

**PURDUE UNIVERSITY**  
**GRADUATE SCHOOL**  
**Thesis/Dissertation Acceptance**

This is to certify that the thesis/dissertation prepared

By Natalie M. Rappaport

Entitled Indiana 4-H Horse and Pony Adult Volunteers' Valuation of Equine Welfare

For the degree of Master of Science

Is approved by the final examining committee:

Colleen Brady

Chair

Neil Knobloch

Roger Tormoehlen

To the best of my knowledge and as understood by the student in the *Research Integrity and Copyright Disclaimer (Graduate School Form 20)*, this thesis/dissertation adheres to the provisions of Purdue University's "Policy on Integrity in Research" and the use of copyrighted material.

Approved by Major Professor(s): Colleen Brady

Approved by: Roger Tormoehlen

Head of the Graduate Program

07/16/09

Date

**PURDUE UNIVERSITY  
GRADUATE SCHOOL**

**Research Integrity and Copyright Disclaimer**

Title of Thesis/Dissertation:

Indiana 4-H Horse and Pony Adult Volunteers' Valuation of Equine Welfare

For the degree of Master of Science

I certify that in the preparation of this thesis, I have observed the provisions of *Purdue University Executive Memorandum No. C-22*, September 6, 1991, *Policy on Integrity in Research*.\*

Further, I certify that this work is free of plagiarism and all materials appearing in this thesis/dissertation have been properly quoted and attributed.

I certify that all copyrighted material incorporated into this thesis/dissertation is in compliance with the United States' copyright law and that I have received written permission from the copyright owners for my use of their work, which is beyond the scope of the law. I agree to indemnify and save harmless Purdue University from any and all claims that may be asserted or that may arise from any copyright violation.

Natalie M. Rappaport

Printed Name and Signature of Candidate

07/27/2009

Date (month/day/year)

\*Located at [http://www.purdue.edu/policies/pages/teach\\_res\\_outreach/c\\_22.html](http://www.purdue.edu/policies/pages/teach_res_outreach/c_22.html)

INDIANA 4-H HORSE AND PONY ADULT VOLUNTEERS' VALUATION OF  
EQUINE WELFARE

A Thesis

Submitted to the Faculty

of

Purdue University

by

Natalie M. Rappaport

In Partial Fulfillment of the  
Requirements for the Degree

of

Master of Science

August 2009

Purdue University

West Lafayette, Indiana

UMI Number: 1470081

### INFORMATION TO USERS

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleed-through, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

UMI<sup>®</sup>

---

UMI Microform 1470081  
Copyright 2009 by ProQuest LLC  
All rights reserved. This microform edition is protected against  
unauthorized copying under Title 17, United States Code.

---

ProQuest LLC  
789 East Eisenhower Parkway  
P.O. Box 1346  
Ann Arbor, MI 48106-1346

To Truman, the best puppy dog in the world, who spent all the nights I was awake writing this asleep.

## ACKNOWLEDGMENTS

I would like to thank, first and foremost, Dr. Colleen Brady, for her unwavering support, encouragement, and faith in me, my abilities, and the value of this research. It was a true honor to work with her.

Dr. Neil Knobloch was an incredible fount of information and his contributions to my scholastic endeavors and growth are duly, and very gratefully, noted.

Dr. Edmond Pajor also provided most welcome advice and challenge, and it is with great gratitude that I acknowledge his role in this work.

Dr. Roger Tormoehlen made his support available to me in numerous ways, through his leadership in our department and through his involvement in this study, and I am indebted to him for making this thesis possible.

Many thanks to Terry Saunders, Linda Hines, and Allison Sapp for arranging logistics, answering questions, providing administrative and oftentimes emotional support, and for generally putting up with me.

## TABLE OF CONTENTS

	Page
LIST OF TABLES .....	vi
LIST OF FIGURES .....	vii
ABSTRACT .....	viii
CHAPTER 1. INTRODUCTION .....	1
1.1. Objectives .....	1
1.2. Organization .....	1
1.3. Thesis Statement.....	2
1.4. Statement of the Problem .....	2
1.5. Study Significance .....	3
1.6. Purpose of the Study .....	5
1.7. Limitations of the Study .....	5
1.8. Assumptions of the Study .....	6
CHAPTER 2. REVIEW OF RELATED LITERATURE.....	7
2.1. Purpose of the Study .....	7
2.2. Objectives of the Study.....	7
2.3. Introduction.....	7
2.4. Conceptual Framework.....	8
2.5. Thematic Analysis .....	12
2.5.1. Practical Welfare-Assessments and Attitudes .....	12
2.5.2. The Equine Situation and Ensuing Welfare Debates.....	21
2.5.3. The Role of Education in Equine Welfare Discussions.....	30
2.6. Outcome of Interest .....	32
CHAPTER 3. METHODS AND PROCEDURES.....	35
3.1. Purpose of the Study .....	35
3.2. Objectives of the Study.....	35
3.3. Institutional Review of Human Subjects Use .....	35
3.4. Research Design .....	36
3.5. Participants.....	37
3.6. Instrumentation .....	39
3.7. Data Collection .....	40
3.8. Data Analysis.....	42
CHAPTER 4. RESULTS AND FINDINGS .....	44
4.1. Purpose of the Study .....	44
4.2. Objectives of the Study.....	44
4.3. Results and Findings .....	44

	Page
4.3.1. Population Characterization .....	46
4.3.2. Psychometric Properties of Researcher Designed Instrument .....	49
4.3.3. Descriptions and Trends of Valuation Data .....	52
4.3.4. Identification of Differential Factors Affecting Skill Valuation .....	57
4.3.5. Statistical analysis of valuation scoring .....	60
CHAPTER 5. CONCLUSIONS .....	63
5.1. Purpose of the Study .....	63
5.2. Objectives of the Study .....	63
5.3. Discussions, Implications, and Conclusions .....	63
5.3.1. Researcher-designed assessment .....	64
5.3.2. Volunteers' value of horse welfare skills .....	65
5.3.3. Differential value of welfare principles .....	79
5.3.4. Significant factors affecting values of welfare .....	81
5.4. Conclusions and Recommendations .....	84
LIST OF REFERENCES .....	86
APPENDIX .....	94



## LIST OF TABLES

Table	Page
Table 1: Classification of horsemanship skills .....	51
Table 2: Mean values of Five Freedom and Riding and life skills categories .....	52
Table 3: Freedom from Hunger and Thirst skill valuation .....	54
Table 4: Freedom from Discomfort skill valuation.....	54
Table 5: Freedom from Pain, Injury, and Disease skill valuation .....	55
Table 6: Freedom to Express Normal Behavior skill valuation .....	56
Table 7: Freedom from Fear and Distress skill valuation.....	57
Table 8: Numerical references for Five Freedom categories .....	57
Table 9: One sample t-test between mean welfare score and category means .	61

## LIST OF FIGURES

Figure	Page
Figure 1: Age distribution of respondents .....	46
Figure 2: Respondents' indication of horse ownership experience.....	47
Figure 3: Respondent familiarity with National 4-H curriculum .....	48
Figure 4: Overall surveyed skill item means .....	53
Figure 5: Mann-Whitney mean ranking by ownership experience .....	59
Figure 6: Kruskal-Wallis mean ranking by familiarity with curriculum .....	60
Figure 7: Statistic comparisons of mean category scores .....	62

## ABSTRACT

Rappaport, Natalie M. M.S., Purdue University, August, 2009. Indiana 4-H Horse and Pony Adult Volunteers' Valuation of Equine Welfare. Major Professor: Colleen Brady.

The purpose of the present study was to determine the value that Indiana 4-H Horse and Pony adult volunteers place on skills that reflect aspects of equine well-being. In order to promote horse welfare through practice, the underlying perceptual attitudes about horse welfare must first be gleaned from industry participants. Because the 4-H Horse and Pony program functions as an educational resource for recreational horse enthusiasts, this program, and the adult facilitators in charge of programming, play an active role in the development of proper horsemanship skills for 4-H youth. This study asked these adult volunteer educators to assign a value to National 4-H Horse and Pony project skills that represented components of the Five Freedoms framework of animal welfare. Overall these adult volunteers perceived skills related to welfare were of high value, but with differential value placed on certain skill sets. Skills related to nutrition, malnutrition, and thirst were the most highly regarded, and skills related to physical facility management and design were the least valued in regards to the responsible care and use of horses. Different assignments of value were also observed based on previous horse ownership experience, education level, and familiarity with the programmatic source of the skills. These results are discussed in terms of the implications for horse welfare from a 4-H program perspective, and for the continued effectiveness of welfare as a science in the horse industry at large.

## CHAPTER 1. INTRODUCTION

### 1.1. Objectives

The overall goal of this research was to determine the value that Indiana 4-H Horse and Pony project adult volunteers place on skills related to equine welfare.

The specific objectives were to:

1. Develop and test an assessment for determining attitude toward equine well-being based on basic horsemanship skills
2. Describe adult volunteers' value of project skills as they relate to horse welfare
3. Compare valuation scores of skills representing different aspects of welfare relative to perceived worth
4. Identify underlying factors potentially associated with subsequent valuation
5. Provide baseline attitudinal level measures for future study in welfare education and programmatic needs assessment

### 1.2. Organization

This thesis includes discourse on such relevant topics as equine well-being, educational theory, and the unique intersection of animal science principles and youth development in the Indiana 4-H Horse and Pony project. It has five chapters and 84 pages.

### 1.3. Thesis Statement

This research investigates Indiana 4-H Horse and Pony project adult volunteers' perceived value of equine welfare. This study examines leaders' and judges' valuation of horse well-being by their determination of worth of select programmatic horsemanship skills.

### 1.4. Statement of the Problem

Animal well-being is an increasingly relevant and widespread societal and scientific concern for practitioners of animal production, husbandry, and care. Assessment of equine well-being has concentrated on management practices, or, animal-based parameters that are impacted by human choices, in part due to a growing cultural interest in evaluating welfare *in situ* for the variety of ways horses are used throughout the world. Animal well-being is given measurable credence in the farm and companion animal industries, but the unique, diverse, and global equine market struggles to derive its own characteristic ethic of care and use. The challenges in defining horse welfare for such an internally segmented industry can be resolved by optimizing criteria for animal quality of life utilizing basic horsemanship skills and knowledge. One objective of the Indiana 4-H Horse and Pony project is to “develop an appreciation of horse well-being and proper horsemanship” through experiential educational programs for youth and volunteer participants (Brady, 2007, p. 2). By soliciting attitudes about the value of horsemanship skills founded on tenets of welfare from adult volunteers in the Indiana 4-H Horse and Pony program, conclusions about programmatic content may provide an introductory evaluation of needs for implementing welfare-minded best practices through educational intervention. To progress in improving equine welfare on a global scale, baseline attitudes need to be determined for every rank of industry practitioner. Perceptions of equine welfare should be obtained as they relate to an individuals' realm of action and influence, in a way that represents personal choices of responsibility. For learners in a non-formal equine-facilitated education program, sentience of their role in impacting

animal well-being begins in evaluating their attitudes towards essential skills for horse care and use.

### 1.5. Study Significance

Animal welfare can be variously defined in terms of the state of an animal in relation to its environment in such a way that prevents unnecessary suffering, but the semantics of any definition can be suited to the political foundations of almost every philosophy; therein lies the difficulty in establishing a characteristic ethic for dissimilar industries and cultures. Broad descriptions of animal welfare include the ideal of an animal in complete mental and physical health, with the animal existing in harmony within its environment and being able to adapt to artificial experiences without suffering, and whose feelings are taken into account (Duncan, 2005). Hewson's (2003) working definition of animal welfare is that it "comprises the state of the animal's body and mind, and the extent to which its nature (genetic traits manifest in breed and temperament) is satisfied" (p. 407). A logical guide for analyzing welfare is outlined in the UK Farm Animal Welfare Council's Five Freedoms (2008), developed "to safeguard and improve welfare within the proper constraints of an effective livestock industry" (para. 2). As a conceptual framework, the Five Freedoms provide a comprehensive set of standards that even laymen find interpretable. The Five Freedoms represent the development of scientific measures for an emotionally subjective idea and has stimulated the development of methodologies to explain animal experiences (Millman, Duncan, Stauffacher, Stookey, 2004). The movement for understanding animals has contributed to and coincided with an evolving social ethic for universal moral accountability. This juxtaposition of science and thought necessitates an intersection of attitudes and knowledge for making progress in animal welfare.

The idea of welfare in a practical sense is about the way animals react to how humans approach, interact with, and make decisions for those animals based on

their value of what is important and right. Despite the research being conducted in this field, an evident factor affecting the "progress in improving animal welfare is the effective transfer of information between the academic community and industry, policy makers, and the general public" (Millman, et al., 2004, p. 304). An accessible mode of evaluating the effectiveness of welfare as a science is to explore the context of mechanisms through which attitudes about welfare are promoted and information is dispersed (FAWC, 2008). Especially in the United States, where voluntary organizations play an important sociological and political role for changing policy (Curtis, Graab, Baer, 1992), educational resources and access to them, are critical for achieving outcomes that adequately reflect the value of horse welfare. Learning experiences allow disseminated scientific information to be effectively implemented (Andersen, Waite, Heleski, 2006) when industry participants are able to make assessments and ethical assignments of welfare measurements (Broom, 1991). The diversity in the equine inventory and the large economic contribution of the equine industry to the state demands continuing research on the characteristics of the Indiana industry, especially in regards to contemporary issues of horse well-being.

According to a 2002 survey, there were 160,000 equines on 34,000 operations in the state of Indiana and over \$4.6 billion of Indiana's economy is derived from horses or horse-related services and industries (National Agricultural Statistics Service, 2003). The Indiana 4-H Horse and Pony program is a large and influential part of that industry. The program enrolls about 8000 youth and relies on volunteers across the state to provide information and resources in fulfillment of project objectives. Program participants are encouraged to be active and meaningful participants of the horse industry, and they represent an important subgroup of the Indiana equine community. The role of the Indiana 4-H Horse and Pony program as an educational resource for developing horsemanship skills reflects the importance of equine well-being by providing access to learning opportunities and materials for its participants. This study provides preliminarily

data for evaluating the impact of educational programming on horse welfare by determining how program facilitators regard the skills highlighted by the projects. From this study, 4-H educators and other researchers may continue to study the influence of education on welfare-friendly behaviors and address discrepancies between participant behaviors and program objectives related to animal care and use.

#### 1.6. Purpose of the Study

The purpose of this study is to describe the attitudes of Indiana 4-H Horse and Pony adult volunteers towards equine welfare by soliciting value scores for program skills that reflect aspects of animal well-being.

#### 1.7. Limitations of the Study

This study has several limitations. Firstly, the research question of welfare is a timely and increasingly public issue. Many of the basic horsemanship skills asked in this study are the same topics that are included in discussions of horse, and other animal, welfare in a variety of media forums. While this survey seeks to evaluate true individual perceptions of each of the welfare skills, the historical public nature of the welfare dialog can influence what the respondents indicate to be of value. Another limitation is inherent in the testing of these attitudes; while respondents may not consider a specific skill to be valuable, when presented with a skill on the questionnaire, respondents may consider it more likely to have value. The researcher-designed instrument may also pose threats to internal validity, as its psychometric properties have not been fully established for all audiences. One social threat to study validity is experimental treatment diffusion. While the questionnaire was administered during the winter, a time when barn discussion about the content would be at a minimum, there is no doubt that in such a small population, and for such a relevant program and industry topic, there was a sharing of information and opinions between respondents. Finally,



the threat of resentful demoralization of the population group limits the internal validity. Several qualitative comments confirm that many respondents believed the questionnaire to be useless, a general demoralized attitude that may have impacted the results and subsequent conclusions of the study.

### 1.8. Assumptions of the Study

The researcher made several basic assumptions in undertaking this study, regarding the conceptualizing of horse welfare and the survey methods and procedures utilized. The following statements are assumed:

- The Five Freedoms framework, traditionally used to evaluate farm animals, is an acceptable and comprehensive assessment context for horse welfare
- For practicality of measurement, each horsemanship skill was classified according to only one of the welfare or riding categories, when in reality the Five Freedoms framework is based on inherently overlapping principles, and most skills relate to more than one of the Five Freedoms components
- The entire population of adult leaders and judges was able to be reached through either online or mail survey methodology
- The lists of 4-H leaders and judges contact information was accurate and correct
- The participants were at the adequate reading level to read the questionnaire, and were able to understand the questions that were asked

## CHAPTER 2. REVIEW OF RELATED LITERATURE

### 2.1. Purpose of the Study

The purpose of this study is to describe the attitudes of Indiana Horse and Pony adult volunteers towards equine welfare by soliciting value scores for program skills that reflect aspects of animal well-being.

### 2.2. Objectives of the Study

The overall goal of this research was to determine the value that Indiana 4-H Horse and Pony project adult volunteers place on skills related to equine welfare.

The specific objectives were to:

1. Develop and test an assessment for determining attitude toward equine well-being based on basic horsemanship skills
2. Describe adult volunteers' value of project skills as they relate to horse welfare
3. Compare valuation scores of skills representing different aspects of welfare relative to perceived worth
4. Identify underlying factors potentially associated with subsequent valuation
5. Provide baseline attitudinal level measures for future study in welfare education and programmatic needs assessment

### 2.3. Introduction

Previous research on the perception of animal welfare is varied in scope and measures. Research on horse owners' or care providers' attitudes about welfare

is generally philosophically biased or design-limited to reflect a singular purpose or realm of human action (ie. opinions on horse slaughter for human consumption; evaluation of competition/show horse welfare and ethics), few studies have considered the correlation between skills and knowledge, and how attitudes and behaviors relate to personal practice of horse welfare; even equine assessment protocol based on comprehensively observable criteria ignores the concept of attitudinal perversity in its application. The following review of literature reflects the need for attitudinal evaluation in order to continue in improving the incidence of welfare best practices through proper horsemanship-- a sentiment shared by the horse industry as a whole, and an overarching objective of many non-formal, youth education programs, such as the Indiana 4-H Horse and Pony project.

#### 2.4. Conceptual Framework

Conceptually, the question of how Indiana 4-H Horse and Pony volunteer participants feel about equine welfare was addressed by presenting content in a way that reflected personal valuation of related skills without inducing an emotional response to the subjective idea of "welfare". Study participants were asked about welfare as it is outlined by the UK Farm Animal Welfare Council's Five Freedoms, but since objective measurements of attitudinal parameters were paramount for providing the most accurate results, the material presented to participants was coded. To enable a legitimate valuation of the content, researchers used horsemanship skills that would be familiar to participants based on their role in the 4-H Horse and Pony program. Because topics covered in individual localities vary with resources, educators, and other program variables, the skills presented for valuation were based on expert-reviewed learning objectives from the National 4-H Horse and Pony curriculum. By categorizing project skills according to the Five Freedoms welfare framework, researchers were able to adequately determine participants' values of horse well-being without measurable bias.

In order to conduct scientific research on an inherently subjective topic, the conceptualization of welfare needed to be defined. Three schools of thought, or welfare approaches, are consistently reinforced in the production of welfare science research: the feelings-based approach, biological systems approach, and natural living approach. Each of these approaches represents a logically valid and experience-based set of measures that focus on different aspects of animal life.

The feelings-based approach assesses welfare from the subjective animal viewpoint. That is, affective states, feelings or emotions of the animals, should be linked to observed phenomena as a welfare indicator. This feelings-based approach was championed by Duncan, who believed it was not the physical state of being ill that caused animals to suffer, but the mental suffering associated with illness, or feeling ill; “there may be cases in which the animal is not in full physical health, but feels all right, and we conclude that its welfare is all right” (Duncan & Petherick, 1991, p. 5018).

A contrary approach based on mechanism functioning is seen in the biological systems school of thought, which embraces scientific measures based on physiology as indicators of welfare. This approach is needs-based and evaluates animal responses to different experiences, including behavioral changes as ‘coping’ mechanisms. The guiding principle expounds that biological functions reflect animal welfare. While this certainly may be true in contrary situations (e.g. a grain-fed horse who is physically unable to eat is certainly experiencing poor well-being), it may not be true for induced situations; in fact, most evidence has shown this is nearly never the case, e.g. in horses who experience increased work and growth potential by eating grain, but with an increasing risk of digestive disturbance (Kronfield & Harris, 2003).

