

**THE EFFECTS OF STORYTELLING
ON WORLDVIEW AND ATTITUDES
TOWARD SUSTAINABLE AGRICULTURE**

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ABSTRACT

There is evidence that the American agrifood system is a significant contributor to environmental, economic, social, and ethical-animal welfare damage to the earth and to society and is unsustainable, yet the worldview of a substantial percentage of the population conflicts with this assessment. A significant number of researchers, non-governmental organizations, and government entities assert that the detrimental effects of industrial agriculture must be addressed without delay and sustainable agricultural practices implemented. The transition from industrial to sustainable agriculture will not be a simple one. Attempting to change a worldview is not an easy task. A growing body of research in other disciplinary areas suggests that storytelling can serve as an effective method of fostering change. This mixed-methods study examines the role of storytelling in effecting positive change in worldview and attitudes toward sustainable agriculture. A review of the related literature revealed that no instrument was available to measure attitudes toward sustainable agriculture with consideration of economic, environmental, social, and ethical-animal welfare dimensions. The first objective of the study, therefore, was to design such an instrument. The instrument is called *The Sustainable Agriculture Paradigm Scale* and is used as a pre and post-test in the study. A number of open-ended questions were added to the post-test to solicit qualitative data. The study explores the effects of Story-based, that is, a told story and a read story, versus Information-based treatments, that is, a lecture and a read factsheet, on effecting positive change in attitudes toward sustainable agriculture. The

qualitative data provides a secondary, supportive role exploring what characteristics of a story are associated with change. The hypothesis of the study is that Story-based treatments will be more effective in promoting positive change than will Information-based treatments. The findings of the study provide evidence supporting this hypothesis. The story characteristics found to be associated with positive change included: first-hand personal view, vivid description, and identification with the narrator.

DEDICATION

This work is dedicated
to
the special girls in my life –
my daughters, Jessica and Evelyn
and
granddaughters, Maddylee and Tanner.
You are the future.
This is for you!

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CHAPTER ONE

A number of researchers contend that the American agrifood system, as it currently functions, exerts a significant negative impact on the environment, the economy, and social conditions. John Ikerd, Professor Emeritus of Agricultural Economics, University of Missouri, acknowledges that although the industrialization of agriculture has increased the availability of food and reduced its costs, “it has done so by imposing significant costs on nature and society through environmental degradation and growing social inequity” (Ikerd, 2009, p. 13). He argues that such practices are not sustainable over the long run. Other researchers express agreement with this assessment (Horne & McDermott, 2001; Krisberg, 2008; Pew Commission on Industrial Farm Animal Production, 2008; Pretty, 2007; Shiva, 2000; Tegtmeier & Duffy, 2004; Union of Concerned Scientists, 2008). A two-year study funded by the Pew Charitable Trusts through a grant to Johns Hopkins Bloomberg School of Public Health concluded, “the present system of producing food animals in the United States is not sustainable and presents an unacceptable level of risk to public health and damage to the environment, as well as unnecessary harm to the animals we raise for food” (Pew Commission on Industrial Farm Animal Production, 2008, p. viii). Other organizations and individual researchers articulate similar concerns (Gilchrist, Greko, Wallinga, Beran, Riley, & Thorne, 2007; Ikerd, 2009; Krisberg, 2003; Loba & Meyer, 2001; Lawrence, 2005; Steinfeld, Gerber, Wassenaar, Castel, Rosalles, & de Hann, 2006; U.S. Government Accounting Office, 2004).

Numerous researchers assert that we can no longer afford to ignore the negative effects of industrial agriculture and contend that the well-informed and recognized practice of sustainable agriculture has the capacity to meet the food and fiber needs of our citizens as well as those of

the global community, along with the added benefits of environmental and resource protection (Badgley & Perfecto, 2007; Badgley, et al., 2007; Horne & McDermott, 2001; Ho, 2007; Ikerd, 1996; Millennium Ecosystem Assessment, 2005; Pretty, Morison, & Hine, 2003; Tilman, Cassman, Matson, Naylor, & Polasky, 2002). In addition, Ikerd (1996) indicates that, “this new paradigm seems capable of creating benefits the industrial model is inherently incapable of creating, such as greater individual creativity, dignity of work, and attention to issues of social equity” (p.7).

Current Paradigm and Worldview

Given the growing body of research regarding the negative impacts of modern agricultural practices and the inclusion of this issue in the popular media such as the movie, *Food, Inc.* (Kenner, 2008), and the *Time* magazine article, “America’s Food Crisis and How to Fix It” (Walsh, 2009), it seems logical that a considerable number of Americans would express negative views toward industrial agriculture and demand change. While some do, several Gallup polls have found that a significant percentage of Americans hold positive attitudes toward agriculture. In a 2001 poll, 89% of Americans expressed confidence in the safety of the nation’s food supply (Saad, 2001). In a more recent Gallup poll, almost 56% of Americans had a positive attitude toward industrial agriculture, only marginally exceeded by the restaurant industry with 57%, and the computer industry with a 62% approval rating. Positive attitudes toward such agriculture actually rose six points from 2008 to 2009 (Jones, 2009). How can this contradiction be explained?

In the work of fiction *Ishmael* (Quinn, 1992), the teacher Ishmael, a gorilla who represents the Jungian “Wise Old Man” archetype (Frye, 1971, p. 151), asks his pupil (a young man), “What have people been told that keeps them from becoming excited, that keeps them

relatively calm when they view the catastrophic damage they're inflicting on this planet?" The student answers that he doesn't know. Ishmael goes on to answer the question himself in the following manner:

They've been told an explaining story. They've been given an explanation of *how things came to be this way*, and this stills their alarm. The explanation covers everything, including the deterioration of the ozone layer, the pollution of the oceans, the destruction of the rain forests, and even human extinction--and it satisfied them (Quinn, 1992, p.44).

This statement expresses the essence of "paradigm." Kuhn (1970) first used the concept of "paradigm" to explain the underlying assumptions of scientific debates. He also introduced the term "paradigm shift" to describe a change in the basic assumptions within prevailing scientific theory. Shortly thereafter, in 1974, Pirages and Ehrlich describe paradigm as "a prominent worldview, model or frame of reference through which individuals, or collectively, a society interpret the meaning of the external world" (p. 43), thus transferring the concept to the sociocultural realm. The term "paradigm shift" has come to signify a change from one way of thinking to another. I have found that when the term "paradigm" is used, the writer is often using the word to signify a "prominent world view," as described by Pirages and Ehrlich, rather than the underlying assumptions of a scientific debate.

What many Americans, including myself, have grown up believing, that is, our worldview about agriculture, can be found on the website of the United States Department of Agriculture National Agriculture Library's Alternative Farming Systems Information Center:

The prevailing agricultural system, variously called "conventional farming," "modern agriculture," or "industrial farming" has delivered tremendous gains in productivity and efficiency. Food production worldwide has risen in the past 50 years; the World Bank estimates that between 70 percent and 90 percent of the recent increases in food production are the result of conventional agriculture rather than greater acreage under cultivation. U.S. consumers have come to expect abundant and inexpensive food. (Gold, 2007, para.10)

There is also a widespread attitude that industrialized agriculture is the only method available that will enable us to meet the food and fiber needs of our citizens as well as those of the global community. Some researchers claim that sustainable and/or organic agriculture will be unable to feed the world population (Borlaug, 2000; Huang, Pray, & Rozelle, 2002; Steinfeld, et al., 2006; Trewavas, 2002). This view is fostered by organizations such as the Cato Institute, and the Hudson Institute whose stated mission is “to generate public support for the modern food system, high-yield farming, and wildlife conservation” (Hudson Institute, 1999, p. 31).

Change through Storytelling

A number of researchers, educators, and practitioners have discovered that there is power in story and storytelling to effect change. Haven (2007) suggests that this may occur because human beings are “evolutionarily hardwired... to think in story terms” (p.4). Slater and Rouner (2002) think it is associated with the “suspension of disbelief” that occurs when involved in story (p.179). Kincaid’s (2002) drama theory contends it is because of identification with characters in the story and the emotional response evoked.

My personal experience as an extension educator has led me to believe that there is power in storytelling. For approximately 15 years, I used conventional methods of education, such as lectures, seminars, demonstrations, and publications, with varying levels of success, in efforts to encourage adoption of recommended practices for environmentally sound landscape design, installation, and maintenance in Florida. I then worked with a group of Master Gardener volunteers to create a musical-comedy presentation which told a story about landscape practices designed to protect both the quantity and quality of the state’s limited water resources. The production focused on proper fertilization and limited herbicide and pesticide use. The presentation was called *Save the Water!* It was staged on 32 separate occasions to audiences

totaling over 2,000. Surveys conducted with a random sample of audience members three to six months following the presentation indicated that the landscape practices modeled in the performance were being adopted at a significant rate. In addition, volunteer hours increased more than 50% during the run of the production. Master Gardeners participating in *Save the Water!* became our most effective agents of change and goodwill ambassadors in the county and in the region. This was, by far, the most effective program I participated in during my eighteen years as an extension educator (Grace & Kaufman, 2008).

Theoretical Basis for Guiding Change

The theoretical basis of this study is drama theory and the psychology of narratives. Drama theory, as described by Kincaid (2002), contends that drama impacts audience members as a result of identification with the characters and emotional involvement in the story. According to Kincaid, “the empathic emotional response in the audience is the motivational force that induces members of the audience to reconceptualize the central problem depicted in the drama and to resolve it in a similar manner in their own lives” (Kincaid, 2002, p.150). This “reconceptualization” can be likened to the concept of an alteration in world view (aka paradigm shift) since it signifies a change from one way of thinking to another (Kuhn, 1970). It is this shift that leads to changed behavior.

The psychology of narratives describes humans as social information processors. They process stories efficiently, with minimal effort and high recall. Absorption of the material presented is very high and counter-arguing is virtually non-existent. This blocking of counter-arguing “provides an extraordinary opportunity to influence individuals who would ordinarily be resistant to persuasion” (Slater & Rouner, 2002, p. 180). This may be due to the “suspension of

disbelief” which often occurs when one is involved in watching a drama. According to this theory, there is evidence that even fiction can change beliefs.

Tuivavalagi (2003) presents a simple model which helps explain the relationship between concepts, worldview, attitudes, behavior, and activities as he views it (Figure 1-1). He states that, “each worldview is composed of a set of concepts in relation to how an individual or a group of individuals view the world and how it works” (p. 53).

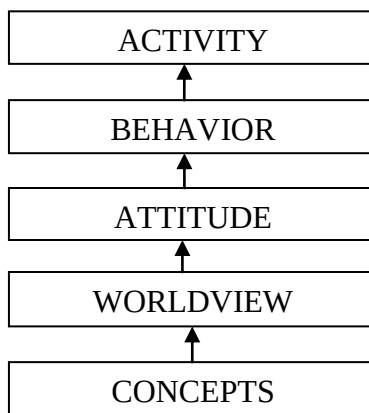


Figure 1-1. The relationship between concepts, worldview, attitudes, behavior, and activities. From “Worldviews, concepts, attitudes and awareness with regard to resource management in Samoa and other Pacific islands,” by N. S. Tuivavalagi, 2003, *Samoaan Environment Forum*, 4, p. 52. Copyright 2003 Samoaan Environment Forum, 4. Reprinted with permission.

Problem Statement

There is evidence that the American agrifood system is a significant contributor to environmental, economic, social, and ethical-animal welfare damage to the earth and to society and is unsustainable, yet the worldview of a substantial percentage of the population conflicts with this assessment. A significant number of researchers, non-governmental organizations, and government entities assert that the detrimental effects of industrial agriculture must be addressed without delay and sustainable agricultural practices implemented.

The transition from industrial agriculture to sustainable agriculture will not be a simple one, however. Green (1993) notes, “it is unfortunate, but true, that many in the agriculture community view sustainable agriculture as a personal criticism, or an attack, on conventional agriculture of which they are justifiably proud” (p. 7). Attempting to change a long-held worldview is not an easy task. Just the suggestion that change should be considered may raise negative emotions in some people and increase resistance to change. If people don’t agree with you about something, giving logical reasons for change rarely works. In fact, it may make them even more opposed to what you are suggesting (Denning, 2007; Festinger, 1957; Kunda, 1990; Lord, Ross, and Lepper, 1979; Westen, Blagov, Harenski, Kilts, & Hamann, 2004). In spite of this, the most common methods among many educators when addressing the need for change remains the use of didactic lectures and/or the distribution of informational factsheets (Grace, 1996; Strong & Harder, 2009).

A growing body of research in other disciplinary areas suggests that storytelling can serve as an effective method of fostering change. With the exception of changes inspired by Rachel Carson’s (1962) *Silent Spring*, storytelling has not been explored within the domain of agriculture. There is a need for research to determine if this method of promoting change can be effective in this setting.

Purpose and Objectives of the Study

This mixed-methods study addressed the effects of storytelling on college students’ attitudes related to sustainable agriculture in the United States. A sequential, embedded design was used in which qualitative data provided a supportive role in an intervention trial. Study participants participated in one of four treatment regimes which included: a story told by a teller, the same story read silently, a lecture containing the same basic information, and the silent

reading of a factsheet also including the same basic information. Pre-post quantitative data was collected using the Sustainable Agriculture Paradigm Scale developed for use in the study, to test drama theory and the psychology of narratives which predict that drama, embodied here in the form of a story (i.e. narrative), can positively influence worldview and attitudes toward sustainable agriculture. The qualitative data, collected through open-ended questions after the intervention, was used to explore what qualities of the story were associated with change as experienced by study participants.

The specific objectives of the study were to:

1. Develop an instrument to measure attitudes toward sustainable agriculture including economic, environmental, social, and ethical-animal welfare components.
2. Examine the impact of a carefully crafted story on college student's attitudes toward sustainable agriculture.
3. Explore what qualities of the story are associated with change as experienced by study participants.

Study Hypothesis

The hypothesis of the study is that Story-based treatments will be more effective in promoting positive change in attitudes toward sustainable agriculture among college students at Virginia Tech than will Information-based treatments.

Professional Significance of the Study

This proposed study of storytelling and its potential to serve as an effective change agent can make a contribution to the knowledge of alternative methods of fostering sustainable behavior within the context of agriculture. If the effectiveness of storytelling in other disciplines holds true within agriculture, it could provide a powerful new tool for facilitating change.

The population for this study is undergraduate students at Virginia Tech, a large land-grant university located in Blacksburg, Virginia. Two groups of students were studied including students in the College of Agriculture and Life Sciences who have had formal coursework in agriculture, and students from the College of Liberal Arts and Human Sciences without such coursework. Both groups have the potential to influence the future direction of agricultural practices in the United States. A significant number of those from the College of Agriculture and Life Sciences will go on to hold jobs in the agricultural sector as producers, educators, or in allied trades. Agricultural educators, in particular, will go on to influence their future students by sharing their own views and attitudes toward agriculture. Non-agriculture students, in their role as consumers of food products, and possibly in their professional role, for example, as health care professionals, may also exert an influence on future agricultural practices (Jackson, Minjares, Naumoff, Shrimali, & Martin, 2009).

Limitations of the Study

Sample Selection: The sample in this study consists of undergraduate students at Virginia Tech. Random sampling was not used to select study participants thus the findings are not generalizable to other populations at Virginia Tech or elsewhere.

Instrumentation: The instrument used to measure attitudes toward sustainable agriculture, The Sustainable Agriculture Paradigm Scale, is a new scale I developed for use in this study. Efforts to establish and improve the validity and reliability of the scale are described herein and are limited to its use in the current study.

Definitions of Key Terms

Paradigm: A prominent worldview, model or frame of reference through which individuals, or collectively, a society interpret the meaning of the external world (Pirages & Ehrlich, 1974).

Story: A unifying structure having a distinct beginning, middle, and end, which provides details regarding an event with which characters must struggle, during which time they experience emotions, take action, and discover meaning.

Sustainable Agriculture: Sustainable agriculture is both a philosophy and an integrated, site-specific set of practices that serve to ensure the environmental integrity of the land, the economic security of the farmer and the community, the health and well-being of society, and the ethical and humane treatment of agricultural and wild animals.

Worldview: A set of concepts in relation to how an individual or a group of individuals view the world and how it works (Tuivavalagi, 2002, p. 53).

Note: I believe the terms “paradigm” and “worldview” represent synonymous concepts. I have found that when the term “paradigm” is used, the writer is most often using the word to signify a “prominent worldview” as described by Pirages and Ehrlich (1974) rather than the underlying assumptions of a scientific debate (Kuhn, 1970).

Summary

In this chapter I have introduced the problem addressed in this study, the theoretical basis for guiding change through storytelling, and presented the problem statement. I have also highlighted the objectives of the study, the research hypothesis, and briefly reviewed the methodology. In the final paragraphs I have outlined the professional significance of the study, its limitations, and included definitions of several key terms used in the study. Chapters Two and Three will address these topics in greater depth.

CHAPTER 2

REVIEW OF THE LITERATURE

This research focuses on the role of storytelling in affecting an individual's worldview and attitude toward sustainable agriculture in the United States. In this chapter, I present a review of the literature in three main areas: (a) U.S. Agriculture: 1800-present, (b) Worldview, Attitudes, and Behavior: Barriers to Change, and (c) Storytelling: A Method of Effecting Change.

U.S. Agriculture: 1800-Present

The story of modern agriculture begins approximately 200 years ago with the advent of the Industrial Revolution which had its early beginnings in Europe, primarily Great Britain. New machine-based technological innovations were beginning to transform manufacturing, mining, agriculture, and transportation, profoundly affecting cultural and socioeconomic conditions. During the course of the 18th to 19th centuries, industrialization spread throughout Europe and to America. Agriculture in the United States was soon to be affected by the changes in the manufacturing sector. Mechanization led to the development of the tractor, which allowed fewer farmers to work larger acreage. The discovery of the beneficial effects of fertilizer on plant growth was followed by the manufacture of synthetic fertilizers which made more intensive agriculture possible. Animal nutrition was improved by the use of vitamins, and the discovery of antibiotics allowed animals to be raised indoors at greater densities in controlled animal feeding operations (Meier & Rauch, 2000).

The introduction of these chemical and mechanical means to overcome dramatically declining agricultural productivity led to natural resource problems such as soil erosion and water depletion and contamination. These practices were widely criticized by early British and

U.S. conservationist movements of the 1800's (Allen, 2004; Marx, 1990). The conservation movement continued into the 20th century. Aldo Leopold, who was to become an internationally known conservationist, ecologist, and educator, began observing the degradation of land and water resources in his early career as a forester and later as a professor of game management at the University of Wisconsin--Madison (Leopold Center for Sustainable Agriculture, 2008). According to The Leopold Center, so named in honor of Leopold's life and work, Leopold "devoted his life to planting seeds of thought about how farming should be productive but not interfere with natural systems" (Leopold Center, 2008, "More About Aldo," para. 1). In 1949, a year after his death, Leopold's now famous and prophetic book, *A Sand County Almanac*, was published. Therein, Leopold called for a new ethic of the land stating, "a land ethic changes the role of Homo sapiens from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members and also respect for the community as such" (Leopold, 1949, p. 204).

