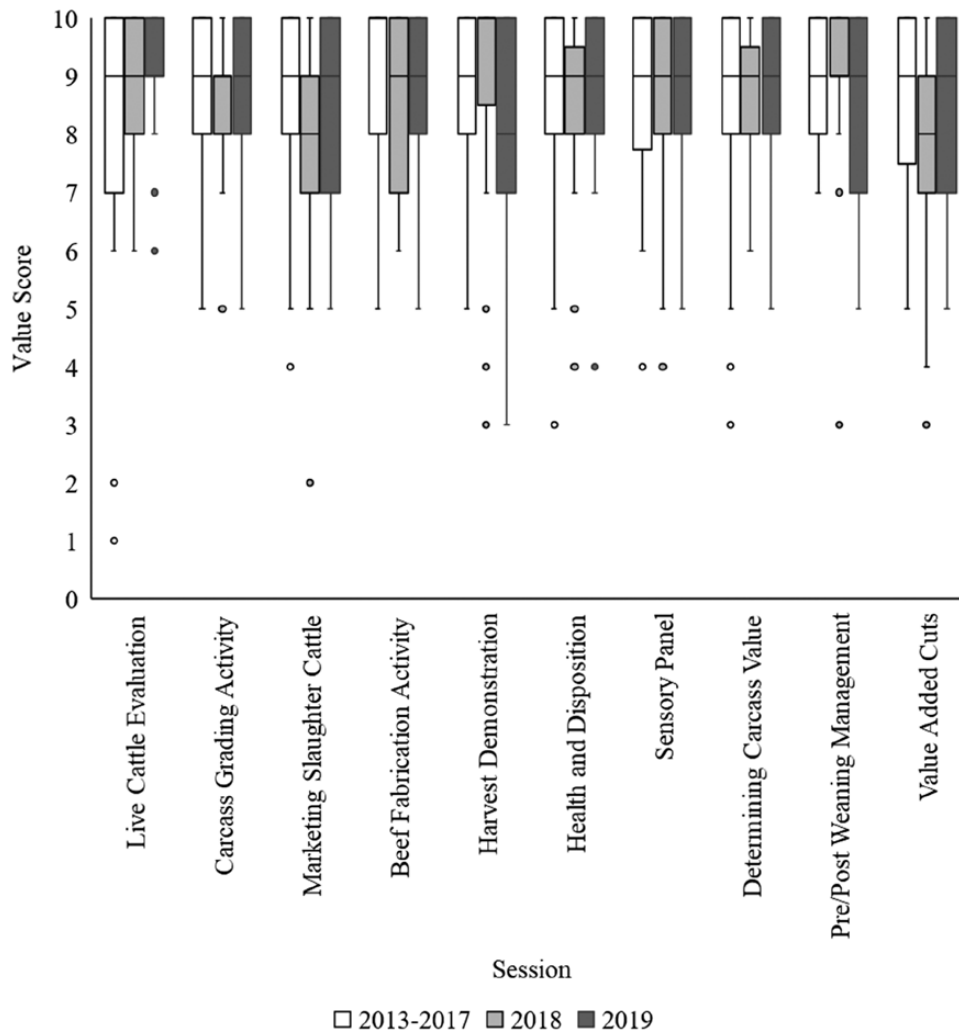


Figure 1. Box and whisker plot of session value scores from SDSU Beef 2020 programs 2013–2019. Participants rated the value of program sessions on a scale of 1 = not valuable to 10 = highly valuable. Due to significant program changes implemented after the 2018 program, special attention was focused on how scores shifted from 2018 to 2019. Scores from 2013 to 2017 were combined as a baseline reference.

under 6, but the session had an overall mode of 10. Historically, from 2013 to 2018, the average score for the harvest demonstration ranged from 7.8 to 9.0 each year. Therefore, the decrease in scores is not concerning enough to warrant a drastic change to the harvest demonstration session.

Overall, the value scores for the sessions all ranked above 8 on a scale of 1–10 indicating a relatively large value to participants' operations and would warrant continued consideration in future Beef 2020 programs.

Knowledge of carcass traits, carcass value, and management factors that influence those traits increased after participation in the Beef 2020 program (5.18 vs. 7.67 ± 0.16 ; $P < 0.0001$; Fig. 2) for all participants from 2013 to 2019. When evaluating each year individually, all years resulted in an increase in knowledge ($P < 0.05$; Fig. 2). When asked

if they would recommend Beef 2020 to other beef producers or industry professionals, 99% of all respondents said yes.

CONCLUSION

The overwhelmingly positive responses from participants over the last eight Beef 2020 programs suggests that Beef 2020 provides valuable information to participants, increases participant knowledge about beef carcass traits, carcass value, and management factors that influence those traits and should be offered in future years to allow other beef producers or industry professionals to participate in the program. Additionally, the use of a focus group is an effective way to assess program effectiveness, strengths, and weaknesses as the program was able to be modified to fit the changing needs and learning

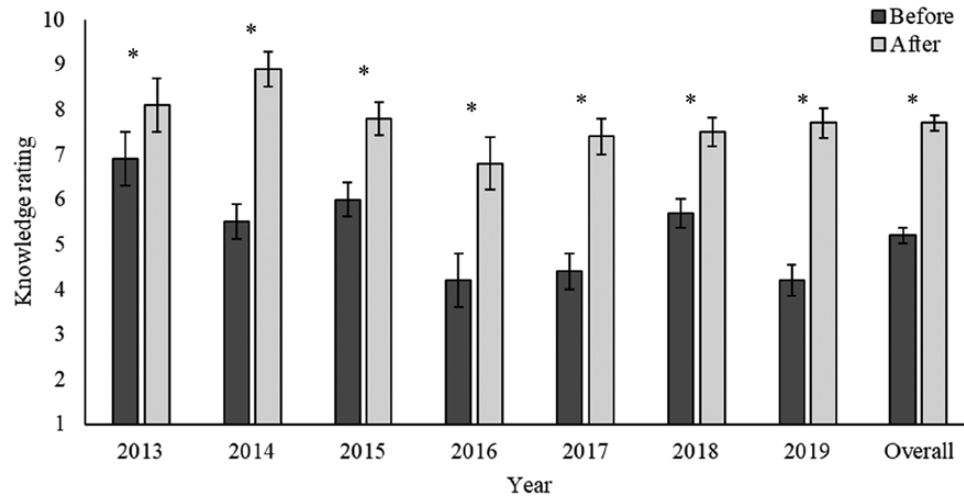


Figure 2. Perceived beef industry knowledge ratings (reported as means; error bars denote standard error) for participants of Beef 2020 by participation year and overall. Participants were asked to rate their own knowledge of the beef industry on a scale of 1 = extremely limited to 10 = extremely knowledgeable before and after participation in Beef 2020. Data were analyzed using a paired *t*-test and years were not compared to each other due to the changes made to the program annually. *Before and after scores differ, $P < 0.05$.

goals of the participants. The Beef 2020 program can be used as a model for other Extension professionals to create programs intended to link livestock producers to their end products.

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