A third approach to animal welfare rooted in evolutionary biology contrasts domesticated animal experiences with those experienced by its wild or ‘natural’

counterparts. Barnard and Hurst (1996) argue that in order to understand what welfare truly means, researchers must first reconcile an animal's "naturally selected performance criteria and rules of operation" with the adaptations required to live in a synthetic or changing environment (p. 428). Scholars of this school contend that anthropomorphic criteria do not adequately explain the positive or negative subjective states that an animal experiences, or how those affects may act as the proximate mechanism to change its fitness strategy, welfare. The important factor for evaluating welfare from a basic-nature approach is the allowance of an animal to maintain its species characteristic adaptations.

Oftentimes, not surprisingly, the aspects associated with these three schools of welfare conflict, which presents a slew of ethical and practical challenges (Hewson, 2003). For this thesis study, a collective approach that considered all of the aforementioned measures was needed to entertain an overarching unbiased attitude toward welfare. For this reason, the concept of welfare in this research was based on the Five Freedoms framework. This welfare concept is designed to be easily understood and interpretable by bodies of diverse membership that have differing familiarity with husbandry practices (Farm Animal Welfare Council, 2008a; Fraser, 2008). The Five Freedoms were developed in the 1960's as voluntary compliance guidelines by a government council formed as a reaction to a sensational expose` of intensive farming practices. These principles are designed to prevent unnecessary suffering, by identifying "the elements that determine the animals' own perception of their welfare state and [by defining] the provisions necessary to promote that state" (Webster, 2001, p. 233). Proponents of this framework applaud its check-list-like systematic inclusion not only of comprehensive animal-based parameters, but also of the necessary conditions for economic viability required by the global livestock and animal-products market (Bartussek, 1999).

While the Five Freedoms have been used as the conceptual framework for welfare assessment in many species, for diverse situations including on farm, in transit, and at slaughterhouses (Whay, Main, Green, Webster, 2003), critics of this concept argue against its scientific usage on several grounds. Firstly, arguments against the anthropocentric constructs such as “fear” and “distress” state there is a semantically, inherently subjective negative or vague meaning in those words, and that physiologically responses to these types of situations oftentimes have fitness, adaptive, or behavioral value (Kort, Olivier, Koolhaas, 2007; Barnard & Hurst, 1996). Secondly, critics argue against the division of criteria into those that emphasize feelings and emotions (eg. Freedom from Fear and Distress) and those that emphasize biological functioning systems (eg. Freedom from Pain, Injury, and Disease), as these are not strictly alternatives nor are they mutually exclusive as indices of welfare (Barnard & Hurst, 1996); as Kort, Olivier, and Koolhaas (2007) expound, “Freedom from hunger together with an impoverished environment may disturb mental health as reflected by stereotypic and compulsive behaviors in zoo, circus and farm animals” (p. 424). Therefore the fulfillment/ignorance of one criterion may have a welfare effect on one or more other criterion.

Despite the ongoing Five Freedoms debate in the ranks of the scientific community of its suitability as a concept for assessment, the merit of the framework—based on its ease of understanding, systematic and comprehensive parameters, and widespread acceptance by government and policy organizations (Fraser, 2008)—justifies its use in this study as the overarching framework for asking questions about equine welfare. As Fraser (2008) explains:

instead of coming down on the side of any one of the three broad conceptions of animal welfare, the Five Freedoms incorporate all three, arranged [in a way] that corresponds roughly to the way scientists might divide the relevant issues: veterinary issues, nutritional issues,

environmental issues, and behavioral issues, with affective states captured in several places (p. 233).

It is noted, however, that in using the Five Freedoms as the criteria for the categorical division of tested skills in this study there are intrinsic challenges in reconciling the psychometric properties of the framework and the measures of the research tool.

## 2.5. Thematic Analysis

The thematic impetus for investigating attitudes of horse welfare in an educational forum is founded in three emerging concepts from related literature: the attitudes towards and assessments of practicing welfare-friendly behaviors, the fundamentally unique global equine animal situation, and the roles of formal, non-formal, and informal education in the horse industry. Review of these topics has led to the valuation query of basic horsemanship practices as a method to ascertain horse-enthusiasts' attitudes towards the skills needed for practicing welfare in a relevant way.

### 2.5.1. Practical Welfare-Assessments and Attitudes

Fraser (2008) argues that if animal welfare is to truly be promoted, the value that we place on it must be increased; this can be done by first ensuring that our idea of animal welfare is aligned with the idea of welfare of the actual animal. Science-based assessment schemes have become effective support tools for communicating and auditing animal welfare issues. Both quantitative research on animal experiences and qualitative valuation on the moral implications of animal life-circumstances contribute to a body of protocols, a deliberate consumer market, and far-reaching public policy that affirm the practical consideration of animal well-being.

#### 2.5.1.1. Practical Animal Welfare Assessment

For different groups of stakeholders in different animal industries, the compromise of welfare ideals may very well reflect the respective roles of any one person in that economy (Bracke, De Greef, Hopster, 2005). For the producers, caregivers, and managers of animals, livestock in particular, there has been continued scrutiny and pressure not only from consumers, but also from legislature and non-government bodies to address well-being concerns as a result of modernization and the subsequent departure from a traditional ethic of care. At this level of involvement, “enhancing animal welfare and well-being in practice requires evaluation of the animals’ interaction with their daily surroundings” (Odendaal, 1998, p. 93) ; practical welfare then implies a judgment of the way in which animals react to the circumstances of their everyday lives. Rollin explains that while there is a social ethic for every industry to pursue its aims and its objectives, there is also an imminent need for a new social ethic that resolves goals of human welfare—productivity, efficiency, progress—with the mitigation of animal suffering (2004). Thus, the realm of welfare science continues to investigate the experiences of animals in an attempt to determine the best practices for both parties. The methods and means of study vary, mainly by conceptions of welfare and respective expertise within those fields of biological functioning, affective states, and natural living, however several topics are prominently investigated as welfare science regardless of approach, particularly stress, abnormal behavior, and preferences and motivations (Fraser, 2008). The result of expert collaboration and research has led to the development of many welfare protocol guidelines, and schemes that are designed to monitor animal well-being from the producers’ stand point and for the benefit of all industry stakeholders. “More generally, codes of good practice, certified minimum standards of animal welfare, attempts to raise awareness within the many branches of animal production, and attempts to bring animal welfare issues into educational activity” through the development and implementation of designated programs (Lassen, Sandøe, Forkman, 2006, p.



223). These protocols take the information gleaned from scientific research and propose its use for practical application on the farm. The use of these systems is being encouraged by governing offices, consumer groups, and producer conglomerates as a means of standardizing a display of welfare. There are, however, potential constraints in standardizing these measures. As researchers have presented in their qualitative analysis of stakeholder values, the perspective development of a sustainable system for monitoring and significantly improving the welfare of farm animals is poor without the conditional motivation provided by integrated, communicative, and influential stake holders (2005). Through interviews with producers, retailers, policy-makers, scientists, and consumers, Bracke, De Greef, and Hopster characterized stake holders according to their role in the production chain, their interests and beliefs regarding animal welfare, and their information and technology needs from a working monitor system. What the researchers developed in their analysis was a livestock production chain in the shape of an hourglass, with concerned consumers representing the bottom-most and widest component of the animal products market. In addition, they confirmed that while animal welfare is valued by all stakeholders, “different stakeholders have overlapping but also partly different evaluation paradigms” (Bracke, De Greef, Hopster, 2005, p. 51). The inherent problem then in developing these systems is what measure, or from whose point of view, should monitoring be done?

Lassen, Sandøe and Forkman also explored the different values of stake holders in regards to practical welfare in their case study of Danish lay perceptions of pig welfare, a regular topic of public debate (2006). Focus groups representing Denmark residents of differing ages, gender, education, and place of residence (urban/rural) were guided through semi-structured interviews to explore pig welfare as part of a broader discussion on the role of pork and pigs in society. Interviewees revealed their welfare concerns included the concept of preventing suffering, as well as the extent to which pigs were able to lead a natural life. Even

when researchers explained the design and purpose of certain management practices such as docking to reduce tail biting, participants maintained that a curly tail was an important marker of welfare; a revelation from this study that lay persons equate qualities of 'natural living' as an index of producer consideration of welfare, and that they use these indicators when judging welfare situations, despite being presented with logical, scientific welfare justification of the alternative (Lassen, Sandøe, Forkman, 2006). This Danish study serves to elucidate the discrepancies that exist between producer and non-producer definitions of "welfare", and cements the notion that any discussion of what constitutes welfare must be linked to how the public (or producer, or other stakeholder) perceives what parameters are to be assessed.

An even greater issue than differing perspectives in the stakeholder chain is a lack of consistent characterization of stake holders' interests. While livestock management systems can generally be described by similar practices (e.g. milking systems of dairy cows; types of sow housing; cage/non-cage options for egg-laying hens), and can therefore be subject to monitoring systems based on predicted and limited parameters associated with animal life experiences, the companion animal industry is saturated with players from economically, socially, and even temporally different value systems that further complicate the complexity of welfare ideals for this classification of animal. Furthermore, the individual experiences of companion animals are so varied within species, utility, and other factors that circumstances seem to prevent the development of practical welfare parameters for the animals most likely to experience human interaction. Companion animals, or pets, such as dogs have routinely been acknowledged in a different social context from livestock animals which are used primarily as a resource. Even in ancient Greece dogs were kept as companions by people in every social class, and some were even given human-like post-humus consideration and burial that conveyed the depth of the relationship between owner and pet (Fraser, 2008). "Animals are demonstrably a source of

social support” and many Americans indicate their pet is a family member, treated in many ways like a human (Beck & Katcher, 2003, p. 80). While this sentiment is a common Western idea, there is a frustrating lack of information and investigation on the status of companion animal welfare. Most disturbing is the contradictory phenomenon occurring in the United States whereby millions of surplus companion animals are surrendered, abandoned, and euthanized by members of a self-proclaimed animal-loving society. Kass, New, Scarlett, and Salman undertook a study to compare the characteristics of owners who relinquished their pets for euthanasia, and those who relinquished their pets for adoption (2001). The implications of this study help indicate what social, economic, or temporal constraints on humans cause them to value (or devalue) provisions for animal well-being, in this case, continuing to provide care by means of changing ownership or choosing to end animal life and circumventing future considerations. In this study, most of the owners relinquishing their pets for euthanasia had long-standing commitments to the animals, with animals euthanized having a median age of 10.4 years, compared to the median age of dogs relinquished for adoption, which was 1.2 years (Kass et al., 2001). A large number (82%) of dogs were euthanized for geriatric-related issues, while 19% of the euthanized dogs were relinquished almost solely for behavioral reasons. Of the total 2,617 dogs relinquished, 74% were potentially adoptable. What this study shows is that the majority of owners who relinquish their pets for adoption consider them to be capable of interaction within the human-animal bond, to possess the desirable animal qualities that justify continued provision for its existence. Additionally, euthanasia seems to be a consideration for most owners more as a means of eliminating suffering than as a solution to sour pet ownership, a legitimate expression of how owners value dog welfare. While this study is exceedingly limited in scope, and owner characteristics fail to include previously studied explanations for relinquishment—such as changing residences and human health concerns—the research presented here provides a brief overview of owner desires for euthanasia over the adoption alternative. The

distinction between euthanized and adoptable pets was mostly related to old age or associated illness, which highlights welfare consciousness of owners to not prolong pet suffering. What is unresolved, however, is the differential valuation by owners of other pet traits, such as behavior, which represents an inconsistency in common welfare measures; why some behaviors are considered grounds for relinquishment by owners and these same behaviors are justifiable by others for adoption is an unpredictable variable of welfare unique to the companion animal industry.

The practice, then, of perceived welfare is reflective of how valuable or of what value different people believe an animals' quality of life is measured. The studies described above illustrate that these perceptions of value may be different depending on the role, circumstances, or knowledge of a persons' involvement in impacting animal well-being. While the brunt of judgment in improving welfare is generally delegated to the producer (or analogous person), the nature of animal industries-- which have to be so culturally and socially conspicuous-- automatically dictates that there is subjective pressure on the industries by consumers and policy-makers.

#### 2.5.1.2. Consumer Perceptions

While the media may claim the birth of the welfare-savvy consumer in the socially conscious era of the 1960s, the underlying concept of animal welfare is rooted in the contractual obligations of the human-animal bond and the principles of stockmanship, ideas dating back to the prehistoric times. While humans, by nature of their killing animals for food, may not have an innate tendency to maximize the welfare of animals (Beck & Katcher, 1993), there is no doubt that historical reliance on animals as a resource dictates a reasonable amount of consideration for their provisions. While many consumer perceptions of well-being are based on animal quality of life, there is a definitive perceived human-centric reward for the proper management of animals. McCrindle has found that

a human benefit system is a proactive, rather than reactive, approach to promoting animal well-being in resource-poor African communities, where animal and human welfare is still inextricably linked (1998). Promoting animal welfare in these communities using prescriptive, Eurocentric methods to address the variety of unique, potentially compromising circumstances that exist there are unrealistic. Instead, McCrindle lauds a community development approach that includes both a situational and cost-benefit analysis prior to intervention and evaluation by teams consisting of at least one veterinarian and one sociologist/anthropologist (1998). By tailoring strategies that improve animal welfare--targeting motivators of human benefit-- in line with the socioeconomic characteristics of a locale, making provisions for animal well-being is not an inapplicable political movement, but a method to prevent avoidable human suffering. A key trend for Western consumers is similarly related to improving aspects of human welfare through better provisions for animals, particularly in areas of food health and safety. Indeed these motivators, rather than ethical treatment of animals, are the major driving force behind the organic and free-range products market (Harper & Makatouni, 2002). As Blandford, Bureau, Fulponi and Henson (2002) note, "while consumers may feel a moral obligation to avoid cruelty to animals and/or to care for animals, they perceive a number of personal benefits from high levels of animal welfare in terms of quality and/or safety of the end product" (p. 82). These researchers additionally explain that little investigation on the relationship between consumer concerns and production methods has been done. So, while consumers may believe that certain production practices as they relate to food health and safety are unacceptable for welfare, their measures are based solely on anthropomorphic constructs (Blandford et al., 2002).

There is, however, an increasing amount of evidence, specifically economic indicators, to support that consumers are concerned about animal welfare (Harper & Makatouni, 2002). Fifty-nine percent of Ohio residents surveyed about their attitudes regarding food, agricultural, and environmental issues, indicated

they would pay more for products labeled as coming from humanely treated animals; 85% of those same surveyed residents also indicated that quality of life of farm animals, even of those used for meat, was important (Rauch & Sharp, 2005). Bennett, Anderson, and Blaney further explored the relationship between moral and economic values in their study of moral intensity and willingness to pay. In this experimental study, a convenience sample of college undergraduates were administered a survey that consisted of three sections: first, personal details and views on farm animal welfare; second, information on a farm animal welfare issue -the import and export of live animals for slaughter- and questions about their willingness to pay in support of legislation to ban the practice and their attitudes in reference to the scenario; third, a second presentation of a farm animal welfare issue in the same format, this one focused on caged egg production in the UK (Bennett, Anderson, Blaney, 2001). Results from this research indicate that there is some evidence that a contingent value model such as the one used in the study supports the hypothesis that a moral imperative associated with an issue is reflected in willingness to pay values. While the “willingness to pay” measure is useful in exploring the moral intensity linked to consumption of welfare-friendly products, decision making in regards to this issue is a complex process composed of behavioral and economic characteristics, and may not remain consistent consumer trends, based on changes in these conditions. Consumer perceptions about welfare and how they value animal well-being may depend on individual experiences, perceptions, and economic circumstances.

#### 2.5.1.3. Welfare Politics and Policies

Public policy regarding animal welfare attempts to balance the modes of industry and the social consciousness by defining action plans with objective-oriented benchmarks. In the policy arena, European countries far surpass North American geographies regarding animal welfare legislation. Particularly in the realm of animal agriculture, “there has been little legislative or consumer activity aimed” at

changing welfare policy in the United States (Rollin, 2004, p. 963). The intrinsic link of global markets today necessitates a critical evaluation of partner countries' policy on animal well-being and how that may impact economic and political roles on the world stage. This type of analysis, on the context of international animal welfare policy, was reported in an article by Hobbs, Hobbs, Isaac, and Kerr, who reviewed the standards used in the European Union (EU) and the trade law proposals in defense of those standards currently brought to World Trade Organization (WTO) (2002). The background for changing laws governing international trade is a series of policies that lay down standards (based on the Five Freedoms) for the conditions that farm animals, including laying hens and veal calves, in Member States experience, a movement spearheaded most visibly by lobbying non-governmental organizations (Hobbs et al., 2002). Due to the stringent guidelines and consequential increased cost for food commodities in those countries, the possibility exists that governed products may be replaced by cheaper imports not regulated by the same standards. The EU maintains that the WTO has an essential role in addressing welfare trade policy, and proposes they develop a new multilateral agreement regarding the topic, impose a labeling regime for imported products, and provide compensation for producers to offset the cost of upholding welfare standards. Hobbs et al. contend that this proposal has not produced its designed outcomes, but has stimulated discussion and enabled identification of the WTO's lack of infrastructure for addressing ethical issues of trade in several markets (2002). While the proposal may be presumptuous, the questions of the politics involved in passing such a piece of legislation would require significant political effort and a resolution of the different ethical concerns of consumers from many different countries.

While animal welfare policy in the United States is not of the same European Union precedent, widespread legislation in the last several years since Rollin's social commentary (2004) has implemented large-scale changes in the governance of animal well-being. Anti-cruelty laws were enacted in all fifty states

by the late 1800s, and were the first step toward legally protecting animals from the abuses of humans. While these laws in theory provide for the complete care of animals, many controversial practices--such as physical alterations, like ear cropping, dehorning and tail docking--are deliberately exempt from these statutes (Soave, 2000). Use of these common management practices could be argued to improve or compromise well-being, depending on other conditions affecting the animals' quality of life; the law itself takes no official position on the most disputed principles of animal welfare, providing protection only against intentional abuse or cruelty. The Animal Welfare Act, signed into law in 1966, is the only piece of Federal law designed to regulate "the treatment of animals in research, exhibition, transport, and by dealers" (United States Department of Agriculture, 2009, para. 1). While this type of legislation can placate the activists and observers of the horse industry, participants may view welfare regulation as potentially more invasive, and can often solicit adversity to well-intentioned law. Oftentimes increased regulation means complying with more rigorous standards, or finding alternative means for producing desired results, both of which require a higher cost to the horse industry participant. When considering the policy of welfare, of utmost concern to producers in particular is the need for economically sustainable options, such as incentives, to maintain a viable existence in the more socially conscious markets that demand animal welfare considerations (Armstrong & Pajor, 2001). While the farm animal industry has been experiencing this revolution for several years now, the horse industry is just beginning to realize the welfare implications of their internal *modus operandi*.

### 2.5.2. The Equine Situation and Ensuing Welfare Debates

The relationship between humans and equines is not comparable to that with farm animals in two major ways: a majority of people do not utilize horses for economic livelihood or sport and horses remain closer to companion animals in emotional appeal. Unlike food animals, the role of the horse varies across geographic regions and diverse sub-cultures, so the ethic for equine use is



likewise juxtaposed. And like pet animals, there are definitive social expectations for horse ownership and care, but with variable enforcement and lax recourse for unacceptable actions. The indeterminate moral characterization of the horse as an animal leads to complex and often contradictory ideals of welfare both from within and outside of the industry.

#### 2.5.2.1. Human Classification of Horses As Animals

“The modern horse is essentially the creation of man over several thousand years of selective breeding” (Baker & Turner, 2000, p. 178), and as the last 200 years of industrialization have gradually removed the majority of the human population from contact with rural commonalities, the dependent relationship between horse and caretaker has been scrutinized from various points of view and contact. People tend to view horses differently, as livestock, working animals, or companion animals (Alberta Equine Welfare Group, 2008), and similarly, the identified welfare concerns in the horse industry, by outsiders, stakeholders and practitioners, are generally based on these usage classifications. This disparity in classifying horses with any constant moral archetype produces a variety of welfare concerns all of which become inherently subjective to measure and communicate.

##### 2.5.2.1.1. Horses as “livestock”

According to Section 602(2) of the Agricultural Act of 1949 (7 U.S.C. 1471(2)), the definition of livestock in federal United States legislation "means cattle, sheep, goats, swine, poultry (including egg-producing poultry), equine animals used for food or in the production of food, fish used for food, and other animals". While horse meat is not currently (typically) consumed in the US, historically the motivation for horse domestication was based on its adequacy as a food resource, and at several points in American history, horse meat has been an important protein substitute for other unavailable or cost prohibitive red meats (Hausberger, Roche, Henry, Visser, 2008; Alberta Equine Welfare Group, 2008).