Silent Spring

It was not until 1962, however, that these environmental and health concerns related to pesticide use in agriculture captured the attention of the general public. This was due, in large part, to the publication of *Silent Spring* by Rachel Carson (1962). This now classic book told of the dangers associated with the extensive use of pesticides in agriculture, particularly DDT, and identified conflicts of interest in government regulation of pesticides. According to Brooks (1972), the book was serialized in the *New Yorker* magazine prior to publication and drew such attention that forty thousand advanced sales were made prior to its official publication in September 1962. It then spent 31 weeks on the *New York Times* best seller list (Newsweek, 1964). Within four months, 100,000 copies had been sold (Graham, 1970). The extensive

readership of *Silent Spring* resulted in the first widespread awareness of environmental and health problems associated with the use of chemical pesticides and provoked a groundswell of alarm among citizens.

The book was meticulously researched and, although brutally attacked by both the agrichemical industry and government, withstood stringent examination, having its findings validated by The President's Science Committee (PSAC) in 1963 with the publication of *The Use of Pesticides* (Graham, 1970). According to Hynes (1989), "*Silent Spring* crystallized an 'ethic of the environment' which inspired grassroots environmentalism... and the creation of the Environmental Protection Agency (EPA) and its state counterparts" (p. 9).

Limits to Growth

As the debate over environmental contamination continued to rage, Donnella and Dennis Meadows and a team from the Massachusetts Institute of Technology published *The Limits to Growth*. In the book, Meadows, Meadows, Rander, and Behrens (1972) model the consequences of a rapidly growing world population and finite resource supplies. The limits the Meadows' team identified were ecological limits, which they applied to economic growth as measured by gross national product (GNP), presuming a similar increase in the use of natural resources. They concluded "the most probable results [of reaching the limits to growth] will be a rather sudden and uncontrollable decline in both population and industrial capacity" (p. 23). According to Ekins (1993), "while the 'limits to growth' thesis struck a chord with the general public, economists and other scientists were quick to seek to discredit it" (p. 270). Critiques by scientists including Beckerman (1974), Cole, Freeman, Jahoda, and Pavitt (1973), and Hirsch (1976) served to bring into disrepute the work of Meadow's team. Consensus remained in favor

of growth. Emphasis was instead placed on a “perceived complementarity between growth and environment” (Ekins, 1993, p. 275).

A New Environmental Paradigm

During this same time period (that is, the mid-70’s), Dunlap and Van Liere (1978, 1984) contend that, as a result of the environmental movement, a new paradigm was beginning to emerge. They labeled this paradigm the new environmental paradigm (NEP). The NEP claimed that there were limits to growth, that humans were threatening the balance of nature, and that nature did not exist solely for human use.

Conventional Agriculture Paradigm versus Alternative Agriculture Paradigm

Beus and Dunlap (1990) noted a similar split occurring in agriculture. They assert, “the conventional paradigm of large-scale, highly industrialized agriculture is being challenged by an increasingly vocal alternative agriculture movement which advocates major shifts toward a more ecologically sustainable agriculture” (p. 590). In order to clarify the “core beliefs and values underlying these two approaches to agriculture” (p. 590), Beus and Dunlap undertook a study in which they compared the writings of six major advocates of conventional agriculture to those of six leading proponents of alternative agriculture. They found that there were major differing viewpoints on many agricultural issues. They synthesized the competing paradigms into six major dimensions: dependence vs. independence, centralization vs. decentralization, competition vs. community, domination of nature vs. harmony with nature, specialization vs. diversity, and exploitation vs. restraint. See Table 2-1 for key elements of these dimensions. As can clearly be seen from this comparison, conventional and alternative agriculture represent distinct paradigms with opposing theoretical underpinnings.

Table 2-1

Conventional Agriculture Paradigm vs. Alternative Agriculture Paradigm

Conventional Agricultural Paradigm	Alternative Agricultural Paradigm
<i>Centralization:</i> National production, larger farms, fewer farmers, concentrated control of land, resources and capital	<i>Decentralization:</i> Local/regional production, more farmers, small farms, dispersed control of land, resources and capital
<i>Dependence:</i> Large, capital-intensive production units and technology, heavy reliance on external inputs, dependence on market	<i>Independence:</i> Smaller, low-capital production units and technology, reduced reliance on external inputs, more self-sufficiency
<i>Competition:</i> Lack of cooperation, self-interest, small rural communities not necessary, farming is business only, emphasis on efficiency and profit	<i>Cooperation:</i> Increased cooperation, preservation of rural communities and traditions, farming a way of life, emphasis on permanence, quality, beauty
<i>Domination of nature:</i> Humans separate from and superior to nature, nature consists of resources to be used, human systems imposed, production using chemicals, highly processed, nutrient-fortified food.	<i>Harmony with nature:</i> Humans part of and subject to nature, nature valued for its own sake, natural ecosystems imitated, production by development of healthy soil, minimally processed, naturally nutritious food
<i>Specialization:</i> Narrow genetic base, monocultures, separation of crops and livestock, standardized production system, highly specialized, confidence in reductionist science and technology	<i>Diversity:</i> Broad genetic base, polycultures, integration of crops and livestock, locally adapted production system, limited confidence in inter-disciplinary, systems-oriented science
<i>Exploitation:</i> External costs ignored, short-term benefits outweigh long term consequences, high consumption to maintain economic growth, use of non-renewable resources, financial success, materialism	<i>Restraint:</i> External costs considered, short-term and long-term outcomes equally important, , consumption restrained to benefit future generations, use of renewable resources, simpler lifestyle, non-materialism

Note: Adapted from "Conventional versus alternative agriculture: The paradigmatic roots of the debate, by C. E. Beus and R. E. Dunlap, 1990, *Rural Sociology*, 56(3), pp. 598-599. Copyright 1990 Rural Sociological Society. Used with permission.

Continuing Concerns

In spite of the environmental movement and the ongoing “limits to growth” debate, continuing anxiety over the deterioration of the environment and natural resources prompted the United Nations to establish the World Commission on Environment and Development in 1983 to evaluate and make recommendations in regard to these concerns. The commission became known by the name of its Chair, Gro Harlem Brundtland. It consisted of an international group of environmental and development experts, politicians and civil servants who developed and published its final report “Our Common Future: Report of the World Commission on Environment and Development” (more commonly known as the Brundtland Report) on March 20, 1987.

The Brundtland report cautioned the world that it would be ill-advised to continue making progress toward economic development without considering the health of the environment and the finite nature of natural resources. The primary concern of the Brundtland report was on achieving a more just and equitable world for all peoples. It encouraged the economic growth of poorer nations and suggested that resources be redistributed to such nations for this purpose. It contended that all countries could achieve full economic status and simultaneously improve their resource base. The commission acknowledged that achieving these goals would require both social and technological change. The report envisioned the concurrence of environmental conservation and economic growth by creating smarter development strategies and utilizing new technologies. The report called for a sustainable level of population, thus enabling developing nations to meet their basic needs of food, water, energy, sanitation and jobs without overshooting resources. The commission asserted that these nations should be permitted to grow until their quality of life equaled that of developed nations. Thus

environmental protection, economic growth and social equity were defined as the basis of sustainable development (Brundtland, 1987).

Allen (2004) notes that, “environmentalists often found themselves at odds with the goals of economic developers, even when those goals included humanistic objectives such as increasing food security” since most development plans involved the further degradation of resources (p. 33). With the acknowledgement in the Brundtland Report of environmental concerns being an important factor in the overall goals of sustainable development, the environmental movement gradually became part of the wider discourse encompassing environmental, economic, and social concerns.

Sustainable Development

The Brundtland Report is perhaps most well known for producing a still widely used definition of sustainable development: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987, p. 43).

Regardless of efforts made in the name of sustainable development based on the premise of a “complementarity between growth and environment” (Ekins, 1993, p. 275), Kendall (1992), writing for the Union of Concerned Scientists (UCS), issued the “World Scientists Warning to Humanity,” which begins with the following caveat:

Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. Fundamental changes are urgent if we are to avoid the collision our present course will bring about. (Kendall, 1972, “Introduction,” para. 1)

This appeal was issued by 1,700 of the world's leading scientists along with the majority of Nobel laureates in the sciences. It was spearheaded and written by Henry Kendall, now deceased, former chair of UCS's board of directors (Kendall, 1992).

In 2000, then Secretary General of the United Nations, Kofi Annan, called for an assessment of the health of the world's ecosystems. This process and resulting report is known as the Millennium Ecosystem Assessment (MA) and was completed in 2005. The MA was authorized by governments through four conventions and was a partnership of U.N. agencies, conventions, business, non-government organizations and had a multi-stakeholder board of directors. The assessment was undertaken by 1,360 experts from 95 countries. There was an 80-person independent board of review editors. There were review comments from 850 experts and governments. The report included information from 33 sub-global assessments.

The MA focuses on ecosystem services (the benefits people obtain from ecosystems), how changes in ecosystem services have affected human wellbeing, how ecosystem changes may affect people in future decades, and response options that might be adopted at local, national, or global scales to improve ecosystem management and thereby contribute to human well-being and poverty alleviation. The main focus was the consequences of ecosystem change for human well-being. The report concluded that ecosystems have been drastically impacted by humans in the past 50 years, mainly to meet their needs for food, water, timber, fiber, and fuel. Humans have benefited from the use of these resources but have significantly degraded the ecosystems from which these resources have been derived. This degradation could grow substantially worse during the first half of the 21st century. Although the report suggests ways in which these problems could be at least partially mitigated, it concludes that the required changes in institutions, policies, and practices are not occurring (Millennium Ecosystem Assessment, 2005).

Industrial Agriculture

Industrial agriculture contributes significantly to these problems. As currently practiced, it has been found to have a tremendous negative impact on the environment, the achievement of sustainability, and the continued health and welfare of both human and non-human species (Ikerd, 2009; Horne & McDermott, 2001; Krisberg, 2008; Pew Commission on Industrial Farm Animal Production, 2008; Pretty, 2007; Shiva, 2000; Tegtmeier & Duffy, 2004; Union of Concerned Scientists, 2008). John Ikerd, Professor Emeritus of Agricultural Economics, University of Missouri, acknowledges that the industrialization of agriculture has increased the availability of food and reduced its cost. He contends, however, “it has done so by imposing significant costs on nature and society through environmental degradation and growing social inequity” (Ikerd, 2009, “The American food system,” para. 2). He argues that such practices are not sustainable over the long run.

Dr. Ikerd is far from alone in this contention. In recent years, numerous researchers, educators, and practitioners have condemned many common industrial agriculture practices as being unsustainable. Horne and McDermott (2001) present a scathing indictment of industrial agriculture concluding that, “the food security of our nation, and our world, is threatened” (p. 32). Wendell Berry (2005), well known author, farmer, and philosopher maintains:

The effects of the process of industrialization have become so apparent, so numerous, so favorable to the agribusiness corporations, and so unfavorable to everything else, that by now the questions troubling me and a few others in the ‘60s and ‘70s are being asked everywhere. (Berry, 2005, “Renewing Husbandry,” para. 6)

A recent report in *The Nations Health*, the official newspaper of the American Public Health Association, warned that “U.S. industrial farming endangers health and the environment,

and promotes disease and contamination” (Krisberg, 2008, p. 1) and, according to the Union of Concerned Scientists (UCS):

The industrial agriculture approaches that have come to dominate American agriculture have been advanced by ill-considered government policies and subsidies. Such approaches involve massive use of chemical pesticides and fertilizers and are not sustainable, since they contaminate soil, deplete groundwater, pollute rivers, and cause other problems. (UCS, 2008, “Food and Agriculture 101,” para. 2)

A 2006 study commissioned by the North Dakota Attorney General’s Office provides a review of 56 socioeconomic studies concerning the impacts of industrial agriculture on rural communities and concludes that “public concern about the detrimental community impacts of industrialized farming is warranted” (Stofferahn, 2006, p. 30).

Industrial Farm Animal Production

Of particular concern is industrial farm animal production, particularly those facilities classified as concentrated animal feeding operations (CAFOs) by the Environmental Protection Agency (see Figure 2-1).

Regulatory Definitions of Large CAFOs, Medium CAFO, and Small CAFOs

A **Large CAFO** confines at least the number of animals described in the table below.

A **Medium CAFO** falls within the size range in the table below and either:

- has a manmade ditch or pipe that carries manure or wastewater to surface water; **or**
- the animals come into contact with surface water that passes through the area where they're confined.

If an operation is found to be a significant contributor of pollutants, the permitting authority may designate a medium-sized facility as a CAFO.

A **Small CAFO** confines fewer than the number of animals listed in the table **and** has been designated as a CAFO by the permitting authority as a significant contributor of pollutants.

Animal Sector	Size Thresholds (number of animals)		
	Large CAFOs	Medium CAFOs ¹	Small CAFOs ²
cattle or cow/calf pairs	1,000 or more	300 - 999	less than 300
mature dairy cattle	700 or more	200 - 699	less than 200
veal calves	1,000 or more	300 - 999	less than 300
swine (weighing over 55 pounds)	2,500 or more	750 - 2,499	less than 750
swine (weighing less than 55 pounds)	10,000 or more	3,000 - 9,999	less than 3,000
horses	500 or more	150 - 499	less than 150
sheep or lambs	10,000 or more	3,000 - 9,999	less than 3,000
turkeys	55,000 or more	16,500 - 54,999	less than 16,500
laying hens or broilers (liquid manure handling systems)	30,000 or more	9,000 - 29,999	less than 9,000
chickens other than laying hens (other than a liquid manure handling systems)	125,000 or more	37,500 - 124,999	less than 37,500
laying hens (other than a liquid manure handling systems)	82,000 or more	25,000 - 81,999	less than 25,000
ducks (other than a liquid manure handling systems)	30,000 or more	10,000 - 29,999	less than 10,000
ducks (liquid manure handling systems)	5,000 or more	1,500 - 4,999	less than 1,500

¹Must also meet one of two "method of discharge" criteria to be defined as a CAFO or may be designated.

²Never a CAFO by regulatory definition, but may be designated as a CAFO on a case-by-case basis.

Figure 2-1. Regulatory definitions of large CAFOs, medium CAFOs, and small CAFOs, United States Environmental Protection Agency, http://www.epa.gov/npdes/pubs/sector_table.pdf.

A two-year study funded by the Pew Charitable Trust through a grant to Johns Hopkins Bloomberg School of Public Health found significant negative impacts on public health, the environment, animal welfare, and rural community welfare associated with industrial farm animal production facilities. The commission concluded, “the present system of producing food animals in the United States is not sustainable and presents an unacceptable level of risk to public health and damage to the environment as well as unnecessary harm to the animals we raise for food” (Pew Commission on Industrial Farm Animal Production, 2008, p. viii).

Steinfeld et al. (2006) found that the livestock sector is one of the top two or three most significant contributors to the most serious environmental problems, at every scale from local to global. They conclude that it is a significant contributor to climate change, responsible for 18 percent of greenhouse gas emissions, a larger share than that of transportation. It also causes increased air pollution, water depletion and pollution, and loss of biodiversity.

Gilchrist, Greko, Wallinga, Beran, Riley, and Thorne (2006) present evidence that “the industrialization of livestock production and the widespread use of nontherapeutic antimicrobial growth promotants has intensified the risk for the emergence of new, more virulent, or more resistant microorganisms,” and “these have reduced the effectiveness of several classes of antibiotics for treating infections in humans and livestock” (p.313). Gilchrist et al. also express concern regarding the transfer of zoonoses, such as influenza, from animals to humans. They are particularly concerned with “increasing number of swine facilities adjacent to avian facilities [that] could further promote the evolution of the next pandemic” (Gilchrist, et al., 2006, p. 320). Their concern arises in part from recent research on the Spanish influenza pandemic of 1918 (Taubenberger, Reid, Lourens, Wang, Jin, & Fanning, 2005; Belshe, 2005) which killed an estimated 50-100 million people worldwide in a two year period (Johnson & Mueller, 2002).

The research contends that, although the 1918 virus “probably derived from a bird, it first had spent years adapting to life in mammals, either pigs or humans” (Drexler, 2003, p. 189).

With these serious, potentially life threatening concerns in mind, we turn now to a description of sustainable agriculture, a potential, gradual replacement for industrial agriculture.

Sustainable Agriculture Defined

Gardener, Jamtgaard, and Kirschenmann (1995) comment that many different people have tried to define sustainable agriculture, “including academics, farmer organizations, advocates, and legislatures” (p.45). They note that the majority of definitions contain the following aspects of sustainability: environmental, economic, and social. They comment further that a broader definition including food access, labor rights, race and gender issues (Allen & Sachs, 1993) and humane treatment of livestock (Gips, 1984) is gaining ground. A representative sample of definitions of sustainable agriculture include the following:

- As it pertains to agriculture, sustainable describes farming systems that are "capable of maintaining their productivity and usefulness to society indefinitely. Such systems... must be resource-conserving, socially supportive, commercially competitive, and environmentally sound" (Ikerd, 1990, p.18).
- Sustainable agriculture “is, in large part, a wedding of ecology and agriculture. It proposes that a farm must be not only economically but also ecologically healthy if it is to be viable over the long term. It also proposes that farmers and farm workers should be afforded a good quality of life and be treated fairly. A sustainable agriculture will yield healthy rural communities and towns, which are key to the overall health of our nation” (Horne & McDermott, 2001, p. 37).
- The National Campaign for Sustainable Agriculture, a nonprofit organization created in 1994 to coordinate unified action within the sustainable agriculture movement is “dedicated to educating the public on the importance of a sustainable food and agriculture system that is economically viable, environmentally sound, socially just, and humane” (as cited by Allen, 2004, p. 41).

- “Sustainable agriculture encompasses a set of production practices that are economically profitable for farmers, that preserve and enhance environmental quality, and that contribute to the well-being of farm households while nurturing local community development. Sustainable agriculture denotes a holistic, systems-oriented approach to farming that focuses on the interrelationships of social, economic, and environmental processes” (Lyson, 2004, p. 79).
- Sustainable agriculture is defined in the Food, Agriculture, Conservation, and Trade Act (FACTA) of 1990 as:
 - an integrated system of plant and animal production practices having a site-specific application that will over the long term:
 - satisfy human food and fiber needs.
 - enhance environmental quality and the natural resource base upon which the agriculture economy depends.
 - make the most efficient use of nonrenewable resources and on farm resources and integrate, where appropriate, natural biological cycles and controls.
 - sustain the economic viability of farm operations.
 - enhance the quality of life for farmers and society as a whole.

