

Change In Knowledge And Practices As A Result Of Adults' Participation In The Texas A&M Ranch To Rail Program

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Abstract

The study, a causal-comparative design, was planned to assess the impact of the Texas A&M Ranch to Rail Program on adults' knowledge of selected cattle performance and carcass-related information and practice level of selected recommended beef production practices. A census was attempted to gather information from 713 participants (1990-2001 program years). Data were collected with a mail questionnaire using a post then pre design following procedures recommended by Dillman (2000). Three hundred eighty-two participants responded to the questionnaire. Respondents had an increase in self-perceived knowledge level as a result of their participation in the Ranch to Rail Program (pre-knowledge Mean = 2.40, post-knowledge Mean = 4.03, where 1 = *Low* through 5 = *High*). The paired samples *t*-test yielded a 2-tailed level of significance beyond 0.05 for the pre- and post-knowledge level comparison. The difference of 1.63 is practically significant as shown in the large effect size of 1.78. Use of practices also increased as a result of respondents' participation in the Ranch to Rail Program (pre-practice Mean = 3.11, post-practice Mean = 3.86, where 1 = *Never* through 5 = *Always*). The paired samples *t*-test resulted in a 2-tailed level of significance beyond 0.05 for the pre- and post-practice level comparison. Again, the difference is important as shown in the large effect size of 1.18.

Introduction

Since its establishment in 1914 through the Smith-Lever Act, the Cooperative Extension System (CES) has grown to become the largest adult and youth education organization in the United States, if not the world (Fiske, 1989). Its mission is simple and straightforward: to help people improve their lives through an educational process that uses scientific knowledge focused on issues and needs (Rasmussen, 1989). Today, as in most public institutions, assessing the outcomes of programs in CES is not just the norm but is mandated. Three major acts were passed in the 1990s that have had a direct impact on Cooperative Extension. These acts are the Government Performance and Results Act (GPRA) of 1993, the Federal Agriculture Improvement and Reform Act (FAIR) of 1996, and the Agricultural Research, Extension, and Education Reform Act (AREERA) of 1998. The GPRA requires all public agencies to link performance plans to annual budget requests by developing in-depth performance strategies which describe the intentions of the allocated funding. FAIR requires that CES use state-of-the-art information technology systems to effectively measure all programs within the system. AREERA requires that plans of work be approved on the federal level on a competitive basis to receive funding. These acts have led to performance-based budgeting in regard to CES budget requests (Ladewig, 1999). Due to this increase in public accountability, it is even more critical that CES develop effective evaluation strategies that measure program outcomes and how they impact the lives of the constituents whom CES serves.

The beef industry is a major contributor to the economy of Texas, and therefore, is a major focus of educational programs of Texas Cooperative Extension. In 2000, cattle and calves comprised 51% of the \$13.34 billion total cash farm receipts in Texas. Texas led the United States in the number of cattle operations (152,000), all cattle and calves (13,700,000 head), all cows (5,810,000 head), beef cows that had calved (5,465,000 head), calf crop (5,100,000 head), cattle on feed in lots with 1,000 head capacity (2,930,000 head), fed cattle marketed (6,190,000 head), and value of all cattle and calves (\$8.357 billion) (Texas Agricultural Statistics Service, 2000).

One of the major Extension educational programs on beef cattle in Texas is the Texas A&M Ranch to Rail Program. Established in 1990, the Texas A&M Ranch to Rail Program is an information feedback system that allows producers to learn more about their calf crops and the factors that influence value beyond the weaned calf phase of beef production. It creates an opportunity for producers to determine how their calf crops fit the needs of the industry and provides the information needed to determine if changes in genetics and/or management factors are warranted in order to be competitive in beef production (Texas A&M University, 2001). This program has served as a model for most other state sponsored cattle feedout programs across the nation.

Purpose/Objectives

The purpose of this study was to evaluate the impact of the Texas A&M Ranch to Rail Program on learning and adoption of practices by participants in the program. The following objectives were addressed in this study:

1. Did the Texas A&M Ranch to Rail Program impact participants' learning (i.e., knowledge)?
2. Did the Texas A&M Ranch to Rail Program facilitate participants to make changes in their beef production and ranch management practices?