The majority of horse meat produced in the US was exported to countries like France, Belgium, the Netherlands, and Japan, where horse meat has always been an integral part of the cuisine and culture. Despite the relative small proportion of the horse population that was sent to slaughter—only 1.3 percent of the population in 2005, a rate that varies little during the past ten years (Heleski, Waite, Reynnells, 2008)—provisions for the ethical treatment of horses to be processed for meat were regulated in much the same way as other food animals. Plants and purchasers were subject to the typical federal standards regarding the method and treatment of animals to be slaughtered, particularly those provisions outlined in the Humane Slaughter Act. Furthermore, the USDA was required by the Federal Meat Inspection Act of 1906 to inspect all animals processed into products for human consumption, and to ensure proper labeling and safety of those products (Becker, 2007). One potential threat to the safety of products was identified by Anderson and Lee as *Salmonella* contamination in fresh horse meat, which had become at that point a major international problem, due to the widespread export of horse meat processed in the United States particularly to countries in Europe (1976). They discussed the potential sources of contamination, which included horse feces, environmental runoff, and the use of infected animal-byproducts or disease harboring organisms in feedstuffs, questioning the physical facility management and its impact on consumer safety and horse health prior to slaughter. Anderson and Lee also noted that the circumstances of slaughter itself may contribute to disease transmission. These researchers noted that “many times [the horses] are injured or unhealthy, housed poorly, fed and watered improperly, and sometimes held for long times, as much as a week, in dirty, confined pens at the slaughter plant”, a formula for increasing the carrying rate of *Salmonella* in the animals by inducing stress (Anderson & Lee, 1976, p. 663). This observation was the harbinger for continued scientific investigation, and moral judgment, on the welfare of horses sent to slaughter.

McGee, Lanier, and Grandin (2001) characterized the type and condition of horses sold at auction to the type and condition of horses slaughtered, in order to identify any potential relationships between the circumstances of these venues affecting measurable aspects of horse welfare. The researchers observed ten non-cataloged horse auctions in nine different states that only sold horses valued between \$50 and \$3500 as well as 81 loads of horses to the three operational horse slaughter plants in the US at that time. Data was collected for both the 1,473 auctioned and 1,348 slaughtered horses that included gender, classification, body condition based on the Henneke scoring system, soundness, foot condition based on a similar scoring system to the body condition score, color, age, and breed (McGee, Lanier, Grandin, 2001). The researchers found that slaughter plant horses had poorer foot and body condition, and were less sound than auction horses. Riding horses considered sound and usable were the most numerous type of horses at the auctions (47%), while sound usable riding horses were much less prevalent (13%) at slaughter plants (McGee, Lanier, Grandin, 2001). Researchers supplemented their quantitative data collection with interviews of horse industry participants, who indicated that the economics of the horse trading business favored selling usably sound animals for riding rather than for slaughter, in the absence of any severe behavioral problems. The results of this survey indicate that welfare problems of low-end auction horses that ended up at slaughter plants-- at least those problems related to body condition scoring, foot condition, soundness, and behavioral pathologies--were not caused by the circumstances of the slaughter house environment, but were the result of some prior situation.

The situation most immediately prior to arrival at slaughter plants is transportation. Because the number of horse processing facilities in the United States was limited, there was increasing study and scrutiny on the methods and care given to horses in transit to those locations. "Horses intended for slaughter are usually cull animals [...] purchased from widely dispersed areas and usually

loaded in loose groups onto large livestock transports for movement to distant processing plants” (Grandin, 2000, p. 31). Scientific research on these different facets of transport was conducted by independent teams of researchers across the country prior to the development of federal commercial transport to slaughter regulations. These projects included investigation of maximum transit time, water deprivation, defining animals ‘unfit to travel’, trailer design, and stocking density, in order to optimize horse well-being based on justifiable recommendations (Stull, 2001). Research on the experiences of horses en route and during slaughter is becoming increasingly more relevant, due to the monumental changes in policy regarding horse processing in the United States and the subsequent global affects on horse welfare.

In September 2007, individual states’ legislation closed the last horse processing plant in the United States, under pressure from animal rights groups and public outcry opposed to the slaughter and export of horse meat to other countries for human consumption (Evans, Evans, Von Bailey, Rice, Jones, Shumway, and McKendrick, 2008). Public perception aside, the facts remain that equines are legally considered as livestock, and there is continued demand and growth of the consumer markets for horsemeat (Reece, 2000). The reasoning behind or in opposition of legislation banning horse slaughter is entrenched in the fundamental perceptions of horses as livestock animals. Many horse industry participants detach judgment on the practice of human consumption and focus on the economic realities of banning slaughter; opponents of a ban on slaughter argue that unintended consequences such as increased neglect, abuse, and abandonment of unwanted horses, would negatively impact the welfare of US horses more so than continued regulation and provision for the small percentage of horses sent to slaughter (Becker, 2007; Heleski, Waite, Reynnells, 2008). The environmental impact of absorbing animals diverted from slaughter would be great, the costs of providing care in rescue or rehabilitation centers overwhelming, and the infrastructure needed to accomplish these goals

themselves does not exist. The elimination of processing as an option for horse owner surrender has also highlighted the plight of unwanted horses even beyond those destined for slaughter, including the surplus of wild horses maintained by the Bureau of Land Management, and the thousands of homeless mares resulting from cutbacks in the pregnant mare industry (Becker, 2007). The opposition argument is based on the impact of banning slaughter on the horse industry as a whole, while the argument for the legislation is based on eliminating the pain and suffering of those horses destined for slaughter (Heleski, Waite, Reynnells, 2008). The practice of slaughtering animals to consume horsemeat, they contend, is cruel and unnecessary, particularly when there is no internal market for the products. These animal protection and rights groups argue that horses are transported long distances on poorly equipped trailers, in offensive conditions, with inadequate rest, food, and water, only to be met with an inhumane end by captive bolt and slaughter (Becker, 2007). For these proponents, questions of welfare are synonymous with the potential course of a horse's life, of which death for consumption is an unsavory and morally unacceptable end, designed to protect not horse welfare, but human capitalism. The value of horse welfare as a livestock animal is a contentious point of debate still for and between parties in the US horse industry and public stakeholders, particularly because this country raises the horse primarily as a performance or pleasure animal.

#### 2.5.2.1.2. Horses as “companion animals”

While some states limit the definition of livestock to farm animals specifically, others, such as Rhode Island, differentiate livestock and pets according to the degree of contact between human and animal (Waisman, Wagman, Frasch, 2002). The history of human interaction with horses is long but varied, and relationships formed with horses are usually quite different from those formed with other companion animals such as dogs and cats. While the emotional appeal and attraction to horses is enriched by social culture, the sheer spectrum of duration and human-life-impact of equine companions is fundamentally

different than that of other smaller companion animals. Horses require specialized care and housing, both of which do not need to be provided primarily by the owner. The horse owner can choose the amount and type of interactions with the animal, usually based on the spatial separation necessitated by equine ecology. Furthermore, ownership itself is frequently changed, so that “relationships with horses are not always expected to continue indefinitely as with other companion animals” (Stewart, 1999, p. 102). Hausberger et al. reviewed recent scientific literature on the knowledge of the horse-human bond, and proposed a theoretical framework based on serial interactions that help to distinguish the variety of ways in which people relate to horses (2008). Awareness of this framework, based on Hinde’s serial succession definition of relationship-- in which partners have expectations for the next interaction on the basis of the previous one-- can be instrumental to develop strong positive relationships that are beneficial for human and horse welfare. This can also help to counteract unavoidable negative impacts on the relationship that occur during routine care; these learning rules can be utilized for personally specific roles, adaptable to short occasional interactions, such as veterinary inspections, or long-term bonds, such as forever-home ownership. “The interaction between rider and horse, the search for the optimal match between two individuals, is an aspect of the horse–human relationship that requires attention in order to decrease [liabilities to ownership] and reduced states of welfare” (Hausberger et al., 2008, p. 2).

This is of particular concern as the chain of commerce for horses is not as developed as that of dogs and cats. While the typical companion animal chain of commerce relies on only three supplier classes of non- and purpose-bred animals to all the players in the industry (Favre, 2003), the horse industry is proliferated by various classes of breeders, trainers, sellers, buyers, and clients that supply multiple users with animals in a convoluted consumer pipeline. While there exists an entire commerce segment for dogs and cats not directed at

purposeful users, there are end-user restrictions for a growing population of unwanted horses. As referenced in the previous discussion of horse slaughter, the infrastructure for unwanted horses, defined by the American Association of Equine Practitioners as “horses that are no longer wanted by their current owner because they are old, injured, sick, unmanageable, or fail to meet their owners expectations (Heleski, Waite, Reynnells, 2008, p. 24), is unregulated and variable. The Humane Society of the United States even indicates that equine shelters are less established and require extreme costs and staff time that distinguish sheltering of these animals differently than that of dogs and cats (Becker, 2007). With the abolishment of domestic horse slaughter, even fewer end user opportunities exist in the horse chain of commerce. As with other companion animals, horses may be members of families, cherished pets, but there is no way to generalize the experiences or treatment these animals perceive.

#### 2.5.2.1.3. Horses as “working animals”

The lexicon of American politics aptly describes a two-dimensional structure of legislative time allocation for members of Congress as the show horse/work horse dichotomy, which makes a distinction between those members’ respective balance of work and publicity (Payne, 1980). This terminology can be appropriated to actual equine classification, where working horses are defined as those that directly provide transportation or labor for human development. In this literal application of the dichotomy, “show horses” would be those used as companion (pleasure or performance) or livestock animals, distinguished by their indirect or lack of need-based impact on human livelihood. In developing countries worldwide particularly poor or harsh localities utilize horse power as a resource. Studies have estimated there are 90 million equines in the developing world, with the majority of all donkeys, mules, and horses residing in these countries, most of which are used for work (Pritchard, Lindberg, Main, Whay, 2005). Considerations for the welfare of these animals are generally considered secondary to their potential resource value. de Aluja described the working

conditions of equids in Mexico, highlighting the welfare concerns of these animals based on their circumstances. This study noted that most plowing equines are owned by peasants who are constrained by finances or land characteristics that prevents them from using machinery or other animals. The legislation for animal protection does not exist, and the concept of animal welfare is not generally accepted by those who consider their equines a machine with which to make money (de Aluja, 1998). Perhaps due to ignorance, the structures of carts, ploughs, and harnesses make efficient work difficult, and avoidable lesions, abrasions, ulcers, and abscesses and other health concerns affect usability. It is generally acknowledged by peasants, however, that life without working equines would be more difficult, and the animals' need for food is often provided for, albeit minimally. Based on this study, welfare concerns for working equines are related to their role in providing human well-being. Basic health care and functional working tools would both provide a more effective resource for human use and improve equine welfare in rural Mexico.

Pritchard et al. took a more quantitative approach to describing working equine welfare, and developed an assessment protocol using direct observation of health and behavior parameters to develop benchmarks for the development of intervention strategies (2005). In this study, 4889 horses, mules, and donkey used for draught, pack, and ridden work in urban and peri-urban areas of Afghanistan, Egypt, India, Jordan, and Pakistan were assessed by eight researchers using the designed parameters of well-being. These animal-based parameters included both behavioral and physical indicators of health, a practical audit not based on resource examination, and designed to include both extrinsic conditions and manifestations of intrinsic experiences. This protocol was particularly designed for field use, designed to take a minimal amount of time, be applicable during the animals' normal working day, and require little tactile contact with the working equine (Pritchard et al., 2005). The results of this study provide a snapshot of welfare for these animals that can then be subject to



further analysis to identify risk factors or areas of concern that can be addressed through targeted prioritization of education or other resources. Future assessments using the same protocol, then, can measure intervention strategies effectiveness in a quantifiable way. The development of these types of job-specific assessments are important for evaluating welfare in a way that is relevant to the horse experiences and human designed use; further understanding of the dynamic can help improve welfare in ways that coincide with owner's means of provision.

### 2.5.3. The Role of Education in Equine Welfare Discussions

When considering questions of science, such as those related to animals, reliable and accurate information is paramount, especially when the consequences of decisions have a large effect. While this information should form the rational basis for action in such disciplines, the idea of welfare science is confounded by its very existence--inherently based on moral values and a comparative balance of scientific judgments. The key to encouraging discussion about equine welfare is to understand where and how information about and attitudes towards horses are founded and perpetuated.

A review of the policy affecting the US horse industry reveals a tangible change in the protection afforded equines based on public perceptions of animal welfare in the last thirty years. Many of these legislative actions have been supported not by the horse industry, but by non-governmental organizations and lobbyists philosophically disposed to animal rights positions, although the term 'welfare' is judiciously used to defend these arguments. The truth is that welfare as a scientific idea, insulated from specific circumstances, is an unfamiliar or exacting term not only for segments horse industry participants, but for the general voting public. One evident factor affecting the "progress in improving animal welfare is the effective transfer of information between the academic community and industry, policy makers, and the general public" (Millman, et al., 2004, p. 304).

Rushen has described several of the communication problems that exist between the academic or other communities of researchers, highlighting that discrepancies of information transfer may be related to inherently different ideas about what constitutes welfare (2003). Rushen contends there are conceptual and methodological problems with scientific assessment of animal welfare and states that some of the inherent complexities in defining welfare have been ignored in an attempt to practically apply science for specific policies (2003). These problems include the limited scope of welfare research, making topics of study irrelevant to actual issues; the over investigation of housing systems as indicators of welfare, as opposed to other variables like nutrition, stockmanship, and breeding effects; and controlled experimental conditions that do not adequately identify the epidemiological threats to welfare. There is no generally accepted concept of welfare that allows construct weighting without the subjective bias from the different segments of such a variable industry. Instead, argues Rushen (2003), the current limiting paradigm of objective welfare assessment should be amended to include “multiple concepts that more closely match the diverse and specific concerns of the public” where the measures taken to address those concerns are justified in how much they do so (p. 211). His idea of bridging the gap, then, between applied and basic research rests in the collaboration and alignment of horse industry stakeholder interests and scientific investigation of those issues, such that welfare remains relevant and applicable in policy and literature. Further complicating the progress in improving horse welfare is the process by which users, consumers, and the general public are educated about welfare concerns or equine science in general. The success of horse protection legislation has been motivated by non-governmental organizations, particularly animal rights groups, with effective, well-financed marketing and celebrity endorsements, that do not have a scientific, but a philosophical, basis for wanting change; these values have also been championed by the public media. With a multitude of other available resources,

the objectives of programs dedicated solely to teaching equine science skills may be diluted by the prevalence of alternative philosophies.

## 2.6. Outcome of Interest

This study seeks to measure adult educator attitudes about the value of horsemanship skills that relate to welfare practices. Improving horse welfare in a real way relies on promoting attitudes and behaviors that respect animals and their experiences. Because 4-H leaders and judges in the Indiana Horse and Pony project are programmatically asked to promote horse well-being, there are attitudinal objectives for the educational teaching required in this role. Galloway and Gallagher have anecdotally described that challenges in managing 4-H Horse and Pony programs are primarily associated with the volunteer leaders (2002). The time and fiscal commitments, in addition to the great responsibility, asked of these educators can lead to conflicts in the dominance hierarchy between Extension personnel and volunteers. “Philosophical differences about [horse] training methods underlie many disagreements”, which reflects the importance of reconciling leader opinions about horse care and use with program objectives (Galloway & Gallagher, 2002, para. 5). As this current study discourse obtains a snapshot or baseline from this particular population of concern, as something “which appears to aid in this process of attitudinal change [towards animal welfare, it] is therefore worthy of detailed and urgent investigation (Manning & Serpell, 1994). This research measures attitudes as an important component of the ongoing investigation in teaching and applying welfare science for practical equine considerations. Koballa notes that these “affective variables are as important as cognitive variables in influencing learning outcomes” particularly of scientific subject matter (1988, p. 115). Attitudes, the author explains, are generally enduring, and are learned as a response in a consistent way towards an object, either positively or negatively. Values, in contrast, play a role in mediating different attitudes. The complex interaction of these concepts presents an action model described by Koballa (1998):

“Basically [it is suggested] that a person’s beliefs about an object determine how the person feels towards the object (that is, the person’s attitude). In turn, the attitude, mediated by values, determines the person’s behavior intentions with respect to the object. Finally, these behavioral intentions influence but do not completely determine, how the person actually behaves towards the object “(p. 121).

These concepts, then, when placed in the context of this study relate how attitudes about aspects of horse welfare can be measured based on the value of behavioral skills. Most horse industry participants, much less volunteer horse science educators, believe that horse welfare is important. That belief determines personal attitudes about what aspects of horsemanship constitute well-being. Asking for values of horsemanship skills identifies arbitrations, the concept of compromise inherent in the definition of animal welfare. Because the principles are based on behaviors, the attitudinal perceptions of welfare can be correlated to the practice of indicated valued skills for care and use. By asking questions about welfare in this way, researchers are presenting the concept of welfare to respondents within multiple contexts. Contextual understanding can lead to attitudinal development (Balschweid, 2001), particularly in regards to welfare issues. If, for example, a particular Horse and Pony adult volunteer is trained in some type of veterinary role, their propensity for welfare considerations may be biased towards health parameters. If another volunteer is a strong proponent of Natural Horsemanship, they may be more sensitive to and knowledgeable about equine behaviors. These inclinations, attitudes, can directly impact the programming choices, and youth learning experiences, when these volunteers are in authoritarian roles. Furthermore, without the formality of a traditional classroom and standardization of instructional content, intrinsic biases of facilitators in individual 4-H Horse and Pony clubs may (unintentionally) misrepresent concepts such as ‘well-being’ by limiting its contextual application. Other researchers have previously noted biases associated with volunteers

teaching programmatic content, particularly in relation to comfort with or knowledge of equine science subject matter and the disparities between perceived importance and attention paid to particular program skills (Kerr, 1998; Rappaport, Kinsler, Brady, Balschweid, 2008). Measuring facilitator attitudes about welfare within the unique educational context of the Indiana 4-H Horse and Pony program can provide useful data for continued programmatic development, particularly in regards to improving and promoting equine well-being.

## CHAPTER 3. METHODS AND PROCEDURES

### 3.1. Purpose of the Study

The purpose of this study is to describe the attitudes of Indiana Horse and Pony adult volunteers towards equine welfare by soliciting value scores for program skills that reflect aspects of animal well-being.

### 3.2. Objectives of the Study

The overall goal of this research was to determine the value that Indiana 4-H Horse and Pony project adult volunteers place on skills related to equine welfare.

The specific objectives were to:

1. Develop and test an assessment for determining attitude toward equine well-being based on basic horsemanship skills
2. Describe adult volunteers' value of project skills as they relate to horse welfare
3. Compare valuation scores of skills representing different aspects of welfare relative to perceived worth
4. Identify underlying factors potentially associated with subsequent valuation
5. Provide baseline attitudinal level measures for future study in welfare education and programmatic needs assessment

### 3.3. Institutional Review of Human Subjects Use

All research conducted at Purdue University that involves human participants requires approval by the Committee on the Use of Human Research Subjects.

Following the requisite training in human research protocol by all the researchers, an exempt research request was submitted to the Committee for investigation of the study topic. Final approval for the research, IRB reference #0812007590 was granted on Monday, January 5, 2009.