I find none of these definitions completely satisfactory. The majority refer to practical considerations such as “sustain the economic viability of farm operations” and “make the most of nonrenewable resources” which are, of course, important and necessary. They neglect, however, to note that there is a philosophy underlying these recommendations, that is, the “big picture” of why they are important. That philosophy is, I think, well expressed by Aldo Leopold in *A Sand County Almanac* when he writes, “a land ethic changes the role of Homo sapiens from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members and also respect for the community as such” (Leopold, 1949, p. 204). In this one sentence Leopold describes a desirable relationship between human beings and the earth and this is, in essence, the underlying philosophy of sustainable agriculture.

Another component missing from these definitions is consideration for the ethical and humane treatment of livestock. Animals raised in Concentrated Animal Feeding Operations are regarded more as industrial products than living, breathing creatures, and are treated as such. Little or no consideration is given to an animals' need to express natural behaviors, which can result in extreme stress and greater susceptibility to disease (Imhoff, 2010; Kirby, 2010; Pew Commission on Industrial Farm Animal Production, 2008). In light of these important considerations, I propose the following definition:

Sustainable agriculture is both a philosophy and an integrated, site-specific set of practices that serve to ensure the environmental integrity of the land, the economic security of the farmer and the community, the health and well-being of society, and the ethical and humane treatment of agricultural and wild animals.

Although it is important to have a clear definition of sustainable agriculture, it must become more than just a definition in book or on a government website that few people will ever see. More than simply providing adequate food and fiber to communities, sustainable agriculture must create a new story, a new paradigm, in which economic, environmental, social, and ethical concerns are equally important, with the understanding that the disturbance, neglect, or devaluing of a single component throws the system out of balance, thus affecting all.

Worldview, Attitudes, and Behavior: Barriers to Change

As previously noted, concerns about our way of life and its impact on the planet began in earnest with the publication of *Silent Spring* (Carson, 1962). Since then, many concerned individuals and organized groups have attempted to educate others about the present and potential future negative impact of these practices on planet Earth and its human and non-human inhabitants. Similar concerns and efforts continue into the present time. It might seem a simple task to provide people with education about these problems and expect them to make changes.

However, there is a wealth of research which indicates that increased knowledge of such problems often does not lead to attitude and/or behavior change (Finger, 1994; Geller, Erickson, & Buttram, 1983; Mohr, Nemiroff, Beers, & Desmarais, 1995; McKenzie-Mohr, & Smith, 1999).

A theory which has had much influence in the educational community in recent years is Mezirow's theory of transformative learning. As described by Mezirow (1997), "transformative learning is the process of effecting change in a frame of reference" (p. 5). He goes on to state, "we transform our frames of reference through critical reflection on the assumptions upon which our interpretations, beliefs, and habits of mind or points of view are based" (p. 7). Thus the process of change is mainly cognitive, rational, and logical in nature.

Not everyone agrees with Mezirow's focus on critical reflection and rationality as key to the change process, however. Grabove (1997) asserts that a different view of transformational learning is emerging defining it as "an intuitive, creative, emotional process" (p. 90). Taylor (1998) contends "that critical reflection is granted too much importance in a perspective transformation, a process too rationally driven" (pp. 33-34).

Hamilton (2007) asserts that "the task of achieving true sustainability... is no longer predominantly a scientific or technological one, but a cultural and social one" (p. 1). He argues that it will be difficult but not impossible to influence people to behave more sustainably. He writes:

Confronting consumers with the facts about environmental decline and expecting people to change their behavior as a result misconstrues the psychology of the modern individual. It is a mistake to assume that consumers will respond to the logic of the environmental message. Consumption decisions are not driven by reason; certainly, advertisers abandoned that assumption decades ago. (Hamilton, 2007, p. 1)

Kollmuss and Agyeman (2002) note that in spite of much study there has been no “definitive explanation” of why people display pro-environmental behavior. They write, “research showed that in most cases, increases in knowledge and awareness did not lead to pro-environmental behavior.” They conclude by saying, “we do not attribute a direct relationship to environmental knowledge and pro-environmental behavior. We see environmental knowledge, values, and attitudes, together with emotional involvement as making up a complex we call ‘*pro-environmental consciousness*’” (Kollmuss & Agyeman, 2002, p. 256).

Hamilton (2007) and Kollmuss and Agyeman (2002) intimate that appealing strictly to logic, the realm of the left brain, has little effect on influencing pro-environmental behavior. Hamilton says achieving sustainability is a cultural and social task. Kollmuss and Agyeman say pro-environmental behavior is a complex resulting from “knowledge, values, attitudes, together with emotional involvement” (p. 256).

The Importance of Worldview

Given the substantial and growing body of evidence documenting the grave negative environmental, economic, social, and ethical consequences stemming from the current practices of industrial agriculture, it seems surprising that we, as a society, aren’t further along in adopting more sustainable agricultural practices. I believe the reason lies in the worldview which defines how we perceive the world. What I have believed about American agriculture for most of my life is fairly consistent with the previously quoted statement found on the United States Department of Agriculture National Agriculture Library’s Alternative Farming Systems Information Center website:

The prevailing agricultural system, variously called "conventional farming," "modern agriculture," or "industrial farming" has delivered tremendous gains in productivity and efficiency. Food production worldwide has risen in the past 50 years; the World Bank

estimates that between 70 percent and 90 percent of the recent increases in food production are the result of conventional agriculture rather than greater acreage under cultivation. U.S. consumers have come to expect abundant and inexpensive food. (Gold, 2007, para.10)

Similar to my own experience, the majority of Americans have grown up being told a story about the remarkable success of American agriculture. The description of industrial agriculture on the USDA website contains the essence of that story. It includes “tremendous gains in productivity and efficiency, a 50% increase in food production worldwide with 70 to 90 percent of the increase due to conventional farming (aka, industrial agriculture), and the availability of abundant and inexpensive food.”

There is also a widespread attitude that industrialized agriculture is the only method available that will enable us to meet the food and fiber needs of our citizens as well as those of the global community. Some researchers claim that sustainable and/or organic agriculture will be unable to feed the world population (Borlaug, 2000; Huang, Pray, & Rozelle, 2002; Steinfeld, et al., 2006; Trewavas, 2002). This view is fostered by organizations such as the Cato Institute, and the Hudson Institute, whose stated mission is “to generate public support for the modern food system, high-yield farming, and wildlife conservation” (Hudson Institute, 1999, p. 31).

Pirages and Ehrlich (1974) introduce the concept of a dominant social paradigm (DSP) in which society’s most basic, widespread worldview is expressed. They argue that among the core elements of our society’s dominant social paradigm are:

- Americans’ belief in progress, growth, and prosperity;
- faith in science and technology;
- commitment to a laissez-faire economy and private property rights;
- and view of nature as something that must be subdued and made useful. (p. 43)

The American worldview of agriculture is greatly influenced by this DSP. Stauber, Hassebrook, Bird, Bultena, Hoiberg, MacCormack, & Menanteau-Horta (1995) describe the philosophical underpinnings of industrial agriculture as including the following assumptions:

- Nature is a competitor to be overcome;
- Progress requires unending evolution of larger farms and depopulation of farm communities;
- Progress is measured primarily by increased material consumption;
- Efficiency is measured by looking at the bottom line; and
- Science is an unbiased enterprise driven by natural forces to produce social good.

As can readily be seen, the assumptions underlying industrial agriculture closely parallel society's dominant social paradigm.

Effecting Change

Attempting to change a long-held worldview (described here as paradigm) is not an easy task. Just the suggestion that change is necessary may raise negative emotions in some people and increase resistance to change. If people don't agree with you about something, giving logical reasons for change rarely works. In fact, it may make them even more opposed to what you are suggesting. There is a significant body of research that supports this contention (Denning, 2007; Festinger, 1957; Kunda, 1990; Lord, Ross & Lepper, 1979; Westen, Blagov, Harenski, Kilts, & Hamann, 2004).

Cognitive dissonance. When people encounter ideas which conflict with what they believe, they experience what Festinger (1957) terms "cognitive dissonance." He found that people will filter belief-incompatible information in order to reduce the tension that results from having two conflicting thoughts at the same time. In the book *When Prophecy Fails* (Festinger, Riecken, & Schachter, 1956), an account is given of what happened to members of a UFO doomsday cult when the leader's end of the world prophecy failed to come true. The majority of

members remained part of the group and rationalized the failure by deciding that the destruction of the world had been avoided by their faith.

Confirmation bias. In 1979, Lord, Ross & Lepler studied what happens when people are provided with arguments that run contrary to what they believe. The result was that study participants found clever ways to reinterpret or set aside the contradictory evidence and became even more polarized in their beliefs. The researchers called this “confirmation bias.”

Emotionally based reasoning. In a study conducted more recently, Drew Westen and his colleagues at Emory University had similar findings (Westen et al., 2004). In this study, however, fMRI brain scans were used to explore what was happening in the brain while participants were considering the inconsistent information. Westen et al. reported that they saw no increased activity in the left brain, the part normally engaged during reasoning, but rather a network of emotion circuits lighting up in the right brain area which has been hypothesized to be involved in resolving conflicts and regulating emotions. In addition, after participants had figured out a way to interpret the statements as supporting their original position, the part of the brain involved in reward and pleasure (mid-brain) became active, and the conclusion was greatly reinforced with the elimination of negative emotions and the establishment of positive ones. The researchers argue that the emotionally based reasoning leads to “stamping in” of defensive beliefs that allow them to feel good even when their reactions defy logic. Thus, a person can learn little from new data as previously held beliefs are solidified. This raises the question, can we impact emotionally based reasoning?

Storytelling: A Method of Effecting Change

For many thousands of years, the human race has passed knowledge, culture, history, attitudes, values and norms from generation to generation by means of stories. It has only been

in recent history that this oral tradition has been replaced to a certain extent by the written word. Research by developmental psychologists has led them to conclude that the principal means through which humans come to understand the world around them is through stories (Gopnik, 1999).

A number of researchers, educators, and practitioners have discovered that there is power in story and storytelling to effect change (Denning, 2007; Ganz, 2001; Green & Brock, 2000; Haven, 2007; Simmons, 2001; and Taylor, 2007). Consider, for example, the effect of Rachel Carson's (1962) *Silent Spring* on attitudes toward pesticide use in the United States. Consider also more contemporary works such as Pollan's (2006) *The Omnivore's Dilemma* and Kingsolver's (2007) *Animal, Vegetable, Miracle: A Year of Food Life*, and their influence on consumer's knowledge and attitudes toward our food supply.

Rachel Carson was not the first scientist to write of the potential dangers surrounding the use of pesticides. Six months prior to the publication of *Silent Spring*, Murray Bookchin, writing under the pen name of Lewis Herber, published *Our Synthetic Environment* which, according to Hynes (1989), "covered the same ground as *Silent Spring*, and also wider territory (p. 3). When asked in later years why Carson's book "catalyzed the industrial world and his did not," he replied that the world was "captivated by the superb prose of *Silent Spring*, while his work had a small, specialized audience... the technically trained" (Bookchin, 1974, as referenced by Hynes, p.3). Unlike Bookchin, Carson had addressed her book to the average citizen and engagingly and persuasively related her scientific findings to create a gripping narrative account which readers found moving, motivating, and memorable.

Narrative or Story

In the literature, the terms “story” and “narrative” are often used interchangeably. Sometimes, however, they are distinguished one from the other. Polkinghorne (1988) contends that both story and narrative are used in a broad sense in actual practice. He suggests that we accept this broad meaning and treat story and narrative as synonyms. Polkinghorne defines both narrative and story as “the fundamental scheme for linking individual human actions and events into interrelated aspects of an understandable composite” (p. 13.)

Haven (2007) argues that narrative and story differ. He describes narrative as being plot-based event descriptions. He contends that stories, on the other hand, are character-based and are propelled forward by the struggles, motives, obstacles, and goals of a particular character. It is the addition of these details that differentiate story from narrative and impart story’s “unique power and effectiveness” (p. 79). The actions that occur do not take place for their own sake but are meant to elucidate the character’s own struggles.

Aristotle uses the term “poetry” to define a ‘medium of imitation’ that seeks to represent or duplicate life through character, emotion, or action (Aristotle’s *Poetics*, trans 1970, Whalley). The term “poetry” as used by Aristotle, is not the final product but rather the art of creating poetry. He defines it broadly to include epic poetry, tragedy, comedy, dithyrambic poetry, and some kinds of music (Aristotle’s *Poetics*). He considers plot to be the most important part of tragedy, followed by character (ethos) and then thought (dianoia, that is, what the character says at a particular time). Aristotle separates plot (muthos) and story (logos) referring to plot as “the soul of tragedy” (para. 25). If we compare this to Haven’s definition of narrative as being “plot-based event descriptions” it would seem that what Aristotle is referring to is narrative. However, to make the plot work, Aristotle contends that it is also necessary to have astonishment, fear and

pity, reversal, recognition, and suffering. Since these are emotions and/or conditions experienced by characters, Aristotle's "poetry" bears a distinct similarity to Haven's definition of "story."

Denning (2007) chooses simply to use the terms synonymously. He states, "One could fill a whole library with the academic discussion swirling around such a simple commonsense notion" (p. 229). I agree with Denning that there does seem to be much academic discussion regarding differences between "narrative" and "story." I prefer the word "story" since Haven's definition seems the most fitting for the current research. This is the term I will use most frequently. At times, however, I will refer to "narrative" or "drama" as these may be the descriptors used in the research I will be examining based on the preference or interpretation of the particular author or researcher. As does Aristotle with "poetry," I use the term "story" quite broadly.

Story Defined

We have already considered Polkinghorne's (1988) definition of story which is, "the fundamental scheme for linking individual human actions and events into interrelated aspects of an understandable composite" (p. 13).

Haven (2007) defines story as "a detailed, character-based narration of a character's struggles to overcome obstacles and reach an important goal" (p. 79). He asserts that there are five core narrative elements that are critical to story and "all five must be presented (or created) in order for the mind to relate to, understand, and decide to pay attention to, an incoming narrative. These then are the informational elements that uniquely define a story" (p. 75). He identifies them as: character, intent, actions, struggles, and details.

Simmons (2001) says, “basically, a story is a narrative account of an event or events—true or fictional. The difference between giving an example and telling a story is the addition of emotional content and added sensory details in the telling. A story weaves detail, character, and events into a whole that is greater than the sum of its parts” (p. 31).

In the previous section I defined what Aristotle means by poetry. In terms of components, he identifies (in descending order): plot (the most important), character, diction, thought, spectacle, and song. In addition, he specifies that a plot must have a beginning, middle, and end, must be universal in meaning, and maintain unity of theme and purpose. Bruner (1986), believes a story has a unified structure which he describes by saying, “What gives the story its unity is the manner in which plight (more commonly referred to as plot), characters, and consciousness interact to yield a structure that has a start, a development, and a sense of ending (p. 21). Green and Brock (2000), who choose to use the term narrative, state, “a narrative account requires a story that raises unanswered questions, presents unresolved conflicts, or depicts not yet completed activity; characters may encounter and then resolve a crisis or crises. A story line, with a beginning, middle, and end, is identifiable” (p. 701).

Based on analysis of these various descriptions of story or narrative, I have identified the components listed below. There are many commonalities among the descriptions, though frequently expressed using dissimilar terminology.

- *Structure* – fundamental scheme, interrelated aspects, understandable composite, structuring information, weaves events into a whole
- *Time* – beginning, middle, end; start, development, and sense of ending; a story line, with a beginning, middle, and end, is identifiable.
- *Plot* – actions and events, account of events, plight, actions
- *Character* – character, character based, human actions
- *Struggles* – goals, motives, reversal, obstacles, crisis, conflicts, consciousness, solve problems

- *Meaning* – universal meaning, relevance, creation of meaning
- *Emotions* – suffering, motives, thoughts, astonishment, recognition, meaning, tragedy
- *Details* – sensory details, details, informational elements

Integrating these elements, I have crafted, and will be using, the following definition of story:

Story: a unifying structure having a distinct beginning, middle, and end, which provides details regarding an event with which characters must struggle, during which time they experience emotions, take action, and discover meaning.

Ways of Knowing

According to Bruner (1986), “there are two modes of cognitive functioning, two modes of thought, each providing distinctive ways of ordering experience, of constructing reality” (p.11). He calls these different ways of knowing the “paradigmatic” (or scientific) mode and the “narrative” mode and explains them as follows:

The scientific or "paradigmatic" mode... deals in general causes... and makes use of procedures to assure verifiable reference and to test for empirical truth. ... The imaginative application of the paradigmatic mode leads to good theory, tight analysis, logical proof, sound argument, and empirical discovery guided by reasoned hypothesis. The imaginative application of the narrative mode leads instead to good stories, gripping drama, believable (although not necessarily "true") historical accounts. It deals in human and human-like intention and action and the vicissitudes and consequences that mark their course. (pp.12-13)

The validity of the modes is judged by different criteria. The paradigmatic mode convinces by a well-formed argument; the narrative mode by its likeness to real life as experienced by people every day in natural settings.

As does Bruner (1986), Polkinghorne (1988) distinguishes two distinct ways of knowing. He views human life within the context of three realms: the organic realm, the material realm, and the realm of meaning. He contends that the physical sciences are meant to study things in the realms of the material and organic, and the human sciences the realm of meaning.

Polkinghorne notes, however, that many of the human sciences have modeled themselves after the physical sciences in spite of these differences. He implies that this is an error since they, “do not produce knowledge that leads to the prediction and control of human experience; they produce, instead, knowledge that deepens and enlarges the understanding of human experience” (p. 159).

Rossiter (1999) also identifies two different ways of knowing which she refers to as “narrative knowing” and “scientific knowing” (p. 60). Scientific knowing is concerned with discrete (i.e. separate and unconnected) facts or events logically arranged into categories, and seeks predictability and control. Narrative knowing has to do with human purpose, meaning, and understanding. Events are organized sequentially into “integrated, meaningful unities” (p.60). The concern is with how the parts fit together and add up to a credible whole.

Bruner (1986), Polkinghorne (1988), and Rossiter (1999) all identify similar types of knowing although using somewhat different terminology. All three view story (or narrative) as having to do with the nature of the human experience and the pursuit of meaning and understanding. When I consider “ways of knowing” what comes to mind are the different paradigms of quantitative and qualitative research methods. The quantitative begins with an idea – a hypothesis – regarding the subject of interest and then sets out to test it. The qualitative method, on the other hand, begins with a question or a subject area to explore in order to understand or discover something about it. The differences between these two methods are outlined in Table 2-2.

Table 2-2.

