2015

Integrating Experiential Learning into Animal Science Curriculum through a Hands-on Beef Cattle Management and Marketing Contest

Corinne J. Harrison
Illinois State University, cori.harrison@yahoo.com

INTEGRATING EXPERIENTIAL LEARNING INTO ANIMAL SCIENCE CURRICULUM THROUGH A HANDS-ON BEEF CATTLE MANAGEMENT AND MARKETING CONTEST

Corinne J. Harrison

63 Pages May 2015

According to Illinois Agricultural Education's 2014 annual report, nearly 61% of students beginning their undergraduate studies in Agriculture at a 2-year college in Illinois came from non-farm backgrounds. Yet, knowledge of and experience in livestock operations is still a requirement for many careers in the animal science industry. In response to this predicament, the Department of Agriculture at Illinois State University has implemented a course that provides students an opportunity to gain hands-on experience with beef cattle management and marketing. The course was designed to enhance learning by requiring students to develop and execute a management and marketing plan for a pen of steers at the University Farm, which encouraged practical application of classroom instruction. The objective of this study was to determine if participation in the course enhanced student learning and knowledge retention. Eight student teams, composed of 3-4 students each, executed their own management and marketing strategies with the goal of obtaining the highest return on production, measured by subtracting expenses from revenue. Quantitative data was derived from gain scores on a pre-test at the beginning of the course and a post-test at the conclusion of the

course. Qualitative data was obtained by having the students reflect upon what they had learned. This reflection occurred at the end of each unit using Likert-scale and open-ended questions. Results obtained demonstrated that the contest enhanced learning and knowledge retention. Post-test means improved significantly (p=0.000) over pre-test means with gain scores being the highest in the unit topic areas of meat science, marketing and health. In addition, student reflection indicated the students believed that the contest enhanced learning, noting that it increased their beef cattle knowledge by making them aware of all of the factors that go into raising and marketing feed lot cattle.

INTEGRATING EXPERIENTIAL LEARNING INTO ANIMAL SCIENCE CURRICULUM THROUGH A HANDS-ON BEEF CATTLE MANAGEMENT AND MARKETING CONTEST

CORINNE J. HARRISON

A Thesis Submitted in Partial
Fulfillment of the Requirements
for the Degree of

MASTER OF SCIENCE

Department of Agriculture

ILLINOIS STATE UNIVERSITY

2015

INTEGRATING EXPERIENTIAL LEARNING INTO ANIMAL SCIENCE CURRICULUM THROUGH A HANDS-ON BEEF CATTLE MANAGEMENT AND MARKETING CONTEST

CORINNE J. HARRISON

COMMITTEE MEMBERS:

Robert Rhykerd, Chair

Justin Rickard, Co-Chair

Kerry Tudor

ACKNOWLEDGMENTS

I would like to begin by expressing my sincerest gratitude to Dr. Justin Rickard, for his continuous support of my thesis and research. A big and well-deserved thank you goes out to the remainder of my thesis committee, Dr. Rob Rhykerd and Dr. Kerry Tudor. They were always just an E-mail, phone call or a few steps away to help me with any questions. To my entire committee, I thank you for your kind words of encouragement and inspiring me to stretch beyond my comfort level and grow during this process.

I would also like to thank the staff at the Illinois State University Farm. This project would not have been possible without the countless hours of hard work and time dedicated to answering student questions. An additional thanks goes out to Carly Holcomb for administering the pretests, posttests and unit surveys for this research.

Thanks are extended to the entire Department of Agriculture at Illinois State University faculty and staff for providing me with a supportive learning environment. I would specifically like to thank the woman who keeps the department running, Kathy Scott. Thank you for having an answer to every question I ever asked!

For every time they helped me, made me laugh, or allowed me to vent when the stress was high I will be forever grateful to Katelynn Clement and Kelsey Schueler. I could not have asked for a better support system and officemates.

To my husband, Ryan Malone, who endured many nights of Casey's pizza due to my working late on my thesis, thank you for being you and always standing by my side.

And finally, I want to thank my family. To my parents and role models, Bill and Joan Harrison, thank you for everyday pushing me to achieve success and teaching me to never give up on anything I ever dreamed of doing- from showing cattle to my education. To my brother, Shane Harrison, who has been making me laugh since the day he was born- looks like I beat you to the Master's punch. Your turn!

C.H

CONTENTS

TABLES

CHAPTER I

GENERAL INTRODUCTION

Knowledge of and experience with production agriculture is desired for many careers in the agriculture industry. Bekkum (1993) found that the highest ranked need of Agricultural undergraduates, as perceived by agricultural businesses, was working part-time on a farm or in agribusiness, and the second highest need was being raised on a farm. Bekkum also noted that many companies suggested that coming from a farm background helps to establish creditability with clientele. However, the source of students in agricultural higher-education programs across the country has shifted from rural to urban. According to Illinois Agricultural Education, of the 3,210 Agricultural students enrolled in Illinois Community Colleges for the 2013-2014 school year, 60.4% report coming from a non-farm background. This presents both an opportunity and a challenge for many animal science programs. While it is a great opportunity for departments of agriculture to increase background diversity in their student populations, according to Russell (1993), this lack of agricultural background and/or experience jeopardizes the long-term future of the agricultural industry. This position exhibits the need for colleges and departments of agriculture to provide students with experiential learning opportunities, more commonly thought of as hands-on learning opportunities, that they may have missed growing up in a non-farm area. Due to the hands-on nature of the animal sciences, hands-on learning opportunities may be important in an animal science curriculum.

American educational theorist David Kolb (1984) defines experiential learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience." Kolb recognized that learning is a continuous process in which the person's knowledge and abilities are shaped and developed according to the nature of the experiences in which he or she is involved. Today, internships, field placements, work/study assignments, structured exercises and role playing, gaming simulations, and other forms of experience-based education are playing a larger role in the curricula of undergraduate and professional programs. Experience-based education has become widely accepted as a method of instruction in colleges and universities across the nation (Kolb, 1984).

The experiential learning focus of secondary agricultural education can be viewed in a multitude of ways. Some agricultural skills and abilities cannot be taught by books or by reviewing the works of others, and therefore, experiential learning has long been valued in the field of agricultural education and has been recognized as an integral part of the educational process (Cheek et al., 1993). Agricultural programs seek to engage students in meaningful experiences by placing an emphasis on learning by doing. This style is apparent in the amount of attention given to laboratory work, field trips, problem solving and supervised occupational experience programs (Phipps & Osborne, 1988).

While the number of programs involving experiential education in the nation's agricultural colleges and universities is large, there is limited data regarding the use of experiential education in the animal sciences, and more specifically beef cattle education. The University of Florida developed a multi-species large animal management and production practicum to provide students with hands-on experience (Reiling et al., 2003).

The results of this study yielded highly positive course evaluations, partly attributed to the fact that when students engage themselves in the learning process, the learning experience is more interesting. However, this study encompassed a course that spanned two school years (four semesters). Many students may not have the resources and time available to dedicate to a course that is this time consuming. That study also introduced students to a variety of production animals, therefore, it would be of value to determine if experiential learning in the animal sciences is equally as beneficial to a more specific course that focuses on only one animal species.

Marshall et al. (1998) compiled the results of 13 years of a beef cattle management practicum at the University of Florida to analyze the perceived value of this hands-on educational experience. The 194 students that completed the analysis indicated that the course was most useful in teaching cattle handling skills and subject matter competence. While Marshall et al.'s study "Experiential learning in the animal sciences: effect of 13 years of a beef cattle management practicum" thoroughly analyzed experiential learning in beef cattle management, it did so from an alumnus view of the past. Perhaps perceived value of hands-on learning is best assessed from current students' point of view upon completion of each unit.

The objective of this study was to determine if integrating experiential learning into animal science curriculum through a hands-on beef cattle management and marketing contest is beneficial in increasing students' comprehension of basic beef cattle concepts. Determination of the extent of knowledge retention provided an indication as to whether or not there is a need for future research on the subject.

Thesis Organization

This thesis is in an alternate format. It includes a general introduction, a manuscript formatted according to the style of Natural Sciences Education, and a review of the literature.

CHAPTER II

INTEGRATING EXPERIENTIAL LEARNING INTO ANIMAL SCIENCE CURRICULUM THROUGH A HANDS-ON BEEF CATTLE MANAGEMENT AND MARKETING CONTEST

Abstract

According to Illinois Agricultural Education's 2014 annual report, nearly 61% of students beginning their undergraduate studies in Agriculture at a 2-year college in Illinois came from non-farm backgrounds. Yet, knowledge of and experience in livestock operations is still a requirement for many careers in the animal science industry. In response to this predicament, the Department of Agriculture at Illinois State University has implemented a course that provides students an opportunity to gain hands-on experience with beef cattle management and marketing. The course was designed to enhance learning by requiring students to develop and execute a management and marketing plan for a pen of steers at the University Farm, which encouraged practical application of classroom instruction. The objective of this study was to determine if participation in the course enhanced student learning and knowledge retention. Eight student teams, composed of 3-4 students each, executed their own management and marketing strategies with the goal of obtaining the highest return on production, measured by subtracting expenses from revenue. Quantitative data was derived from gain scores on a pre-test at the beginning of the course and a post-test at the conclusion of thecourse. Qualitative data was obtained by having the students reflect upon what they

had learned. This reflection occurred at the end of each unit using Likert-scale and open-ended questions. Results obtained demonstrated that the contest enhanced learning and knowledge retention. Post-test means improved significantly (p=0.000) over pre-test means with gain scores being the highest in the unit topic areas of meat science, marketing and health. In addition, student reflection indicated the students believed that the contest enhanced learning, noting that it increased their beef cattle knowledge by making them aware of all of the factors that go into raising and marketing feed lot cattle.