Methods/Procedures

This was a causal-comparative study. It was designed to assess the impact of the Texas A&M Ranch to Rail Program on adult's knowledge level and practice change. Participants from the inception of this program in 1990 to the 2000-2001 program year were targeted. The method of data collection was a mail questionnaire.

The Ranch to Rail participant database of 1,503 names and addresses (1990-91 through the 2000-01 program years) maintained by the Department of Animal Science, Texas A&M University, was used to identify the sampling frame. Because the list was compiled annually and because participants may have consigned cattle in multiple years, there were numerous duplications. Additionally, participants' addresses may have changed from year to year. These changes may have occurred because, in fact, participants moved or, alternately, because the U.S. Postal Service changed participants' addresses to comply with 9-1-1 rules. Removing duplicate entries resulted in a sample frame of 793. A census was attempted to gather information from this population. A census was used to obtain the most accurate results possible. Frame error existed because of duplicate/multiple entries, participants who died after their participation in the program, and participants in the program whose addresses were inaccurate. These "errors" were removed from the original database throughout the conduct of this study.

Dillman (2000) identifies four sources of error which form the cornerstones for conducting a quality survey. These are sampling error, coverage error, measurement error, and nonresponse error. All of these affect external validity, which is a major concern in the outcome measures of survey research. Gall, Borg, and Gall (1996) define external validity as the extent to which the results of a research study can be generalized to individuals and situations beyond those involved in the study. In this study, nonresponse was controlled by comparing early to late respondents. Late respondents were considered to be those who responded in the last wave of successive follow-ups to the questionnaire.

A mail questionnaire was used to collect data on the following:

1. Perceptions of past participants' level of knowledge related to feedlot performance, carcass quality, factors that affect profit and value, retained ownership, and the National Beef Quality Audit.
2. Perceptions of past participants' level of practice related to selected recommended beef production and ranch management practices.

The questionnaire had six sections (Kistler, 2002). Only the data from Section I are reported in this paper. This section was designed to collect information from past participants

related to their perceptions of the educational influence of the Ranch to Rail Program. Questions 1, 2, and 5 used a Likert-type scale utilizing a post then pre design (Rockwell & Kohn, 1989). This method features a retrospective pre-test after an educational intervention as a means of minimizing response shift bias, which can be a source of contamination in self report assessments. The respondent answers the survey questions with the same frame of reference for both pre and post questions. Response shift bias is a change in an individual's frame of reference because of program participation (Howard & Dailey, 1979). This method has shown to provide a more accurate estimate of measuring change than the conventional pre-test/post-test method in self report assessments (Hoogstraten, 1985; Howard & Dailey, 1979; Howard, 1980; Pratt, McGuigan, & Katzev, 2000; Rohs & Langone, 1998; Rohs, 2000; Rohs, Langone, & Coleman, 2001; Skeff, Stratos, & Bergen, 1992; Sprangers & Hoogstraten, 1988a; Sprangers & Hoogstraten, 1988b).

Question one asked respondents their perceptions of their knowledge level of various performance and carcass-related information before and after their participation in the Ranch to Rail Program. Respondents assessed their knowledge level using a scale of 1 = *Low* through 5 = *High*. Knowledge-related questions can be found in Table 1. Question two asked respondents to indicate how often they used selected recommended beef production and ranch management practices before and after their participation in the Ranch to Rail Program on a scale of 1 = *Never* through 5 = *Always*. Selected management practice questions can be found in Table 2.