Quantitative vs. Qualitative Research Methods

	Quantitative	Qualitative
Epistemology	Only empirical science represents a genuine form of human knowledge	Numerous methods for discovering knowledge
Ontology	Single, verifiable reality or truth	Reality is subjective and multiple
Axiology	Science must remain value free	Research is value-laden and biases are present
Rhetoric	Formal and impersonal	Literary, informal style
Methodology	Deductive	Inductive logic (although deductive and/or abductive may also be used)

Note: Adapted from *Designing and Conducting Mixed Methods Research* (p. 24), by J. W. Creswell and V. L. Plano Clark, 2007, Thousand Oaks, CA: Sage Publications, Inc. Used under fair use guidelines, 2001.

Story as a way of knowing can be likened to the qualitative paradigm. An example of this is the manner in which Steven Denning arrived at his insights in regard to the power of story to effect organizational change. Denning (2007) had been trying to convince his employer, the World Bank, to accept his ideas regarding changes in the organization. He happened to notice that when he told a story about his ideas, his superiors listened. Not only did they listen but they acted upon his suggestions. Based on his background and these experiences, he surmised that it was the story mode of presentation that was causing his success. He thus arrived at the conclusion that story could be used as a powerful change mechanism, i.e., he assigned meaning to his experience.

Evidence from Neuroscience on the Appeal of Story to the Mind

Kendall Haven is a professional storyteller and author and had been practicing the art for more than twenty-five years. While working as a consultant for NASA's Goddard Space Flight

Center, which was considering restructuring their Earth Sciences' outreach writing into story form, he was challenged to "prove" the effectiveness of story. After conducting extensive research, Haven wrote *Story Proof: the Science Behind the Startling Power of Story* (2007) which represents his response to that challenge. He devotes a considerable portion of the book to a discussion of evidence recently emerging from research in the neurosciences explaining the underlying reasons for the appeal of story to the mind. I provide a brief synopsis of that research in the following pages.

The brain. Haven (2007) describes three facts that have emerged recently from neurological research that are key to understanding why and how stories are so important to humans.

1. One hundred thousand years of human reliance on story has evolutionarily rewired the human brain to be predisposed to think in story terms and to use story structure to create meaning and to make sense of events and others' actions (p. 27).

He cites the work of evolutionary biologists (Bruner, 1990; Donald, 1991; Nelson, 2003; Pinker, 2000; and Tomasello, 1995) in support of this contention. Bruner (1990) concluded after many years studying babies, that we were born preprogrammed to search for and to create meaning from story elements (p. 24), and Gopnik, Meltzoff & Kuhl (1999) assert:

Our brains were designed by evolution to develop representations from input that accurately approximate real things in the world. Those programs... let us predict what the world will be like and so act on it effectively. They are nature's way of solving the problem of knowledge (p. 139).

2. Cells that fire together wire together. The more a child (or adult) engages their story neural net to interpret incoming sensory input, the more likely they are to do it in the future (p. 27).

The brains of children are able to undergo major transformations and rewiring, however, they do not remain that way. By the age of twelve or thirteen, brain plasticity is gone (Huttenlocher,

1984). According to Crossley (2000) children are indoctrinated through family stories, from a very early age, to find relationships among people, events, and the world.

3. This evolutionary predisposition is reinforced by the dominant use of story throughout childhood. Children hear stories, see stories, have stories read to them, and read stories themselves. This dominance of story exposure through the key years of brain plasticity results in adults irrevocably hard-wired to think in story terms. (p. 27)

The mind. According to Haven (2007):

Brain is the hardware. Mind is the software. The mind is what you do with the amazing wiring that constitutes the neural net.... Minds compare new input to data (experiences, thoughts, interpretations) already stored in the brain, interpret and understand new information, and create meaning from it. (p. 30)

Haven contends that human minds use a specific story structure to make sense of incoming information. He puts forth seven concepts on which this structure is based. Research is provided supporting each of these concepts (see Table 2-3).

Table 2-3

The Seven Concepts of Story Structure.

Concept/Theme	Research Supporting
Experience builds expectation	Bransford, Brown, & Cocker, 2000; Pinker, 1997; Bruner, 2003; Crossley, 2000.
It must make sense.	Bransford, Brown, & Cocker, 2000; Crossley, 2000; Anderson, 1993; Bower & Morrow, 1990; Close, 2000.
Human minds demand meaning.	Johnson, 1999; Hardcastle, 2003; Bruner, 1990.
Intentions dictate and control behavior. Behavior reveals the goals, beliefs, and values of character.	Johnson, 1999; Bower & Morrow, 1990; Bruner, 1990; Montague, 2006; Pinker, 1997; Dawkins, 2006; Bransford & Stein, 1993.
Minds are <i>designed</i> to work with partial information and fill in what's missing to arrive at understanding.	Pinker, 1997, 2000; Zeki, 1993.
Events, actions and narratives must be viewed from the perspective of a character.	Olmstead, 1997; Gardner, 1978; El-Youseff, 2006; Taylor, 1996; Bower & Morrow, 1990; Bruner, 1986; Egan, 1997.
Struggles reveal meaning.	Bransford & Stein, 1993; Zaltman, 2003;
<i>Note:</i> Adapted from <i>Story Proof</i> by K. Haven, 2007, Westport, CT: Libraries Unlimited. Used under fair use guidelines, 2011.	

In addition to these seven concepts which Haven contends are essential to interpret incoming information, he identifies eleven mental techniques (from the research) “that the mind uses to enforce these concepts on incoming information” (p. 45). These tools are engaged at the automatic subconscious level. They are: assumptions, cheat sheets, expectations, inference, pattern matching, prior knowledge, binary opposition, language and syntax rules, blending, emotions rule, and details.¹

¹ Used under fair use guidelines, 2011.

Haven (2007) concludes that we use these concepts and tools to create context and relevance “that form the gateway to meaning” (p. 64). Cobb (1994) states, “In the most general sense, the contemporary view of learning is that people construct new knowledge and understand within the context of what they already know and believe and do it only when they can see how the new information is relevant to them” (as cited by Haven, p. 65).

Based on his analysis of human mental processes gleaned from extensive research, Haven identified the five core narrative elements that are critical to story. They are: character, intent, actions, struggles, and details. All must be present for the mind to interpret incoming narrative.

Theories and Real World Experience

A number of theories and ideas regarding the distinct elements of story that foster change have been proposed. In regard to this, Kincaid (2002) comments:

Conventional social and behavioral theories have valid application to the effects of television and radio dramas: social cognitive theory (Bandura, 1986), diffusion of innovations theory (Rogers, 1991), stages-of-change (McGuire, 1989; Prochaska et al., 1992), health belief theory (Becker, 1974), and the theory of reasoned action (Fishbein & Ajzen, 1975). However, they are inadequate in that they omit compelling aspects of entertainment, especially drama. (p. 137)

In order to explore these compelling aspects of drama, among which he includes social relationships (particularly conflict and confrontation), emotion, and narrative effect on the audience, he recommends instead that we look at established theories of drama such as Aristotle’s *Poetics*, and to the relatively new “drama theory.” I am in agreement with Kincaid on these points. I will therefore focus on theories and practitioner’s experiences that take these aspects into account. I will first describe the formal theories put forth by researchers studying story and attitude and/or behavior change. I will then address the real-world experience of practitioners in the field.

Neural nets and story structure. Haven (2007) maintains that the ability of story to affect attitude and/or behavior has to do with two factors: the evolutionary hardwiring of the human brain to think in story terms, and the inclusion of five core narrative elements in story structure: character, intent, actions, struggles, and details. All must be present for the mind to interpret incoming narrative.

Drama theory and the convergence theory of communication.² Kincaid (2002) contends that drama theory and the convergence theory of communication can explain the manner in which drama affects human behavior. He views drama theory as an “an extension of the convergence theory of communication... incorporating emotion and conflict” (p. 144). It does this by telling an engaging story, involving the audience emotionally, and depicting changes in characters with which the audience identifies. He states:

The essence of drama is confrontation, which generates emotion. Emotion is the motivational force that drives the action of the characters, leading to conflict and resolution.... The empathic emotional response in the audience is the motivational force that induces members of the audience to reconceptualize the central problem depicted in the drama and to resolve it in a similar manner in their own lives. (p. 150)

The psychology of narratives/narrative persuasion. According to Slater & Rouner (2002), the psychology of narratives describes humans as social information processors. They process stories very efficiently, with minimal effort and high recall. Absorption of the material presented is very high and counter-arguing is virtually non-existent. This may be due to the “suspension of disbelief” which often occurs when one is involved in watching a drama. They theorize that, “the processing of narratives, to a great extent, precludes cognitive resistance or

² Convergence theory applies to any information that is shared, including the content of a drama that is shared by members of an audience (Kincaid, 2002).

counterarguing to persuasive content in the narrative (p. 174). To summarize these ideas, the manner in which drama can affect human behavior may include the following:

- Response to story/narrative deeply rooted in human experience and history;
- Absorption – the drama must be compelling enough to cause awareness of persuasive content to fade into the background;
- Suspension of disbelief – stories become real, all information has to be processed as if it were factual;
- Absorption in narrative and counterarguing are fundamentally incompatible. This blocking of counterarguing provides an extraordinary opportunity to influence individuals who would ordinarily be resistant to persuasion;
- Identification with characters- response to a character's own development and experience may lead to at least temporary acceptance of values and beliefs that represent a shift from the individual's existing beliefs.

Finally, Slater & Rouner note that the intensity of attention is largely due to emotional factors and pose the question of whether such experience will result in lasting change. Other researchers have found that such belief and attitude change are substantive (Kincaid, Yun, Piotrow, & Yaser, 1993; Singhal & Rogers, 1999).

Transportation. Green & Brock (2000) proposed that “transportation” is a mechanism through which narrative can affect beliefs. They define transportation as “absorption into a story” and specify that it involves imagery, affect, and attentional focus. They distinguish transportation from theories which contend that the critical element for change is the amount of thought an individual devotes to the message. They note that these include the elaboration likelihood model (ELM) of Petty & Cacioppo (1981) and the heuristic-systematic model (HSM) of Chaiken (1980). They state:

Elaboration implies critical attention to major points of an argument, whereas transportation is an immersion into a text. Elaboration leads to attitude change via logical consideration and evaluation of arguments, whereas transportation may lead to persuasion through other mechanisms. (p. 702)

The “other mechanisms” postulated by Green & Brock include:

- Transportation may reduce negative cognitive responding. Transported readers may be less likely to disbelieve or counterargue story claims, and thus their beliefs may be influenced.
- Transportation may make narrative experience seem more like real experience. Direct experience can be a powerful means of forming attitudes (Fazio & Zanna, 1981 as cited by Green & Brock).
- Transportation is likely to create strong feelings toward story characters; the experiences or beliefs of those characters may then have an enhanced influence on readers’ beliefs.

Story structure. Aristototle considers “poetry,” which he defines broadly to include epic poetry, tragedy, comedy, dithyrambic poetry, and some kinds of music, to be a ‘medium of imitation’ that seeks to represent or duplicate life through character, emotion or action. He contends that in order for poetry to be effective it must contain a plot as well as elements of astonishment, reversal, recognition, and suffering (Aristotle’s *Poetics*, trans 1970, Whalley).

Identification with characters. According to Rossiter (1999), stories both inform and transform. Starting with the familiar, they lead the listener on a path into the unfamiliar thus providing an opportunity for personal growth and change. When a character in a story with whom listeners identify makes a change, they may then be able to imagine themselves changing as well. Rossiter maintains that, “stories enable us to engage with new knowledge, broader perspectives, and expanded possibilities because we encounter them in the familiar territory of human experience” (p. 2-3).

Faith and inspiration. Simmons (2003), asserting the ability of story to inspire, influence and persuade, contends that, “People don’t want more information. They are up to their eyeballs in information. They want *faith*—faith in you, your goals, your success, in the story you tell. It is faith that moves mountains, not facts” (p. 3). She goes on to say that what is needed is a meaningful story that inspires people to believe in what you believe. When they do this, they

will “pick up where you left off because they believe.” It has become their story and they will re-tell this story to others.

Emotional connection/impact. Taylor (2007) tells us, “Smokey the Bear was more effective in getting a generation of Americans to worry about forest fires than are a labful of scientists in making us worry about global warming... Environmentalists are bursting with facts, passion and dire warnings... But they have no story. They appeal to our intellects... [they] have yet to touch the broader range of our emotions and thereby have failed to convince many to change their behavior” (p. 34-35).

I have analyzed the preceding theories and ideas to create Table 2-4 in which I synthesize what these researchers, educators, and practitioners believe to be the elements of story that give it the power to foster change.

Table 2-4.

Elements of Story that Foster Change

Elements of Story that Fosters Change	Proponent
Hardwired to think in story terms	Haven
Response to story deeply rooted in human experience and history	Slater & Rouner
Emotional involvement, strong feelings	Kincaid, Slater & Rouner, Green & Brock, Taylor
Identification with characters	Kincaid, Slater & Rouner, Green & Brock, Rossiter
Absorption (aka transportation) – no counter-arguing possible	Slater & Rouner, Green & Brock
Story structure	Aristotle, Haven
Suspension of disbelief	Green & Brock
Inspiration and support for alternative behaviors	Simmons, Rossiter

I think these elements exhibit a natural order indicating that they must occur sequentially and in a progressive manner. The process begins with humans being “hardwired” to think in story terms, the response to story being deeply rooted in human experience, history, and biology. The next step is story creation, which must be done in a structured manner and contain certain key elements. This is followed by listeners’ absorption in the story, which leads to emotional involvement and identification with the characters, suspension of disbelief thus suppressing counterarguing, and inspiration and support for alternative behaviors. The next step is a changed worldview resulting in the final step in the process, attitude and/or behavior change. This process is depicted in Figure 2-2.

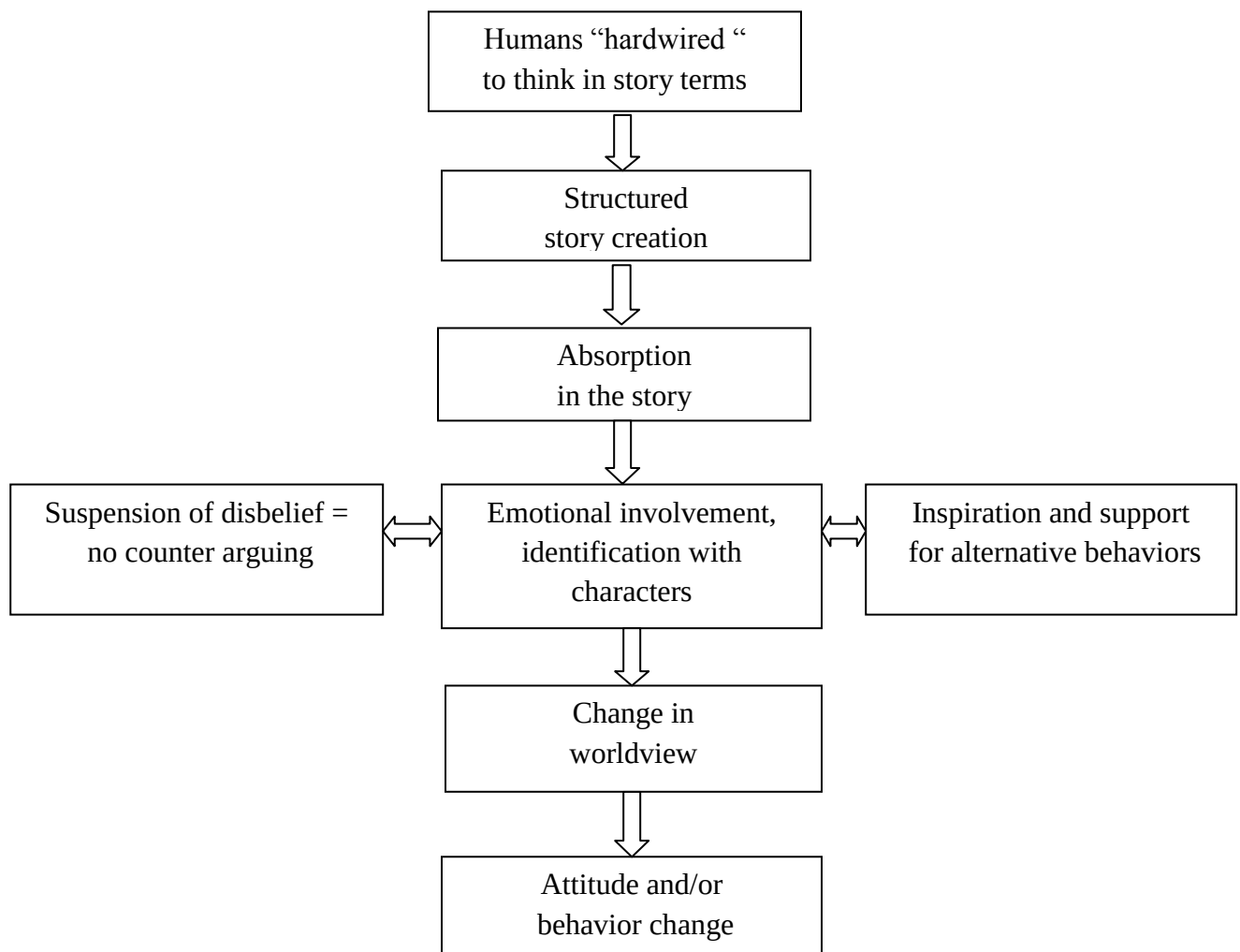


Figure 2-2: Storytelling Change Process. This figure represents a series of states, conditions, and activities that must occur to activate the change process.

Summary

In this chapter I presented the results of a review of the literature pertaining to U.S. agriculture from 1800 to the present including problems associated with industrial agricultural production as it is currently practiced. I discussed the problems associated with transitioning to a more sustainable method of agriculture. I identified a worldview that encompasses only the positive results of industrial agriculture while choosing to remain unaware or deny the many economic, environmental, social, and ethical-animal welfare problems with which it is associated

as a major barrier to change. Research indicates that efforts to foster change by providing information about existing problems are ineffective. Storytelling has been identified as a potentially powerful method of fostering change. I presented the reasoning and evidence supporting this contention from both a theoretical and practical perspective. In the next chapter I describe the research methods used in this study to explore the use of storytelling to effect change in attitudes toward sustainable agriculture.

CHAPTER 3

RESEARCH METHODS

The purpose of the study is to examine the effects of storytelling on worldview and attitudes related to sustainable agriculture in the United States and to explore what qualities of a story are associated with change as experienced by study participants. The objectives of the study are to:

1. Develop an instrument to measure attitudes toward sustainable agriculture including economic, environmental, social, and ethical components.
2. Examine the impact of a carefully crafted story on college student's attitudes toward sustainable agriculture.
3. Explore what qualities of the story are associated with change as experienced by study participants.