Introduction

Knowledge of and experience with production agriculture is desired for many careers in the agriculture industry. Bekkum (1993) found that the highest ranked need of Agricultural undergraduates as perceived by agricultural businesses was working part-time on a farm or in agribusiness, and the second highest need was being raised on a farm. Bekkum also noted that many companies suggested that coming from a farm background helps to establish creditability with clientele. However, the source of students in agricultural higher-education programs across the country has shifted from rural to urban. According to the 2014 Illinois Agricultural Education annual report, of the 3,210 Agricultural students enrolled in Illinois Community Colleges for the 2013-2014 school year, 60.4% report coming from a non-farm background. This presents both an opportunity and a challenge for many animal science programs. While it is a great opportunity for departments of agriculture to fill their hallways with diverse students, according to Russell (1993), this lack of agricultural background and/or experience jeopardizes the long-term future of the agricultural industry. This position exhibits the need for colleges of agriculture to provide students with experiential learning

opportunities, more commonly thought of as hands-on learning opportunities, they may have missed growing up in a non-farm area. In no sector of agricultural education is this truer than working in the animal sciences.

American educational theorist David Kolb defines experiential learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience." Kolb recognized that learning is a continuous process in which the person's knowledge and abilities are shaped and developed according to the nature of the experiences in which he or she is involved. Today, internships, field placements, work/study assignments, structured exercises and role plays, gaming simulations, and other forms of experience-based education are playing a larger role in the curricula of undergraduate and professional programs. Experience-based education has become widely accepted as a method of instruction in colleges and universities across the nation (Kolb, 1984).

The experiential learning focus of secondary agricultural education can be viewed in a multitude of ways. Some agricultural skills and abilities cannot be taught by books or by reviewing the works of others, and therefore, experiential learning has long been valued in the field of agricultural education and has been recognized as an integral part of the educational process (Cheek et al., 1993). Agricultural programs seek to engage students in meaningful experiences by placing an emphasis on learning by doing. This style is apparent in the amount of attention given to laboratory work, field trips, problem solving and supervised occupational experience programs (Phipps and Osborne, 1988).

While the number of programs involving experiential education in the national's agricultural colleges and universities are vast, there is limited data regarding the use of

experiential education in the animal sciences, and more specifically beef cattle education. The University of Florida developed a multi-species large animal management and production practicum to provide students with hands-on experience (Reiling et al., 2003). The results of this study yielded highly positive course evaluations, partly attributed to the fact that when students engage themselves in the learning process, the learning experience is more interesting. However, this study encompassed a course that spawned two school years (four semesters). Most students do not have the resources and time available to dedicate to a course that is this time consuming. This study also introduced students to a variety of production animals, therefore, it would be of value to determine if experiential learning in the animal sciences is equally as beneficial to a more specific course that focuses on only one species of animals.

Marshall et al. (1998) compiled the results of 13 years of a beef cattle management practicum at the University of Florida to analyze the perceived value of this hands-on educational experience. The 194 students that completed the analysis indicated that the course was most useful in teaching cattle handling skills and subject matter competence. While Marshall et al.'s (1998) study "Experiential learning in the animal sciences: effect of 13 years of a beef cattle management practicum" thoroughly analyzes experiential learning in beef cattle management, it does so from alumnus view of the past. Perhaps perceived value of hands-on learning is best assessed from current students upon completion of each unit.

The intent of this concurrent mixed methods study is to determine if integrating experiential learning into animal science curriculum through a hands-on beef cattle management and marketing contest is beneficial to a student's competency of basic beef

cattle concepts. The determination of the extent of knowledge retention will provide an indication as to whether or not there is a need for future research on the subject.

Statement of the Problem

The source of students in agricultural programs across the country has shifted from rural to urban. However, knowledge of and experience with production agriculture animals is desired for many careers in the agricultural industry. Therefore, this lack of agricultural background and/or experience may jeopardize these students' future success. This situation creates a need to incorporate experiential learning opportunities into the animal agriculture curriculum, yet there is limited data regarding animal science programs doing so. This study aims to explore further the knowledge retention gained by students participating in a hands-on beef cattle feedlot management course.

Materials and Methods

Curriculum Design

A beef steer management and marketing class, AGR 287: Independent Study in Beef Cattle Management, and beef management contest were designed and implemented at Illinois State University in the Department of Agriculture. The class spanned two semesters and was designed to incorporate the four components of the Kolb's cycle of experiential learning. First, concrete experience was provided through hands-on work performed by the enrolled students at the Illinois State University Farm. For reflective observation, students were asked to write summaries reflecting upon their experiences at the end of each unit. Then, abstract conceptualization was formed throughout the year when the students formed conclusions about the success of certain decisions and their consequences. Finally, active experimentation took place as students continually changed

their management plans as unexpected and unplanned events arose throughout the year with their pen of steers.

The course was open to all interested students, and students that participated had the option to earn two college credits per semester for the course. Students enrolled were given an Institutional Review Board approved (IRB #2013-0243) consent form (Appendix A), and given the option to participate in the course without participating in the study. Demographics of the student participants are presented in Appendix B. These students were then asked to form eight groups total, with three or four students per group in order to maintain similar group sizes. The reason for using eight groups is due to the number of steer calves weaned at the Illinois State University Farm. After receiving Institutional Animal Care and Use Committee Approval (IACUC Protocol #21-2013), each of the farm's 43 weaned steers were weighed and sorted into groups by weight, with the three outliers being sorted off to provide the most uniform pens possible. Student groups were allowed to purchase which pen of steers they would like to manage for the year via video auction. Actual cattle prices from a local sale barn were used as the basis for pricing at the auction. Prior to this video auction, students were given a three-hour window to view and examine the steer pens and make their purchasing decisions.

Even though the students were not required to put forth the actual dollar amount, all money "spent" was tracked in an Excel spreadsheet. The spreadsheet was designed to track production costs and marketing activities, which in turn, helped identify the winning group. Each group and the course instructors were given a spreadsheet to track expenses. This allowed each group to conduct "what if" analyses and then develop

production and marketing plans. The winning group was selected by netting the highest return on production, revenue minus expenses, on the official spreadsheet.

To supplement management decisions and enhance learning, weekly one-hour class meetings were used for class discussion of one of the eight unit topics. Those weekly meetings not only served the purpose of supplementing management decisions, but also to increase student safety with the animals. Topics were as follows:

1. Nutrition- Groups were given four different feed ration alternatives to feed their pen of steers. Class discussion on this topic included beef cattle nutrient requirements, feed ration ingredients and feed ration costs on a per head per day basis. In addition, an industry nutrition expert was invited to participate in a discussion with the students.
2. Weighing and Average Daily Gain- Each group was required to weigh their pen of steers every 21 days and calculate an average daily gain on each steer in their pen. Class discussion on this topic included formulas to monitor calf growth and weight gain.
3. Implanting- Groups had to decide whether the use of hormone implants for their steers would be beneficial and, if used, the dosage amount in accordance with product label requirements. The level alternatives were as follows- Low potency (Ralgro®), Moderate potency (Synovex-S® one time use), High potency (Synovex-S® two time use), or no implantation.
4. Marketing- Each group developed a plan for marketing their steers. Alternatives included but were not limited to: Live-weight basis, Quality Grid system, Yield Grid system and niche market.

5. Health- Groups were in charge of the health of their animals. They were required to inform farm staff if a steer in their pen appeared ill or had an ailment, and they assisted with proper treatment.
6. Anatomy of the beef animal/Evaluation- Groups were presented with the basic parts of a market beef animal and asked to speak and write using these terms in class. Groups were asked to analyze and give a live evaluation of their steers based upon muscling, finish, structural correctness and balance. That evaluation helped students decide on the best time to market their animals.
7. Cattle basics, behavior and handling- Groups were presented proper cattle behavior and handling techniques and asked to put these techniques to use at the Illinois State University farm.
8. Meat Quality- Groups evaluated meat quality and yield of harvested steers in the meats laboratory. They were also instructed and assisted in the fabrication of a beef carcass from primal cuts to retail cuts.

During weekly meetings, students posed questions that arose from their experiences gained working with the steers. Various concerns and problems encountered by the students were discussed and potential solutions were evaluated through faculty and peer input. In addition, weekly meetings helped to increase communication within groups and with faculty, which was of utmost importance to the success of the student groups.

Experimental Design

Data regarding knowledge retention was obtained using a mixed methods research design with a concurrent embedded strategy (Creswell, 2010). Using this strategy, both quantitative and qualitative data were collected concurrently. Researchers in the 20th

century brought light to what we now refer to as mixed methods research as a reaction to the polarization between quantitative and qualitative research. Now, mixed methodologies are utilized to a greater degree by educational researchers than by researchers representing any other field (Collins et al., 2012).