Table 1
Knowledge-Related Questions of Section I, Question 1 of the Ranch to Rail Evaluation Questionnaire

Question^{a, b}
<i>What is your level of knowledge of the following? (Pre-and Post-Ranch to Rail)</i>
<ul style="list-style-type: none"> • Performance of my calves in the feedlot (e.g., average daily gain, feed conversion, health status)
<ul style="list-style-type: none"> • Carcass characteristics of my calves (e.g., USDA Yield & Quality grades, carcass weight, ribeye area, dressing percentage, percent retail yield, fat thickness)
<ul style="list-style-type: none"> • How my calves meet the needs of the beef industry
<ul style="list-style-type: none"> • Factors that affect performance of calves in the feedlot (e.g., weather conditions, type of ration, age of calf, occurrence of illness, breed type)
<ul style="list-style-type: none"> • Factors that affect profit in feedlot calves (e.g., average daily gain, occurrence of illness, death loss, degree of fatness, market prices, cost of gain, marketing method – sold live or on the rail)
<ul style="list-style-type: none"> • Factors that affect carcass value (e.g., carcass weight, percent retail yield, USDA Yield & Quality grades, blood splash, dark cutter)
<ul style="list-style-type: none"> • Factors that create value beyond the weaned calf phase of production
<ul style="list-style-type: none"> • Retained ownership as a marketing alternative
<ul style="list-style-type: none"> • National Beef Quality Audit results and information

^a Scale: 1 through 5, where 1 = *Low*, 3 = *Average*, 5 = *High*

^b Cronbach's Alpha: Pre-Ranch to Rail = .91, Post-Ranch to Rail = .87

Table 2

Management Practice Questions of Section I, Question 2 of the Ranch to Rail Evaluation Questionnaire

Question^{a, b}
<i>How often do you perform the following management practice? (Pre-and Post-Ranch to Rail)</i>
<ul style="list-style-type: none"> • Individual identification of cattle and calves (e.g., ear tag, brand, tattoo)
<ul style="list-style-type: none"> • Keep and utilize herd records to aid in management and marketing decisions
<ul style="list-style-type: none"> • Keep and utilize performance and carcass data of cattle to aid in management and marketing decisions
<ul style="list-style-type: none"> • Base breeding program on market trend information (e.g., consumer, order buyer, auction barn, feedlot, and/or packer demands)
<ul style="list-style-type: none"> • Follow a Value Added Calf Vaccination Management Program
<ul style="list-style-type: none"> • Select bulls based on performance and quality needs of my cow herd and calf crop (utilizing performance records and EPD's for selection)
<ul style="list-style-type: none"> • Use alternative marketing strategies based on business needs of the operation, market conditions, and type/class of cattle sold (e.g., auction barn, retained ownership, video alliance)
<ul style="list-style-type: none"> • Follow a Beef Quality Assurance Program for my operation (e.g., Texas Beef Quality Producer Program)
<ul style="list-style-type: none"> • Use a controlled breeding/calving season
<ul style="list-style-type: none"> • Castrate bull calves
<ul style="list-style-type: none"> • Dehorn calves through mechanical and/or chemical methods
<ul style="list-style-type: none"> • Dehorn cattle through genetic methods (i.e., use and selection of polled cattle)
<ul style="list-style-type: none"> • Keep processing and treatment records of all cattle (Includes date treated, animal health product used, dose used, route and location of administration, product withdrawal period)
<ul style="list-style-type: none"> • Use new technology to aid in management and marketing decisions (e.g., ultrasound, marker-assisted selection, electronic ear tags and data management systems)

^a Scale: 1 through 5, where 1 = *Never*, 2 = *Seldom*, 3 = *Sometimes*, 4 = *Often*, 5 = *Always*

^b Cronbach's Alpha: Pre-Ranch to Rail = .83, Post-Ranch to Rail = .79

The questionnaire was developed by the researchers utilizing the Tailored Design Method (Dillman, 2000) with input from faculty of the Department of Agricultural Education and Department of Animal Science at Texas A&M University. As suggested by Gall, Borg, and Gall (1996), content validity was assessed by a panel of experts. These experts were nine Extension Livestock or Beef Cattle Specialists with Texas Cooperative Extension who were located on campus or at various Research and Extension Centers throughout the state and had first-hand knowledge and experience with the Texas A&M Ranch to Rail Program.