Framing the Research

When conducting research, individuals make certain philosophical assumptions based on how they view the world. These include theories regarding the origin, nature, and limits of knowledge (epistemology), the role of personal values in research (axiology), the nature of truth or reality (ontology), the language style (rhetoric), and the methods used (methodology).

One particular worldview that has long been considered "the gold standard" in Cooperative Extension and its university base is that of positivism (Patton, 2008, p. 113). Epistemologically, positivism contends that only empirical science represents a genuine form of human knowledge, and other forms are meaningless and do not produce true

knowledge (Keat, 1981). Ontologically, positivism believes in a singular, verifiable reality and truth (Patton, 2002). In terms of axiology, proponents of positivism believe that science must remain value free. The rhetoric of quantitative research is both formal and impersonal, and the methodology is deductive and typically quantitative in nature.

Postpositivism critiques and amends positivism contending that knowledge is not based on unchallengeable truths but is contingent upon human suppositions. Thus knowledge can be modified in light of further research and investigation. Postpositivism shares some commonalities with positivism in that it often, but not always, employs quantitative methodology, is reductionist in nature, depends on empirical observation and measurement, and seeks to verify theories (Creswell & Plano-Clark, 2007).

The Constructivist world view holds that individuals strive to understand the world in which they live and work and develop subjective meanings from their experiences (epistemology). Researchers recognize the existence of multiple realities (ontology), and acknowledge their own personal biases (axiology). Constructivism is “typically seen as an approach to qualitative research” (methodology) (Creswell, 2009, p. 8), and is written in a literary and informative style (rhetoric).

The Advocacy/Participatory worldview maintains that, “research inquiry needs to be intertwined with politics and a political agenda” and “focuses on the needs of groups and individuals in our society that may be marginalized or disenfranchised” (Creswell, 2009, p. 9) (ontology). Researchers are actively involved with participants as collaborators (epistemology), and recognize and negotiate biases (axiology). Although typically seen with qualitative research, it can serve as the foundation for quantitative research as well.

Researchers use language designed to bring about change for the people involved (rhetoric).

The worldview of Pragmatism, which has gained some acceptance and popularity in recent years, is “...not committed to any one system of philosophy and reality” (Creswell, 2007, p. 23). Pragmatists feel free to choose a methodology based on its appropriateness to the study at hand and on what they see as the intended consequences of the research. They may use quantitative methods, qualitative methods, or a combination thereof. Patton (2008), a well known pragmatist, contends that, “...the real methodological gold standard (is) methodological appropriateness... simply explain how and why the methods used are appropriate to the purpose, resources, timeline, and intended use” (p.114). Pragmatists believe in both singular and multiple realities (ontology), using what works to address the research question (epistemology), are willing to consider both biased and unbiased perspectives in their research (axiology), and may employ formal or informal writing styles in their reports (rhetoric) (Creswell & Plano-Clark, 2007).

I am a proponent of the pragmatic perspective and it is within this paradigm that I have conducted this study. Pragmatism is often the stance of researchers who use a mixed-methods design, a relatively new research methodology. As defined by Creswell & Plano Clark (2007):

Mixed methods research...focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone (p. 5).

Given the purpose and objectives of this study of storytelling, I have chosen to use a mixed methods design which I believe is the most appropriate to the type of information I am seeking. Quantitative methods are necessary to conduct tests for validity and reliability of the measurement instrument to be developed to address Objective 1. Quantitative methods are also appropriate to address Objective 2 in which I will be looking for causal determination and prediction. Objective 3, on the other hand, is best addressed using both qualitative measures to explore study participants' personal experience of the various treatments. I believe this combination of quantitative and qualitative methods will provide a more complete understanding of the research problem under study than would either method alone.

Instrumentation

At the time of this study, no standardized instrument had been developed for adequately measuring comprehensive attitudes toward sustainable agriculture. Therefore, I developed a survey instrument to collect data for the study. It is called *The Sustainable Agriculture Paradigm Scale*. The development of the instrument addresses Objective 1 of the study. The process used for developing the instrument is shown in Figure 3-1.

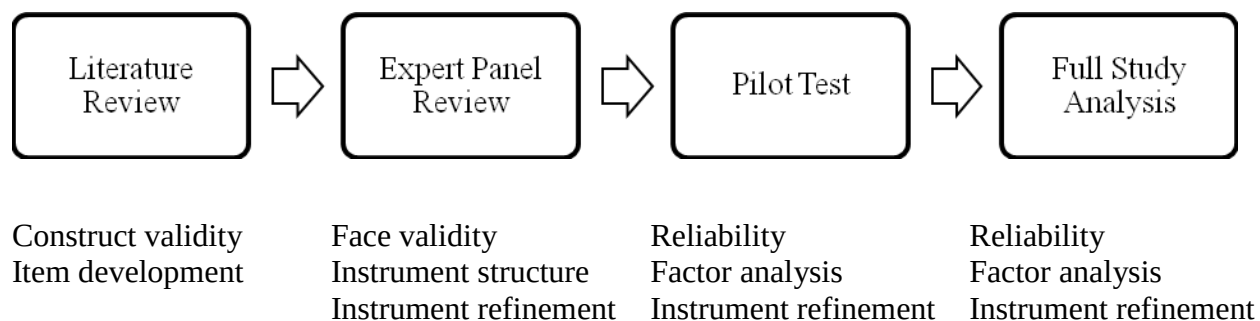


Figure 3-1. Development process of the Sustainable Agriculture Paradigm Scale.

Establishment of Instrument Validity

DeVellis (2003) states that, “validity is inferred from the manner in which a scale was constructed, its ability to predict specific events, or its relationship to measures of other constructs” (p. 49). He identified three types of validity: content, criterion related, and construct validity. He notes that these three represent the conventional interpretation of validity.

Content related validity evidence. Evidence of content validity is a logical process which begins with the development of the instrument. The first step in establishing validity is to correctly define the construct under study. The beginning step in this process is a review of the pertinent literature. Such a review was undertaken to identify the various dimensions of sustainable agriculture. Once the dimensions were known, representative questions or statements were written from which the instrument was developed. Evidence of content validity includes evidence of appropriate depth and breadth of content as well as appropriate language and cognitive level for the population under study. Such evidence was sought by asking a panel of experts to review the instrument. Details are reported in Chapter 4.

Criterion related validity. Criterion related validity, often referred to as predictive validity (DeVellis, 2003) relates to how well an instrument predicts some future behavior. The most common method of establishing this type of validity is to compare the instrument under study with another established, accurate, and valid test of the same characteristic. The criterion of interest, in this case, is attitudes towards sustainable agriculture and resulting behavioral intentions and changes. To my knowledge, there is no comparable measure with which to compare the Sustainable Agriculture Paradigm Scale at this point in time. A number of the items in the scale were developed from similar items in several existing instruments. These will be discussed in Chapter 5.

Construct validity. Construct validity refers to, “the extent to which any measuring instrument measures what it is supposed to measure” (Carmin & Zeller, 1979). Internal methods are used to examine the structure of the measure you’re attempting to validate and are used to determine if items of a scale “hang together” in such a way that they may be added up to form a total score. Factor analysis is the most common approach for conducting the analysis. It provides evidence that the items of a scale are measuring a single trait or not. If the analysis suggests the presence of more than one trait, a total score would not be appropriate. Factor analysis is also used to determine if the underlying structure of the scale is consistent with the theoretical definition. A factor analysis was run and analyzed after the pilot test and again after the full study. Results are presented in Chapter 4.

Establishing Reliability

“Reliability refers to the degree to which test scores are free from errors of measurement” (American Psychological Association, 1985, p. 19). Errors are extraneous factors which can produce misleading test scores. Cronbach’s alpha is a coefficient (a number between 0 and 1) that is used to rate the reliability of an instrument (DeVellis, 2003). Pedhazur and Schmelkin (1991) assert that this statistical test is, “a formula that is probably used most often in the estimation of internal-consistency reliability”(p. 92). According to Gliem and Gliem (2003), “the closer Cronbach’s alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale” (p. 87). They assert that an alpha of .8 is an acceptable goal for which to aim. Cronbach’s alpha was computed following the pilot test and again after completion of the full study. Results are presented in Chapter 4. Based on information derived from these analyses, necessary changes and adjustments will be made to increase validity and reliability.

Research Design

The design to be used in this study is an embedded sequential mixed methods design (Creswell & Plano Clark, 2007). In this type of design, one data set, in this case the qualitative, provides a supportive, secondary role in the study based primarily on the quantitative data. A two-phase (sequential) approach is employed and the quantitative and qualitative data are used to answer different research questions within the study. The quantitative data was used to address Objective 2, and the qualitative data was used to address Objective 3 (see Figure 3-2).

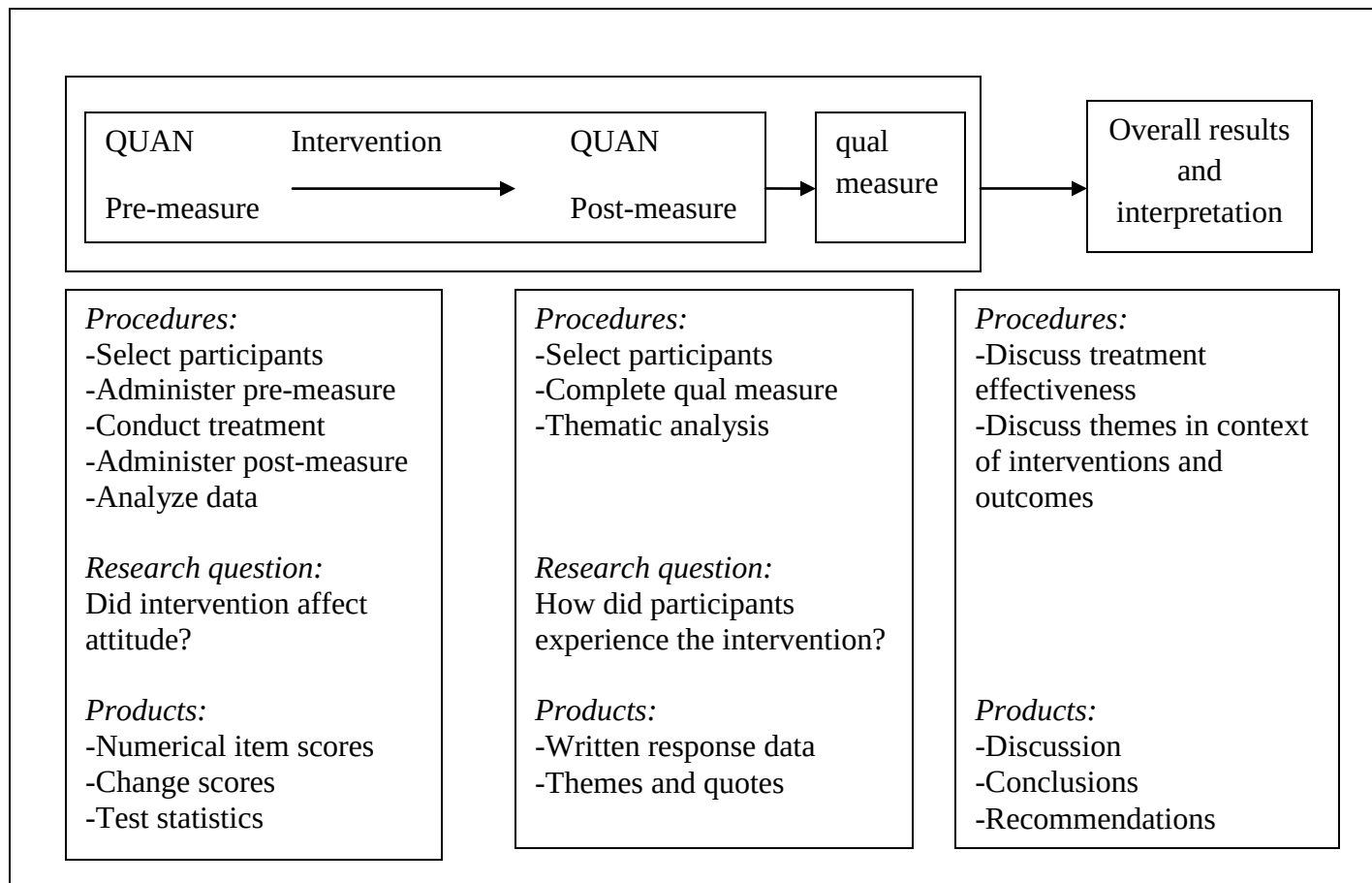


Figure 3-2: Embedded Sequential Mixed Methods Design Model. Based on components from *Designing and Conducting Mixed Methods Research* (p. 51 & 68), by J. W. Creswell and V. L. Plano Clark, 2007, Thousand Oaks, CA: Sage Publications, Inc. Used under fair use guidelines, 2011.

Subjects were assigned to one of four treatment groups. The different treatment regimes served as the primary independent variables in the study. Other relevant variables included demographic data and study-specific questions. The dependent variable is participants' attitudes toward sustainable agriculture following treatment as measured by the Sustainable Agriculture Paradigm Scale. The four treatments included two verbal and two non-verbal alternatives and consisted of:

- 1) listening to a story told by a storyteller,
- 2) reading the same story individually and silently,
- 3) listening to a didactic lecture containing the same basic information but not in story form,
- 4) individual and silent reading of fact sheets containing the same information.

Treatments one and two were chosen based on studies conducted by Haven (2007) and Janner (1994) suggesting that orally telling a story is the most effective means of story delivery. Haven, speaking of the oral presentation of a story, states, "Storytelling creates excitement, enthusiasm, and more detailed and expansive images in the mind of the listener than does the same story delivered in other ways" (p. 121). Treatments three and four were chosen based on the common use of didactic lectures among adult agricultural educators in the Cooperative Extension Service (Grace, 1996; Strong & Harder, 2009) and the vast number of fact sheets that are available to clientele on-line and frequently distributed to clientele during educational programs. The factsheet used in the study is included here as Appendix B. See Figure 3-3 for an illustration of the four treatment regimes used in the study.

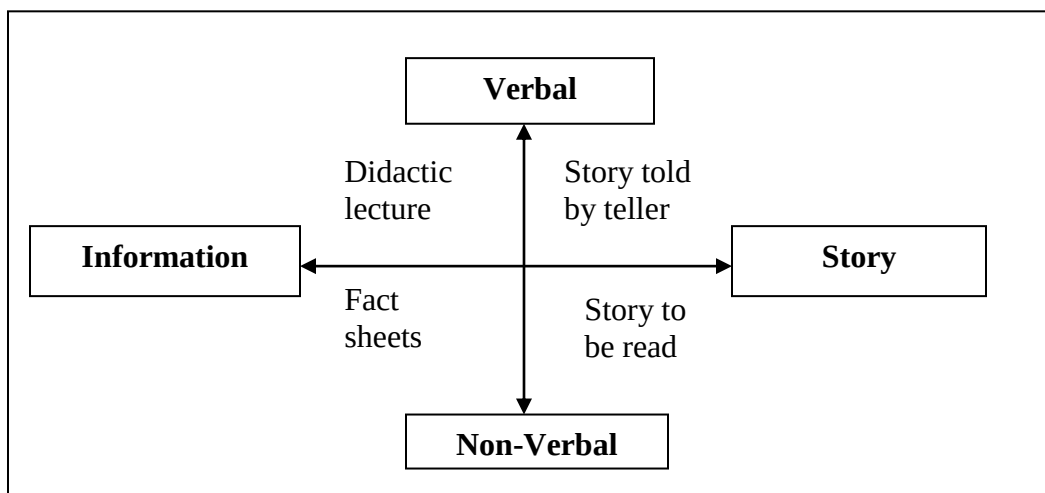


Figure 3-3: Illustration of the four treatment regimes used in the study. The verbal regimes include a didactic lecture and a story told by a teller. The nonverbal regimes include factsheets read individually and silently, and the silent reading of the same story told by the teller.

Study Population

The population for this study was upper-level undergraduate students at Virginia Polytechnic Institute and State University, a large land-grant university in the southern United States. Sixty-five students from the College of Agriculture and Life Sciences and 77 students from the College of Liberal Arts and Human Sciences were recruited to participate in the study. Approval to conduct human subjects' research was requested from the Institutional Review Board at Virginia Tech and permission was received prior to the beginning of the study. In addition, all participants received, read, and signed an "Informed Consent" document before taking part in the study.

Students from the College of Agriculture and Life Sciences have taken coursework in agriculture and will likely hold opinions regarding its practice. A significant number of these students will go on to hold jobs in the area of agricultural education. Such individuals can and will influence the future direction of agricultural practices in the United States. Agricultural

educators can perform an important role in introducing students to the benefits and practice of sustainable agriculture. Many of these educators, however, are not well acquainted with or supportive of sustainable agriculture. A study on the impact of sustainable agriculture on secondary school agriculture education teachers concluded that sustainable agriculture has had a limited impact on secondary school agricultural education teachers and programs (Agbaje, Martin, & William, 2001). The classes from which students in the College of Agriculture and Life Sciences were drawn included Sustainable Development in the Department of Agricultural and Applied Economics, and Communicating Agriculture in Writing and Communicating Agriculture and Life Sciences in Speaking in the Department of Agricultural and Extension Education.

The course in which the subjects from the College of Liberal Arts and Human Sciences were drawn, Global Environment Issues in the Department of Political Science, involved a critical examination of major global environmental problems (e.g. global warming, atmospheric ozone depletion, acid rain, tropical deforestation, toxic waste) with emphasis on their social, economic, political, ethical, and policy implications and solutions. The students in this class are likely to be similar to the general adult population in that they have little formal education in agriculture. Due to the possible influence of course material influencing attitudes toward sustainable agriculture, the course instructor agreed to put off discussion of agriculture with students until after the completion of the treatments and the post-tests. In addition, a control group selected from this class was included in the study. Given their interest in the subject matter of this class, that is, global environmental issues, these students may also have an impact on the future of agriculture. They may do this by their food purchasing decisions, their support of agricultural practices that cause no harm to the environment, and possibly in their professional

role, for example, as health care professionals (Jackson, Minjares, Naumoff, Shrimali, & Martin, 2009).

Because of a possibility of distinct responses to treatment between College of Agriculture and Life Sciences participants and College of Liberal Arts and Human Sciences participants, the groups test results were compared and analyzed.