During this quasi-experimental research, a single-group was given a pretest and posttest to measure the effect that participating in the course had on student knowledge without using a control group. The purpose of quasi-experimental designs is to determine the causality of intervention or treatment with the target population (Rockinson-Szapkiw, 2010). While quasi-experimental designs can come in many forms, they do lack one or more of the key mechanisms of a true-experimental design. This study examined a single-group of participants, or treatment group, before taking part in the course with a pre-test and then after taking part in the course with a post-test. In order to conduct the course with minimal class disruptions, the course was not divided into two groups, and therefore, no control group was used for this research.

Pre-Test/Post-Test

Data collected through a single-group pretest-posttest procedure was a major focus of the research. Therefore, the effect of the intervention of participating in the course was measured. Pretest-posttest designs are widely used in educational research, primarily for the purpose of comparing groups and measuring change resulting from experimental treatments. Pretest-posttest design provides tight scientific control over threats to internal validity. Difference between pretest and posttest scores for individuals, or gain scores, will serve as the dependent variable in this study. The change in the scores was hypothetically based upon the activities performed in the class. However, the use of a

single-group in this particular quasi-designed experiment only allowed for inferences to be made about the effect of the intervention by looking at the difference in the pretest and posttest results. Because this research was exploratory and did not employ a control group, the aim of this study was to be causal description, not strictly exploration of relationships.

The actual pretest-posttest used was comprised of 21 multiple-choice questions (see Appendix C). Seven questions served as demographic questions, while the remaining 14 are divided among the eight unit topics with varying degree of difficulty. Some unit topics have more than one question, while others only have one. The number of questions per unit on the pre-test/post-test was decided by importance/relevance to the course. Therefore, because the course was dedicated to feedlot cattle, more emphasis was placed upon implanting and marketing than live evaluation, and thus those topics have more questions. In addition, the 14 content questions on the test fell into one of two categories. Six of the questions were considered lecture and experience questions, meaning they were discussed in lecture and then applied later in the students' experience while working with their pen of steers. The remaining eight questions were questions that the students learned solely from experience with the steers and conversation generated from that experience. The latter questions were not discussed during lecture periods. After receiving Institutional Review Board approval (IRB Protocol #2013-0243), the same test was administered prior to students beginning the course and upon completion of the course.

Survey Design

As a method of supplementing the pretest-posttest procedure, surveys were administered to each student at the conclusion of each unit and at the conclusion of the course. These surveys were also developed in accordance with the Illinois State University Institutional Review Board and administered to the students by a Collaborative Institutional Training Initiative approved assistant who was unassociated with the class. Unit surveys were constructed with two descriptive open-ended questions and two Likert-scale closed-ended questions (see Appendix D). The course completion survey administered at the end of the course consisted of five open ended questions pertaining to the students' perceived value and weaknesses of the course, and is included in Appendix E.

Statistical Analysis

Data was analyzed with IBM SPSS Statistics 21 using a paired samples T-Test of the pre and posttest scores and a one-way analysis of variance on mean scores to determine if the course was more beneficial to students without an agricultural background than those with an agricultural background. The small sample size for this set did not allow for use of a multi-way analysis of variance. Significance for a given factor was pre-determined at $p \leq 0.05$. The dependent variable used in the analysis was gain scores was derived from the pretest scores and the posttest scores. The independent variables used consisted of whether a participant came from a farm background or non-farm background, male vs. female, and each of the eight course unit topics. Qualitative data was not analyzed statistically, however, it is presented in table format to supplement the quantitative data presented.

Results

Quantitative

Table 1 indicates the relationship between the 23 Pre-Test scores and Post-Test scores. By running a paired samples T-test to compare the scores from the two tests, the gain scores from the Pre-Test to Post-Test were found to be different from zero (p = 0.000). In addition, the mean of the gain scores was found to be 18.5, indicating that post-test scores improved approximately 18.5 percentage points from pre-test scores.

Table 2 represents the same pre-test scores and post-test scores, along with gain scores, separated by student background. In the demographic section of the pre-test and post-test, students indicated if they came from a farm, rural non-farm, or urban background. To establish a larger sample size, the rural, non-farm students and urban students were combined for this test, and thus categorized into two groups: Farm or Non-Farm. A one-way analysis of variance (ANOVA) was used to compare the means of the scores within each background. Although the mean post-test score of students from a non-farm background (61.28) improved the most numerically from the pre-test score (41.67), the one-way ANOVA indicated no significant difference between groups or within groups (p>0.05). An ANOVA is used to determine whether there are any significant differences between the means of two or more independent (unrelated) groups.

Table 3 compares the gain scores of female participants with gain scores of male participants. Females in the course gained approximately 2.14 points more numerically on their posttest after taking the class than the males. However, this difference was not found to be a significant.

Table 4 breaks pretest and posttest questions into two categories. Six of the

questions (numbers 8, 10, 12, 18, 19 and 20) were derived from material being presented to the class in lecture form, with students later applying what they had learned. Eight of the questions (numbers 9, 11, 13, 14, 15, 16, 17 and 20) were not presented in lecture, and were instead derived from the experiences the students had. A paired samples T-test revealed that from the pretest to the posttest, mean scores of the lecture questions and the experience questions improved significantly (p=0.000 and p=0.003, respectively).

Table 5 shows each question on the pretest and posttest separated by unit topic and the number of students answering each question correctly. The questions that had the greatest increase from students answering correctly on the pre-test to the post-test were 13, 15 and 21. These questions represented the unit topics Marketing, Meat Science and Health, respectively. Only three questions saw a decrease in the number of students answering correctly from pre-test to post-test. Those three questions were numbers 10, 16, and 20 which represented the Implanting, Meat Science and Nutrition units, respectively.

Qualitative

Students rated their experience in each unit using a five-point Likert-type scale from strongly agree to strongly disagree (1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree). The highest rated unit topic value to educational enhancement by the students was animal health with a mean score of 1.8696. The top five unit topics that enhanced student learning the most, according to the students, are presented in Table 6. They are animal health, implanting, nutrition/weighing, parts and evaluation, and marketing.

Open ended responses as to why students enrolled in the course, what they

thought was most beneficial about the course, and their current knowledge and experience level as indicated on the course completion survey are presented in Table 7. A majority of the students cited the "hands-on experience" as their main reason for enrolling in the course, and felt that "making choices" for their pen of steers was the most beneficial aspect of the course. In addition, students felt their "knowledge increased" throughout the course.

Discussion

A hands-on beef cattle management and marketing course and contest provided students with an experiential learning opportunity. Participation in the class had a significant positive impact on students learning as reflected by a paired comparison of pre and posttest scores. AGR 287: Independent Study in Beef Cattle Management engaged student participants in all four of the major components in the experiential learning process. First, concrete experience was provided through hands-on work performed by the students enrolled at the Illinois State University Farm. For the reflective observation portion, students periodically were asked to write summaries reflecting upon their experiences. Then, abstract conceptualization was formed throughout the year when the students made conclusions about the success of certain decisions and their consequences. Finally, active experimentation took place as students continually changed their management plans as unexpected and unplanned events arose throughout the year.

Students enroll in courses for a number of reasons, and measuring the worth of an educational experience is difficult. Though results indicated student knowledge retention increased significantly from pre to post-test, there are many ways in which this class may have enhanced a student's learning through the experiential learning process. Most

notably, student learning may have been enhanced through application of team work, communication and problem-solving skills within their group. In a similar study, Marshall et. al (1998) notes that these characteristics are valuable to employers and that experiential learning opportunities force students to think critically about the knowledge they have gained in the classroom.

Furthermore, student background did not seem to have an effect on the value of the course to a student's educational experience. Pre and post-test scores, along with gain scores, between groups were not found to be significantly different. This could possibly be due to the small sample size of participants. However, it may be an indication that the hands-on course is equally beneficial to all agricultural students. Likely, this occurred due to the varying student opinion of what constitutes a farm background and non-farm background. No two students' past experiences are the same, and perhaps this course allowed for a level playing field for all students to gain hands-on experiences with beef cattle management. This demographic assessment suggests that even students with several years of experience were able to gain knowledge from the hands-on activity the class provided.

Looking further into demographics, gender did not seem to have an effect on gain scores from pretest to posttest. On average, females' scores increased 21.3 percentage points from their pretest to their posttest, while males' scores increased 19.2 percentage points. However, this difference was not found to statistically significant (p=0.790).

Because demographics did not have a significant impact on gain scores, statistical analysis was conducted to see if question type had any influence on posttest scores. Questions that were categorized as "lecture questions" saw a 23.5 percentage point

increase in mean scores from the pretest to the posttest. On the hand, questions that were categorized as “experience questions” saw only a 15.8 percentage point increase in mean scores from the pretest to the posttest. It is likely that the greatest significant increase was seen in the lecture questions due to the nature of the material being presented in the classroom and then the opportunity for the student to apply what he/she had learned on their pen of steers. Alternatively, experience questions were strictly derived from the conditions the student underwent while working on their project outside of the classroom. This re-affirms the work of several by supporting the importance of experiential learning as a supportive method of teaching classroom material.