Procedures outlined in Dillman's Tailored Design Method were used for mail survey implementation and data collection (Dillman, 2000). A pre-notice letter was mailed to each member in the original database of 793 on October 29, 2001. The purpose of this letter was to alert past participants of the forthcoming survey. Questionnaires and cover letters signed by the researcher and the Associate Department Head and Extension Program Leader, Department of Animal Science, were mailed on November 5, 2001. Enclosed with each questionnaire and

cover letter to each past participant was a business reply envelope addressed to the researcher. The envelope was for use by the respondent when returning his/her questionnaire.

Each questionnaire was identified with an identification number keyed to each of the participants. The identification number was placed on the lower left hand corner of the last page. This number was used to identify and follow-up with non-respondents. Three follow-ups were conducted. A thank you/reminder post card was mailed to each participant on November 16, 2001. On December 5, 2001, a second complete packet was mailed to each non-respondent. This packet included a questionnaire, a revised cover letter, and a return business reply envelope. On January 23, 2002, a final attempt was made to contact non-respondents. Another complete packet, including a different colored questionnaire, a revised cover letter, and a return business reply envelope, was mailed to each of the 361 non-respondents. Throughout survey implementation, returned letters and packets with incorrect addresses were updated, where possible, and re-mailed.

Data collection was discontinued on March 1, 2002. The original frame consisted of 793 names and addresses. Through the implementation phase of the study, prospective respondents were removed from the frame if they had died, were no longer in business, were discovered to be a duplicate entity, or had an incorrect address. As a result, 80 names were removed; leaving an accessible population was 713. Of the accessible population, there were 418 responses received for a response rate of 58.6%. Of these 418 responses, 37 questionnaires were returned unanswered. So the data sample of 382 responses was 53.6% of the accessible population.

Respondents were dichotomized as either early or late by the date their questionnaires were received back to the researcher. Early respondents were those whose questionnaires were received in either the first or second wave of responses before December 10, 2001 (232 responses, 61.0%) through January 31, 2002 (104 responses, 27.0%). Thus, early respondents totaled 336 (88.0%). Late respondents were those whose questionnaires were received in the third and final wave from February 1-28, 2002 (46 responses, 12.0%).

SPSS10.0 for Windows software was used for data analysis. Descriptive statistics were used to summarize and organize the data. Frequencies, percentages, measures of central tendency, and variability were used to describe the data. To accomplish the objectives of the study, pre- and post-knowledge level and practice level data along with an overall knowledge and practice change level were analyzed using a paired samples *t*-test with a 0.05 level of significance. The variables knowledge level and use of practices were composite variables (i.e., scales) consisting of average responses to nine knowledge and 14 practice items. Cronbach's alpha was used to assess reliability (i.e., internal consistency) of each of the scales. Because responses were received from only 54.0% of the accessible population, early and late respondents were compared, using *t* tests, on selected variables. Comparisons between early and late respondents were made on knowledge and practice change, the major variables of this study, and secondary variables of dollars made or saved, satisfaction, herd size, and personal information found in Section IV of the questionnaire (e.g., position, years in cattle business, gender, age, education, and race/ethnicity) (Lindner, Murphy, & Briers, 2001). Differences between early and late respondents on these variables were examined through the use of *t* tests and cross-tabulation. None of these statistical tests yielded statistically significant differences

between the two groups. Because the data were similar, Miller and Smith (1983) state that data from early and late respondents could be pooled together, and results could be generalized to the population. Confidence intervals and tests for statistical significance were set *a priori* at the 0.05 level.

Results/Findings

Section I of the questionnaire was used for the knowledge and practice elements. Knowledge level included nine questions related to various performance and carcass-related information before and after their participation in the Ranch to Rail Program. A five point Likert-type scale was used where 1 = *Low* through 5 = *High*. The questions were formatted using a post then pre design allowing respondents to assess their perceived knowledge level through a retrospective pre-test and post-test using the same frame of reference. This method minimizes response-shift bias, which can be a source of contamination in self report assessments (Rohs, 1998). Reliabilities of the test scales were measured using Cronbach's alpha. Pre-knowledge and post-knowledge level scales had alpha levels of 0.91 and 0.87, respectively. Table 3 displays the overall pre-knowledge, post-knowledge, and knowledge change of the respondents. Respondents had a pre-knowledge mean of 2.40 and a post-knowledge mean of 4.03 which yielded an increase (1.63) in knowledge level. The paired samples t-test resulted in a 2-tailed level of significance beyond 0.05 for the pre- and post-knowledge level comparison. This significance is important as shown in the large effect size index of 1.78 (Cohen, 1988).