#### 3.4. Research Design

The intention of this research study was to describe the value perceptions of Indiana 4-H Horse and Pony adult volunteers towards equine welfare skills. This was done by administering a survey to a deliberate sample of Horse and Pony volunteers from across the state. Project skills were utilized as the practical welfare parameters and were categorized by researchers unbeknownst to respondents as representative of the concepts defined in the Five Freedoms framework. Anonymous categorization of welfare skills in this study is justified by the work on the effects of rank versus category when measuring subjective self-perceptions by Hoffmeyer-Zlotnik and Krebs (2000). Those authors postulate that categorical measurement requires respondents have an understanding of the overall system of categorization (ie. the Five Freedoms concept), whereas open ranking methods, like those utilized in this thesis research, allow respondents to implicitly respond to items in an objective way that reflects relative judgment within the item selections. Although neither system measures what underlying criteria determine respondent's choice for a specific value, when asking questions of welfare, the open ranking method provides the most practical assessment of how differential values impact the researchers' categorical generalities (Hoffmeyer-Zlotnik & Krebs, 2000). Attitudinal survey methods are used to determine how participants feel about this topic. Although there is the risk of receiving misinformation with self-reporting on attitude survey methods (Dwyer, 1993), sound design can minimize these effects, especially those of acquiescence. The test questionnaire deliberately omits affective terms such as "welfare" to promote truthful responses. And because ideas about animal welfare are inherently related to personal belief systems, attitudinal survey

methods yield the most accurate results about the subjective value of the query items. Whitmore used a similar research design when investigating the relationship between teacher behavior and student achievement in a targeted minority education program (1974). This study utilized a method likewise assuming that a scale identifying educator positions on educational materials was an adequate measure of the attitudes that may influence teaching practices (Whitmore, 1974). This study, unlike the Whitmore investigation, did not investigate incidence of behavior or knowledge of skills as correlates to motivational variables, but it does ask participants' perceived value of practicable project skills and behaviors as they relate to their positions on the responsible care and use of horses, and measures of incidence and knowledge are a likely future extension of this current study. Because this research was firmly rooted within a particular educational paradigm, an intentional sample of participants was solicited to represent the demographics of the Indiana 4-H Horse and Pony program state-wide. The incidental compliance with the voluntary request for participants, combined with the great variation in equine inventory and distribution throughout the state (Garrett, Brady, McNamara, Russell, 2002) dictated the need for comprehensive, census selection based the context of the study.

### 3.5. Participants

In order to ensure that any one locality or group of similarly-minded individuals was not overrepresented in this study, requests for potential participants were sent to county extension offices in all Indiana counties with at least one active 4-H Horse and Pony club. Those counties that responded to the request sent files with adult volunteer and youth participant contact information into the State database system. Respondents included those from the following 56 Indiana localities: Adams, Allen, Bartholomew, Blackford, Boone, Brown, Carroll, Cass, Clark, Clay, Clinton, Decatur, DeKalb, Delaware, Dubois, Fountain, Fulton, Gibson, Hamilton, Hancock, Harrison, Hendricks, Henry, Howard, Huntington,



Jackson, Jay, Jennings, Kosciusko, LaGrange, LaPorte, Lawrence, Marshall, Miami, Monroe, Morgan, Newton, Noble, Orange, Pike, Porter, Randolph, Ripley, Scott, Shelby, Spencer, St. Joseph, Steuben, Sullivan, Switzerland, Tippecanoe, Vanderburg, Vermillion, Vigo, Wabash, Warrick, Wayne, and White counties. County Extension agents were solicited two times by the researchers for contact information. Only participants from counties that submitted volunteer contact information by the launch date of the survey were included in the study. All 4-H Horse and Pony adult volunteers with email addresses were sent an online version of the research questionnaire, in an attempt to facilitate participation and reduce the cost and waste of resources. Those adult volunteers with no email addresses on file were sent a paper version of the same questionnaire. No questionnaire was sent to adult volunteers with inaccurate or incomplete contact information.

The participants in this study represent a concerted sample and therefore several threats to external validity, in addition to the afore mentioned threats to internal validity, exist in this methodology. Firstly, the results of this study cannot be extrapolated to any other group of adult or youth horse industry participants. The subject matter and methodologies of this study firmly place it within the 4-H Horse and Pony context. Furthermore, broad application of the findings is limited by geographical constraints, and does not accurately reflect the attitudes of 4-H Horse and Pony participants in other states without additional study. Finally, interaction effects of selection biases with the experimental variable may preclude characterization of the entire Indiana 4-H Horse and Pony program based on this data. While participants were solicited from all counties, actual survey respondents may be reflective of different motivators, either by county Extension personnel or by individual 4-H Horse and Pony members, to offer their opinions (or choose not to) on programmatic content.

### 3.6. Instrumentation

Data collected in this research includes numerical assignments of value on horsemanship skills (which are subsequently derived into welfare category scores) and demographic information from each participant. Both groups of adult participants were administered the same questionnaire, regardless of the online or paper format. The questionnaire for this research consisted of sixty items measuring attitudinal value of equine welfare and ten demographic questions asking about horse experience and ownership, familiarity with available 4-H educational resources, level of education, industry of occupation, and voluntary association in other 4-H projects and horse-related organizations. Prior to this research study, the questionnaire utilized was developed and pilot tested. The items were content derived from learning objectives of the National 4-H Horse and Pony curriculum handbooks. Skills from each lesson, in each level of handbook were enumerated, compared, and edited by experts to yield sixty total test items. Each tested skill was then coded as belonging to either one of the Five Freedoms of animal welfare categories or the Riding and Life Skills category. Categorization of the skills was guided by published protocol for horse welfare (National Equine Welfare Council, 2005) and reviewed by equine Extension and welfare specialists, an index of content and face validity of the items. Many skills could have been coded for more than one category, but for clarity of components, each was only placed in one bin. Several project skills were not directly related to welfare principles, and were instead program-specific or riding discipline-specific, so those were coded as Riding and Life Skills. Each skill-related item on the questionnaire included a statement of the skill, followed by ten unnumbered checkboxes on a scale between “Least Valuable” (1) and “Most Valuable” (10) to measure the construct of value to horse welfare (see Appendix). The even-numbered scale was intentional, to provoke semantic differential analysis of positive/negative indices. Semantic differential scales are routinely used to provide more than evaluative measures for constructs, particularly those related to moderately viewed concepts (Diab, 1965). As the

previous review of literature concludes, animal well-being is a widely accepted notion based on evolution and conformities of social and cultural values. That being said, if research constructs were strictly evaluative measures, it would be expected that personal attitude scores would reflect those extolled by acceptability, and could even dispose participants to reply in acquiescence of what the perceived “correct” answer is. In using the spectrum assignment hallmark of semantic differential techniques, measures of personally distinct attitudes can be adequately addressed while providing a scale for comparison among respondents. The ten gradients of the differential scale were designed to allow participants to compare their attitudes for any given skill with those of another item, and value each as they would on a spectrum. Additionally, the scale was designed to promote unconscious flow from one item to another; by providing more gradients between two extremes of emotional value, participants were encouraged to mark their responses with a minimum of critical thinking, a more accurate reflection of true attitudes. The research tool was pilot tested by a group of 24 undergraduate students in a collegiate equine course. This pilot sample adequately reflects the test populations’ familiarity with the basic horsemanship skills derived for the attitudinal measure and the variable demographics additionally measured.

### 3.7. Data Collection

Descriptive, comparative data were collected in this research using quantitative research methods. The population surveyed included adult volunteer leaders and judges involved in the Indiana 4-H Horse and Pony program, representing 56 counties from Indiana and select residents from Ohio, Michigan, and Maine. Initial solicitation of potential participants was encouraged by the principal investigator sending an email to Indiana county Extension offices requesting they move their Horse and Pony rosters to an accessible database. Additional instructions on how to use the database software to complete the request were sent out following the initial email. After three weeks and another email reminder

to county offices, the contents were transferred from the database to a Microsoft Excel spreadsheet and used to identify adult volunteers and their correspondence information. All 4-H Horse and Pony adult volunteers with email addresses were contacted by those means, while those adult volunteers with no email addresses on record were contacted through traditional mailed materials. The methodology of data collection from participants followed the Dillman Tailored Design Method in order to achieve a high response rate from the two different technologies used in this study: self-administered mail and internet surveys (Dillman, 2007). The Tailored Design method entails a series of principles and elements that address the common reasons why respondents do or do not choose to participate in social research based on extensive experimentation. Implementation of the method in this research involved four contacts with potential respondents. For the 544 participants administered paper surveys, a pre-notice postcard was first sent to all volunteers on the lists provided by participating counties. Following clarification of mailing label confusion (addresses were correct but corresponding names were incorrect), and filtering of the contact list for those erringly identified as involved in the Horse and Pony program, a questionnaire and detailed cover letter explaining the nature of the request were sent to participants. A postcard was sent two weeks later expressing appreciation for those who had responded and indicating uncompleted surveys should be sent back promptly (Dillman, 2007). A replacement survey was sent to non-respondents 5 weeks following the initial mailout. Roughly the same procedure was implemented for those 580 participants surveyed via the online format, except paper products were replaced by email. Pre-notice was conducted by email, and one week later, another email was sent to participants containing the same cover letter content (as the paper version) and a link to the Zoomerang survey site hosting the assessment. Reminders were sent from the Zoomerang interface to non-respondents after three weeks. An additional email containing the survey link was sent to non-respondents 6 weeks following initial deployment. The final numbers of

responses for paper survey participants was 196 and 193 responses from the online survey, representing an overall 34.6 % response rate.

Despite the meticulous timeline for these processes stipulated by Dillman, the actual administration of this survey did not exactly follow the suggested temporal pattern. It is acknowledged that untimely management of the survey process may have compromised the principles of respondent trust and perceptions of increased reward fostered by the Tailored Design Method, resulting in an increase of survey error from coverage, sampling, measurement, and non-response (Dillman, 2007). Future studies would benefit from heeding the strict timeliness of the method, as well as checking participant rosters voluntarily provided to the state-level by Indiana counties to minimize errors and inefficiency associated with soliciting potential respondents misidentified by county personnel.

### 3.8. Data Analysis

Data from each participant's questionnaire was transferred into a Microsoft Excel spreadsheet according to unique numerical coded records. Each code number represented a known adult volunteer with the Indiana 4-H Horse and Pony program, but for ease of organization and as a guarantee of non-disclosure, names or other personally identifying information was used for no other purpose than recruitment. Each participant record contained the numerical value assigned to each of the 60 skill items and responses to the ten demographic items.

Respondent data from those utilizing the online survey format was downloaded directly to the Excel program from within the Zoomerang site. Data from paper surveys was manually entered into the same spreadsheet.

Analysis of survey validity and reliability was conducted in the following ways. Cronbach's alpha internal consistency was calculated overall, as well as for each of the six categories of skills. Inter-item correlations were also calculated for all

items, and for all skills within each category. Skills as related to the survey questions were reviewed by equine Extension specialists and animal welfare experts for face validity. Factor analysis using the alpha factoring method to maximize generalizability/reliability of the factors was conducted to reduce data into linear combinations of variables. This analysis extracted 11 components, explaining 60.1% of the variance in responses. Many of the extracted factors could be labeled as components of the welfare freedom categories. For example, *understanding horse tooth wear* and *caring for horse teeth* both loaded onto the same factor; all of the life skills explicitly related to competition and show ethics loaded onto a different factor. Confirmatory factor analysis of the researcher-proposed skill categorization, however, did not yield model fit at a statistically adequate level; this model could be confounded by the inclusion of the non-welfare skills (riding and life skills), and modification of the Freedom scales and items could result in better fit. Continued development of the instrument for mainstream or broader use needs to resolve this issue, but for the purposes of this thesis, content and face validity are necessary and sufficient.

For statistical analysis, data was transformed from Excel to Statistical Package for the Social Sciences (SPSS, 2007). Descriptive statistics were used to analyze item, participant, and welfare categorical data, using frequencies, means, medians, modes, ranges, percentages, and standard deviations. Non-parametric test statistics were used to determine the significance of differences in item and category value scores. For categorical data, several analyses were used to determine: 1) differences in each category mean compared to the overall mean of all skills (one sample t-test), 2) differences between each category mean compared to all other category means (paired sample t-test), 3) analysis of variance in categorical scoring between groups identified by demographic variables (Kruskal-Wallis H-test, Mann-Whitney U-test).

## CHAPTER 4. RESULTS AND FINDINGS

### 4.1. Purpose of the Study

The purpose of this study is to describe the attitudes of Indiana Horse and Pony adult volunteers towards equine welfare by soliciting value scores for program skills that reflect aspects of animal well-being.

### 4.2. Objectives of the Study

The overall goal of this research was to determine the value that Indiana 4-H Horse and Pony project adult volunteers place on skills related to equine welfare.

The specific objectives were to:

1. Develop and test an assessment for determining attitude toward equine well-being based on basic horsemanship skills
2. Describe adult volunteers' value of project skills as they relate to horse welfare
3. Compare valuation scores of skills representing different aspects of welfare relative to perceived worth
4. Identify underlying factors potentially associated with subsequent valuation
5. Provide baseline attitudinal level measures for future study in welfare education and programmatic needs assessment

### 4.3. Results and Findings

The results of this research are organized and presented in this chapter according to the above stated study objectives. Characterization of the

respondent population is firstly described. The next section describes the psychometric properties of the attitudinal assessment developed for this research, according to the sample population studied in this research. The third section describes the value that Indiana 4-H Horse and Pony volunteers place on horsemanship skills that relate to welfare and riding and life skills, based on the numerical trends of measurements obtained from the assessment. The overall trends in data are described, as well as description of the response trends with respect to each of the Five Freedom welfare and riding and life categories of skills. Additional statistical analyses in the next section compares the value of particular sets of skills, according to welfare classification, as they relate to trends of perceived worth within and between respondent groupings. Identifying underlying factors associated with valuation is achieved through statistical analysis of categorical values based on respondent groupings is included in the final section. These analyses do not imply causality, but allow for comparison of values based on demographic characterizations of respondents. The findings based on these results provide attitudinal measures that can be used as baseline information for setting programmatic benchmarks for welfare education.



#### 4.3.1. Population Characterization

A total of 389 4-H Horse and Pony adult leaders from 58 counties in the state of Indiana, and judges from Indiana, Michigan, Ohio, and Maine answered the questionnaire regarding their attitude about horse welfare. The majority of respondents were experienced horse owners aged in their 40's. As seen in Figure 1, the youngest volunteers were 18 years and the oldest were in their 70's.

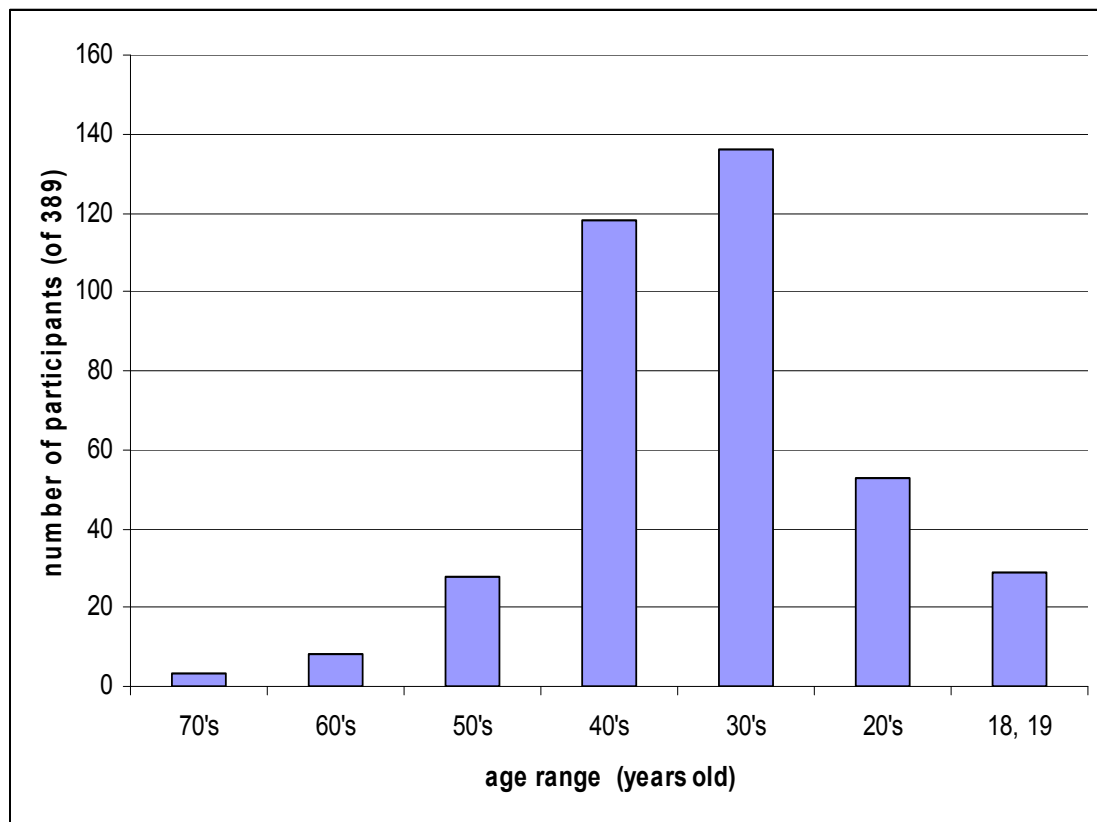


Figure 1: Age distribution of respondents

Only ten respondents of the 389 had no previous horse ownership experience and two participants did not respond to the question (Figure 2). The average respondent had 21-25 years of horse industry experience.

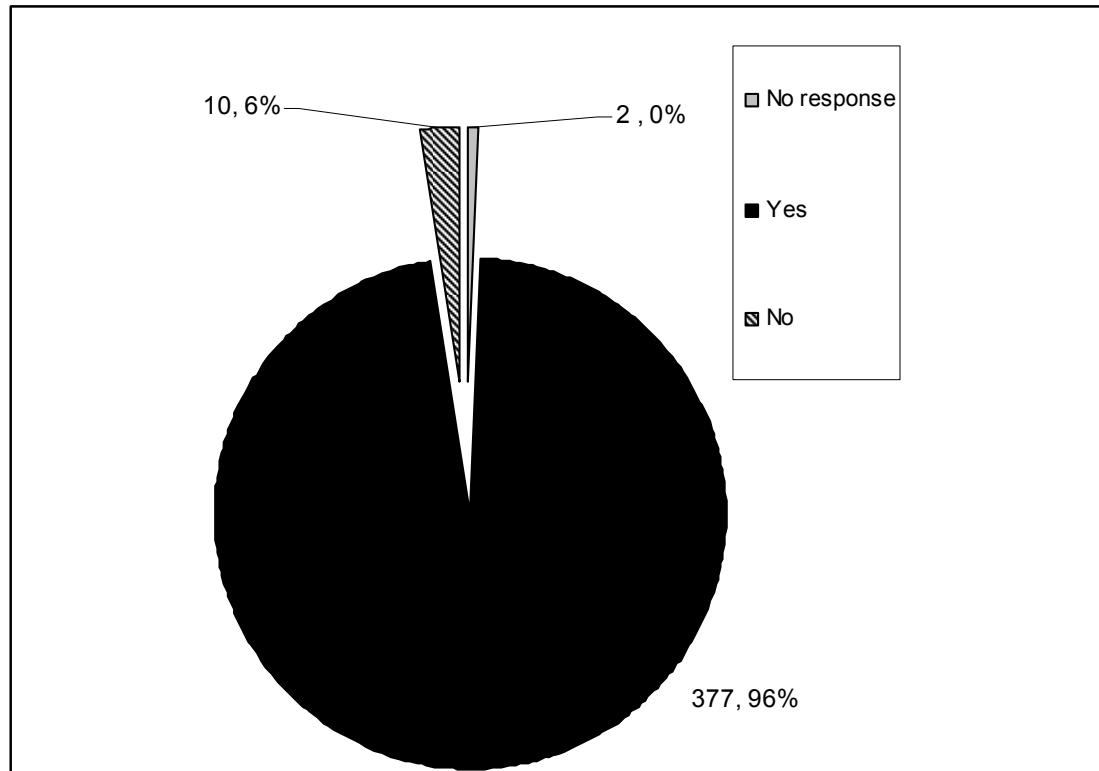


Figure 2: Respondents' indication of horse ownership experience

Approximately half of the participants from Indiana resided in rural counties, and half resided in urban counties. The majority of respondents, 323 of 389 participants, had attended college. Fifty percent of the respondents had a college diploma, and fifty four respondents (14%) had attained an advanced collegiate degree. Most of the respondents indicated they were familiar with and used the available National 4-H horse and Pony curriculum handbooks in their county clubs. Forty five respondents indicated they were familiar with the materials but did not use them, and 113 respondents indicated they were unfamiliar with this resource.