When pre and post-test questions were analyzed further, there were three unit topics that seemed to stand out with a large number of students answering the questions correctly on the post-test when compared to the pre-test. In the areas of meat science, marketing and health, anywhere from 14 to 12 more students answered correctly on the post-test than on the pre-test. Likely, these units saw the greatest increase in correct answers because students immersed themselves in research on these topics to make the most informed decisions possible in regards to their pen of steers. When this data was combined with student perception as to which unit they felt was the most valuable, the animal health unit seemed to rise to the top as it was the highest ranked unit topic by the students for enhancing their understanding. Health was a day-to-day issue that required some groups to be more informed than others as some pens of steers stayed healthier than others. However, it was an issue that received student attention throughout the entire course as students were continually monitoring their pens for sickness or ailments.

Because just over half (52.1%) of the students in this course were in a major that

involved the animal sciences, it can be assumed that the knowledge gained in this course could potentially go on to help these in their professional careers. Marshall et. al (1998) found that animal science graduates that were currently employed in the animal science industry noted the two most lacking educational experiences in animal science curriculum were marketing and industry contacts. To accommodate this finding, this course required students to develop their own personal marketing plans and also allowed them the opportunity to contact experts in the beef cattle industry if they desired more information or another opinion.

Finally, student perception via free response to the course was positive. A conducive learning environment for all students begins with sparking their interest and keeping the students engaged. Open responses indicated that this course did just that. Overall, students predominately joined the course for the hands-on experience opportunity as they noted not many of their other courses allow them the opportunity. This exhibits the students' desire for out-of-the-classroom experiences. Interestingly enough, each student that enrolled in the hands-on course seemed to indicate some portion of the hands-on experience was the most beneficial aspect of course. These aspects included, but were not limited to: live evaluation, making decisions and learning marketing techniques. Most noted the application of course concepts to real-world situations, such as the method in which this contest generated financial outcomes that were dependent upon beef production, environmental factors, and the marketing decisions made by the teams. Therefore, teams were constantly engaged and updating themselves on issues that affected their return to management, which created an almost constructivist way of learning. What is perhaps even more interesting is that at the

conclusion of the course, students replied that their biggest improvement for the course was for it to provide even more opportunities for students to make real-life decisions. This response speaks loudly to the level of student engagement in hands-on experiential learning and what students want to learn.

Conclusions

The shift in demographic distribution and background experience of students from rural to urban indicates a need for a renewal in the teaching of basic handling and management skills in the animal sciences. Illinois State University AGR 287: Independent Study in Beef Cattle Management and Marketing successfully encouraged experiential learning by requiring students to make real-life cattle management decisions, and then act upon their decisions by marketing their pen of steers. Quantitative and qualitative analysis of student participation indicated that the course had a positive impact on student knowledge retention of beef cattle management and marketing concepts. This contest may serve as a model for other universities with agriculture programs that wish to enhance their students' understanding of beef cattle production and marketing.

Tables

Table 1. Compared Means of the Pre-test and Post-test

Descriptives	Mean	N	Std. Deviation	Std. Error Mean
Pre-test	41.0000	23	11.43158	2.38365
Post-test	59.4609	23	16.02996	3.34248

Paired Samples Test	Paired Differences							
				95% Confidence Level				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pre-test – Post-test	-18.46087	17.19061	3.58449	-25.89465	-11.02709	-5.150	22	.000

Table 2. Compared Means of the Pre-test and Post-test by Student Background

Descriptives		N	Mean	Std. Deviation	Minimum	Maximum
Gain Scores	Farm	17	19.4353	19.23197	-15.40	61.50
	Non-Farm	6	21.7667	16.37518	-7.60	38.40
	Total	23	20.0435	18.19433	-15.40	61.50
Pre-Test	Farm	17	40.7647	12.04232	21.40	71.40
	Non-Farm	6	41.6667	10.49851	28.60	57.10
	Total	23	41.0000	11.43158	21.40	71.40
Post-Test	Farm	17	58.8176	16.65312	21.40	85.70
	Non-Farm	6	61.2833	15.42030	42.90	85.70
	Total	23	59.4609	16.02996	21.40	85.70

One-Way ANOVA		Sum of Squares	df	Mean Square	F	Sig.
Gain Scores	Between Groups	24.104	1	24.104	.070	.794
	Within Groups	7258.632	21	345.649		
	Total	7282.737	22			
Pre-Test	Between Groups	3.608	1	3.608	.026	.873
	Within Groups	2871.372	21	136.732		
	Total	2874.980	22			
Post-Test	Between Groups	26.962	1	26.962	.101	.754
	Within Groups	5626.153	21	267.912		
	Total	5653.115	22			

Table 3. Comparing Gain Scores between Gender

Descriptives	Mean	N	Std. Deviation	Std. Error Mean
Male	16.8357	14	19.12407	5.11112
Female	19.4000	9	15.09304	5.03101
Total	17.8391	23	17.33745	10.3419

ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	36.023	1	36.023	.115	.738
Within Groups	6576.892	21	313.185		
Total	6612.915	22			

Table 4. Compared Means of the Pre-test and Post-test by Question Type

Descriptives		Mean	N	Std. Deviation	Std. Error Mean
Experience Questions	Pre-test	45.6522	23	16.25817	3.39006
	Post-test	61.4130	23	18.81166	3.92250
Lecture Questions	Pre-test	33.6957	23	18.54806	3.86754
	Post-test	57.2391	23	20.61091	4.29767

Paired Samples Test		95% Confidence Upper	t	df	Sig. (2-tailed)
Experience Questions	Pre-Post	-5.95264	-3.333	22	.003
Lecture Questions	Pre-Post	-13.31297	-4.773	22	.000

Table 5. Number of Students Answering Correctly by Unit (Pre-test vs. Post-test)

Question #	Unit Topic	# of Students Answering Correctly on Pre-Test (n=23)	# of Students Answering Correctly on Post-Test (n=23)	Difference
8	Implanting	6	11	+5
9	Behavior	18	18	0
10	Implanting	7	3	-4
11	Implanting	5	8	+3
12	Marketing	6	19	+13
13	Weighing/ADG	12	21	+9
14	Nutrition	4	6	+2
15	Meat Science	8	22	+14
16	Meat Science	13	10	-3
17	Marketing	14	23	+9
18	Parts/Evaluation	5	12	+6
19	Behavior	10	12	+2
20	Nutrition	8	7	-1
21	Health	11	23	+12

Table 6. Top Five Student Perceived Value of Unit Enhancing their Understanding

1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, 5= Strongly disagree

Unit Topic	n	Total Score	Mean
Animal Health	23	43	1.8696
Implanting	19	37	1.9474
Nutrition/Weighing	19	41	2.1579
Parts/Evaluation	22	48	2.1818
Marketing	23	52	2.2609

Table 7. Student Course Completion Survey Responses

Please indicate your primary reason for taking this course.
I took this course because it was not your "everyday sit in a desk" kind of class. I wanted to get hands-on experience and learn more about the beef industry.
To gain fundamental knowledge in the beef livestock industry. To become more aware of life as a livestock producer and gain decision-making tactics in raising livestock.
To learn about the cattle business and how to make money raising/marketing cattle.
What aspects of this course did you feel were the most beneficial to you?
Being able to track our steers' progress using the diets we chose.
Learning how to judge finish on a market steer.
Going through the motions of managing a group of feeder steers and making choices for them.
Learning about pricing, and how to adjust your marketing plan as your animals and the market changes.
What do you suggest to improve this course?
I would like to be able to job-shadow chores at the farm.
Offer more decisions to make for the steers (deworming, different feeding plans).
Offer more options for feed rations and have weekly classes at the farm sometimes.
Even more hands-on experience out at the farm and I think we should be able to develop our own diets.

References

Bekkum, V. A. (1993). Experience needs of College of Agriculture graduates as perceived by business and industry. *NACTA journal (USA)*.

Cheek, J. G., Arrington, L. R., Carter, S., & Randell, R. S. (1994). Relationship of supervised agricultural experience program participation and student achievement in agriculture. *Journal of Agricultural Education, 35*(2), 1-5.

Collins, K. M., Onwuegbuzie, A. J., & Johnson, R. B. (2012). Securing a place at the table: A review and extension of legitimation criteria for the conduct of mixed research. *American Behavioral Scientist*, 0002764211433799.

Creswell, John W. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Los Angeles: Sage, 2009. Print.

Kolb, David A. *Experiential Learning: Experience as the Source of Learning and Development*. Englewood Cliffs, NJ: Prentice-Hall, 1984. Print.

Marshall, T. T., Hoover, T. S., Reiling, B. A., & Downs, K. M. (1998). Experiential learning in the animal sciences: effect of 13 years of a beef cattle management practicum. *Journal of animal science*, *76*(11), 2947-2952.

Phipps, L. J., & Osborne, E. W. (1988). Handbook on agricultural education in public schools.

Reiling, B. A., Marshall, T. T., Brendemuhl, J. H., McQuagge, J. A., & Umphrey, J. E. (2003). Experiential learning in the animal sciences: Development of a multispecies large-animal management and production practicum. *Journal of animal science*, *81*(12), 3202-3210.

Russell, E. B. (1993). Attracting youth to agriculture. *Journal of Extension*, *31*(4), 23-27.

CHAPTER III

LITERATURE REVIEW

Role of Agricultural Higher Education

Higher education in the United States has grown from humble beginnings to become an extensive program encompassing some 4,500 different colleges and universities and more than 20 million students (Bok, 2013). In the beginning, higher education was governed by institutions like Harvard, which focused mainly on liberal arts rather than the mechanical and technical arts. In its early years, higher education in America was for the elite, privileged people who only wanted to focus on liberal studies. Few middle and lower-class families sent their sons off to college as most of them needed to stay home and farm (Rudolph, 1990).