Table 3

Pre- and Post-Knowledge Level and Overall Knowledge Change of Ranch to Rail Respondents

Item	No.	Mean ^a	SD	<i>d</i> ^b	<i>t</i> -value	<i>df</i>	Sig. ^c
Pre-Knowledge Level	370	2.41	0.84				
Post-Knowledge Level	370	4.04	0.58				
Knowledge Change	370	1.63	0.91	1.78	34.38	369	<.01

^aScale: 1 through 5, where 1 = *Low*, 3 = *Average*, and 5 = *High*

^bCohen's measure of effect size (0.20 = Small, 0.50 = Medium, 0.80 = High)

^c2-tailed

Practice level included 14 questions related to the respondent's use of selected recommended beef production and ranch management practices before and after their participation in the Ranch to Rail Program. A five point Likert-type scale was used where 1 = *Never* through 5 = *Always*. These questions were also formatted using a post then pre design. Reliability of the test scale was assessed using Cronbach's alpha. Pre-practice and post-practice level scale had alpha levels of 0.83 and 0.79, respectively. Table 4 displays the overall pre-practice, post-practice level, and practice change of respondents. Respondents' had a pre-practice mean of 3.11 and a post-practice mean of 3.86 which yielded an increase (0.74) in practice level. The paired samples *t*-test resulted in a 2-tailed level of significance beyond 0.05 for the pre- and post-practice level comparison. This difference is important as shown in the large effect size index of 1.18 (Cohen, 1988).

Table 4

Pre- and Post-Practice Level and Overall Practice Change of Ranch to Rail Respondents

Item	No.	Mean^a	SD	<i>d</i>^b	<i>t</i>-value	<i>df</i>	Sig.^c
Pre-Practice Level	371	3.12	0.76				
Post-Practice Level	371	3.86	0.64				
Practice Change	371	0.74	0.63	1.18	22.80	370	<.01

^aScale: 1 through 5, where 1 = *Never*, 2 = *Seldom*, 3 = *Sometimes*, 4 = *Often*, and 5 = *Always*

^bCohen's measure of effect size (0.20 = Small, 0.50 = Medium, 0.80 = High)

^c2-tailed

Conclusions and Recommendations

The objectives of this study addressed the impact of the Texas A&M Ranch to Rail Program on participants' knowledge level and use of recommended beef production and ranch management practices.

Respondents had an increase in their knowledge level as a result of the Ranch to Rail Program (pre-knowledge mean of 2.40 and a post-knowledge mean of 4.03 which indicates a increase of 1.63 in knowledge level). The paired samples *t*-test resulted in a 2-tailed level of significance beyond 0.05 for the pre- and post-knowledge level comparisons. This difference is important as shown in the large effect size index of 1.78 (Cohen, 1988). Therefore, we conclude that the Texas A&M Ranch to Rail Program made a difference in participants' knowledge (i.e., learning) level due to their participation in the program. Further, we conclude that the difference was practically significant due to the large effect size.

Respondents had an increase in their level of practice as a result of the Ranch to Rail Program (pre-practice mean of 3.11 and a post-practice mean of 3.86, an increase of 0.74 in practice level). The paired samples *t*-test resulted in a 2-tailed level of significance beyond 0.05 for the pre- and post-practice level comparison. This difference is important as shown in the large effect size index of 1.18 (Cohen, 1988). Therefore, we conclude that the Texas A&M Ranch to Rail Program made a difference in participants' use of beef production and management practices due to their participation in the program. We also conclude again, that the difference was practically significant due to the large effect size.

Based on the findings and conclusions presented in this study, recommendations have been made in two specific areas. These are 1) recommendations for practice and 2) recommendations for further research.

Recommendations for practice are as follows:

1. The Ranch to Rail Program should continue. Both the quantitative and qualitative data indicate that the program has had a positive impact on respondents and their beef operations.