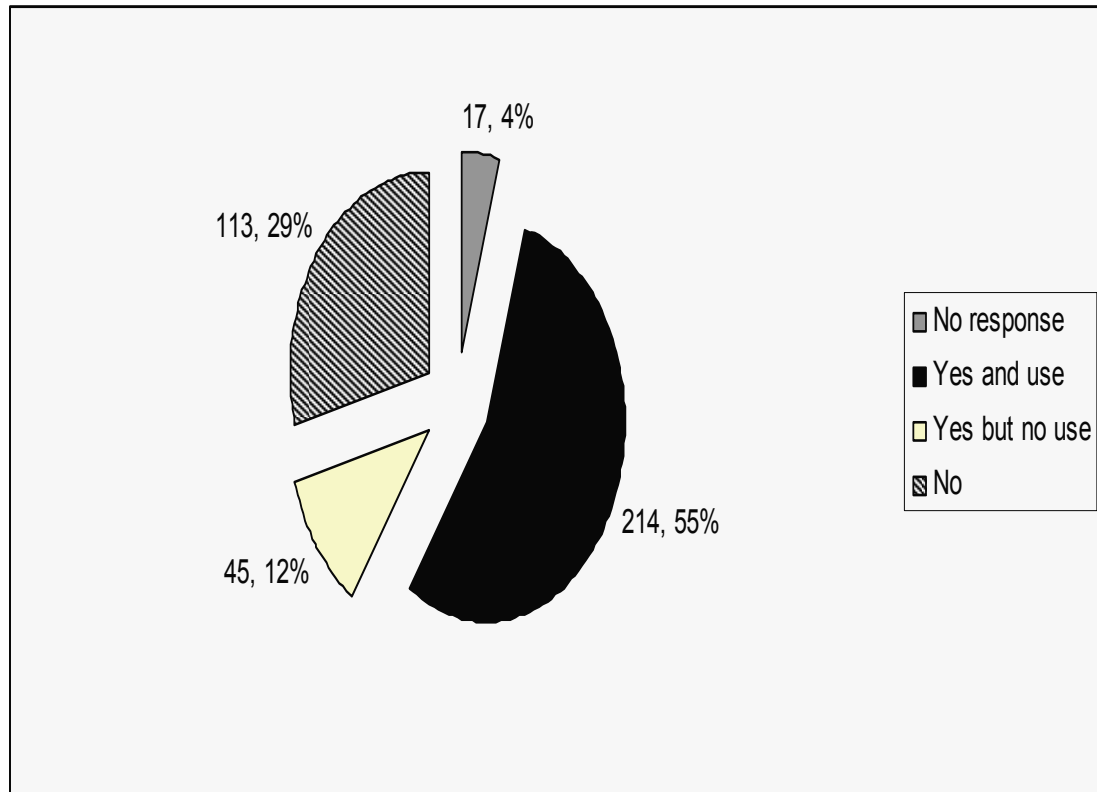


Figure 1: Respondent familiarity with National 4-H curriculum

Respondents were also asked to indicate what other horse-related voluntary organizations they participated in. Of the 389 respondents, forty seven indicated they were members of the Indiana Horse Council and 211 indicated they were members of other horse-related associations; respondents were asked to indicate all applicable answers. Seventy nine respondents indicated they were members of breed-affiliated organizations at either the state or local levels. Quarter horse associations were the most frequently listed, as were paint and pinto, Arabian, Appaloosa, Morgan, Pony of America, Shetland pony, Tennessee Walking horse, Missouri Fox Trotter, miniature equine, and mule organizations. The industry of occupation most frequently indicated by respondents was educational, health, and social services.

#### 4.3.2. Psychometric Properties of Researcher Designed Instrument

A total of 339 fully completed responses were utilized in the reliability analyses of the assessment designed for this research to determine attitudes about welfare based on valuation of horsemanship skills. Measures of internal consistency yielded Cronbach's alpha levels of  $\alpha = 0.974$  for all 60 items (including Riding and Life skills) on the assessment and  $\alpha = 0.970$  for the 47 items that measured only welfare skills. Inter-item correlations for all 60 items was  $r = 0.396$ , and  $r = 0.417$  for the welfare skill items. The 60 horsemanship skills included on the assessment were reviewed by Extension specialists, and horse and welfare experts to determine classification according to one of the five welfare freedom categories or the riding and life skills category; respondents were unaware of the researchers' categorization of items. The Five Freedom categories are: Freedom from Hunger and Thirst; Freedom from Discomfort; Freedom from Pain, Injury, and Disease; Freedom to Express Normal Behavior; Freedom from Fear and Distress. The division of skills into these categories is shown in Table 1 below.



Table 1: Classification of horsemanship skills

<i>Freedom from Hunger and Thirst</i>	<i>Freedom from Discomfort</i>	<i>Freedom from Pain, Injury, and Disease</i>
Caring for horse teeth Exploring factors related to colic Understanding how to weigh a horse and adjust nutritional ration Evaluating hay Understanding horse nutritional requirements Assessing horse health using body condition scoring Understanding horse tooth wear	Comparing types of fences Knowing pasture management techniques Managing horse waste Designing horse housing Preparing prior to trailering a horse Knowing avenues for disposal of deceased horses Measuring horse height	Recognizing unsoundnesses Controlling parasites Investigating horse diseases Recognizing blemishes Evaluating horses for conformation and usefulness Assessing horse health Understanding horse reproductive parts Knowing hoof care Checking horse vital signs Proper injection techniques and sites Evaluating factors involved with breeding Improving horse's show appearance Keeping horse health records
<i>Freedom to Express Normal Behavior</i>	<i>Freedom from Fear and Distress</i>	<i>Riding and life skills</i>
Catching a horse Relating performance to conformation Training a horse to line drive, ground drive Recognizing horse behaviors Putting on a halter Leading properly when loading horse into trailer Understanding horse psychology Training a horse to lunge Identifying horse behaviors	Picking up a horse's foot Praising a horse Using horse tack appropriately Mounting and dismounting properly Practicing loading and unloading trailered horses Identifying different uses for horses Reprimanding a horse Grooming horse's tail Assembling a grooming kit Knowing when to euthanize/humanely end horse life Using grooming tools	Ethical conduct Learning etiquette for how to ride in a group Identifying parts of the equine skeleton Riding patterns Appreciating pre-purchase exams Leading a horse Keeping financial records Developing horse riding skills Showing a horse at halter Displaying good sportsmanship Mastering knot tying Evaluating ethics in competitive situations Distinguishing between ethical and unethical human behaviors

### 4.3.3. Descriptions and Trends of Valuation Data

According to the research design, respondents were asked to assign a value to 60 programmatic horsemanship skills that were classified by researchers into one of five welfare categories or riding and life skill category. For data analysis, the unmarked value spectrum between “least valuable” and “most valuable” was transformed onto a numerical scale, with 1 representing “least valuable” and 10 representing “most valuable” items. This data analysis utilizes trends, rather than individual scores, as measures of value, therefore, unless otherwise noted, scores represent mean worth of the derived classification variables. The perceived value of welfare skill categories are displayed in Table 2 below.

Table 2: Mean values of Five Freedom and Riding and life skills categories

Category	Mean	Std Deviation	Alpha
Freedom from Hunger and Thirst	8.22	1.23	0.88
Riding and life	8.02	1.14	0.88
Freedom from Fear and Distress	7.94	1.24	0.89
Freedom to Express Normal Behavior	7.91	1.19	0.82
Freedom from Pain, Injury, and Disease	7.88	1.20	0.91
Freedom from Discomfort	7.18	1.47	0.86

The overall mean value of the skills was  $m = 7.914$ . The overall mean value of welfare, that is skills classified according to the Five Freedoms but not Riding and Life skills, was  $m = 7.855$ . The highest value of skill categories was  $m = 8.221$ , the Freedom from Hunger and Thirst, while the lowest valued category was  $m = 7.181$ , the Freedom from Distress. The relative rankings of categorical values are also seen in Table 2.

The trends for means of the individual skill items, displayed in Figure 4, are obviously different. The order of the welfare skills on the questionnaire was done so at random. No skill mean was below a 6.00 on the 10-point scale. Overall, the highest valued skill was  $m = 9.45$ , *displaying good sportsmanship*, classified in

the Riding and life skills category; the highest welfare skill was  $m = 9.24$ , *recognizing unsoundnesses* and the lowest valued skill overall was  $m = 6.25$ , *evaluating factors involved in breeding*. Both these highest and lowest skills are classified in the Freedom from Pain, Injury, and Disease.

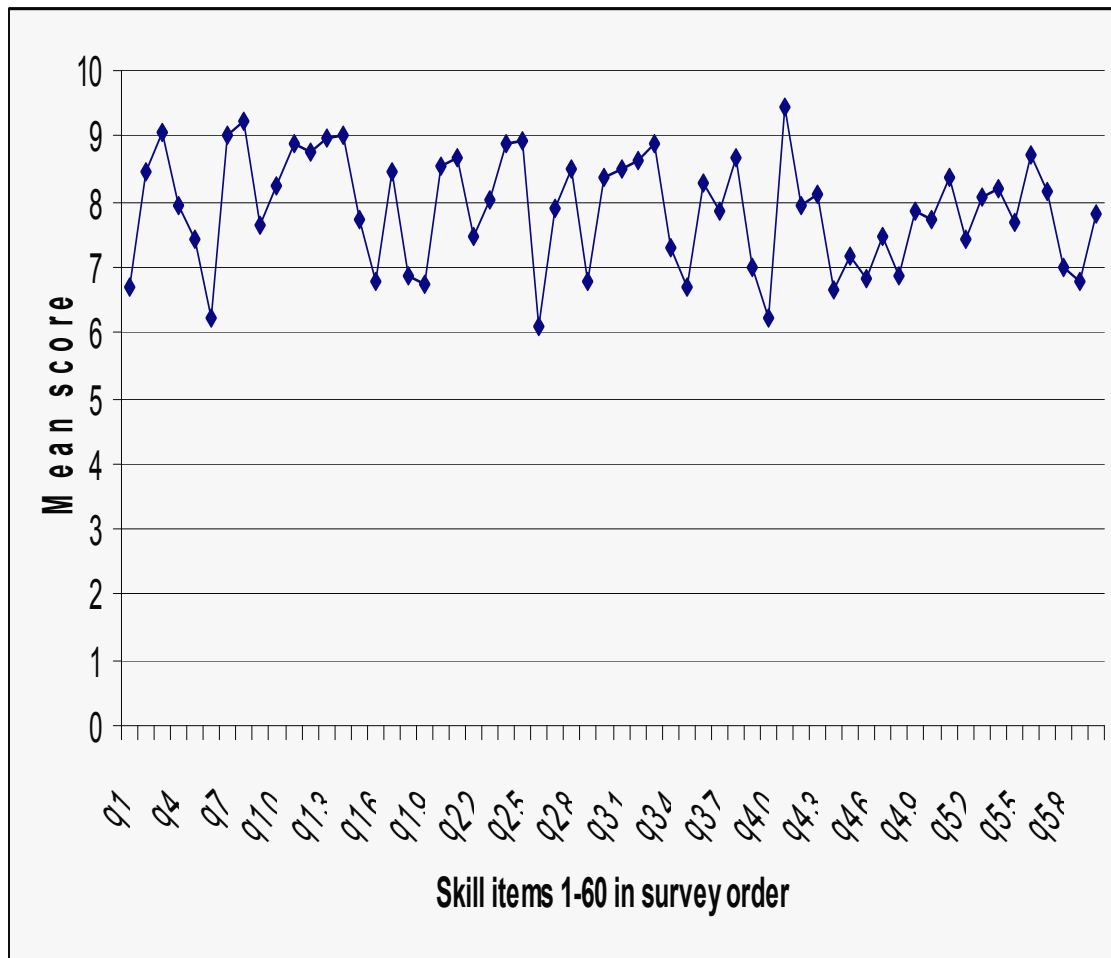


Figure 4: Overall surveyed skill item means

Each category score was a derived variable based on mean composite values of constituent horsemanship skills. The following tables describe summary statistics for the skills that are classified in each welfare and riding and life skills grouping.



Table 3 describes the skills classified according to the Freedom from Hunger and Thirst. The seven skills in this category, as seen in the table, are associated with nutritional well-being. The range of value scores was 1.008, with the highest skill, *exploring factors related to colic*, valued at 8.76 and the lowest, *understanding horse tooth wear* assigned a value of 7.76.

Table 3: Freedom from Hunger and Thirst skill valuation

Skill	Mean	Std Dev
<i>Understanding horse tooth wear</i>	7.76	1.72
<i>Understanding how to weigh a horse/adjust nutritional ration</i>	7.88	1.82
<i>Assessing horse health using body condition scoring</i>	7.88	1.87
<i>Evaluating hay</i>	8.37	1.45
<i>Caring for horse teeth</i>	8.43	1.46
<i>Understanding horse nutritional requirements</i>	8.47	1.43
<i>Exploring factors related to colic</i>	8.76	1.38

Skills that were related to physical facilities and management were classified in the Freedom from Discomfort category. The seven items ranged from a high 8.14 value for *preparing prior to trailering horses* to a low value of 6.69 for *designing horse housing*, a range between extreme means of 1.47, as seen in Table 4.

Table 4: Freedom from Discomfort skill valuation

Skill	Mean	Std Dev
<i>Designing horse housing</i>	6.69	2.07
<i>Comparing types of fences</i>	6.74	2.08
<i>Measuring horse height</i>	6.77	2.02
<i>Knowing avenues for disposal of deceased horses</i>	7.02	2.36
<i>Managing horse waste</i>	7.28	1.87
<i>Knowing pasture management techniques</i>	7.63	1.60
<i>Preparing prior to trailering a horse</i>	8.14	1.64

The Freedom from Pain, Injury, and Disease category contained 13 skills that were related primarily to horse health. This welfare category contained the overall highest and lowest valued welfare skills, *recognizing unsoundnesses* and *evaluating factors involve with breeding*, respectively. The 3.09 range of item means, from a high score of 9.24 to a low score of 6.15, highlights these categorical extremes. Table 5 highlights the value placed on skills for this welfare category.

Table 5: Freedom from Pain, Injury, and Disease skill valuation

Skill	Mean	Std dev
<i>Understanding horse reproductive parts</i>	6.15	2.01
<i>Evaluating factors involved with breeding</i>	6.25	2.13
<i>Recognizing blemishes</i>	6.90	2.04
<i>Improving a horse's show appearance</i>	7.21	2.07
<i>Investigating horse diseases</i>	7.76	1.67
<i>Proper injection techniques and sites</i>	7.82	2.05
<i>Evaluating horses for conformation and usefulness</i>	8.09	1.67
<i>Keeping horse health records</i>	8.09	1.66
<i>Checking horse vital signs</i>	8.23	1.78
<i>Knowing hoof care</i>	8.83	1.23
<i>Assessing horse health</i>	8.86	1.28
<i>Controlling parasites</i>	8.98	1.22
<i>Recognizing unsoundnesses</i>	9.24	1.02

Table 6 displays the skill valuation for the five horsemanship principles that relate to horse behavior, or require an understanding of horse behavior in order to perform the skill. The range of mean values for these skills is 2.293, with the highest valued skill as *putting on a halter* and the least valued skill as *training a horse to line drive, ground drive*.

Table 6: Freedom to Express Normal Behavior skill valuation

Skill	Mean	Std dev
<i>Training a horse to line drive, ground drive</i>	6.39	2.18
<i>Training a horse to lunge</i>	7.45	1.97
<i>Relating performance to conformation</i>	7.56	1.89
<i>Understanding horse psychology</i>	7.64	1.92
<i>Catching a horse</i>	7.97	n/a
<i>Identifying horse behaviors</i>	8.16	1.62
<i>Recognizing horse behaviors</i>	8.42	1.44
<i>Leading properly when loading horse into trailer</i>	8.64	1.56
<i>Putting on a halter</i>	8.69	1.60

Skills that relate to minimizing horse mental suffering were classified in the Freedom from Fear and Distress category. These 11 skills had a range of 2.342. The highest valued skill was *picking up a horse's foot* and the lowest valued skill was *identifying different uses for horses*. A summary of all the skills value scores are seen in Table 7 below.

Table 7: Freedom from Fear and Distress skill valuation

Skill	Mean	Std dev
<i>Identifying different uses for horses</i>	6.66	1.99
<i>Grooming horse's tail</i>	6.81	2.18
<i>Assembling a grooming kit</i>	6.88	1.91
<i>Using grooming tools</i>	7.73	1.77
<i>Knowing when to euthanize/humanely end horse life</i>	7.97	2.08
<i>Reprimanding a horse</i>	8.10	1.92
<i>Praising a horse</i>	8.21	1.85
<i>Mounting and dismounting properly</i>	8.48	1.67
<i>Practicing loading and unloading trailered horses</i>	8.48	1.50
<i>Using horse tack appropriately</i>	8.97	1.20
<i>Picking up a horse's foot</i>	8.99	1.44

Each of the Five Freedoms has been arbitrarily enumerated by the UK Farm Animal Welfare Council. For brevity in the remainder of the results, references to the Five Freedoms will be designated by these arbitrary numbers, and skills are classified according to the above illustrated categorical assignment. The numerical assignments of the Freedoms are seen in Table 8.

Table 8: Numerical references for Five Freedom categories

Freedom Principle	Numerical reference
<i>Freedom from Hunger and Thirst</i>	Freedom 1
<i>Freedom from Discomfort</i>	Freedom 2
<i>Freedom from Pain, Injury, and Disease</i>	Freedom 3
<i>Freedom to Express Normal Behavior</i>	Freedom 4
<i>Freedom from Fear and Distress</i>	Freedom 5

#### 4.3.4. Identification of Differential Factors Affecting Skill Valuation

Respondents were grouped according to several demographic indices, and Kruskal-Wallis tests were used to determine significant differences in the distribution of value scores for those different groupings with three variables, and Mann-Whitney tests were used to determine significant differences in value score

distribution for groupings of two variables. Kruskal-Wallis and Mann-Whitney tests first rank each measurement variable (in this study, the welfare score for each category) so that the smallest mean score gets a ranking of 1, the second smallest mean score gets a ranking of 2, and so on, so that higher ranking indicates a higher welfare score. These rankings are then averaged and compared between each nominal group (in this study, demographic sub-sample groupings), with the null hypothesis that the mean ranking of each sub-groups' welfare scores are the same, or, that the welfare scores come from sub-groups with identical welfare 'locations'. This test serves as an analysis of variance for ranked data and can be used to describe the distribution of scores. The sub-sample groupings were classified according to:

- County population, 2 variables, rural vs. urban
- Horse ownership, 2 variables, owner experience vs. never owned
- Horse experience, 13 variables, years in increments of 5, up to 65+
- Education level, 11 variables, see Appendix, question 68
- Familiarity with National 4-H Curriculum, 3 variables, used, not used, not familiar

Each sub-sample group was compared independently of all other nominal variables for measurement of the mean value of the welfare and riding and life skills categories. No significant differences in value scores for any category were found between the rural and urban variables of county population distributions, and the horse experience variables.

Significant differences were found in the distribution of scores on all five freedom and riding and life skills based on education level. Figure 5 describes the Mann-Whitney mean ranking scores of respondents with differing horse ownership experience. Respondents with previous horse ownership experience scored skills related to the Freedom from Discomfort, and Riding and Life Skills (0.048; 0.034 at  $p < 0.05$ ) as slightly significant, lower in value, when compared to the scores of respondents who have never owned a horse before. In this figure, similar letters

indicate significant differences in category scores at  $p < 0.05$  in distributions for the sub-sample groupings.