The passage of the Morrill Federal Grant Act of 1862 initiated a new period in the history of higher education by donating land to the states. The land was then sold by the states and the revenue generated from the sales funded public colleges that focused on agriculture and the mechanical arts. In total, 69 colleges were funded by these land grants (Library of Congress). In addition, this legislation created opportunities for average American citizens by allowing them to participate in a larger variety of education (Christy & Williamson, 1992). The purpose of the Morrill Federal Grant Act of 1862 was to equalize higher education by establishing institutions which had an ultimate objective of teaching sections of learning that were related to mechanical and agricultural arts,

without taking out the scientific and classical studies.. This allowed legislatures of different states to promote liberal and practical education to the industrial classes (Christy and Williamson, 1992).

Because the Morrill Federal Grant Act of 1862 did not divide funds along racial lines, the Second Morrill Act of 1890 was developed. The Second Morrill Act of 1890 established colleges of agriculture, mechanical arts, and home economics for people of color in states that restricted attendance at their land grant universities to white students (Christy and Williamson, 1992). The Morrill Acts opened doors for higher education to serve the common person interested in the mechanical and agricultural arts though land-grant colleges and thus were instrumental to the development of agriculture in higher education (Barrick, 1989).

According to Barrick (1989), agricultural education, which has been used synonymously with vocational agriculture is, "the scientific study of the principles and methods of teaching and learning as they pertain to agriculture." In addition to providing skills training, agricultural education links application of real world activities to the classroom and thus employs many different approaches to teaching. According to the National Research Council (2014), during an undergraduate education, agricultural students should master a variety of transferrable skills in addition to content knowledge. Employers value the skills at least as much as book learning. They go on to recommend communication, teamwork, decision-making, critical thinking and management be made important parts of agricultural curriculum. Furthermore, agricultural curriculum should give students the opportunity to engage in a variety of experiences that make content knowledge come alive.

During the next ten years, colleges of agriculture will be challenged to transform their role in higher education. This transformation is brought about by, not only an evolving agricultural world globally, but also a changing breed of agricultural students.

Agricultural students in this century vary in many ways from agricultural students of the last century, but most notably demographically. According to the National Research Council, well under 5% of the United States population live on farms, and barely 20% come from rural areas (Dimitri et. al, 2005). The increasing number of students coming from urban and suburban populations has evolved into a lack of awareness for basic agricultural practices. Russell (1993) insists this lack of agricultural background and/or experience jeopardizes the long-term future of the agricultural industry. These statistics alone prompt a transformation of agricultural curriculum to meet the needs of a changing world.

To meet these needs, agricultural education professionals have utilized both minds-on and hands-on approaches for lesson design, intent, and delivery (Parr & Edwards, 2004). These minds-on and hands-on approaches are encompassed and exemplified a non-tradition learning style known as experiential learning.

Experiential Learning

The term experiential learning includes a large variety of strategies that engage students in learning opportunities that go beyond traditional classroom activities (Shapiro & Levine, 1999). American philosopher and educational reformer John Dewey recognized nearly 100 years ago that students learn best and retain most when they are active participants in their own learning (Shapiro & Levine, 1999). Experiential learning is broadly defined as, the process by which a learner creates meaning from direct

experience (Bohn & Schmidt, 2008). When experiential learning is implemented in a classroom setting, it is more specifically considered as students participating in real life activities, reflecting on those activities, and incorporating their new understanding of that activity into their new lives (Bohn & Schmidt, 2008). The experiences outside of the classroom provide the increasingly growing numbers of non-traditional learners with valuable opportunities to apply theory to practice (Rolls, 1992).

Experiential learning as a formal part of college and university curricula extends across a wide range of subject areas and disciplines (Cantor, 1997). The idea of experiential learning is not new in the field of education (Wulff-Risner & Stewart, 1997). The theory of experiential learning goes back to the work of some very prominent twentieth century scholars (Kolb & Kolb, 2005) at a time when agricultural education in the United States was organized in both non-formal and formal settings (Knobloch, 2003). Some of the scholars who helped to model the theory of experiential learning are John Dewey, Kurt Lewin, Jean Piaget, William James, Carl Jung, Paulo Freire, Carl Rogers, and many others (Kolb & Kolb, 2005). Each of these scholars helped to develop a holistic model of the experiential learning process (Kolb & Kolb, 2005). While these scholars each had their own views and their own definitions of experiential learning, their theories are built on six propositions that are shared by them all:

1. Learning is best conceived as a process, not in terms of outcomes.
2. All learning is relearning. Learning is best facilitated by a process that draws out the students' beliefs and ideas about a topic so that they can be examined, tested, and integrated with new, more refined ideas.
3. Learning requires the resolution of conflicts between dialectically opposed

modes of adaptation to the world.

4. Learning is a holistic process of adaptation to the world.

5. Learning results from synergetic transactions between the person and the environment.

6. Learning is the process of creating knowledge.

From these six propositions, American educationalist David Kolb developed the Experiential Learning Theory (ELT). ELT proposes a constructivist theory of learning whereby social knowledge is created and recreated in the personal knowledge of the learner (Kolb & Kolb, 2005). The experiential learning theory suggests that learning occurs as a result of a specific experience of many experiences (Roberts & Harlin, 2007). Kolb proposed that experiential learning theory is a holistic integrative perspective on learning that combines experience, perception, cognition, and behavior (Wulff-Risner & Stewart, 1997). These four steps are more commonly thought of as experiencing, reflecting, thinking and acting. When a student has a concrete experience it is the basis for observations and reflections. These reflections are integrated into abstract concepts from which new implications for action can be made. These implications can be actively tested and serve as guides in creating new experiences. When referring to the experiential learning theory, Kolb and Kolb (2005) state that, learning is the major determinant of human development, and how individuals learn shapes the course of their personal development (Kolb and Kolb, 2005).

In their article, Teaching Options and Futures Trading through Experiential Learning, Parcell and Franken (2009) discussed a commodity trading course which was built upon the principles of experiential learning and has shown successful results. The

results of their study demonstrate that by having the students participate in an actual trading pool investment, they became more actively involved in their own learning process. Experiential learning was able to help these students take an interest in their own learning and get involved with their course.

Another outcome of the integration of experiential learning is the learner being able to identify specific parts of their experience upon which they can reflect (Roberts and Harlin, 2007). Individual student experiences include curricular experiences, classroom experiences, and out-of-class experiences (Terenzini & Reason, 2005). Curricular experiences are the student‘s general education coursework, his/her decision of academic major or field of study, and other academic experiences including, but are not limited to, internships, study abroad, and cooperative education (Terenzini & Reason, 2005). These may also include the amount of writing a student does, the feedback from faculty members, and the instructor‘s pedagogical skills (Terenzini & Reason, 2005). Out-of-class experiences refer to what shapes a student's psychosocial, cognitive, attitudinal, and occupational learning outcomes in slight and intricate ways. These may include, but are not limited to, where a student lives while going to school, hours working on and/or off campus, family support, hours spent studying, and involvement in co-curricular activities (Terenzini & Reason, 2005). The framework suggests that all of these areas are important to a full understanding of how students change and grow (Terenzini & Reason, 2005). Research has shown that the metacognitive skills that students employ while partaking in experiential learning activities permit students to assess their highest level of understanding and mastery of the area under discussion (Bohn and Schmidt, 2008). By including experiential learning activities in classrooms, students are able to

personalize their learning experiences (Bohn & Schmidt, 2008).

Experiential Learning in Agricultural Curriculum

Agricultural education has been experiential in nature since its beginning (Hughes & Barrick, 1993; Cheek, Arrington, Carter, & Randell, 1994; McLean & Camp, 2000; Knoblock, 2003; Roberts, 2006; Baker, 2012). The experiential learning focus of secondary agricultural education has been a foundational model for student learning in agricultural education and can be viewed a multitude of ways (Knoblock, 2003). Some skills and abilities cannot be taught by books or by reviewing the works of others, they require active observations. Most commonly, experiential learning can be shown in agricultural studies through such activities as laboratory work, field trips, and problem solving. Experiential learning has long been valued and recognized as an integral part of the education process in the field of agricultural (Cheek, Arrington, Carter, & Randell, 1993).

As noted earlier, America's universities are facing a change of climate today, particularly within colleges and departments of agriculture. Recognizing this change, the National Research Council called for a transformation in colleges of agriculture to identify the needs of global integration, new science, consumer influence, environmental concerns, and demographic and political shifts (Estepp & Roberts, 2011). It should be noted that this problem is not unique to colleges of agriculture, but is common throughout higher education. To improve the undergraduate learning experience, the NRC called for an increase in the use of case studies, problem-based learning, service learning, community engagement, cooperative learning, active learning, and developing learning communities. Without increased use of these concepts, agricultural education will

continue to struggle to provide students with the tools necessary for success. According to Estepp & Roberts (2011), to meet this need, agricultural instructors can apply constructivist principles in facilitating experiential learning through classroom and laboratory instruction, individualized projects, research and extra-curricular activities to help prepare graduates of colleges of agriculture to work in an ever-changing world. Though the opportunity for participation in learning experiences is vast in agriculture, Knobloch (2003) claims that the biggest challenge for today's teachers and students of agriculture is, "to move beyond the 'doing' and ensure that all learning is connected to thinking and knowledge that will be easily remembered and applied later in life."