2. Enhance the educational component of the Ranch to Rail Program. Even though the Ranch to Rail Program is marketed as “an information feedback system” (Texas A&M University, 2001), it is quite evident from the findings of this study that participants are learning and are adopting recommended management practices as a result of their participation in the program. A tremendous opportunity exists for program administrators to build on the successes of this program by concentrating on educational programming efforts to enhance this program. Some of the activities that participants wanted added to the program are the following: in-depth seminars on applying the data received from the program to their operations (58%), field days (55%), participant meetings and updates throughout the feeding period (45%), information and updates through the use of Internet (45%), and one-on-one consultations (38%) (Kistler, 2002).
3. Refine the evaluation process by collecting data from “potential/prospective” participants prior to participation in the Ranch to Rail Program. As addressed in the above recommendations, an evaluation plan needs to be designed that addresses the objectives of the program. Additionally, potential/prospective participants should be surveyed prior to their participation in the program to gather baseline data on their abilities and capabilities (e.g., knowledge level, use of recommended management practices), as well as their needs and expectations. This information should be used by program administrators to focus the educational activities for the participants enrolled in the current program year.
4. Collect qualitative data from “potential/prospective” and past participants. Comments from program respondents include a rich collection of qualitative data that should be used in both the formative and summative evaluation efforts of the Ranch to Rail Program (Kistler, 2002).
5. Maintain an updated Ranch to Rail database/mailling list. To reduce the problems experienced in this study with numerous inaccurate addresses, program administrators need to maintain and periodically update their database. One idea to keep this list current is to develop a Ranch to Rail newsletter that would be sent out to past and current participants. This newsletter can be used to recruit participants, remind past participants of current enrollment deadlines, keep clientele updated on the program, and provide an educational forum to discuss issues related to the Ranch to Rail Program (e.g., carcass and performance data interpretation, production practices, marketing alternatives, industry trends). Numerous comments were made by respondents that they would like to be kept informed on a more regular basis (Kistler, 2002). A newsletter would address this and some of the educational needs identified by respondents.

Recommendations as a result of this study for further research have been developed and are presented as follows:

1. This study should be replicated periodically within a shorter time frame for measurement (e.g., 2-5 years versus 10 years) for program monitoring purposes (formative evaluation) and program impact purposes (summative evaluation).

2. This study should be replicated in other states with similar feedout programs to assess differences and similarities between participants across the nation. This information could be used by program administrators to enhance program efforts (e.g., collaborate on programming, development of educational resources).

Implications

Cooperative Extension, along with other publicly funded agencies, is required to be accountable from many different levels for the resources they receive. Effective evaluation strategies are needed to measure program outcomes and how they impact the lives of Extension clientele.

This study has shown that one statewide Extension program, the Texas A&M Ranch to Rail Program, has had an impact on the lives of the people who have participated. As a result of their participation in the program, respondents had an increase in their knowledge level of selected beef practices and an increase in the use of recommended beef production and management practices. Following the characteristics of adult learners (Knowles, Holton, & Swanson, 1998), participants' experience played a key role in both knowledge level and practices changed. As characterized by Knowles, et al., (1998), Ranch to Rail participants were ready to learn, problem-centered, and motivated as shown by their enrollment in the program. Program planners need to keep these characteristics in mind during the program development and implementation phase.

Evaluation efforts need to continue to measure the impact of other Extension programs. It is extremely important that evaluation methodology is included in the initial planning phase of program development in order for measurable objectives to be developed to provide program direction and criteria for evaluation. Bennett's Hierarchy (Bennett, 1975, 1976) and the TOP Model (Bennett & Rockwell, 1995, Rockwell & Bennett, n.d.) are useful evaluation models to follow in developing an evaluation plan for Extension programs. Evaluation studies are an important means for Extension program leaders and administrators to use to indicate the impact of their educational efforts. The data collected reinforces the testimonials received from clientele. The future of Extension depends on program evaluation efforts that document the relevance of the agency's efforts to not only its clientele, but to stakeholders and funding sources (i.e., national, state, and local governments).

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