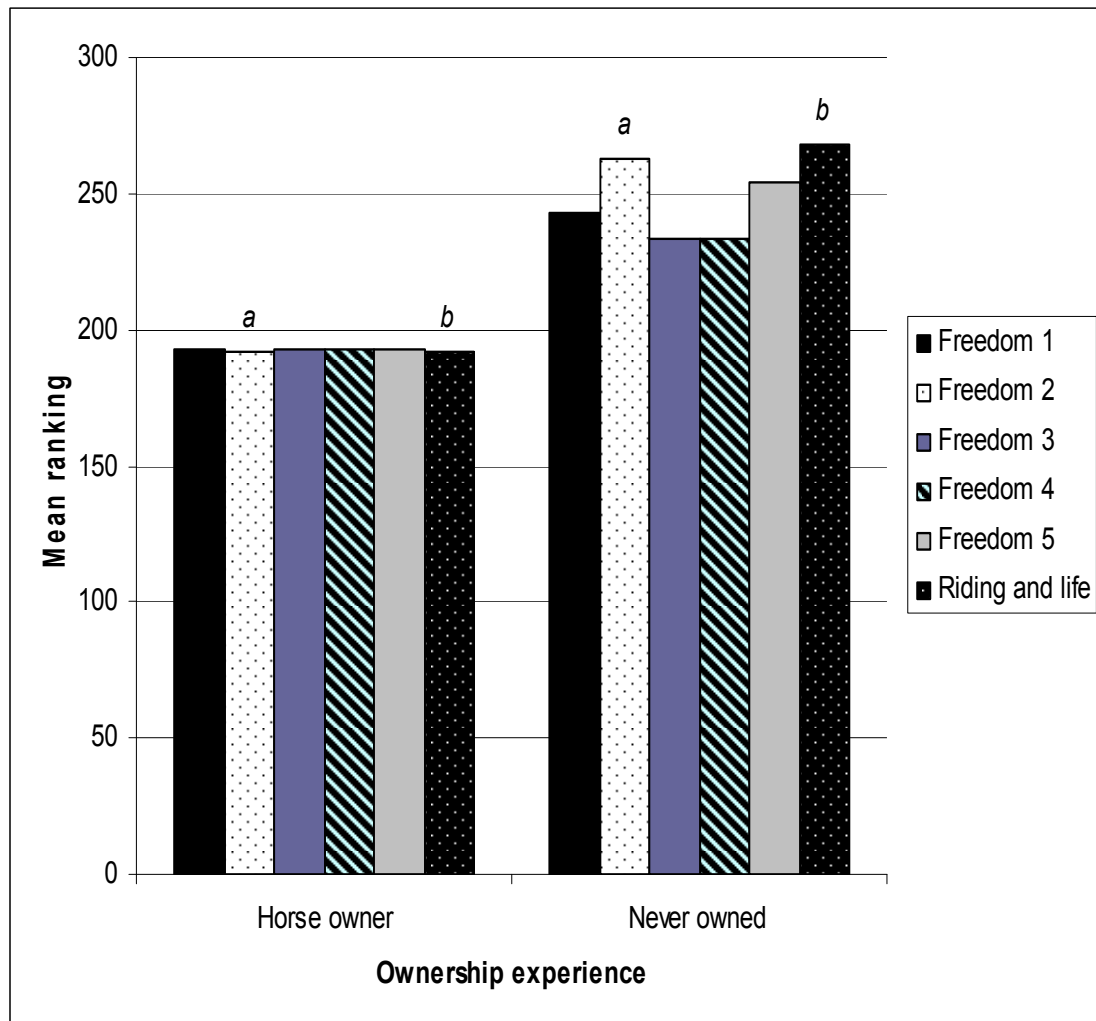


Figure 2: Mann-Whitney mean ranking by ownership experience

Respondent score distributions were significantly different on skills related to all categories except Freedom 1, Hunger and Thirst, for the variables of familiarity with the National 4-H Horse and Pony curriculum handbooks. Significant differences at  $p < 0.05$  in category scores distributions for the sub-sample groupings are again indicated by similar letters.

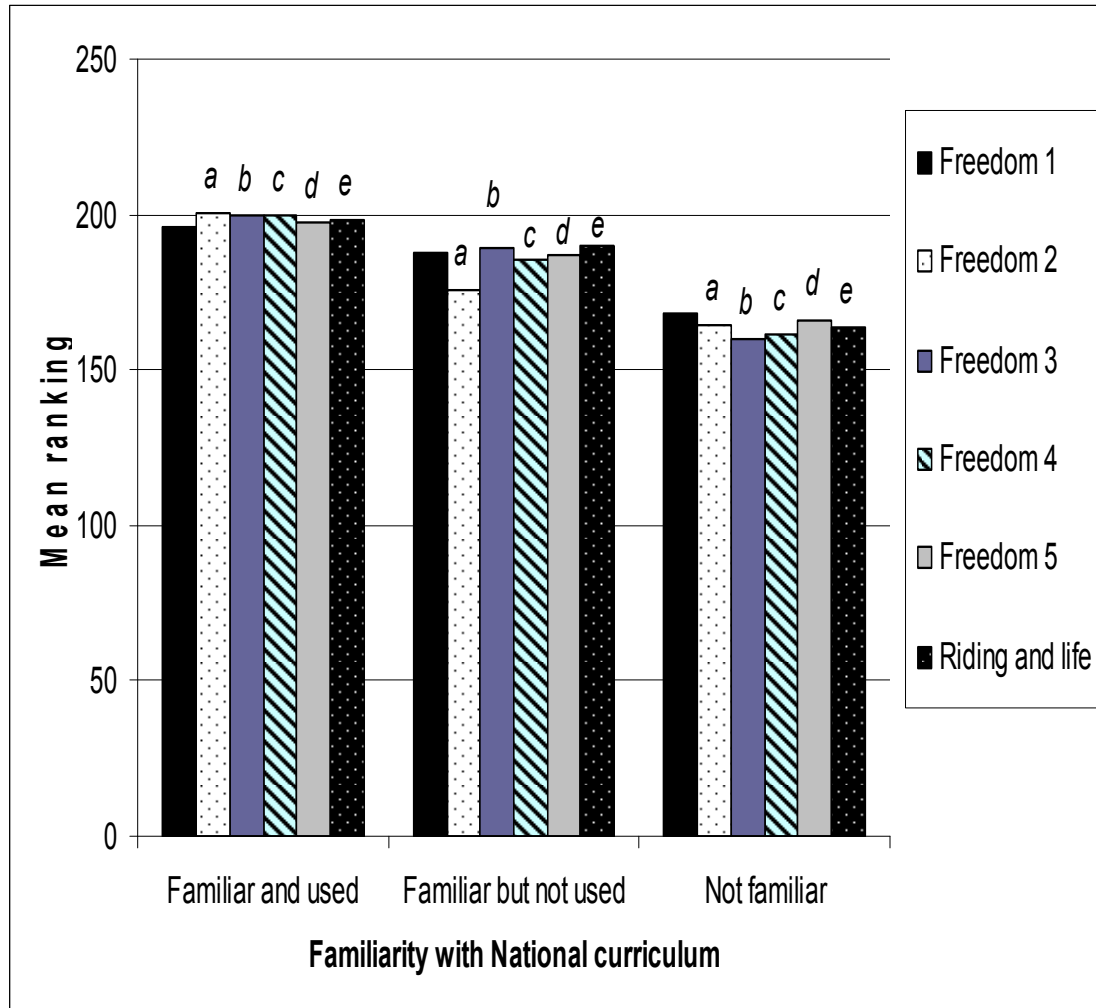


Figure 6: Kruskal-Wallis mean ranking by familiarity with curriculum

#### 4.3.5. Statistical analysis of valuation scoring

One sample t-tests were used to compare the mean value of each category to the overall mean welfare value, test value = 7.86. Table 9 enumerates how three skill category means—Freedom from Hunger and Thirst, Freedom from Discomfort, (Freedom 1 and Freedom 2, respectively), and Riding and life skills—were significantly different than this overall mean welfare value, as indicated by asterisks.

Table 9: One sample t-test between mean welfare score and category means

Mean welfare = 7.86	Mean	Lower diff CI	Upper diff CI	Sig. at $p < 0.05$
Freedom 1	8.22	0.243	0.488	<0.001*
Freedom 2	7.18	-0.821	-0.528	<0.001*
Freedom 3	7.88	-0.098	0.142	0.720
Freedom 4	7.91	-0.063	0.175	0.355
Freedom 5	7.94	-0.043	0.204	0.203
Riding/life	8.02	0.054	0.281	0.004*

Paired sample t-tests compared the mean values of each of the skill categories to each other. Significant differences were found between the values of Freedom 1 and all other categories; also significant differences were found between Freedom 2 and all other skill category means. Furthermore, the analysis yielded significant mean differences between the Riding and Life skills category and Freedom 3, Freedom 4, and Freedom 5. A summary of these categorical mean tests is seen in Figure 7. In this figure, the superscript letters represent mean values that are significantly different from each other at  $p < 0.05$ ; similar superscripts represent significant differences from values with different superscripts.



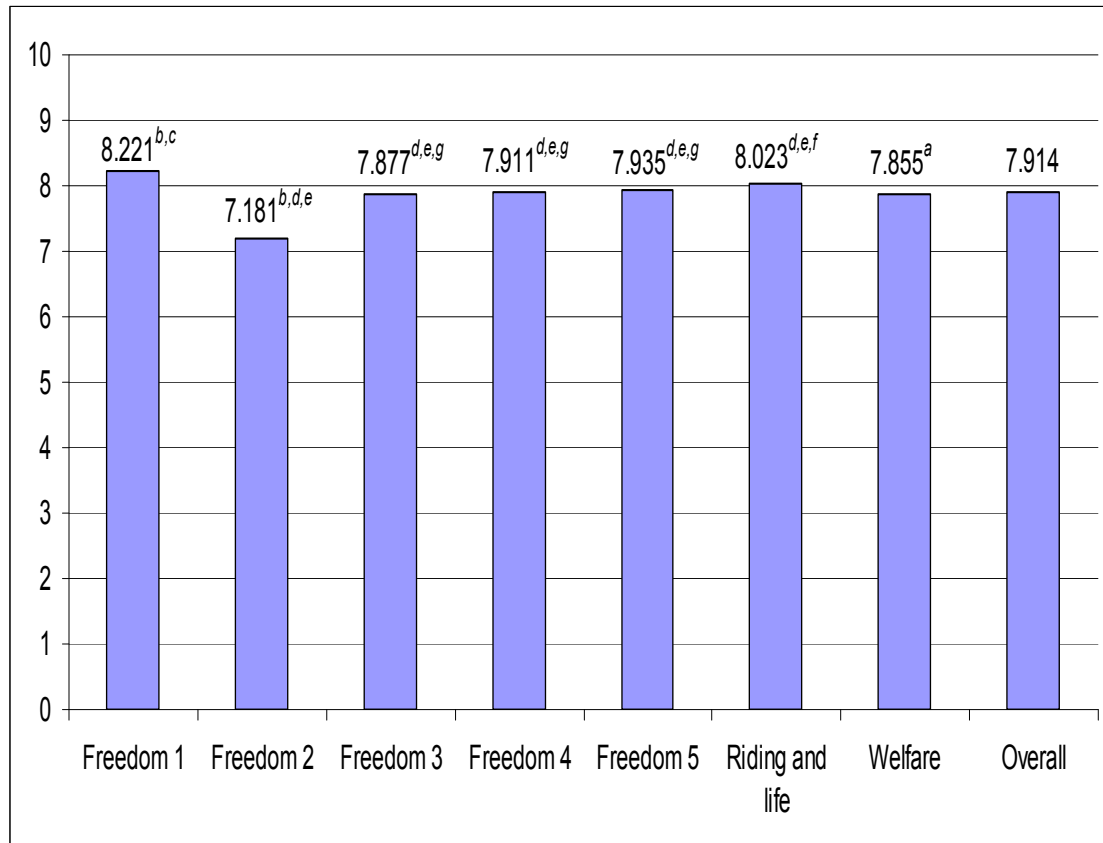


Figure 7: Statistic comparisons of mean category scores

## CHAPTER 5. CONCLUSIONS

### 5.1. Purpose of the Study

The purpose of this study is to describe the attitudes of Indiana Horse and Pony adult volunteers towards equine welfare by soliciting value scores for program skills that reflect aspects of animal well-being.

### 5.2. Objectives of the Study

The overall goal of this research was to determine the value that Indiana 4-H Horse and Pony project adult volunteers place on skills related to equine welfare.

The specific objectives were to:

1. Develop and test an assessment for determining attitude toward equine well-being based on basic horsemanship skills
2. Describe adult volunteers' value of project skills as they relate to horse welfare
3. Compare valuation scores of skills representing different aspects of welfare relative to perceived worth
4. Identify underlying factors potentially associated with subsequent valuation
5. Provide baseline attitudinal level measures for future study in welfare education and programmatic needs assessment

### 5.3. Discussions, Implications, and Conclusions

The following discussions of the findings are based on the afore described analyses of data.

### 5.3.1. Researcher-designed assessment

Based on the testing of this questionnaire with the population of Indiana 4-H Horse and Pony volunteers, the researcher designed tool is sufficient as a measure of equine welfare attitudes, and can be further developed for use with other related populations. The extremely high overall item reliability provides evidence that the measure is consistent for each respondent tested. The high inter-item correlations within each welfare category also contribute to the psychometric strength of this tool and content validity of skill categories used by the researcher. While confirmatory factor analysis did not align model fit with the data presented here, it is worthy to note several caveats to this analysis. Firstly, exploratory factor analysis of the data revealed 11 components, utilizing an alpha factor model with oblique rotation. For brevity, the researchers' hypothetical model, categorization criteria, limited each skill to one welfare classification; therefore it was expected that data, if a true measure of the interdisciplinary construct, would not be a good fit to any linear model. Further analysis on psychometric properties must take into account a model with multiple factor loadings. This type of a model would be more suitable when assessing an inherently inter-connected topic like attitudes about welfare. With more participants, additional test editing, and subsequently more testing, a more valid and true factor structure could be obtained. Secondly, the purpose of this study was only to describe this population of respondents' value, not relate their attitudes to some other measure or criterion, of welfare. The stringency for validity is therefore less so than if this assessment were used for research beyond observational description. Content and face validity were adequate, and other external and internal threats to study, and tool, validity have already been acknowledged. Finally, the assessment itself consists of skills that do not only measure the construct of attitude of welfare value. Skills strictly related to programmatic riding or life skills were deliberately included to serve as a comparison to other, welfare-related skills, as a token measure of divergent validity. While welfare measures reported in this study contain none of these

riding and life skills, additional analysis and modification is necessary to make statements regarding the review and potential use of this tool for other undesignated populations.

### 5.3.2. Volunteers' value of horse welfare skills

Analysis of the data indicates that overall Indiana 4-H Horse and Pony adult volunteers perceive a positive worth of the programmatic skills related to horse welfare. There are differential perceptions of value, however, for skills that relate to specific tenets of welfare. The overall mean value of all skills (7.914) was comparable to the overall value of only welfare skills (7.855), indicating that respondents have a strong positive perception of the contextual value of these horsemanship skills.

#### 5.3.2.1. Freedom from Fear and Thirst

The category of skills with the highest assigned value was for those classified as relating to the Freedom from Hunger and Thirst. The skills in this category reflect those that are related to the physical mechanisms of eating/drinking, such as *understanding horse tooth wear*, and *caring for horse teeth*, as well as the management practices involved in providing adequate sustenance to maintain health and vigor, such as *evaluating hay*, *understanding horse nutritional requirements* and *understanding how to body condition score and adjust nutritional ration*. The *exploring factors related to colic* skill was included in this category as many of the components associated with the disease are related to nutritional habits. While not all of the factors that cause colic have to be nutritionally-based, an understanding of gastrointestinal anatomy and digestive physiological processes are paramount in diagnosing and preventing its incidence. This colic-related skill was the highest ranked in the category, and the lowest ranked skill was *understanding horse tooth wear*. The other skill related to horse teeth, however, was ranked in the top three for the category. There was a

1.00 range in the mean values of all the categorical skills, indicating that as a whole, each of the skills related to hunger and thirst are believed to be of a high value.

The skills that were classified in the Freedom from Hunger and Thirst category are those that are widely expected to be fundamental; access to food and water are the minimum requirements for horse care. Because these principles are considered so basic, respondents may automatically be conditioned to respond strongly, and positively so, towards related skills being relevant for animal welfare. The *exploring factors related to colic* skill is scored so highly compared even to the other skills in the category, because of the potentially catastrophic and oftentimes completely preventable process of the disease. Colic, a broad term for any number of conditions that cause abdominal pain, is also a major cause of premature death in horses, estimated to have about an 11% incidence rate annually (Merck Veterinary Manual). Respondents would no doubt be aware of the possibly fatal outcome of colicking, and have clearly indicated the value in understanding its cause and symptoms by assigning the skill a high score.

The two skills related to horse teeth in this category were scored distinctly differently by the respondents. While *caring for horse teeth* was scored among the highest in the category, the lowest scoring skill was for *understanding horse tooth wear*. The semantics of the skills may have been unbalanced; the former skill uses a benefactive verb while the latter utilizes an experiential process structure, to which respondents have indicated the act of providing care is more valuable than understanding the principle of why care should be provided.

Adequately providing the basic necessities of food and water is the primary hallmark of responsible animal care and use. While respondents indicated this category of skills was the most important, the perceived value of skills relating to knowledge of underlying factors impacting nutrition, such as tooth wear, quality of

feedstuffs, and designing proper regimens, was lower than for the perceived more influential condition of colic. Particularly in the educational context of the 4-H Horse and Pony program, an emphasis on the fundamental knowledge of nutrition and related factors should be considered more valuable. While understanding potentially nutrition motivated disease conditions may be the greater perceived risk to responsible horse care and use, the ethic of horse care should be based on the most foundational principles of equine science, and on prevention and awareness, not on reactive impact.

#### 5.3.2.2. Freedom from Discomfort

The category of skills with the lowest assigned value were those related to the Freedom from Discomfort. The programmatic skills included in this category were those that relate to physical facilities, environmental factors, and shelter.

*Comparing types of fences, designing horse housing, managing horse waste, measuring horse height, and knowing pasture management techniques* are all skills for exploring the animal characteristics that should be considered in barn and facility planning. Another skill in this category, *knowing avenues for disposal of deceased horses*, is classified as such according to the constraints that carcasses pose in environments with animate horses and people. Many people choose to bury carcasses on their properties, because most landfills do not accept bodies, and other options such as rendering or incineration are costly. Without the necessary precautions and planning, however, buried carcasses can pose environmental hazards. Burial may be illegal. Depending on the location of burial, the carcass can impact future facility development plans, or may impact pasture or crop growth. There are also concerns about how leaching from the decomposing body can contaminate ground water supplies and cause odiferous disturbance. Because there are these environmental concerns associated with a common disposal method, this particular skill is classified as a physical facility issue. The *preparing prior to trailering a horse* skill is also included in this category because a trailer is in essence the physical facility a horse experiences

during transport. Preparation in this skill refers to routine maintenance, suitability, and safety of the trailer prior to its use. These preparations include the same considerations as those for permanent housing, regarding size, materials, feeding, management, and upkeep.

Respondents clearly recognized the importance of trailer safety and preparation as they indicated this skill to be the most important in the category. Because many leaders help to facilitate 4-H members with showing, and riding before shows, transporting horses safely is valued as an important skill. In a similar vein to the *exploring factors related to colic* reasoning, a lack of preparation prior to trailering a horse can produce fatal outcomes, therefore perception of this skill may be influenced by the gravity of prevention. Horse transportation welfare, as discussed earlier in this work, is a very public and current concern that has been brought to the forefront of media attention with several recent horrific accidents. Perception, therefore, of the magnitude of risk associated with skills that relate to trailering, is greater than the perceived risk of other skills related to discomfort, for example, types of fencing or manure disposal. Because respondents were asked to contextualize the value of skills for the responsible care and use of horses, “risk” can be defined as the consequences of not valuing the skill, or by researchers, as not performing the behavior, or risk of decreasing welfare. While the perception of risk is not a construct for this study, the complexities associated with the development of individuals’ attitudes towards horse welfare demand its consideration for explaining the underlying motivation for assigning value in this case; when asking about the value of horsemanship skills on a gradient scale, as in this study, what is measured is the manifest assignment of worth. For both the *exploring factors related to colic* and *preparing prior to trailering a horse* skills, high value assignments may be related to the acceptability of a given risk—in this case, not valuing a particular skill— as “the extent to which it is perceived to be involuntary, unfamiliar, catastrophic, uncontrollable, and scientifically uncertain” (Covello, 2004). Using this argument, it can be generalized that respondents

perceive not preparing prior to trailering to be a greater threat to the responsible care and use of horses than designing horse housing. While it could be countered that trailering, as a transient process, is far less likely to impact horse welfare overall than would a lack of consideration of animal characteristics when designing permanent horse housing, the logic of risk perception concludes that there are more perceived risk variables or a greater magnitude of the perceived risk of discomfort in trailering a horse.

Respondents clearly believed that physical facility topics were the least valuable for responsible care and use of horses, despite the importance of providing adequate shelter and environments as a basic requirement of provision. The implications suggest that these respondents are ignorant of how influential everyday accommodations are for a horse's quality of life, and value temporary or infrequent accommodation considerations as the most valuable provisions when considering a horse's physical environment. This value may also reflect a misconception, or real bias, that responsible horse care and use is most associated with human concerns, such as human safety, or human ease of management, or, most likely, particularly with the current financial situation, human economics. While refocusing the definition of welfare from physical to more affective issues, such as behavior, has been a part of campaigns for improving holistic understanding, the daily impact of a horse's environment should not be devalued. Continued programmatic emphasis on providing information and resources and investigating the considerations for horse housing and facility management, should be explored as they relate primarily to what the animals experience, not to the cost or other human constraints.