With student future success in mind, Bekkum (1993) found that the highest ranked need of Agricultural undergraduates as perceived by agricultural businesses was previously working part-time on a farm or in agribusiness, and the second highest need was being raised on a farm as many companies suggest that coming from a farm background helps to establish creditability with clientele. VanDerZanden (2009) further explored this topic, and adds that poor personal skills, such as poor work ethic and poor teamwork skills, are the worst traits for agriculture graduates to lack according to agricultural employers. Uniquely, VanDerZanden (2009) draws the conclusion that some of the most desired skills by agricultural employers, such as work ethic and initiative, are also some of the most difficult skills to teach at the collegiate level. Nevertheless, some of these skills that are difficult to teach can be indirectly taught to students via the development of student problem-solving skills and critical thinking skills, which is the most cited education need in agricultural curricula according to Rhykerd et. al (2006). The use of simulations, games and contests to provide these problem-solving and critical

thinking skills experientially in agriculture curricula has been shown to enhance student learning, advance interpersonal and communication skills, improve students' ability to recognize and apply principles, and expand their ability to analyze situations (Dobbins et al., 1995).

The Fed Cattle Market Simulator (FCMS) allowed student teams at Oklahoma State University to role-play as either feedlot marketing managers or packing plant managers on a computer. The decisions made by these buyers and sellers creates a simulation of the economic activities, dynamics and psychology of the real fed cattle market. Koontz (1995) evaluated the benefits of students partaking in this simulation and noted that participant motivation was dramatically increased over traditional classroom lecture due to the personal involvement and competitive nature of the participants. In addition, student participants noted the best aspects of simulating a real-life scenario was the realism the game created, integration of economic concepts into the simulation and the teachable moments crated by the game that instructors used for discussion and illustration. In addition, the FCMS incorporates several non-economic concepts. Students work in teams to make fast-paced decisions, manage time, delegate responsibilities, work through differences in personalities and practice negotiation and conflict resolution skills (Koontz, 1995). These skills seem to align perfectly with the needs cited by Dobbins, Rhykerd and VanDerZanden.

In a study conducted by Rhykerd et al. (2006), the concepts of the FCMS are taken one step further in the field of agronomy. A crop production and marketing contest was designed to give undergraduate student groups the opportunity to gain hands-on experience with growing and managing a corn and soybean plot at the Illinois State

University Farm. Student groups selected and implemented their own crop production and marketing strategies with the end objective in mind to generate the largest return to management (Rhykerd et al., 2006). Student participants in this contest indicated that participation in the contest positively impacted their knowledge of agricultural practices, increased their self-confidence when interacting with farms and agribusiness personnel, and improved their leadership skills (Rhykerd et. al, 2006).

Experiential Learning in the Animal Sciences

A recent study at the University of Florida brought the same hands-on concepts involved in the Rhykerd et al. (2006) study to animal science curriculum. Reling et al. (2003) recognized that only four percent of the students in production animal majors were raised on a farm or ranch where the majority of family income was attributed to production agriculture. Interestingly enough, eighty-six percent of the students had minimal or no experience working with large domestic farm animals, but nearly sixty-four percent of the students wanted to pursue a career in veterinary medicine (Reiling et al., 2003). Reiling et al. (2003) came to the conclusion that as more students enter animal science programs with nonagricultural backgrounds, a need to reemphasize basic animal-handling skills and practical applications through experiential learning activities presents itself.

Identifying that many colleges and departments of animal science have experienced dramatic changes in demographics of their student population over the past 20 years, the University of Florida developed a multi-species large animal management and production practicum to provide students with hands-on experience (Reiling et al., 2003). The results of this study yielded highly positive course evaluations, partly

attributed to the fact that when students engage themselves in the learning process, the learning experience is more interesting. Students learned to manage animals in production settings, and to work in teams and communicate. Furthermore, Kesler (1997) reported that when non-agriculture majors were introduced to the world of animal science, their impressions of the profession, science and industry were improved. However, this study encompassed a course that spanned two school years (four semesters). Most students do not have the resources and time available to dedicate to a course that is this time consuming. This study also introduced students to a variety of production animals; therefore, it would be of value to determine if experiential learning in the animal sciences is equally as beneficial to a more specific course that focuses on only one species of animals.

Experiential Learning in Beef Cattle Management

Though the research that involves beef cattle management and experiential learning is limited, it is thorough. Marshall et al. (1998) compiled the results of 13 years of a beef cattle management practicum at the University of Florida to analyze the perceived value of this hands-on educational experience. The 194 students that completed the analysis indicated that the course was most useful in teaching cattle handling skills, growth performance measurement, live animal evaluation, nutritional management, carcass and meat product value determination, and breed identification (Marshall et al., 1998). The results also suggest this experiential learning course was effective in addressing hand-on experience with livestock (cattle handling) and subject matter competence (Marshall et al., 1998). Perhaps the most important aspect of this study is job placement. Of the 101 animal science graduates that took the course, 79.6% are now

employed in an agricultural occupation, with 68% employed in the animal health care field as veterinarians or veterinary technicians (Marshall et al., 1998).

While Marshall et al.'s (1998) study "Experiential learning in the animal sciences: effect of 13 years of a beef cattle management practicum" thoroughly analyzes experiential learning in beef cattle management, it does so from alumnus view of the past. Perhaps perceived value of hands-on learning is best assessed from current students upon completion of each unit. The limited information available regarding hands-on learning in the animal sciences and beef cattle management prompts the need for more exploratory research to be conducted on the topic.

References

Baker, M. A. (2012). *The effect of Kolb's experiential learning model on successful secondary student intelligence and student motivation*. Oklahoma State University.

Barrick, R. K. (1989). Agricultural education: Building upon our roots. *Journal of Agricultural Education*, *30*(4), 24-29.

Bohn, D. M., & Schmidt, S. J. (2008). Implementing experiential learning activities in a large enrollment introductory food science and human nutrition course. *Journal of Food Science Education*, *7*(1), 5-13.

Bok, D. (2009). *Universities in the marketplace: The commercialization of higher education*. Princeton University Press.

Cantor, J. A. (1997). Experiential Learning in Higher Education: Linking Classroom and Community. ERIC Digest.

Cheek, J. G., Arrington, L. R., Carter, S., & Randell, R. S. (1994). Relationship of supervised agricultural experience program participation and student achievement in agricultural education. *Journal of agricultural education*, *35*(2), 1-5.

Christy, R. D., & Williamson, L. (Eds.). (1992). *A century of service: Land-grant colleges and universities, 1890-1990*. Transaction Publishers.

Dimitri, C., Effland, A. B., & Conklin, N. C. (2005). The 20th century transformation of US agriculture and farm policy.

Dobbins, C. L., Boehlje, M., Erickson, S., & Robert, T. (1995). Using games to teach farm and agribusiness management. *Review of Agricultural Economics*, *17*(3), 247-255.

Estepp, C. M., & Roberts, T. G. (2011). A Model for Transforming the Undergraduate Learning Experience in Colleges of Agriculture. *NACTA Journal*, *55*(3).

Hughes, M., & Barrick, R. K. (1993). A Model for Agricultural Education in Public Schools. *Journal of Agricultural Education*, *34*(3), 59-67.

Knobloch, N. A. (2003). Is experiential learning authentic?. *Journal of Agricultural Education*, *44*(4), 22-34.

Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development*. FT Press.

Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of management learning &*

education, *4*(2), 193-212.

Kolb, David A. *Experiential Learning: Experience as the Source of Learning and Development*. Englewood Cliffs, NJ: Prentice-Hall, 1984. Print.

Koontz, S. R., Peel, D. S., Trapp, J. N., & Ward, C. E. (1995). Augmenting agricultural economics and agribusiness education with experiential learning. *Review of Agricultural Economics*, *17*(3), 267-274.

Marshall, T. T., Hoover, T. S., Reiling, B. A., & Downs, K. M. (1998). Experiential learning in the animal sciences: effect of 13 years of a beef cattle management practicum. *Journal of animal science*, *76*(11), 2947-2952.

McLean, R. C., & Camp, W. G. (2000). An examination of selected preservice agricultural teacher education programs in the United States. *Journal of Agricultural Education*, *41*(2), 25-35.

Parcell, J. L., & Franken, J. R. (2009). Teaching options and futures trading through experiential learning. *NACTA Journal*, *53*(3), 11-16.

Parr, B., & Edwards, M. C. (2004). Inquiry-based instruction in secondary agricultural education: Problem-solving-An old friend revisited. *Journal of Agricultural Education*, *45*, 106-117.

Reiling, B. A., Marshall, T. T., Brendemuhl, J. H., McQuagge, J. A., & Umphrey, J. E. (2003). Experiential learning in the animal sciences: Development of a multispecies large-animal management and production practicum. *Journal of animal science*, *81*(12), 3202-3210.

Rhykerd, R. L., Tudor, K. W., Wiegand, B. R., Kingman, D. M., & Morrish, D. G. (2006). Enhancing experiential learning through a hands-on crop production and marketing contest. *NACTA Journal*, *50*(4), 25-30.

Roberts, T. G. (2006). A Philosophical Examination of Experiential Learning Theory for Agricultural Educators. *Journal of Agricultural Education*, *47*(1), 17.