Story Development

At the time of this study, no suitable “story” about sustainable agriculture and the raising of livestock existed. Therefore, I created a story for use in the study and selected an appropriate story teller. Story development began with a review of the literature to identify the significant elements of a story designed to effect change and important characteristics to look for when choosing a storyteller. Based on the review, discussed in detail in Chapter 2, the following components were found to be important: structure, time sequence, plot, character, struggles, meaning, emotions, and details. The story I created and used in the study tells of a young man’s unplanned visit to a small, rural community in which a large hog CAFO had opened several years prior. Through interactions with local residents, and a visit to the CAFO, the young man learns of the economic, environmental, and social effects this enterprise has had on the community and on the welfare of animals. He finds himself struggling with his attempts to rationalize the situation but finds that his emotions and conscience will not allow him to reconcile the situation to his satisfaction. He undergoes an intense period of confusion, turmoil, and doubt. He finds that, in order to resolve his inner conflict, he has to rethink the life he lives and the choices he makes. The complete story *Visiting Jewel: A Porcine Tragedy* (Grace, 2010) is included in Appendix A.

Selecting the Storyteller

To tell the story, I selected a fellow graduate student, Chaney Moseley. I chose him for several reasons. First of all, I felt he would be appealing to the college students to whom the story would be told. Chaney is in his early 30's and spent a number of years teaching high school before returning to graduate school. He likes students and it shows. He wears a somewhat spiked haircut and dresses casually but well. More importantly, however, he is very expressive in his speech and physical movements. His enthusiasm is contagious. He possesses what is often referred to as charisma. As pointed out by Gladwell in *The Tipping Point* (2000), "only the charismatic person could infect the other people in the room with his or her emotions" (p.86). Since the theories underlying this study are concerned with emotion and identification with characters, it was crucial for the storyteller to possess this characteristic which, in my estimation, he does.

Data Collection

Data collection began at least two weeks prior to treatment with the completion of the Sustainable Agriculture Paradigm Scale. The instrument was used to determine participants' attitudes toward sustainable agriculture and collect demographic and study specific information. Participants were then randomly assigned to a treatment group within their college. Immediately following treatment, post intervention surveys were used to determine attitude change. The Sustainable Agriculture Paradigm Scale, to which a series of open-ended questions were added, was used for this purpose. The data collection timetable is presented in Table 3.1.

Demographic and Study Specific Information

Participants were asked to respond to the following demographic questions:

- What is your age?
- What is your gender?
- What is your race/ethnicity?
- What is your academic standing?
- What is your college major?
- In what type of area have you spent the greatest portion of your life?

Students were also requested to respond to questions I considered potentially relevant to the study based on the review of the literature and my personal experience. The question regarding political view was found to be relevant in the findings from the survey “Attitudes of Consumers toward the Welfare of Farmed Animals, a study of almost 25,000 adults from 25 European Union countries and thus was added to the survey (TNS Opinion & Social, 2005).

- Do you purchase food for yourself and/or your family?
- On a weekly basis, how often do you eat meat?
- Have you ever visited a small farm which rears animals?
- Have you ever visited a Concentrated Animal Feeding Operation?
- In political matters people talk of “the left” (aka “Liberal”) and “the right” (aka “Conservative”). How would you place your views on this scale?

Left (Liberal)			Right (Conservative)	
1	2	3	4	5

Qualitative Data

Qualitative data was elicited from study participants by means of a series of open-ended questions included at the end of the Sustainable Agriculture Paradigm Scale post-test. The following example, completed by the storytelling group, contains the questions asked of all

treatment groups with the substitution of “read story”, “lecture”, or “fact sheet” as appropriate (Appendix F).

- Please describe anything about the storytelling experience that was especially helpful and/or effective in informing you about industrial farm animal production in the United States.
- Please describe anything about the storytelling experience that you considered ineffective in informing you about industrial farm animal production in the U.S.
- Please describe any emotional reaction you have had as a result of the storytelling experience.
- If you did not experience any emotional reaction, please describe what the storytelling experience was like for you.
- Did you identify with the person telling the story or any of the characters in the story? If so, please name who you identified with and in what way you identified with them.
- Have your attitudes toward industrial farm animal production changed after the storytelling experience? If so, please describe how they have changed.
- If your attitudes have not changed, please describe how they have been confirmed or reinforced.
- What, if any, changes you will make in your life as a result of this storytelling experience?

Table 3-1

The Effects of Storytelling on Attitudes and Worldview toward Sustainable Agriculture Data Collection Timeline

Activity	Date
Sub-Population 1: Global Environmental Issues Class	
Pre intervention surveys used to determine participants' current attitudes toward sustainable agriculture.	Sept. 21
Interventions conducted	Oct. 7
Post intervention surveys used to determine attitude change after intervention.	Immediately following intervention.
Completion of a series of open-ended questions regarding their experience during treatment.	Immediately following post-intervention survey.
Sub-Population 2: Sustainable Economic Development Class	
Pre intervention surveys used to determine participants' current attitudes toward sustainable agriculture.	Sept. 28
Interventions conducted	Oct. 26
Post intervention surveys used to determine attitude change after the intervention.	Immediately following intervention.
Completion of a series of open-ended questions regarding their experience during treatment.	Immediately following post-intervention survey.
Sub-Population 3: Communicating Agriculture in Writing	
Pre intervention surveys used to determine participants' current attitudes toward sustainable agriculture.	Oct. 17
Interventions conducted	Nov. 17
Post intervention surveys used to determine attitude change after the intervention.	Immediately following intervention.
Completion of a series of open-ended questions regarding their experience during treatment.	Immediately following post-intervention survey.

Table 3-1 (*continued*)

Activity	Date
Sub-Population 4: Communicating Agriculture and Life Sciences in Speaking	
Pre intervention surveys used to determine participants' current attitudes toward sustainable agriculture.	Oct. 18
Interventions conducted	Nov. 16
Post intervention surveys used to determine attitude change after the intervention.	Immediately following intervention.
Completion of a series of open-ended questions regarding their experience during treatment.	Immediately following post-intervention survey.

Data Analysis

Objective 2: The quantitative data was statistically analyzed using the statistical software package PASW Statistics 18 to determine if there was a significant difference from pre-survey to post-survey among the four treatment groups. Statistical tests included an ANOVA with post hoc test, a paired-sample t-test, and a two-way between groups ANOVA. Participants were then divided into High and Low Change groups. A multiple linear regression model was also utilized to identify the variables in the study which had the most influence on change scores.

Objective 3. Responses to the open-ended questions were analyzed to determine if there were significant differences in experience between the High and Low Change groups. Colaizzi's (1978) phenomenological method was used to analyze the data. In this method, responses are read several times to obtain an overall feeling for them. Significant phrases or sentences that pertain directly to the individual's experience are identified. Meanings are then formulated from the significant statements and phrases. The formulated meanings are then clustered into themes

allowing for the emergence of common themes from the data. The results are then integrated into a description of the phenomena.

Mixing of the data occurred during analysis by using qualitative data about participants' experience during treatment to explain connections/relationships among the quantitatively derived constructs about attitudes toward sustainable agriculture. A "Mixing Table" is included in the results. This table provides information regarding the manner in which the data was mixed which is a requirement of this design methodology. The following example of such a table includes data from a pilot study I conducted in 2008 (Grace, 2008). The quantitative data collected by the survey instrument is represented by the group designation of High, Medium, or Low. This refers to the level of change from pre to post-test. The data was obtained by analysis of data from T-tests. The qualitative data is represented under the column Attitudes/Themes. A similar mixing table is included in the current research (see Table 3-2).

Table 3-2

Example Mixing Table: Participant Themes by Level of Change Scores

Group	Attitudes/Themes	Freq. of occurrence	Intensity effect size
High n=3	1. Experienced emotional reaction	3	100.0%
	2. Identification with characters	2	66.7%
	3. Effective personal stories	2	66.7%
	4. Confirmation of beliefs	2	66.7%
Medium n=3	1. Experienced emotional reaction	3	100.0%
	2. Identification with characters	2	66.7%
	3. Effective personal stories	2	66.7%
	4. Confirmation of beliefs	1	33.3%
Low n=2	1. Experienced emotional reaction	2	100.0%
	2. Identification with characters	2	100.0%
	3. Effective personal stories	0	0
	4. Confirmation of beliefs	1	50.0%

Note. Reprinted from “Evaluating and Understanding Attitude Change in Response to Narrative: A Mixed Methods Study of Graduate Level Agricultural Education Students” (p. 10) by P.E.Grace, 2008, unpublished manuscript, Dept. of Agricultural and Extension Education, Virginia Tech, Blacksburg, VA.

Summary

In this chapter I presented my position on conducting research in the disciplines of education and the social sciences, followed by a description of the methods I chose to use in this study. I explained the process I employed to develop the Sustainable Agriculture Paradigm Scale and the procedures undertaken to establish validity and reliability. I then discussed the Mixed-Methods research design I used in the study and provided information about the target population. Finally, I outlined the data collection and analysis procedures. In the next chapter I will present the findings of the study.

CHAPTER 4

RESULTS

This chapter presents the results of the data analysis procedures described in Chapter 3. The findings are organized according to research objectives which are:

1. Develop an instrument to measure attitudes toward sustainable agriculture including economic, environmental, social, and ethical-animal welfare components.
2. Examine the impact of a carefully crafted story on college students' attitudes toward sustainable agriculture.
3. Explore what qualities of the story are associated with change as experienced by study participants.

Objective One - Instrument Development

Objective One was the development of an instrument to measure attitudes toward sustainable agriculture. Procedures undertaken for scale development are reported followed by assessment of reliability and validity on the Pilot Test, and the combined pre and post-tests. Revisions made to improve the scale are also discussed. The instrument is called *The Sustainable Agriculture Paradigm Scale*. Three different iterations of the instrument, as it developed, will be discussed. The first is The Sustainable Agriculture Paradigm Scale-Pilot Test (Appendix C), the second is The Sustainable Agriculture Paradigm Scale-VT Full Study (Appendix D), and the third is The Sustainable Agriculture Paradigm Scale-VT Full Study-Revised (Appendix E).

Literature Review and Item Development

Design of the instrument began with a review of the literature in order to identify the dimensions of the construct "sustainable agriculture." As noted in Chapter 2, many different

people have tried to define sustainable agriculture. Gardener, Jamtgaard, and Kirschenmann (1995) note that the majority of definitions contain three criteria: environmental, economic, and social. They comment further that a broader definition including food access, labor rights, race and gender issues and the humane treatment of livestock is gaining ground. After additionally reviewing the works of Ikerd (1990, 2007, 2009), Horne & McDermott, (2001), Lyson (2004), The National Campaign for Sustainable Agriculture (as cited by Allen, 2004, p. 41), and the U.S. Congress (1990), the following dimensions emerged to represent the various aspects of the construct: economic, environmental, social, and ethical-animal welfare.

The economic dimension of sustainable agriculture refers to a set of production practices that are profitable for the farmer. The environmental dimension mandates that these practices serve to preserve and enhance environmental quality. The social dimension considers the contribution of this manner of farming to the health and well-being of farm households and the larger community. Finally, the ethical-animal welfare dimension refers to the humane treatment of farm animals as part of the production system. These dimensions are highly interrelated, creating a systems-oriented approach to agriculture.

The four dimensions were operationalized by a series of items designed to optimally represent each area of emphasis. Several existing surveys and research reports guided the development of statements to be included in the survey (Beus & Dunlap, 1991; Brambell, 1965; Heleski, Mertig, & Zanella, 2004; Mench, 1998; Mench, 2008; European Commission, Directorate General Health and Consumer Protection, 2005). Thirty-nine representative statements were subsequently developed and are included in Appendix C. The response format used a Likert-type scale containing six options, “strongly agree,” “agree,” “neither agree nor

disagree,” “disagree,” “strongly disagree,” and “don’t know.” This type of scaling is frequently used when an instrument is intended to measure attitudes, beliefs, or opinions (DeVellis, 2003).

Expert Review and Refinement

A panel of experts (N=9) consisting of university faculty in the Virginia Tech (VT) Department of Agricultural and Extension Education, the VT Department of Educational Research and Evaluation, the VT Department of Religion and Culture, several Virginia Cooperative Extension Agents, and a representative from the Virginia Biological Farmers Association were asked to review the instrument for evidence of appropriate depth and breadth of content, appropriate language and cognitive level for the population under study, and clear and consistent instrument format.

After consideration of the expert recommendations, a number of changes were made in the instrument including the rephrasing of several items. The resulting instrument, referred to as The Sustainable Agriculture Paradigm Scale-Pilot Test, contains three main sections: introductory narrative, scale-specific items, and demographic-related questions. Section 1 explains the purpose of the survey, assures confidentiality, and provides an estimate of the time required to complete the survey. Next, definitions are given for the terms “animal agriculture” and “concentrated animal feeding operation (CAFO)” since it is important for respondents to understand the meaning of these terms (as we are defining them) while taking the survey. Section 1 then provides directions for answering the survey questions.

Section 2 contains the scale items. These consisted of 39 statements designed to measure respondent’s attitudes toward agriculture including methods of raising livestock for human consumption and are based on the four dimensions of the construct which are: economic, environmental, ethical-animal welfare, and social. The statements are listed in Table 4-1

Table 4-1

Sustainable Agriculture Paradigm Scale-Pilot Test 39 Items

Item Number	Scale Item
1	Farming is first and foremost a business like any other.
2	The key to agriculture's future success lies in learning to imitate natural ecosystems and farm in harmony with nature.
3	As long as animals are producing, (i.e. gaining weight, producing eggs, etc.) it can be assumed they have good animal welfare.
4	Healthy rural communities are essential for American agriculture's future success.
5	The cost of food in the U.S. is deceptively low because many costs are externalized (e.g., subsidies to some farmers; pollution due to nutrient leaching and runoff; damage to roads from truck traffic.).
6	Modern agriculture is a minor cause of ecological problems.
7	Agricultural animals should have adequate space to move around comfortably.
8	Farm traditions serve no purpose for modern agriculture.
9	As a consumer I am willing to pay more for products coming from facilities that provide for on animal welfare beyond common industry standards.
10	Farmland should be farmed to protect the long-term capacity of the land.
11	Humans have the right to use agricultural animals as they see fit.
12	The decline in the number of farmers will result in the loss of farming knowledge and experience.
13	Production, processing, distribution, and marketing of agricultural products are best done at national and international levels.
14	Soil and water should be used so as to maximize production.
15	The production of the food I eat should not cause pain and discomfort to animals.
16	Concerns over the routine use of antibiotics and hormones in animal agriculture have been greatly exaggerated.
17	Farming is as much a way of life as it is a business.
18	Land should be farmed to maximize annual profits; long term productivity must take second priority to the current economic needs of the farm.

Table 4-1 (*continued*)

Item Number	Scale Item
19	Agricultural animals should have access to the outdoors and suitable pasture.
20	Negative health effects are often experienced by workers in CAFOs.
21	The primary goal of farmers should be to maximize the productivity, efficiency and profitability of their farms.
22	Modern agriculture must be modified to become ecologically sound.
23	Too much attention is given to the welfare of agricultural animals in recent years.
24	When CAFOs begin operation in a community, small farmers often cannot compete and are ultimately driven out of business.
25	The “ecological crisis” facing humankind has been greatly overstated.
26	The production of inexpensive meat, eggs, and dairy products justifies maintaining agricultural animals under crowded conditions.
27	Additional economic, environmental, and social burdens are placed on rural communities where CAFOs are located.
28	The key to agriculture’s future lies in the continued development of advanced technologies that will overcome nature’s limits.
29	Agricultural animal welfare should be improved only if it can be done without increasing costs of production.
30	Production, processing, distribution and marketing of agricultural products are best done at local and regional levels.
31	Non-resident owners are the main beneficiaries of profits from large CAFOs located in rural environments.
32	Agricultural animals should be able to lie down on comfortable bedding.
33	High energy use, soil erosion, water pollution, etc. are evidence that U.S. agriculture is not nearly as successful as many believe it to be.
34	People who criticize industrial methods of raising livestock just don’t understand animal agriculture.
35	The crowded conditions of animals raised in CAFOs can lead to increased incidences of food-borne illness in humans.

Table 4-1 (*continued*)

Item Number	Scale Item
36	Soil and water are critical to life and should be strictly conserved.
37	It is important to meet the majority of the behavioral needs of agricultural animals. (i.e., those behaviors animals have evolved to perform and are highly motivated to engage in).
38	Animal agriculture raises serious ethical questions about the treatment of animals
39	CAFOs have a negative impact on air and water quality in communities.

Section 3 of the survey instrument included the following demographic questions:

- What is your age?
- What is your gender?
- What is your race/ethnicity?
- What is your academic standing?
- What is your college major?
- In what type of area have you spent the greatest portion of your life?

The instrument included questions I considered relevant to the study based on the review of the literature and my personal experience. For example, the question regarding political view was found to be relevant in the survey “Attitudes of Consumers toward the Welfare of Farmed Animals,” a study of almost 25,000 adults from 25 European Union countries (TNS Opinion & Social, 2005). Accordingly, the following questions were included in the instrument:

- Do you purchase food for yourself and/or your family?
- On a weekly basis, how often do you eat meat?
- Have you ever visited a small farm which rears animals?
- Have you ever visited a Concentrated Animal Feeding Operation?
- In political matters people talk of “the left” and “the right.” How would you place your views on this scale? Please circle the number you choose.

Left									Right
1	2	3	4	5	6	7	8	9	10

The complete instrument, The Sustainable Agriculture Paradigm Scale-Pilot Test, can be found in Appendix C.

Pilot Test

I conducted a pilot test of the instrument with a group of 70 students in an upper level communications course in the College of Agriculture and Life Sciences at the University of Florida to establish criterion related validity, construct validity, and reliability. I submitted an application to the Institutional Review Board at Virginia Tech requesting permission to conduct human subjects' research. The application was approved prior to the beginning of the research.

Reliability and item discrimination. During preliminary analysis of the data, I found that a large number of "Don't Know" responses were contained in 10 of the 39 items in the survey (items 5, 13, 20, 24, 27, 30, 31, 34, 35, & 39; see Table 4-1 for item wording). R. Van Den Berg, former statistical consultant, University of Georgia (personal communication, May 6, 2010) recommends missing data points should not exceed 10% and that variables or cases with excessive missingness should be removed prior to analysis. I removed the previously mentioned items from the data set. I maintained items 6, 8, and 25, since they were barely beyond the 10% point. The final pilot data set used for analysis thus contained 29 items with 70 respondents. From this data set, the internal consistency of the instrument computed using Cronbach's Alpha was .857. Item discrimination values reported for items 1, 2, 4, 6, 10, 12, and 17 were low ($< .3$) indicating that these items could be measuring something different from the scale as a whole. The remainder of the items scored $> .3$. Since the Alpha level was sufficiently high at .857, however, the items $< .3$ were not removed from the scale at this time. They were left for further consideration in future administrations of the instrument. Refer to Table 4-2 for specific details.

Table 4-2

Item Correlations and Discrimination - Sustainable Agriculture Paradigm Scale-Pilot Test (29 Items, N=70).