#### 5.3.2.3. Freedom from Pain, Injury, and Disease

The categorical mean for the skills classified according to the Freedom from Pain, Injury, and Disease was a higher categorical value than only the Freedom from Discomfort category, despite having the most skills and the individual



highest valued welfare skill, *recognizing unsoundnesses*. The inclusion of the individual lowest valued welfare skill, *evaluating factors involved with breeding*, in this category, however, precludes any expectation of a higher categorical ranking. The skills in this category are those that entertain distinct health issues, such as prevention, diagnosis, and treatment of clinical disease, manifest pain, or visible injury. The *assessing horse health, checking horse vital signs, proper injection techniques and sites, and investigating horse diseases* skills are all obviously related to horse health care. *Knowing hoof care* specifically refers to the maintenance of hooves, which can in turn be an indicator of overall horse health. The skill of *keeping horse health records* could arguably be categorized as a programmatic life skill, but the specificity of the item semantics dictates its inclusion in the Freedom from Pain, Injury, and Disease. Both *recognizing unsoundnesses* and *recognizing blemishes* are included in this category because of the clinical distinction between the terms “unsoundness” and “blemish”. While blemishes may be unpleasant or detracting, only those structural or other defects that effect serviceability are considered unsoundnesses. A related skill is *evaluating horses for conformation and usefulness*, a skill which asks 4-H members to describe the correctness of a horse’s bone structure and determine any unsoundnesses or blemishes. Defects, particularly those related to conformation, can have lasting health implications for the animal; conformational faults may impact the usefulness, performance, or function of a horse. For example, poor structure or balance can cause gait and limb deformities that put undue stress on the legs and body. This added stress can lead to lameness or other conditions. Understanding and managing any defects can prevent, diagnose, and treat animals with resultant or concurrent diseases. *Improving a horse’s show appearance* is a skill that could be classified on an example-basis to each of the welfare categories and riding and life skill category. Researcher classification of the skill into this category is based on the programmatic emphasis of 4-H horse show judging on the exhibitor, rather than the horse; improving a horse’s show appearance can compromise horse health in a variety

of ways. Certain shows or classes may be looking for a particular characteristic, an ideal or standard, which can be faked or simulated artificially to the detriment of the animals' health, for example, injecting or applying unsanctioned chemical substances to alter performance or body structure, or putting ginger or other caustic materials on sensitive anal tissues to elicit an arched tail carriage. These applications can have serious and potentially long-term health impacts for the horse. Other compromises of horse health for improving show appearance may not be related to particular standards or classes, but to the culture of horse showing in general. For example, blankets or sheets are very commonly used to maintain a clean body coat prior to an exhibitor's class, particularly for light colored horses and those prone to rolling around in dirt, feces, or mud. While blanketing a horse may keep them cleaner, thus improving their show appearance, there are dangerous health repercussions for keeping horses' bodies covered with thick fabrics for long periods of time in hot weather. Without the proper accommodations and environmental conditions, blanketed horses can suffer from overheating, dehydration, and possibly death. Two other skills included in this category are related to breeding, *understanding horse reproductive parts* and *evaluating factors involved with breeding*. These skills could also be variably classified, but are included in the Freedom from Pain, Injury, and Disease category for several reasons. Firstly, an understanding of horse reproductive parts is not strictly related to breeding practices, but as an organ system of the horse, should be regarded as any other anatomy in its relation to overall health. Furthermore an understanding of anatomical structure and physiological functioning can aid in the prevention, diagnosis, or treatment of reproductive disease of both male and female systems. Thus, the skill for *understanding horse reproductive parts* has distinct veterinary implications. Secondly, breeding can increase social contact between horses. Increased contact, both sexual and proximal, can lead to the spread of infectious or otherwise transmitted diseases, positing the *evaluating factors involved with breeding* skill firmly into this category. Other factors involved with breeding such

as mate selection and mare nutrition can have great impacts on foal health, including propensities for congenital diseases, genetic mutations, and developmental disorders. The act of parturition itself poses health risks for both the mare and the foal. Finally, overall general health of a horse is determined by its usefulness; there are definitively detrimental health consequences for horses that are bred without a purpose, to provide no service, without a motivation beyond mere existence. There is no market for these types of horses, no avenues for user-ship beyond what is designed, and rampant unregulated ignorance of horse needs. It is acknowledged by the researcher that not all of the factors involved with breeding are related to horse health, but those issues mentioned above were used in classifying the skill in this category.

The two skills related to breeding, *understanding horse reproductive parts* and *evaluating factors involved with breeding*, were the lowest scored skills in the Freedom from Pain, Injury, and Disease category. Several respondents indicated with commentary that their value assignment was based on them being not involved or not interested in breeding. In light of this non-solicited information, it is to be understood that the respondents based their valuation score of the skills on their personal experience or lack of experience for the topic asked about in these items. As mentioned earlier, the intention was not to confer any direct relational value for any of the skills, but to generally ask about responsible care and use using topics that are presented in the content of the 4-H Horse and Pony project. It is extremely telling that respondents perceived the *evaluating factors involved with breeding* skill as the least valuable skill overall in light of the current crisis of unwanted horses in America. Indiscriminate breeding, over breeding, and general disregard of the factors that are involved with breeding have contributed to a surplus of animals that cannot be supported by the industry that begot them. While many respondents, in the open ended solicitation item of the questionnaire, faulted the 4-H Horse and Pony program for not addressing the unwanted horse issue in its content, it is obvious from the value assignment of

this skill that there is widespread misunderstanding about the causal influences of horse industry politics and perceptions on what constitutes responsible care and use. Based on this data, 4-H leaders and judges value riding patterns as more important to horse welfare than conscientious breeding; if these educators truly wish to enter the dialog of the industry in addressing unwanted horse concerns, they first need to understand the basic considerations of responsible horse care and use.

Horse enthusiasts in general, and the 4-H Horse and Pony educator population specifically, need to develop an understanding of horse health within the context of responsible care and use, as it relates to the horse and the industry within which horses live. Health care should be a provision for horses under human care despite their serviceability status; these respondents believed that soundness was the most important health related skill for responsible use, a decidedly human-centric statement, demonstrating a lack of affection for the horse's point of view. The fact that this population deemed breeding skills as the least valuable overall highlights an ignorance for the contraindicating behaviors that contribute to the unwanted horse crisis. This patently unaware attitude leads the researcher to conclude that this, and potentially other 'knowledgable' populations are, as horse industry participants, unintentionally driving the most salient horse welfare concern in decades. To improve horse welfare, and reduce the impact of the unwanted horse issue on the global industry, all horse enthusiasts, regardless of their intentions in the matter, need to critically understand not only the anatomical physiology associated with breeding, but all of the contextual factors involved in making such a decision. Educational campaigns, such as those extolling the control of the dog and cat pet population, may be designed to successfully emphasize the contextual and holistic health of horses and the role of human actions in promoting their welfare.

#### 5.3.2.4. Freedom to Express Normal Behaviors

Several of the skills in the Freedom to Express Normal Behaviors category relate to the allowance of “horseness” in a horse, including *understanding horse psychology*, *recognizing horse behaviors* and *identifying horse behaviors*. Other skills, such as *putting on a halter*, *training a horse to line drive*, *ground drive*, *training a horse to lunge*, *leading properly when loading horse into a trailer*, and *catching a horse*, rely on a basic understanding of horse behavior in order to perform the skill, particularly an appreciation of the spatial ecology of the horse. While the *relating performance to conformation* skill could arguably be classified in the Freedom from Pain, Injury and Disease welfare category per the earlier discussion of conformation effects on health parameters, its classification here is justified in that the inherent structure of any one horse dictates a particular “way of going” that is unique. Performance can be artificially altered in a way that impacts health, but the structure of an animal is a natural dictation of what it actually can (and cannot) do.

Although research has previously reported otherwise (Farm Animal Welfare Council, 2008b) the categorical value assignment of the Freedom to Express Normal Behavior may indicate a greater understanding of behavior, rather than physical indices, such as housing systems (Rushen, 2003) as a welfare indicator; those physical index skills were categorized in the Freedom from Discomfort, which had the lowest categorical mean value. The highest valued skill in this category was for *putting on a halter*, while the lowest skill in this category was assigned to *training a horse to line drive*, *ground drive*. The act of putting a halter on a horse is what allows most people to actually interact with horses, therefore it logically follows that in valuing the responsible care and use of horses, respondents would value the skill that enables the care and use of horses. The skill of *training a horse to line drive*, *ground drive* was valued higher only more than the two skills related to breeding, overall. Because this skill describes a training method that relies on understanding of behavior, rather than a skill that is

describing the allowance of behavior, respondents did not highly value its contribution to responsible horse care and use. Although it was not measured in this study, many respondents may not even value the skill in regards to training their horse, either; line driving is a common training skill for certain types of horses or horses with specific jobs, although line driving can be successfully introduced into almost any training program. Obviously, horses that plow fields or pull weight would be more likely to be line driven than would horses that herd cattle or show jump. Respondents may not be familiar with what the skill describes, or may not perceive the skill to be of particular use for them, which may in part influence the assignment of value. From a welfare perspective, however, this score is not disconcerting, unless those who do utilize the skill do not have an understanding of the normal horse behavior motivating the skill, in which case, welfare could be compromised. The *recognizing horse behaviors* and *identifying horse behaviors* skills were valued at higher than average scores. Respondents indicated that an understanding and interpretation of horse characteristics are valuable when considering the responsible care and use of horses, which highlights that respondents have a more multi-dimensional conceptualization of care and use, beyond simple biological necessities like food and water. At least in regards to the generalization of these two skills, respondents have a greater understanding of behaviors as indicators and characteristics of horse welfare.

Discussion of the value of horse behaviors as welfare indicators reveals that overall, this respondent population values expression of natural “horseness” as a part of responsible care and use. In and of itself, this observation is comforting, but horse industry participants need to be aware of horse behaviors as a mode of communication between animal and human. Clearly, there should be more emphasis on the implications of horse behavior expression, which should be valued as a feedback loop. While horse behaviors are generally classified as “bad” or “good”, an emphasis on the ecology that provokes a certain type of

behavior can lead to more value of expression as a welfare indicator. A greater value of different training methods, such as driving and lunging, and the behavioral principles guiding their effective use, is also apparently lacking in this population. As these methods work within the context of the animals' behavioral pattern, they can be used as avenues of communication that can lead to better, strong, and active working relationships with the horse.

#### 5.3.2.5. Freedom from Fear and Distress

Skills that relate to providing conditions and treatment that avoid mental suffering were classified according to the Freedom from Fear and Distress, which had the second highest categorical value of the five welfare classifications, a mean value score of 7.935. The underlying criteria for classifying skills according to this welfare component was if the suffering of horses could be evident as an expression of and related to that of humans, which can be communicated, documented, and analyzed (Baker and Turner, 2000). While this criteria does not strictly consider horse welfare as from the animal's perspective, all of the skills classified thusly are related to humane handling. It is acknowledged by the researcher that more so than any other welfare principal, the avoidance of mental suffering also includes the provisions outlined by all of the other Freedoms. The skill of *identifying different uses for horses* describes the consideration of mental suffering in human designed horse use; while horses have been used historically for transport, labor, and food, the most prevalent horse use currently is that of pleasure. Pleasure disciplines are varied and diverse, and horses, by their individual characteristics, may be suited to certain uses more so than others. When humans ask horses to perform in a way that is unpleasant, it suffers. A purebred heavy breed draft horse, like a Clydesdale, for example, is not well suited for a discipline that requires speed, such as racing. Asking a Clydesdale to perform in that way induces suffering. Even when suitability is aligned, there are other considerations for mental suffering. Racing is one of the most public visible segments of the horse industry, and the use of young Thoroughbred

horses for racing exemplifies how designs for responsible use demand a consideration of mental suffering. In the world of Thoroughbred racing, these not yet fully developed young horses are manipulated and mechanized to run as fast as possible, and are kept in confined stalls without conspecific interactions when not being strenuously trained. Clearly, these are broad statements not applicable to each and every representative case, but generally speaking, these animals incur mental suffering as the cost of human use. *Praising a horse* and *reprimanding a horse* are obviously in this category as these are means by which humans communicate with horses regarding their behaviors. The feedback a horse receives will influence its future action; effective communication in regards to good and bad actions is paramount for avoiding mental suffering when handling a horse. Skills that relate to grooming, *grooming a horse's tail*, *assembling a grooming kit*, and *using grooming tools*, are included in this category with a similar justification, in that tactile contact is a mode of communication. Choosing and using grooming tools in a safe and appropriate way is an expression of regard for the horse itself. Horses under human care and use are also subjected to events that are not innate even to domesticated horses. *Picking up a horse's foot* goes against the basest instinct of the horse as a prey animal and, from an ecological perspective, is unnatural. Similarly, the use of horse tack, the act of riding astride, and entering a dark confined space are contrary to instinctual horseness, therefore skills like *using horse tack appropriately*, *mounting and dismounting properly*, and *practicing loading and unloading trailered horses* relate to minimizing the strangeness, opening effective communication loops, and avoiding the mental suffering of demanding a horse performs in a foreign way. Finally, the skill of *knowing when to euthanize/humanely end horse life* describes the human recognition of horse suffering, and asks respondents to assign a value to mercy.

The highest valued skill in the Freedom from Fear and Distress category was *picking up a horse's foot*, the second highest valued welfare item, behind



*recognizing unsoundnesses*. Respondents indicated their awareness of hoof health in impacting overall horse care and use by valuing this skill so highly. Routine hoof care is paramount for maintaining a serviceable animal, and serviceability is regarded the most by these respondents. The ability to pick up a horse's foot in a way that minimizes mental suffering is also related to horse and 4-H member safety, which is a topic rightfully emphasized in the programmatic structure. Despite the plethora of commentary on the suitability of horses used by 4-H members in program activities, these leaders and judges valued the skill of *identifying different uses for horses* as the least valuable in the category, an observation contrary to what would be expected. Many comments about suitability included the riding of "green" or poorly trained, badly behaved, or dead-sided horses, all characteristics that describe some manifest form of horse coping strategy induced by suffering. That respondents' qualitative commentary contradicted their quantitative valuation challenges the validity of their statements; it is possible that the semantics of the skill were vague or unclear, and respondents were unaware that in asking about the different uses of horses the idea of suitability was implied. The remaining most plausible explanation is that when given a forum to do so, respondents commented on their perceived personal or programmatic injustices, not on the research question of responsible horse care and use.

Mental suffering is no doubt experienced by horses under human care, and skills in this category assume that horses in fear or distress will act in a way that can be monitored. The value of skills such as *picking up a horse's foot* may be influenced by respondents' consideration of other, non-horse welfare concerns, such as 4-H member safety, and this research does not adequately measure what considerations are influencing value assignment, therefore conclusions regarding the populations' value of skills that minimize animal suffering cannot be divorced from concerns of human suffering. It is obvious that respondents do not value being able to identify horse suitability, a very disconcerting observation for

the 4-H Horse and Pony program as a whole. Educators, as well as parents and 4-H members themselves, should value this skill as it relates to minimizing animal suffering, especially when that suffering can be revealed in a way that impacts rider safety. Horses that are used for disciplines they are not suited for, or animals that are subjected to conditions, treatment, or training that provokes aversive coping strategies should be considered as experiencing decreased welfare. The horse is only ever given a reactive position; it is the role of human owners to consider the factors, not just their own wants, when determining horse suitability.

### 5.3.3. Differential value of welfare principles

Statistical analysis was conducted to determine any differences in mean values of each of the derived categorical scores. The comparison of means is done using t-tests; it is acknowledged that several assumptions of this statistical test are not necessarily met with these data, including normal distribution. Furthermore, samples for these analyses are not actually samples of a larger population, so inferential statistics actually apply to the respondent population as a whole. One sample t-tests were used to compare the values of each welfare category to the mean value of welfare, calculated from the overall scores of each welfare-categorized skills (but not including the scores of skills categorized in the Riding and life skills category). This test value was 7.855, and significant differences were found between this mean and the means of the Freedom from Hunger and Thirst, the Freedom from Discomfort, and the Riding and life skills categories. This analysis reveals that respondents place a different value on these skills compared to the overall value of all skills. The means of both the Freedom from Hunger and Thirst category and the Riding and life skills category are higher than the test value. Ideologically, providing quality, adequate food and water are basic tenets of responsible horse care and use, thus skills that relate to a horse's ability to satiate its minimum requirements in this regard are seen as more valuable than other skills overall. Despite the high value placed on these

skills by the respondents, previous research has indicated the most common reasons for severe malnourishment, an extremely recognizable symptom of poor horse welfare, are owner ignorance and economic hardship (Stull, 2003). The Riding and Life skills category was also valued differently than other skills overall, which may indicate a misconception of the research question or a genuine ignorance of principles of horsemanship that impact welfare. Respondents were explicitly told that the skills presented on the questionnaire were from the programming material of the 4-H Horse and Pony program, that they should indicate value of each according to its value for the responsible care and use of horses, but in the interests of research design integrity, the term “welfare” was not used. It is not uncommon for this population to participate in evaluations of programming materials and events, and respondents may have felt they were being asked to value skills according to some criteria other than the research question, or simply did not read the research question or instructions. This would explain why the Riding and Life skills category, and items in that category, such as *displaying good sportsmanship*, received such high marks of value when asked a question about horse welfare.

Paired sample t-tests were used to compare the means of each of the derived category scores with the means of all the other category scores. Significant differences were found between the mean of the Freedom from Hunger and Thirst and all other categories; the mean of the Freedom from Discomfort and all other categories, the mean of Riding and life skills and all the other categories. Analysis of these differences reveals that respondents make comparative values for categories related to welfare. The Freedom from Hunger and Thirst category was much higher than all the other welfare scores, again reinforcing the recognition of the minimum requirements for food and water as an indicator of animal welfare. The low score of the Freedom from Discomfort reveals a lack of emphasis on aspects related to physical facilities, compared to the value of other types of skills. The differential value of Riding and life skills compared to all of the

other, welfare categories is most revealing of the true attitudes of this respondent population. The inclusion of skills that could be classified as Riding and life skills were used as a contra-indicator of welfare; this population believed only nutrition was more valuable than the discipline-specific and competitive showing issues of the category. The skills included in the Riding and life skills category could at best be nominally related to animal welfare within the greater context of competition, but the high and differential value of this category clearly reveals the human-centric, rather than horse-centric, emphasis of the 4-H experience. While programmatically this is acknowledged, the relevant function of these Extension services may be undermined if constituents, particularly adults in educator roles, do not value the practical consideration of animal welfare skills within the 4-H and broader horse industry culture.

#### 5.3.4. Significant factors affecting values of welfare

Statistical tests between sub-sample groupings of certain demographic variables revealed significant differences in value distribution scores among the Five Freedom welfare categories. Non-parametric Kruskal-Wallis tests were used to compare the distribution of value scores for respondents partitioned into different groupings with at least variables, according to their years of horse experience, highest attained education level, and familiarity with the National 4-H curriculum from which the skills used to ask about welfare were sourced. Non-parametric Mann-Whitney tests were used to compare the groupings of respondents into sub-samples of two variables, county population and horse ownership. Chi square statistics and Mann-Whitney U statistics were utilized to determine significant differences in value score distribution between the groups for each of the derived welfare categories. Non-parametric tests assume no normal distribution of data, and these methods of analysis are relevant when determining relationships between ranked or scale data, and comparing samples for distribution variance. Although the groupings of respondents according to these

demographics are not strictly independent samples, it is assumed in this analysis, and randomly designated by respondents' indication on demographic items, that these are different "populations".

There were no significant differences in value score distribution for respondents residing in rural or urban counties, which provides additional evidence of validity of the instrument, and contributes to the credence of a homogenous population. There were also no differences in the score distribution based on years of horse experience. Those leaders and judges with 0-5 years of horse experience valued the skills in the same way as those with more than 60 years of experience. This comparison justifies using basic horsemanship skills such as these as a way to assess attitudes that is relevant and equivalent for all levels of horse industry participants; further research using this concept could even determine the efficacy of asking about horsemanship skill value from non-horse industry participant stakeholders.