Roberts, T. G., & Harlin, J. F. (2007). The Project Method in Agricultural Education: Then and Now. *Journal of Agricultural education*, *48*(3), 46-56.

Rudolph, F. (1962). *The American college and university: A history*. University of Georgia Press.

Russell, E. B. (1993). Attracting youth to agriculture. *Journal of Extension*, *31*(4), 23-27.

Shapiro, N. S., & Levine, J. H. (1999). *Creating Learning Communities: A Practical Guide to Winning Support, Organizing for Change, and Implementing Programs.*

Jossey-Bass Higher and Adult Education Series. Jossey-Bass Inc., Publishers, 350 Sansome St., San Francisco, CA 94104.

Terenzini, P. T., & Reason, R. D. (2005, November). Parsing the first year of college: A conceptual framework for studying college impacts. In *Association for the Study of Higher Education, Philadelphia, PA*.

VanDerZanden, A. M., & Reinert, M. (2009). Employer attitudes and perceptions of job preparedness of recent Iowa State University horticulture graduates. *HortTechnology*, *19*(3), 647-652.

Wulff-Risner, L., & Stewart, B. (1997). Using Experiential Learning to Teach Evaluation Skills. *Journal of Agricultural Education*, *38*(3), 43-50.

APPENDIX A

SURVEY PARTICIPANT

CONSENT FORM

Dear Survey Participant:

I am a graduate student under the direction of Professor Rob Rhykerd in the Department of Agricultural at Illinois State University. I am conducting a research study to assess student learning in a beef cattle-feedlot management independent study course. I am requesting your participating, which will involve completing a survey at the beginning and end of the course. Your participation is requested from August 18, 2013 until May 8, 2014. To participate in this study you must be at least 18 years of age.

Your participation in this study is absolutely voluntary, and you may withdraw from the study at any time with no questions asked. There will be no penalty, and your grade in the course will not be affected in any way. Your responses are confidential and any information that might allow someone to identify you will not be disclosed. Only the researchers working directly with this study will have access to the surveys and results. Your course instructor will not be made aware if you participate in this research study or not. If you opt out of this research study, you are still required to complete the surveys as part of your coursework.

There are no risks involved with participation beyond those of everyday life. Although there may be no direct benefit to you, a possibly benefit of your participation is improving the ways students learn in the Department of Agriculture at Illinois State University and discovering ways professors in the department can improve the content of their courses to ensure the student is learning the material the most beneficial way possible. We are specifically targeting students in a livestock management course, in order to determine the most effective methods of teaching management skills required of students seeking employment in the livestock industry.

If you have any questions concerning this research study, please call me at (309) 438-5654 or email me at cjharr2@ilstu.edu, or your may also contact Dr. Rob Rhykerd at (309) 438-8550 or by email at rrhyker@ilstu.edu. Questions may also be directed to Illinois State University Research Ethics and Compliance Office (309) 438-2529.

Sincerely,
Corinne Harrison

Please check the box and sign your name verifying that you are voluntarily completing the surveys, you are at least 18 years of age, and have been informed of your rights in regards to this study.

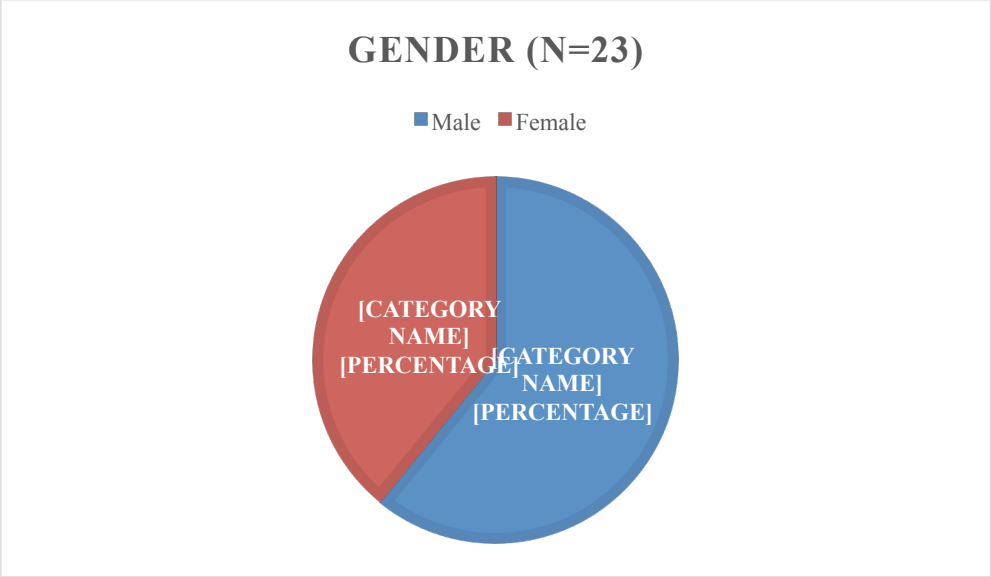
☐ I give consent to participate in this study.

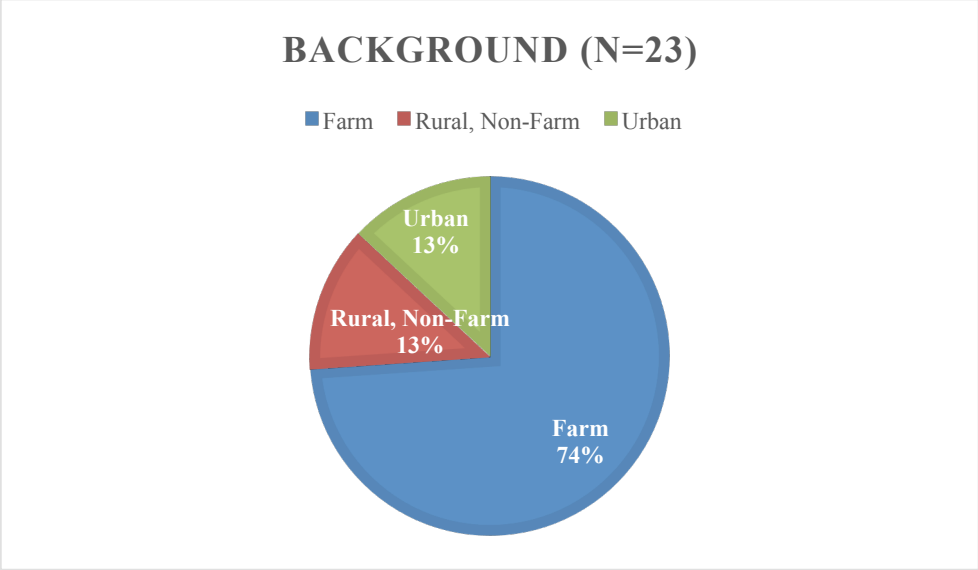
☐ I do not give consent to participate in this study.

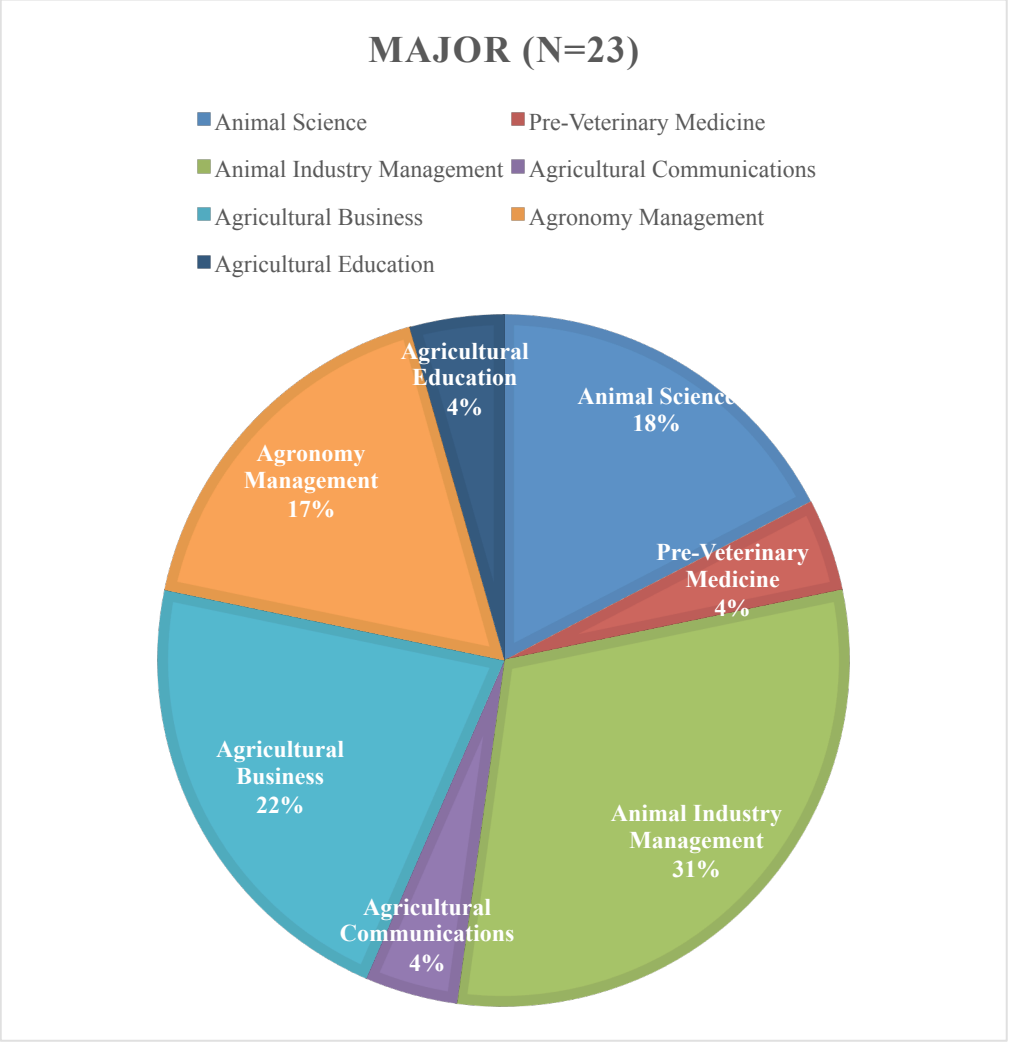
Print Name: _____
Signature: _____ Date: _____