Item Number	Scale Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	Farming is first and foremost a business like any other.	.267	.855
2	The key to agriculture's future success lies in learning to imitate natural ecosystems and farm in harmony with nature.	.288	.855
3	As long as animals are producing, (i.e. gaining weight, producing eggs, etc.) it can be assumed they have good animal welfare.	.509	.849
4	Healthy rural communities are essential for American agriculture's future success.	.098	.860
6	Modern agriculture is a minor cause of ecological problems.	.254	.857
7	Agricultural animals should have adequate space to move around comfortably.	.436	.853
8	Farm traditions serve no purpose for modern agriculture.	.221	.858
9	As a consumer I am willing to pay more for products coming from facilities that provide for on animal welfare beyond common industry standards.	.569	.848
10	Farmland should be farmed to protect the long-term capacity of the land.	.239	.857
11	Humans have the right to use agricultural animals as they see fit.	.386	.853
12	The decline in the number of farmers will result in the loss of farming knowledge and experience.	.038	.861
14	Soil and water should be used so as to maximize production.	.351	.854
15	The production of the food I eat should not cause pain and discomfort to animals.	.376	.853

Table 4-2 (*continued*)

Item Number	Scale Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
16	Concerns over the routine use of antibiotics and hormones in animal agriculture have been greatly exaggerated.	.376	.853
17	Farming is as much a way of life as it is a business.	-.022	.862
18	Land should be farmed to maximize annual profits; long term productivity must take second priority to the current economic needs of the farm.	.438	.851
19	Agricultural animals should have access to the outdoors and suitable pasture.	.352	.854
21	The primary goal of farmers should be to maximize the productivity, efficiency and profitability of their farms.	.456	.851
22	Modern agriculture must be modified to become ecologically sound.	.471	.850
23	Too much attention is given to the welfare of agricultural animals in recent years.	.609	.846
25	The “ecological crisis” facing humankind has been greatly overstated.	.509	.848
26	The production of inexpensive meat, eggs, and dairy products justifies maintaining agricultural animals under crowded conditions.	.563	.847
28	The key to agriculture’s future lies in the continued development of advanced technologies that will overcome nature’s limits.	.340	.854
29	Agricultural animal welfare should be improved only if it can be done without increasing costs of production.	.574	.847
32	Agricultural animals should be able to lie down on comfortable bedding.	.419	.852
33	High energy use, soil erosion, water pollution, etc. are evidence that U.S. agriculture is not nearly as successful as many believe it to be.	.554	.847

Table 4-2 (*continued*)

Item Number	Scale Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
36	Soil and water are critical to life and should be strictly conserved.	.514	.849
37	It is important to meet the majority of the behavioral needs of agricultural animals. (i.e., those behaviors animals have evolved to perform and are highly motivated to engage in).	.518	.849
38	Animal agriculture raises serious ethical questions about the treatment of animals	.473	.850

Factor analysis and construct validity. The 29 items of the Sustainable Agriculture Paradigm Scale –Pilot Test were subjected to principal components analysis (PCA) using PASW Statistics 18. Prior to performing PCA the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Okin value was .609 meeting the recommended value of .6 (Kaiser, 1970, 1974), and the Bartlett's Test of Sphericity (Barlett, 1954) reached statistical significance, supporting the factorability of the correlation matrix.

Principal components analysis revealed the presence of nine components with eigen values exceeding 1, explaining 71.6% of the variance. Varimax rotation of the nine factors failed to converge in 25 iterations. Examining the component matrix I noted that most of the items loaded most strongly (>.4) on the first five components. Inspecting the screeplot, there is a clear break between the first and second component, a lesser break between the second and third component, and a small break between the third and fourth component. The screeplot is presented in Figure 4-1.

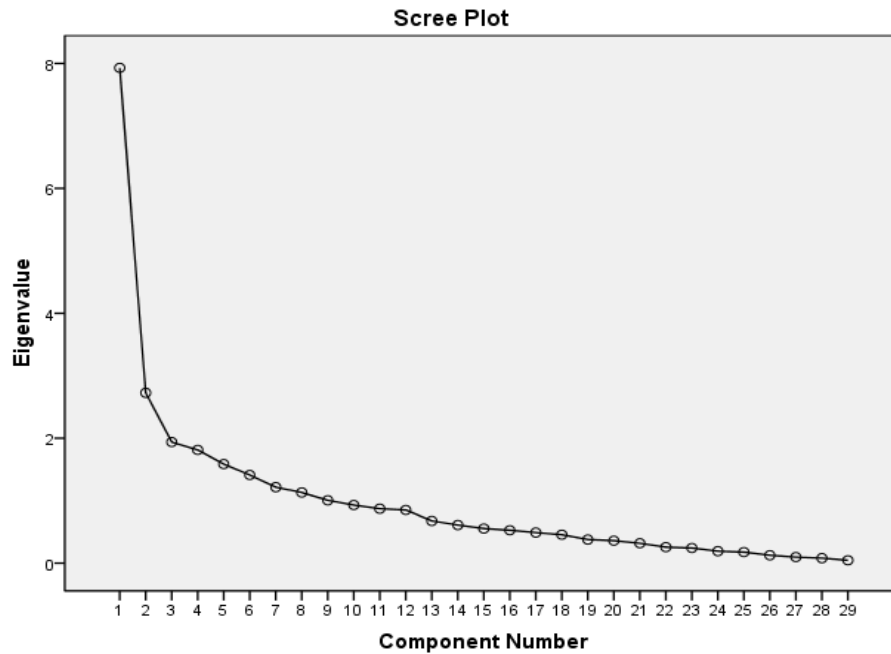


Figure 4-1. Principal Components Analysis Scree Plot from The Sustainable Agriculture Paradigm Scale-Pilot Test (29 items, N=70).

Upon examining the dimensions of the ten questions eliminated earlier, I found that three of these were intended to represent the economic dimension of the construct, and five were intended to represent the social component of the construct. In light of this and my earlier identification of four dimensions underlying the construct of Sustainable Agriculture, four components were extracted for further analysis.

Varimax rotation of the four factors was performed to aid in interpretation of the components. The rotated solution showed 13 strong loadings ($>.4$) on component one, nine on component two, seven on component three, and three on component four. Refer to Table 4-3 for details.

Table 4-3

Rotated Component Matrix - Sustainable Agriculture Paradigm Scale-Pilot Test Ordered by Factor Loadings (29 Items, N=70)

Item Number	Scale Item	Component Number			
		1	2	3	4
11	Humans have the right to use agricultural animals as they see fit.	.716			
23	Too much attention is given to the welfare of agricultural animals in recent years.	.715	.433		
29	Agricultural animal welfare should be improved only if it can be done without increasing costs of production.	.696			
7	Agricultural animals should have adequate space to move around comfortably.	.666			.401
9	As a consumer I am willing to pay more for products coming from facilities that provide for on animal welfare beyond common industry standards.	.662			
15	The production of the food I eat should not cause pain and discomfort to animals.	.630			
38	Animal agriculture raises serious ethical questions about the treatment of animals.	.629			
16	Concerns over the routine use of antibiotics and hormones in animal agriculture have been greatly exaggerated.	.608			
26	The production of inexpensive meat, eggs, and dairy products justifies maintaining agricultural animals under crowded conditions.	.597		.345	
32	Agricultural animals should be able to lie down on comfortable bedding.	.570			
19	Agricultural animals should have access to the outdoors and suitable pasture.	.563			
37	It is important to meet the majority of the behavioral needs of agricultural animals. (i.e., those behaviors animals have evolved to perform and are highly motivated to engage in).	.465	.357		.345

Table 4-3 (*continued*)

Item Number	Scale Item	Component Number			
		1	2	3	4
33	High energy use, soil erosion, water pollution, etc. are evidence that U.S. agriculture is not nearly as successful as many believe it to be.		.731	.308	
25	The “ecological crisis” facing humankind has been greatly overstated.		.657		
10	Farmland should be farmed to protect the long-term capacity of the land.		.588		
22	Modern agriculture must be modified to become ecologically sound.		.574		
2	The key to agriculture’s future success lies in learning to imitate natural ecosystems and farm in harmony with nature.	.326	.571		
36	Soil and water are critical to life and should be strictly conserved.		.514		
14	Soil and water should be used so as to maximize production.			.733	
21	The primary goal of farmers should be to maximize the productivity, efficiency and profitability of their farms.			.732	
18	Land should be farmed to maximize annual profits; long term productivity must take second priority to the current economic needs of the farm.		.413	.667	
3	As long as animals are producing, (i.e. gaining weight, producing eggs, etc.) it can be assumed they have good animal welfare.	.427	.312	.461	
1	Farming is first and foremost a business like any other.			.447	
6	Modern agriculture is a minor cause of ecological problems.		.429	-.429	
28	The key to agriculture’s future lies in the continued development of advanced technologies that will overcome nature’s limits.	.359		.404	

Table 4-3 (*continued*)

		Component Number			
Item Number	Scale Item	1	2	3	4
17	Farming is as much a way of life as it is a business.				.688
12	The decline in the number of farmers will result in the loss of farming knowledge and experience.				.650
8	Farm traditions serve no purpose for modern agriculture.				.590
4	Healthy rural communities are essential for American agriculture's future success.				.447

Note. Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 6 iterations. Eigenvalues and Percentage of Variance Explained: Component 1: 5.781, 24.087; Component 2: 2.617, 10.902; Component 3: 2.321, 9.673; Component 4: 1.463, 6.096. Total variance explained = 50.758%.

Eleven of the 13 strong loadings on component one reflected Ethical-Animal Welfare items and eight of the nine strong loadings on component two reflected Environmental items. Components three and four were not so easily interpreted. Of the seven strong loadings on component three, four reflected Environmental items, two Economic, and one Ethical-Animal Welfare. Of the three strong loadings on component four, one reflected Ethical-Animal Welfare, one Economic, and one Social. The mixed loadings on components three and four may reflect, in part, the deletion of three Economic items and five Social items removed prior to data analysis due to a large number of “Don’t Know” responses to these questions. There were three incidences of strong cross-loadings. The four factors extracted account for 49.7% of the total variance. These results indicated that the items in the scale failed to adequately represent the Economic and Social dimensions of the construct while over-representing the Ethical-Animal Welfare and Environmental dimensions.

Increasing construct validity and demographic question clarity. To improve the validity of the scale, items 5, 13, and 31 (Economic dimension) and items 8, 24, 27, and 30 (Social dimension), from the original 39 item scale (Appendix C), were rewritten in a clearer, broader manner to decrease “Don’t Know” responses. In addition, there were a number of comments on the Pilot Test regarding the confusing nature of demographic question concerning students’ political preference. Some students were not sure of the meaning of “left” and “right.” This question was also rewritten and the response options adjusted to increase clarity. Refer to Table 4-4 for details of these changes.

Table 4-4

Original and Revised Item Wording of Items on the Sustainable Agriculture Paradigm Scale

Original Wording-Pilot Test	Revised Wording-Full Study
The cost of food in the U.S. is deceptively low because many costs are externalized (for example, federal subsidies provided to some farmers).	All costs associated with agricultural production should be borne by the producer rather than the taxpayer, although this may raise the price of industrially produced food.
Production, processing, and marketing of agricultural products is best done at national and international levels.	Food production and marketing done at the national and international level is most beneficial for the average citizen.
Non-resident owners are the main beneficiaries of profits from large CAFOs located in rural environments.	Economic benefits from large corporate agricultural enterprises are more likely to benefit non-resident owners than people living in the community in which the business is located
When CAFOs begin operation in a community, small farmers often cannot compete and are ultimately driven out of business.	The opening of a large-scale agricultural production facility in a community may have detrimental economic effects on small-scale producers in the vicinity.
Additional economic, environmental, and social burdens are placed on rural communities where CAFOs are located.	When workers move to rural communities and become employed by large agricultural enterprises in low-paying jobs, the community may experience increased educational, health, and law enforcement costs.

Table 4-4 (*continued*)

Original Wording-Pilot Test	Revised Wording-Full Study																																	
Production, processing, and marketing of agricultural products is best done at local and regional levels.	The production and marketing of food is most beneficial to society overall when done at the local and regional level.																																	
Farm traditions serve no purpose for modern agriculture	The decline in the number of farmers will result in the loss of farming knowledge and experience.																																	
In political matters people talk of “the left” and “the right.” How would you place your views on this scale? Please circle the number you choose.	In political matters people talk of “the left” (aka “Liberal”) and “the right” (aka “Conservative”). How would you place your views on this scale? Please circle the number you choose.																																	
<table><tr><td colspan="9">Left</td><td colspan="2">Right</td></tr><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr></table>	Left									Right		1	2	3	4	5	6	7	8	9	10	<table><tr><td colspan="3">Left (Liberal)</td><td colspan="3">Right (Conservative)</td></tr><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td></td></tr></table>	Left (Liberal)			Right (Conservative)			1	2	3	4	5	
Left									Right																									
1	2	3	4	5	6	7	8	9	10																									
Left (Liberal)			Right (Conservative)																															
1	2	3	4	5																														

From The Sustainable Agriculture Paradigm Scale-Pilot Test (Appendix C), items 3, 6 and 18 which exhibited strong cross-loadings were removed. Items 14, 16, 17, and 28 which were not loading on the intended dimensions were removed. Items 19, 26, 32, and 37 were also removed to achieve more balance in the scale by decreasing the number of items related to the Ethical-Animal Welfare dimension. After these changes, 24 scale items remained reflecting the four dimensions of the construct as shown in Table 4-5.

Table 4-5

Dimensions of the Construct: Sustainable Agriculture

Item Number	Dimension Items
Economic Dimension	
1	Farming is first and foremost a business like any other.
4	All costs associated with agricultural production should be borne by the producer rather than the taxpayer, although this may raise the price of industrially produced food.
6	As a consumer I am willing to pay more for products coming from facilities that provide for animal welfare beyond common industry standards.
13	The primary goal of farmers should be to maximize the productivity, efficiency and profitability of their farms.
18	When workers move to rural communities and become employed by large agricultural enterprises in low-paying jobs, the community may experience increased educational, health, and law enforcement costs.
21	Economic benefits from large corporate agricultural enterprises are more likely to benefit non-resident owners than people living in the community in which the business is located.
Environmental Dimension	
2	The key to agriculture's future success lies in learning to imitate natural ecosystems and farm in harmony with nature.
7	Farmland should be farmed to protect the long-term capacity of the land.
14	Modern agriculture must be modified to become ecologically sound.
17	The "ecological crisis" facing humankind has been greatly overstated.
22	High energy use, soil erosion, water pollution, etc. are evidence that U.S. agriculture is not nearly as successful as many believe it to be.
23	Soil and water are critical to life and should be strictly conserved.

Table 4-5 (*continued*)

Item Number	Dimension Items
Ethical-Animal Welfare Dimension	
5	Agricultural animals should have adequate space to move around comfortably. Humans have the right to use agricultural animals as they see fit.
11	The production of the food I eat should not cause pain and discomfort to animals.
15	Too much attention has been given to the welfare of agricultural animals in recent years.
19	Agricultural animal welfare should be improved only if it can be done without increasing costs of production.
24	Animal agriculture raises serious ethical questions about the treatment of animals
Social Dimension	
3	Healthy rural communities are essential for American agriculture's future success.
9	The decline in the number of farmers will result in the loss of farming knowledge and experience.
10	Food production and marketing done at the national and international level is most beneficial for the average citizen.
12	The cost of improving working conditions that cause negative health effects to employees in animal feeding operations must be weighed against the current economic needs of the business.
16	The opening of a large-scale agricultural production facility in a community may have detrimental economic effects on small-scale producers in the vicinity.
20	The production and marketing of food is most beneficial to society overall when done at the local and regional level.

The complete revised instrument can be found in Appendix D as The Sustainable Agriculture Paradigm Scale-VT Full Study. This instrument was used for both pre and post-test in the VT study. Additional open-ended questions eliciting qualitative responses were included in the post-test. These questions will be discussed in this chapter under Objective Three.

Full Study Analysis

Combining pre and post tests, 296 useable observations were obtained for analysis. “Don’t Know” responses were recoded as missing data. The instrument was then examined for scale reliability and validity.

Reliability and item discrimination. The internal consistency of the instrument, computed using Cronbach’s Alpha, was .913 (n=176). The pairwise selection option is not available in this test, thus 120 cases were excluded due to missing data. Item discrimination values reported for items 3, 9, 12, and 18 were low ($<.3$) indicating that these items are measuring something different from the scale as a whole. All other items scored $>.3$. (see Table 4-6).

Table 4-6

Item Correlations and Discrimination - Sustainable Agriculture Paradigm Scale-VT Full Study (24 Items, N=296).

Item Number	Scale Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	Farming is first and foremost a business like any other.	.398	.913
2	The key to agriculture's future success lies in learning to imitate natural ecosystems and farm in harmony with nature.	.630	.908
3	Healthy rural communities are essential for American agriculture's future success.	.281	.914
4	All costs associated with agricultural production should be borne by the producer rather than the taxpayer, although this may raise the price of industrially produced food.	.417	.912
5	Agricultural animals should have adequate space to move around comfortably.	.732	.907
6	As a consumer I am willing to pay more for products coming from facilities that provide for animal welfare beyond common industry standards.	.727	.906
7	Farmland should be farmed to protect the long-term capacity of the land.	.481	.911
8	Humans have the right to use agricultural animals as they see fit.	.707	.906
9	The decline in the number of farmers will result in the loss of farming knowledge and experience.	.128	.918
10	Food production and marketing done at the national and international level is most beneficial for the average citizen.	.508	.910
11	The production of the food I eat should not cause pain and discomfort to animals.	.662	.907

Table 4-6 (continued)

Item Number	Scale Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
12	The cost of improving working conditions that cause negative health effects to employees in animal feeding operations must be weighed against the current economic needs of the business.	.037	.921
13	The primary goal of farmers should be to maximize the productivity, efficiency and profitability of their farms.	.710	.906
14	Modern agriculture must be modified to become ecologically sound	.674	.908
15	Too much attention has been given to the welfare of agricultural animals in recent years.	.804	.904
16	The opening of a large-scale agricultural production facility in a community may have detrimental economic effects on small-scale producers in the vicinity.	.424	.912
17	The “ecological crisis” facing humankind has been greatly overstated.	.691	.906
18	When workers move to rural communities and become employed by large agricultural enterprises in low-paying jobs, the community may experience increased educational, health, and law enforcement costs.	.096	.918
19	Agricultural animal welfare should be improved only if it can be done without increasing costs of production.	.776	.905
20	The production and marketing of food is most beneficial to society overall when done at the local and regional level.	.469	.911
21	Economic benefits from large corporate agricultural enterprises are more likely to benefit non-resident owners than people living in the community in which the business is located	.354	.913
22	High energy use, soil erosion, water pollution, etc. are evidence that U.S. agriculture is not nearly as successful as many believe it to be.	.748	.905
23	Soil and water are critical to life and should be strictly conserved.	.515	.910

Table 4-6 (*continued*)

Item Number	Scale Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
24	Animal agriculture raises serious ethical questions about the treatment of animals	.797	.904

Factor analysis and construct validity. The 24 items were subjected to principal components analysis (PCA) using PASW Statistics 18. Prior to performing PCA the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Okin value was .933 meeting and exceeding the recommended value of .6 (Kaiser, 1970, 1974), and the Bartlett's Test of Sphericity (Barlett, 1954) reached statistical significance, supporting the factorability of the correlation matrix.