Significant differences in the value score distribution function were significant for respondents who are horse owners and respondents who have never owned horses, for the skills that related to physical facilities (Freedom from Discomfort) and skills that were associated with programmatic riding and life skills. These statistics indicate that there is inherently a component of horse ownership that causes respondents to value these skills differently. Horse owners are more likely to understand the considerations involved with providing physical facilities, particularly if they keep their horses on their own property. These respondents would also be more aware of the diverse types of skills that go into horse management, and would therefore value life skills learned from horse interactions more for their pertinence. Furthermore, by nature of their distance from the animals, non-horse owners may not fully understand or experience the described care and use skills, causing the value distribution score of these welfare categories to be significantly different from horse owners.

Significant differences in value score distributions for all derived categories were observed for those respondents of varying education levels, indicating a relationship between education and attitudes about welfare. The frequency of scoring welfare skills above and below the median value was approximately equal for every category and for every education level, except for those respondents who had attained a bachelor's degree in a technical field and a graduate degree in a non-technical field. Only 1/3 of those 39 respondents with a bachelor's degree in a technical field ever indicated the value of any category to be greater than the median value. Three of the 13 respondents with a graduate degree in a non-technical field ever indicated that the value of the Freedom of Hunger and Thirst, Freedom from Discomfort, Freedom from Pain, Injury, and Disease, and Freedom to Express Normal Behavior was greater than the median. Those respondents who had attained a certain higher education level (bachelor's degrees, graduate degrees) consistently scored all categories lower in value than those respondents with lesser education. These measures of education, however, are strictly those of formal, broad subject plenary however, similar trends in value distribution scoring were seen when investigating the groups of respondents utilizing, familiar with, or unfamiliar with the National 4-H curriculum handbooks. Significant differences in group distribution scoring were seen for all derived categories except the Freedom from Hunger and Thirst. Only about 1/3 of respondents unfamiliar with the handbooks valued all categories more than the median value, while approximately 50% of those currently using or familiar with the handbooks assigned a value over the categorical medians. These data and statistics indicate that each of these groups of respondents is not equally valuing the horse welfare skills. Summary and descriptive statistics seem to indicate that the use of the National 4-H Horse and Pony curriculum handbooks contributes to a higher valuation of welfare skills, although further analysis is required to determine any causal relationship. The curriculum handbooks were the original source of horsemanship skills, and provided the content for fitting 4-H Horse and Pony programming into the contextual

framework of horse welfare. As expert reviewed and organization sanctioned materials, the skills presented in these handbooks emphasize programmatically important content. These data indicate that these basic skills contribute to considerations of how horse welfare is valued.

While education may be considered the end-all solution, particularly by program personnel working in educational organizations, the implications from this study indicate that education alone does not influence the value of animal welfare, but exposure to specific content education, such as the National 4-H curriculum, and experiential learning, like horse ownership, are also important facets to attitudes about welfare. These findings suggest that a body of education focused on equine welfare that employs the 4-H model of targeting life skills could be instrumental in improving the consideration of welfare skills in this, and potentially other similar populations. There is no suggestion that horse industry experience or county type influences the way respondents value horse welfare, which encourages the continued development of assessment that asks questions about basic horsemanship skills as practical indicators.

#### 5.4. Conclusions and Recommendations

Overall, this population of Indiana 4-H Horse and Pony adult volunteers has a positive perception of the diversity of horsemanship skills that can impact equine well-being. There is differential value of the skills based on welfare category, however, with participants indicating they believe skills related to nutrition are the most important. These respondents did not value as highly elements of physical environment as an influence on responsible horse care and use, but did perceive programmatic skills focused on riding or youth development almost as valuable as skills related to preventing hunger and thirst. It is to be concluded from this study that there exists a perceptual bias of value regarding the basic horsemanship skills that affect horse welfare. The educators in the Indiana 4-H Horse and Pony program have a human-centric view of responsible horse care

and use that may be at odds with program objectives and can be influential in perpetuating attitudes of ignorance. Because most of these volunteers are also active in the horse industry outside of the 4-H program, this knowledge further exacerbates the concern that all participants in the larger equine culture are aware of how the human management choices made on a daily basis can impact well-being. This and other studies to determine attitudes about welfare can be utilized to begin targeted campaigns for awareness, understanding, and education. Based on this research, it is recommended that horse well-being becomes a more prominent emphasis of the Indiana 4-H Horse and Pony program, and indeed all recreational, competitive, and occupational equine activities, by practicing, knowing, and appreciating basic horsemanship skills as a crucial component to responsible animal care and use. Relevant, accessible, and timely educational materials can assist adult volunteers and youth members in understanding and defining the value of horse welfare, not just for its human management benefits, but also as a fundamental trait for accountability, expected on the basis of the human-animal bond. Exploring the concept of welfare within the educational context of the 4-H Horse and Pony program would afford participants the opportunity to ask questions about equine science and the horse industry, and to evaluate their own thoughts, feelings, attitudes, and behaviors about a critical, relevant issue in a way that complements the programmatic goals of promoting horse well-being and fostering life skill development.



## LIST OF REFERENCES

## LIST OF REFERENCES

- Alberta Equine Welfare Group. (2008). The Alberta Horse Welfare Report: A report on horses as food producing animals aimed at addressing horse welfare and improving communication with the livestock industry and the public. Alberta, Canada: Author.
- Andersen, K., Waite, K., Heleski, C. (2006). 4-H Animal Welfare Assessment: Does it Work? *Journal of Extension*, 44(6).
- Anderson, G.D. & D.R. Lee. (1976). Salmonella in Horses: a Source of Contamination of Horsemeat in a Packing Plant Under Federal Inspection. *Applied and Environmental Microbiology*, 31(5):661-663.
- Armstrong, J. D., & E. A. Pajor. (2001). Changes in animal welfare needed to maintain social sustainability. In. R. R. Stowell, R. Bucklin, and R. N. Bottcher (Eds.) *Proc. 6th Int. Symp. Livest. Environ. VI Louisville, KY*, (1–4). St. Joseph, MI: ASAE
- Baker, D.J. & Turner, G.A. (2000). Editorial: Objectivity in the assessment of equine welfare. *Equine Veterinary Journal*, 32 (3): 178-179.
- Balschweid, M. A. (2001). Teaching Biology Using Agriculture as the Context: Perceptions of High School Students. *Journal of Agricultural Education*, 43(2): 56-67.

- Barnard, C.J. & Hurst, J.L. (1996) Welfare by design: The natural selection of welfare criteria. *Animal Welfare*, 5: 405-433.
- Bartussek, H. (1999). A review of the animal needs index (ANI) for the assessment of animals' well-being in the housing systems for Austrian proprietary products and legislation. *Livest. Prod. Sci.*, 61:179–192.
- Beck, A.M.& Katcher, A.H. (2003). Future Directions in Human-Animal Bond Research. *American Behavioral Scientist*, 47(1): 79-93.
- Becker, G.S. (2007). Horse Slaughter Prevention Bills and Issues. (Congressional Research Service Report for Congress, Code RS21842). Washington, D.C.: The Library of Congress.
- Bennett, R.M., Anderson, J., Blaney, R.J.P. (2002). Moral Intensity and Willingness to Pay Concerning Farm Animal Welfare Issues. *Journal of Agricultural and Environmental Ethics*, 15(2).
- Blandford, D., J.C. Bureau, L. Fulponi and S. Henson. (2002). Potential Implications of Animal Welfare Concerns and Public Policies in Industrialized Countries for International Trade. In M. Bohman, J. Caswell and B. Krissoff (Eds.). *Global Food Trade and Consumer Demand for Quality*. New York: Kluwer Academic/Plenum Publishers.
- Bracke, M.B.M., De Greef, K.H., Hopster, H. (2005). Qualitative Stakeholder Analysis for the Development of Sustainable Monitoring Systems for Farm Animal Welfare. *Journal of Agricultural and Environmental Ethics*, 18: 27–56.

- Brady, C.M. (2007). *Indiana 4-H Horse and Pony Handbook*. West Lafayette, IN: Purdue University Cooperative Extension Service.
- Broom, D.M. (1991). Animal welfare: concepts and measurement. *Journal of Animal Science*, 69(10):4167-4175.
- C J Barnardt & J L Hurst. (1996). Welfare by Design: The Natural Selection of Welfare Criteria. *Animal Welfare*, 5: 405-433.
- Cahn, C.M. (Ed.) (2005). *The Merck Veterinary Manual*. 9th ed. Whitehouse Station, NJ: John Wiley & Sons, 2005
- Covello, V.T., McCallum, D.B., Pavlova, M.T (Eds.). (2004). *Effective risk communication: the role and responsibility of government and non-government organizations*. New York: Plenum Publishing Corporation.
- Curtis, J.E., Graab, E.G., Baer, D.E. (1992). Voluntary Association Membership in Fifteen Countries: A Comparative Analysis. *American Sociological Review*, 57(2).
- de Aluja, S. (1998). The welfare of working equids in Mexico. *Applied Animal Behaviour Science*, 59:19–29.
- Diab, L. N. (1965). Studies in social attitudes: III. Attitude assessment through the semantic-differential technique. *Journal of Social Psychology*, 67:303.
- Dillman, D.A. (2007). *Mail and Internet Surveys: The Tailored Design Method*. Hoboken, NJ: John Wiley & Sons.

Duncan, I. J. H. (2005). Science-based assessment of animal welfare: farm animals. *Rev. sci. tech. Off. int. Epiz.*, 24(2): 483-492.

Duncan, I.J.H. & Petherick, J.C. (1991). The implications of cognitive processes for animal welfare. *Journal of Animal Science*, 69: 5017-5022.

Dwyer, E.E. (1991). Attitude Scale Construction: A Review of the Literature. Retrieved 4 September 2008 from ERIC database. ED 359 201.

Evans, P.A., Bailey, D.V., Rice, C., Jones, A., Shumway, K., McKendrick, S. (2008). The State of the Horse Industry Since the Closing of the Horse Harvesting Facilities. [White paper]. Retrieved from <http://extension.usu.edu/equine/files/uploads/horse%20harvesting%20paper%20ext.pdf>.

Farm Animal Welfare Council. (2008a). Farm Animal Welfare Council—Five Freedoms. Retrieved September 28, 2008 from <http://www.fawc.org.uk/freedoms.htm>.

Farm Animal Welfare Council. Consultation on Education, Communication, and Knowledge Application. (2008b). Retrieved October 30, 2008 from [http://www.fawc.org.uk/pdf/consult\\_1009.pdf](http://www.fawc.org.uk/pdf/consult_1009.pdf).

Favre, D. (2003). *Animal Law: Welfare, Interests and Rights*. Detroit, MI: Animal Legal and Historic Center.

Fraser, D. (2008). *Understanding Animal Welfare: The Science in Its Cultural Context*. Oxford, UK: Wiley-Blackwell. .

- Galloway, R & Gallagher, T.J. (2002). The Human Challenge of 4-H Horse Programs. *Journal of Extension*, 40(5).
- Garrett, M.I., Brady, C.M., McNamara, K.T., Russell, M.A. (2004). ID-320-W Economic Impact of the Equine Industry to Indiana. Vincennes, IN: Purdue University Cooperative Extension Service.
- Grandin, T. (Ed.) (2000). Livestock handling and transport, 2<sup>nd</sup> edition. New York: CABI.
- Grandin T., McGee K., Lanier, B.S. (1999). Prevalence of severe welfare problems in horses that arrive at slaughter plants. *J Am Vet Med Assoc*. 212:1531–1533.
- Harper, G.C. & Makatouni, A. (2002). Consumer perception of organic food production and farm animal welfare. *British Food Journal*, 104:3-5.
- Hausberger M., Roche, H., Henry, S., Visser, E.K. (2008). A review of the human-horse relationship. *Applied Animal Behaviour Science*, 109:1–24.
- Heleski, C., Waite, K., Reynnells, R. (Eds.). (2008). The Unwanted Horse Issue: What Now? Forum, Revised Proceedings. Washington, DC: United States Department of Agriculture.
- Hewson, C. J. (2003). What is animal welfare? Common definitions and their practical consequences. *Can Vet J*. 44: 406-409.
- Hobbs, A.L., Hobbs, J.E., Isaac, G.E., Kerr, W.A. (2002). Ethics, domestic food policy and trade law: assessing the EU animal welfare proposal to the WTO. *Food Policy*, 27:437–454.

- I. J. Duncan & Petherick, J.C. (1991). The implications of cognitive processes for animal welfare. *Journal of Animal Science*, 69: 5017-5022.
- Kerr, C. Evaluation of 4-H Horse and Pony Leaders in Indiana and Wisconsin. (1998). Unpublished master's thesis, Purdue University, West Lafayette, IN.
- Koballa, T.R. (1988). Attitude and related concepts in science education. *Science Education*, 72(2):115-126.
- Korte, S.M., Olivier, B., Koolhaas, J.M. (2007). Review: A new animal welfare concept based on allostasis. *Physiology & Behavior*, 92:422–428.
- Kronfield , D. S. & Harris, P.A. (2003). Equine Grain-Associated Disorders. *Vet Learn Compendium*, 25(12).
- Lassen, J., Sandøe, P., Forkman,B. (2006). Happy pigs are dirty! – conflicting perspectives on animal welfare. *Livestock Science*, 103:221– 230.
- Manning , A. & Serpell.J. (1994). *Animals and Human Society*. New York: Routledge.
- McCrinkle, C.M.E. (1998). The community development approach to animal welfare: an African perspective. *Applied Animal Behaviour Science*, 59: 227–233.
- Millman S.T., Duncan, I.J.H., Stauffacher, M., Stookey, J.M. 2004.The impact of applied ethologists and the International Society for Applied Ethology in improving animal welfare. *Applied Animal Behaviour Science*, 86:299-311.

- National Agricultural Statistics Service (2002). Indiana Equine Summary. Retrieved 8 September 2008 from [http://www.nass.usda.gov/Statistics\\_by\\_State/Indiana/Equine\\_Summary/highlights.pdf](http://www.nass.usda.gov/Statistics_by_State/Indiana/Equine_Summary/highlights.pdf).
- Odendaal, J.S.J. (1998). Animal welfare in practice. *Applied Animal Behaviour Science*, 59:93–99.
- Payne, J.L. (1980). Show Horses & Work Horses in the United States House of Representatives. *Polity*, 12(3):428-456
- Pritchard, J.C., Lindberg, A.C., Main, D.C.J., Whay, H. R. (2005). Assessment of the welfare of working horses, mules and donkeys, using health and behaviour parameters. *Preventative Veterinary Medicine*, 69:265–283.
- Rappaport, N.M., Kinsler, A., Brady, C., Balschweid, M. (2008). Indiana 4-H Horse and Pony leaders: perceptions of importance and involvement in essential project skills. In review.
- Reece, V. P., Friend, T.H., Stull, C.H., Grandin, T., Cordes, T. (2000). Equine slaughter transport: Update on research and regulation. *J. Am. Vet. Med. Assoc.* 216:1253–1257.
- Rollin, B. E. (2004). Annual Meeting Keynote Address: Animal agriculture and emerging social ethics. *Journal of Animal Science*, 82(3): 955.
- Rushen, J. (2003). Changing concepts of farm animal welfare: Bridging the gap between applied and basic research. *Applied Animal Behavior Science*, 81: 199-214.
- SPSS Inc. (2007) SPSS 16.0 for Windows. Release 16.0.1 Chicago, IL.



- Stewart, M.F. (1999). *Companion animal death: A practical and comprehensive guide for veterinary practice*. Woburn, MA: Elsevier Health Sciences.
- Stull, C.L. (2001). Evolution of the proposed federal slaughter horse transport regulations. *Journal of Animal Science*, 79:E12-E15.
- United States Department of Agriculture. (2009). Animal Welfare Act: Government and Professional Resources. Retrieved 6 May 2009 from [http://awic.nal.usda.gov/nal\\_display/index.php?info\\_center=3&tax\\_level=3&tax\\_subject=182&topic\\_id=1118&level3\\_id=6735&level4\\_id=0&level5\\_id=0&placement\\_default=0](http://awic.nal.usda.gov/nal_display/index.php?info_center=3&tax_level=3&tax_subject=182&topic_id=1118&level3_id=6735&level4_id=0&level5_id=0&placement_default=0).
- Waisman, S., Wagman, B.A., Frasc, P.D. (2002). *Animal Law: Cases and Materials* (2<sup>nd</sup> ed). Durham, NC: Carolina Academic Press.
- Webster, A.J.F. (2001). Review: Farm animal welfare: the five freedoms and the free market. *The Veterinary Journal*, 161:229–237.
- Whitmore, J.R. (1974). A teacher attitude inventory identifying teacher positions in relation to educational issues and decisions. (Research and Development Memorandum No. 118). Stanford, CA: Stanford University, Stanford Center for Research and Development in Teaching.

## APPENDIX





<b>25. Leading a horse</b>											
<i>Most Valuable</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Least Valuable</i>
<b>26. Understanding horse reproductive system parts</b>											
<i>Most Valuable</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Least Valuable</i>
<b>27. Understanding how to weigh a horse and adjust nutritional ration</b>											
<i>Most Valuable</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Least Valuable</i>
<b>28. Practicing loading and unloading trailered horses</b>											
<i>Most Valuable</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Least Valuable</i>
<b>29. Keeping financial records</b>											
<i>Most Valuable</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Least Valuable</i>
<b>30. Evaluating hay</b>											
<i>Most Valuable</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Least Valuable</i>
<b>31. Understanding horse nutritional requirements</b>											
<i>Most Valuable</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Least Valuable</i>
<b>32. Developing horse riding skills</b>											
<i>Most Valuable</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Least Valuable</i>
<b>33. Knowing hoof care</b>											
<i>Most Valuable</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Least Valuable</i>
<b>34. Managing horse waste</b>											
<i>Most Valuable</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Least Valuable</i>
<b>35. Identifying different uses for horses</b>											
<i>Most Valuable</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Least Valuable</i>
<b>36. Checking horse vital signs</b>											
<i>Most Valuable</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Least Valuable</i>





Please answer the following questions:

**61. Do you currently or have you at one time owned your own horse(s)?**

Yes

No

**62. How many years of horse industry experience do you have, including showing, breeding, training, 4-H?**

\_\_\_\_\_ years

**63. How many years have you been involved with the 4-H program, in the Horse and Pony project and others, in any state?**

\_\_\_\_\_ years as a youth member

\_\_\_\_\_ years as an adult facilitator (leader, judge, helper)

\_\_\_\_\_ years as a parent with child member

\_\_\_\_\_ years total

**64. Are you familiar with the National 4-H Curriculum handbooks? If so, have you used them in your Indiana county Horse and Pony projects?**



Yes, I am familiar with the materials and we have used them in our county

Yes, I am familiar with the materials but we do not use them in our county

No, I am not familiar with the materials

**65. Have you ever been a voluntary member of any breed-affiliated associations, on the state or national level? If so, please write the name of the association(s) or the breed(s).**

Yes

No

**66. Have you ever been a voluntary member of any discipline or other horse-related clubs and associations? Check all that apply.**

Indiana Horse Council member

Other clubs/associations

No

**67. In what year were you born?**

\_\_\_\_\_ year of birth



**68. Which category below best describes your highest education level?**

*For the purposes of this survey, technical fields include engineering, physical and life sciences, technology, math, agriculture. Non-technical fields include education, management, economics, creative and liberal arts, library sciences.*

- 1  No high school diploma
- 2  High school graduate (including equivalency)
- 3  Some college in technical field, no degree
- 4  Some college in non-technical field, no degree
- 5  Associate degree in technical field
- 6  Associate degree in non-technical field
- 7  Bachelor's degree in technical field
- 8  Bachelor's degree in non-technical field
- 9  Graduate degree in technical field
- 10  Graduate degree in non-technical field
- 11  Professional degree

**69. In which industry below is your current occupation?**

- Agriculture, forestry, fishing and hunting, mining
- Construction
- Manufacturing
- Wholesale trading
- Retail trade
- Transportation and warehousing, and utilities information
- Finance, insurance, real estate, and rental and leasing
- Professional, scientific, administrative, or other management services
- Educational, health, and social services
- Arts, entertainment, recreation, accommodation, and food services
- Other services
- Public administration, government
- Currently not working, or attending school full-time

**70. Do you have any other comments regarding your valuation of responsible horse care and use skills that were not otherwise addressed in this survey?**