APPENDIX B

PARTICIPANT DEMOGRAPHICS


GENDER (N=23)
Male
Female
[CATEGORY NAME] [PERCENTAGE]
[CATEGORY NAME] [PERCENTAGE]


BACKGROUND (N=23)
Farm
Rural, Non-Farm
Urban
Urban 13%
Rural, Non-Farm 13%
Farm 74%


MAJOR (N=23)
Animal Science
Pre-Veterinary Medicine
Animal Industry Management
Agricultural Communications
Agricultural Business
Agronomy Management
Agricultural Education
Agricultural Education 4%
Animal Science 18%
Agronomy Management 17%
Pre-Veterinary Medicine 4%
Agricultural Business 22%
Animal Industry Management 31%
Agricultural Communications 4%

APPENDIX C

PARTICIPANT PRE-TEST AND POST-TEST

1. Gender
    a. Male
    b. Female

2. Race
    a. Caucasian
    b. Hispanic
    c. African American
    d. Asian
    e. Other, please specify _____

3. Which of the following best describes your background?
    a. Farm
    b. Rural, Non-Farm
    c. Urban

4. If you chose farm on the previous question, please identify which of the following best describes your farm background.
    a. Grain production
    b. Livestock production
    c. Grain and Livestock production
    d. Other, please specify _____

5. If you chose livestock production on the previous question, please indicate what type of operation best describes your livestock background.
    a. Commercial
    b. Purebred/Seedstock
    c. Junior project
    d. Other, please specify _____

6. If you chose livestock production on Question #4, please indicate what types of livestock that you have experience with. (Please circle all that apply)
    a. Dairy cattle d. Swine g. Chickens
    b. Beef cattle e. Equine h. Turkeys
    c. Sheep f. Goats i. Other, please specify _____

7. Which of the following is your major and sequence?
    a. Animal Science
    b. Animal industry management
    c. Pre-veterinary medicine
    d. Other, please specify _____
8. Synthetic compounds acting similar to naturally occurring catecholamines are __?
    a. Somatotropin
    b. Beta adrenergic agonists
    c. Beta receptors
    d. Beta implants

9. An advantage to feeding heifers (versus steers) to slaughter would be which of the following?
    a. Slower growth rate
    b. Spaying
    c. Quality advantages
    d. Yield advantages

10. Including beta agonists in the diet has been shown to decrease carcass fatness by increasing rates of _____.
    a. Protein degradation
    b. Muscle hyperplasia
    c. Lipid synthesis
    d. Lipolysis

11. Which of the following products has a withdrawal period prior to slaughter?
    a. Paylean
    b. Optaflex
    c. Zilmax
    d. Paymax

12. The Choice-Select spread is typically the widest during which season?
    a. Spring
    b. Summer
    c. Fall
    d. Winter

13. When considering cattle growth rates, which of the following represents an average rate of gain to be expected during the feeding period?
    a. .5 – 1.5 lbs/day
    b. 2.5 – 4.0 lbs/day
    c. 4.5 – 6.0 lbs/day
    d. 6.5 – 8.0 lbs/day

14. As the price of corn increases, which of the following production systems would be thought to have the greatest opportunity for an increase in profitability?

a. Calf-fed
b. Short yearling
c. Long yearling
d. Bullock yearling

15. What is the average dressing percentage for fed cattle?
    a. 52%
    b. 62%
    c. 72%
    d. 82%

16. An average shrink range that may be expected for slaughter steers would be ____.
    a. 2-6%
    b. 6-10%
    c. 10-15%
    d. 15-20%

17. Which of the following marketing approaches would provide the largest advantage for a predominately British steer?
    a. Live Weight Price-Based
    b. Carcass Price-Based
    c. Quality Grid Price-Based
    d. Yield Grid Price-Based

18. Please choose the best location(s) for determining degree of finish on a fed steer.
    a. Topline, tail-length and poll
    b. Topline
    c. Cod, flank and sternum
    d. Rump-width, neck size and heart girth

19. Which of the following pen space allowances is the most appropriate for feedlot cattle (in sq ft. per head)?
    a. 10-15 ft^2
    b. 20-25 ft^2
    c. 15-20 ft^2
    d. 25-40 ft^2

20. Which of the following calf production groups will be on feed for the longest period of time prior to slaughter?
    a. Calf-fed
    b. Backgrounder
    c. Foregrounder
    d. Yearling

21. Which of the following is thought to be the most significant health problem in the cattle industry in terms of economic value annually?

a. Infectious bovine leptospirosis
b. Bovine spongiform encephalopathy
c. Bovine respiratory disease
d. Infectious bovine keratoconjunctivitis

APPENDIX D

PARTICIPANT UNIT SURVEYS

Survey ID: _____

Survey Questions

Using the following scale, answer the following questions about the unit on Beef Cattle Basics, Behavior and Handling.

1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, 5= Strongly Disagree

1. This unit enhanced my understanding of animal behavior and handling.

   1 2 3 4 5

2. After completing this unit, I am confident in my ability to handle cattle.

   1 2 3 4 5

3. What information did you find to be most helpful?

4. What area(s) would you like more information on?

Survey ID: _____

Survey Questions

Using the following scale, answer the following questions about the unit on Beef Cattle Nutrition.

1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, 5= Strongly Disagree

1. This unit enhanced my understanding of beef cattle nutrition needs.

   1 2 3 4 5

2. After completing this unit, I am confident in my ability to feed cattle.

   1 2 3 4 5

3. What information did you find to be most helpful?

4. What area(s) would you like more information on?

Survey ID: _____

Survey Questions

Using the following scale, answer the following questions about the unit on Beef Cattle Weighing and Average Daily Gain.

1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, 5= Strongly Disagree

1. This unit enhanced my understanding of weights and average daily gain.

   1 2 3 4 5

2. After completing this unit, I am confident in my ability to weigh cattle.

   1 2 3 4 5

3. What information did you find to be most helpful?

4. What area(s) would you like more information on?

Survey ID: _____

Survey Questions

Using the following scale, answer the following questions about the unit on Beef Cattle Implanting.

1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, 5= Strongly Disagree

1. This unit enhanced my understanding of implants.

   1 2 3 4 5

2. After completing this unit, I am confident in my ability to implant cattle.

   1 2 3 4 5

3. What information did you find to be most helpful?

4. What area(s) would you like more information on?

Survey ID: _____

Survey Questions

Using the following scale, answer the following questions about the unit on Beef Cattle Marketing.

1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, 5= Strongly Disagree

1. This unit enhanced my understanding of marketing beef cattle.

   1 2 3 4 5

2. After completing this unit, I am confident in my marketing ability.

   1 2 3 4 5

3. What information did you find to be most helpful?

4. What area(s) would you like more information on?

Survey ID: _____

Survey Questions

Using the following scale, answer the following questions about the unit on Beef Cattle Health.

1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, 5= Strongly Disagree

1. This unit enhanced my understanding of animal health.

   1 2 3 4 5

2. After completing this unit, I am confident in my ability to diagnose cattle.

   1 2 3 4 5

3. What information did you find to be most helpful?

4. What area(s) would you like more information on?

Survey ID: _____

Survey Questions

Using the following scale, answer the following questions about the unit on Beef Cattle Parts and Evaluation.

1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, 5= Strongly Disagree

1. This unit enhanced my understanding of beef cattle parts and evaluation.

   1 2 3 4 5

2. After completing this unit, I am confident in my ability to evaluate cattle.

   1 2 3 4 5

3. What information did you find to be most helpful?

4. What area(s) would you like more information on?

Survey ID: _____

Survey Questions

Using the following scale, answer the following questions about the unit on Beef Cattle Meat Science.

1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, 5= Strongly Disagree

1. This unit enhanced my understanding of meat science.

   1 2 3 4 5

2. After completing this unit, I am confident in my ability to evaluate beef carcasses.

   1 2 3 4 5

3. What information did you find to be most helpful?

4. What area(s) would you like more information on?

APPENDIX E

COURSE COMPLETION SURVEY

Course Completion Survey Survey ID: _____

1. In the space provided, please indicate your primary reason for taking this course.

2. What aspects of this course did you feel were the most beneficial to you?

3. Compared to your experience prior to taking this course, please describe your current knowledge and experience level in a livestock management scenario.

4. What do you suggest to improve this course?

5. Other comments/suggestions for this course in the future.