Principal components analysis revealed the presence of five components with eigen values exceeding 1, explaining 58.8% of the variance; however, component one accounted for 36.3% , the majority of this variance. Examining Catell's scree plot, it was noted that only one factor was located above the elbow in the plot as can be seen in Figure 4-2. Catell (1966) recommends retaining only factors above the elbow, or break in the plot, as these are the factors which contribute the most to the explanation of the variance in the data set.

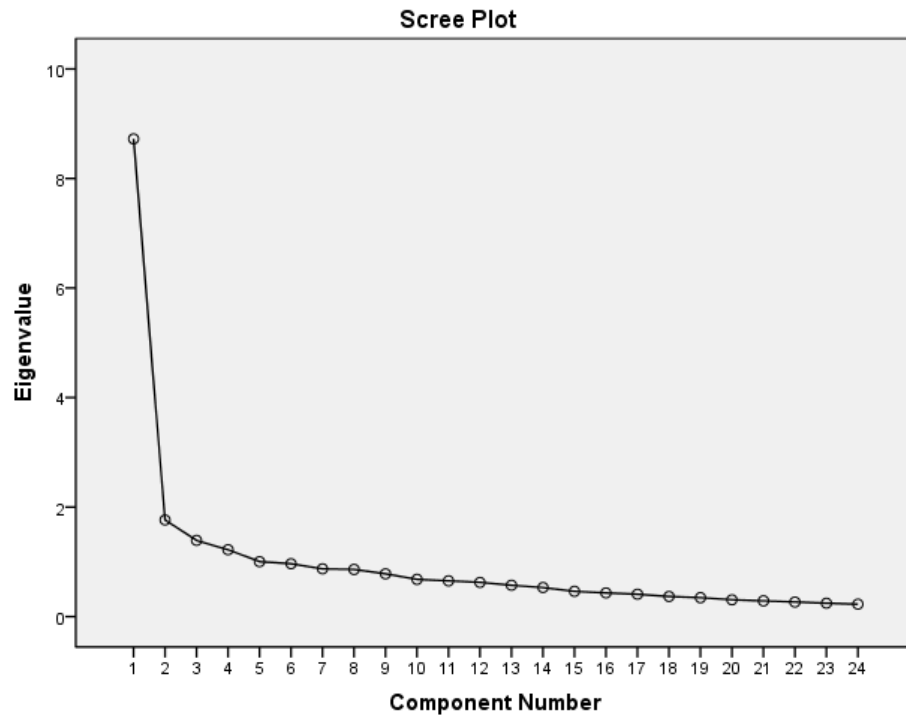


Figure 4-2. Principal Components Analysis Scree Plot - The Sustainable Agriculture Paradigm Scale-VT Full Study (24 Items, N=296).

Examining the Component Matrix, the researcher noted that most of the items loaded quite strongly ($>.4$) on the first component. Based on these analyses, a principal components analysis was conducted on the data extracting one factor. The results of this analysis indicated that all items, with the exception of 3, 9, 12, and 18, loaded quite strongly ($>.4$) on the one component as can be seen in Table 4-7. These four items are the same ones for which Cronbach's Alpha reported low item discrimination values ($<.3$).

Table 4-7

Component Matrix^a Sustainable Agriculture Paradigm Scale-VT Full Study (24 items, ordered by factor loadings, N=296).

Item Number	Scale Items	Component 1
15	Too much attention has been given to the welfare of agricultural animals in recent years.	.847
19	Agricultural animal welfare should be improved only if it can be done without increasing costs of production.	.806
24	Animal agriculture raises serious ethical questions about the treatment of animals.	.801
22	High energy use, soil erosion, water pollution, etc. are evidence that U.S. agriculture is not nearly as successful as many believe it to be.	.800
6	As a consumer I am willing to pay more for products coming from facilities that provide for animal welfare beyond common industry standards.	.793
5	Agricultural animals should have adequate space to move around comfortably.	.757
17	The “ecological crisis” facing humankind has been greatly overstated.	.752
8	Humans have the right to use agricultural animals as they see fit.	.735
14	Modern agriculture must be modified to become ecologically sound.	.718
13	The primary goal of farmers should be to maximize the productivity, efficiency and profitability of their farms.	.704
11	The production of the food I eat should not cause pain and discomfort to animals.	.676
2	The key to agriculture’s future success lies in learning to imitate natural ecosystems and farm in harmony with nature.	.668
23	Soil and water are critical to life and should be strictly conserved.	.594
10	Food production and marketing done at the national and international level is most beneficial for the average citizen.	.487
1	Farming is first and foremost a business like any other.	.475
7	Farmland should be farmed to protect the long-term capacity of the land.	.466

Table 4-7 (continued)

Item Number	Scale Items	Component 1
16	The opening of a large-scale agricultural production facility in a community may have detrimental economic effects on small-scale producers in the vicinity.	.451
20	The production and marketing of food is most beneficial to society overall when done at the local and regional level.	.445
21	Economic benefits from large corporate agricultural enterprises are more likely to benefit non-resident owners than people living in the community in which the business is located.	.400
4	All costs associated with agricultural production should be borne by the producer rather than the taxpayer, although this may raise the price of industrially produced food.	.400
3	Healthy rural communities are essential for American agriculture's future success.	
9	The decline in the number of farmers will result in the loss of farming knowledge and experience.	
12	When workers move to rural communities and become employed by large agricultural enterprises in low-paying jobs, the community may experience increased educational, health, and law enforcement costs.	
18	The cost of improving working conditions that cause negative health effects to employees in animal feeding operations must be weighed against the current economic needs of the business.	

Note: Extraction Method: Principal Component Analysis. a. 1 component extracted. Eigenvalue = 8.724. Percent of variance explained = 36.349.

Items 3, 9, 12, and 18 were removed from the scale. The remaining 20 items were retained. The internal consistency of the instrument, computed using Cronbach's Alpha, was .931 (n=218). All further statistical analyses done in this study were computed using the revised scale, The Sustainable Agriculture Paradigm Scale-VT Full Study-Revised (Appendix E).

Objective 2 – Quantitative Data and Analysis

Objective Two was to examine the impact of a carefully crafted story on college students' attitudes toward sustainable agriculture. Reported here is a description of the study population and the results of the statistical tests employed to test the hypothesis that Story-based treatments would be more effective in creating positive change in attitudes toward sustainable agriculture than would Information-based treatments. All test-score statistics are based on The Sustainable Agriculture Paradigm Scale-VT Full Study-Revised (Appendix E). Information regarding study participant demographics is reported first. This is followed by test statistics for all study participants ($N=142$) in the five treatment groups. Test statistics on comparisons between the Story/Information-based treatment groups and the Oral/Written treatment groups are then reported. Finally, the results of a Multiple Regression Analysis are presented. Study participants are then split by college, College of Agriculture and Life Sciences and College of Liberal Arts and Human Sciences, and test statistics are reported on differences between the groups in response to the treatments overall, and responses to the Information or Story-based treatments.

Study Population

Participants in the study included 77 students from the College of Liberal Arts and Human Sciences class, Global Environmental Issues, and 65 students from three different classes in the College of Agriculture and Life Sciences: Communicating Agriculture in Writing, Sustainable Economic Development, and Communicating Agriculture and Life Sciences in Speaking, for a total of 142 participants. Table 4-8 provides data regarding students' college majors. Table 4-9 provides data regarding responses to the remainder of the demographic and study-specific questions.

Table 4-8

College Majors of Study Population (N=142)

Major	<i>f</i>	%
Agricultural & Applied Economics	12	8.5
Agriculture & Life Sciences	13	9.2
Animal & Poultry Science	8	5.6
Crop & Soil Environmental Science	9	6.3
Engineering	7	4.9
Environmental Policy & Planning	18	12.7
Humanities, Science, & Environment	6	4.2
International Studies	9	6.3
Natural Resource Conservation	7	4.9
Other	24	17.0
Political Science	14	9.9
Public & Urban Affairs	10	7.0
Wildlife Management	4	2.8
Missing Data	1	.7
Total	142	100

Note: The “Other” category represents majors in which there were one or two students.

Table 4-9

Demographic and Study-Specific Characteristics of Study Population (N=142)

Demographic Question	<i>f</i>	%	Demographic Question	<i>f</i>	%
Age: Mean Age = 20 years					
Gender:			College:		
☐ Male	62	43.7	☐ Liberal Arts & Sciences	77	54.2
☐ Female	80	56.3	☐ Agriculture & Life Sciences	65	45.8
Total	142	100.0	Total	142	100.0
Political Preference:			Academic Standing:		
☐ Very liberal	9	6.3	☐ Freshman	3	2.1
☐ Liberal	35	24.6	☐ Sophomore	44	31.0
☐ Neutral	41	28.9	☐ Junior	46	32.9
☐ Conservative	42	29.6	☐ Senior	47	33.6
☐ Very Conservative	12	8.5			
Missing Data	3	2.1	Missing Data	2	1.4
Total	142	100.0	Total	142	100.0
Food Purchases			Visits to small farm		
☐ Yes, regularly.	85	59.9	☐ Yes, more than three times.	80	56.3
☐ Often	24	16.9	☐ Yes, two or three times.	38	26.8
☐ Sometimes	29	20.4	☐ Yes, once.	10	7.0
☐ Hardly ever	4	2.8	☐ No, never	14	9.9
Total	142	100.0	Total	142	100.0
Race/Ethnicity:			Meat in Diet:		
☐ Black/African American	3	2.1	☐ Not at all	10	7.0
☐ Hispanic / Latino	6	4.2	☐ Once a week or less	13	9.2
☐ White	120	84.5	☐ Two or three times a week	29	20.4
☐ Asian	11	7.7	☐ Four or five times/week	47	33.1
	2	1.4	☐ More than five times/week	43	30.3
Missing Data	142	100.0	Total	142	100.0
Total					
Residence			Visits to CAFO		
☐ Rural, farm	22	15.5	☐ Yes, more than three times.	14	9.9
☐ Rural, non-farm	16	11.3	☐ Yes, two or three times.	10	7.0
☐ Small town	24	16.9	☐ Yes, once.	13	9.2
☐ Urban area	47	33.1	☐ No, never.	104	73.8
☐ Metropolitan area	33	23.2	Missing Data	1	.7
Total	142	100.0	Total	142	100.0

Note: The abbreviation CAFO stands for concentrated animal feeding operation.

All Participants/All Treatment Groups ANOVA with Post Hoc Test.

A one-way between groups analysis of variance was conducted to explore the impact of treatment group on attitudes toward sustainable agriculture. Subjects were randomly assigned within their respective college to the following groups: Told Story ($n=37$), Read Story ($n=29$), Lecture ($n=29$), or Fact Sheet ($n=31$). In addition, there was a Control Group ($n=16$) in the College of Liberal Arts and Human Sciences. There was a statistically significant difference at the $p<.05$ in the overall ($N=142$) Change Scores [$F(4, 141)=3.0$, $p=.032$]. The eta squared statistic (.08) indicated a moderate effect size. Post hoc comparisons using the Games-Howell test indicated that the mean change score for the Read Story group (RS) ($M=.163$, $SD=.221$) was significantly different from the lecture group (LE) ($M=-.014$, $SD=.210$). There were no other statistically significant differences among the treatment groups.

Table 4-10

Mean and Standard Deviation Change Scores by Treatment Group (N=142)

Treatment Group	n	Mean	Std. Deviation
Told Story	37	.139	.290
Read Story	29	.163	.221
Lecture	29	-.014	.210
Fact Sheet	31	.017	.244
Control Group	16	.127	.261
Total	142	.085	.256

Story-based versus Information-based Treatments versus Control Group

A paired-samples t-test was conducted to evaluate the impact of the Story-based treatment, the Information-based treatment, or no treatment (Control Group) on participants' scores on the Sustainable Agriculture Paradigm Scale. There was a statistically significant increase from pre-test ($M=3.643$, $SD=.613$) to post-test ($M=3.792$, $SD=.656$, $t(65)=-4.656$,

$p < .005$) for the Story-based treatment group. The eta squared statistic (.25) indicated a large effect size. There was no statistically significant increase from pre-test to post-test for either the Information-based treatment group or the Control Group.

Story-based versus Information-based Treatments and Oral versus Read Treatments

A two way between-groups analysis of variance was conducted to explore the impact of the Information-based ($n=60$) versus the Story-based ($n=66$) treatment groups, and the Oral ($n=66$) versus the Read ($n=60$) treatment groups on change in attitude toward sustainable agriculture. The Control Group ($n=16$) was included as receiving no treatment. There was a statistically significant main effect for the Story-based treatment groups [$F(1, 138)=9.341$, $p=.003$]. The effect size was moderate (partial eta squared=.063). The main effect for Oral versus Read treatments [$F(1, 138)=1.141$, $p=.287$] and the interaction effect Oral versus Read treatments *Information versus Story treatments [$F(1, 138)=.268$, $p=.605$] did not reach statistical significance.

Multiple Linear Regression

To explore which variables in the study had the greatest influence on attitudes toward sustainable agriculture, data was analyzed using multiple linear regression. The assumptions associated with regression were verified prior to and after running the first analyses. Outliers were identified previously during data exploration and had been removed. Normality, linearity, and homoscedasticity were checked by inspecting the Normal Probability Plot which was found to lay in a reasonably straight line from bottom left to top right. The Scatterplot of the standardised residuals was found to be rectangularly shaped with most of the scores concentrated in the center along the 0 point. Multicollinearity was checked by inspecting the Tolerance and

VIF of the predictor variables. No Tolerance values were $<.10$, and no VIF values were >10 . Thus no variables needed to be removed from the analyses due to violations of assumptions.

Using the enter method, 15 variables were entered into the analysis. These were the demographic and study-specific independent variables described in Table 4-8 including: Age, Gender, College, Political Preference, Academic Standing, Food Purchases, Meat in Diet, Race/Ethnicity, Visits to Small Farm, Residence, Visits to a CAFO, and College Major. Additional independent variables entered in the analysis were Pre-test Score, Oral treatment, Story treatment, and Emotional Reaction to treatment. These were included based on the literature review, the theories underlying the research, and the likelihood of their having an effect on the Change Score. The dependent variable was Change Score.

A significant model emerged from the analysis ($F_{15,108}=1.810$, $p<.05$, Adjusted R square=.090). “Visits to a CAFO” and “Story Treatment” emerged as significant variables and are indicated by a single asterisk(*) in Table 4-11.

Table 4-11

Multiple Regression Coefficients and Significant Variables (N=142)

Variable	β	t	Sig.
(Constant)		.435	.664
Gender	.106	1.086	.280
Race/Ethnicity	-.104	-1.180	.241
Residence	-.134	-1.165	.247
Food Purchases	-.054	-.539	.591
Meat in Diet	.060	.537	.592
Visits to Small Farm	.001	.007	.995
Visits to a CAFO	-.388	-3.197	.002*
Political Preference	-.097	-.888	.376
College Major	-.135	-.885	.378
Academic Standing	.019	.197	.844
Emotional Reaction	.136	1.430	.156
Pre-Test Score	-.232	-1.661	.100
Oral Treatment	-.111	-1.158	.249
Story Treatment	.229	2.427	.017*
College	.138	.845	.400

Note: A single asterisk (*) denotes significance, $p < .05$.

Of the remaining variables, Pre-Test Score and Emotional Reaction came closest to significance. Using the enter method, I conducted a second reduced regression analysis including these two variables along with Visits to a CAFO and Story Treatment. The dependent variable was Change Score. From this analysis, A significant model emerged ($F_{4,121}=5.270$, $p < .05$, Adjusted R square=.120). Significant variables which emerged from this analysis were Visits to a CAFO, Story Treatment, and Pre-Test Score. Emotional Reaction did not reach significance. Details of the analysis are presented in Table 4-12.

Table 4-12

Significant Variables from the Reduced Regression Analysis

Variable	β	t	Sig.	sr^2 (unique)
(Constant)		-.093	.926	.
Visits to C.A.F.O.	-.350	-3.538	.001	.088
Story Treatment	.230	2.655	.009	.050
Pre-Test Score	-.231	-2.291	.024	.037

Visits to C.A.F.O. emerged as the strongest predictor of Change Score, accounting for 8.8% of the variance. The second strongest factor was Story Treatment, accounting for an additional 5% of the variance in Change Score. The third strongest factor was Pre-Test Score which accounted for 3.7% of the variance. These three variables account for 11.6% of the total variance.

Split File Analyses.

Because of the possibility of distinct responses to treatment between participants from the College of Agriculture and Life Sciences classes and participants from the College of Liberal Art and Human Sciences class, the data file was split and analyses conducted on each group separately.

Paired-sample t-test. A split file, paired sample T-test was conducted to assess the impact of differences between participants from the from College of Agriculture and Life Sciences classes (n=65) and the College of Liberal Arts and Human Sciences class (n=77) on scores on the Sustainable Agriculture Paradigm Scale across two time periods (pre-intervention and post-intervention). Among the participants from the College of Liberal Arts and Human Sciences class, there was a statistically significant increase in scores from the pre-test (M=4.0073, SD=.45843) to the post-test (M=4.0917, SD=.46424, $t(76)=-3.463$, $p<.001$). The eta squared statistic (.136) indicated a large effect size. There was also a statistically significant

increase in scores among participants from the College of Agriculture and Life Sciences classes from the pre-test ($M=3.3186$, $SD=.60350$) to the post-test ($M=3.4034$, $SD=.68248$, $t(64)=-2.290$, $p<.025$). The eta squared statistic (.075) indicated a moderate effect size.

Split file ANOVA. A split file ANOVA (College of Agriculture and Life Sciences classes ($n=65$); College of Liberal Arts and Human Sciences class ($n=77$)) was conducted to assess the effect of participation in either the Story-based or Information based-treatment group on change in scores from the pre-test to the post-test on the Sustainable Agriculture Paradigm Scale. There was a statistically significant difference at the $p<.05$ in Change Scores for participants from College of Agriculture and Life Sciences classes who experienced a story based-treatment [$F(1, 63)=6.071$, $p=.016$]. The eta squared statistic (.09) indicated a moderate effect size. There was no significant difference in Change Scores among participants from the College of Liberal Arts and Human Sciences class who had experienced a Story-based treatment as compared to an Information-based treatment. Figure 4-3 graphically illustrates the differences between treatment groups split by college.

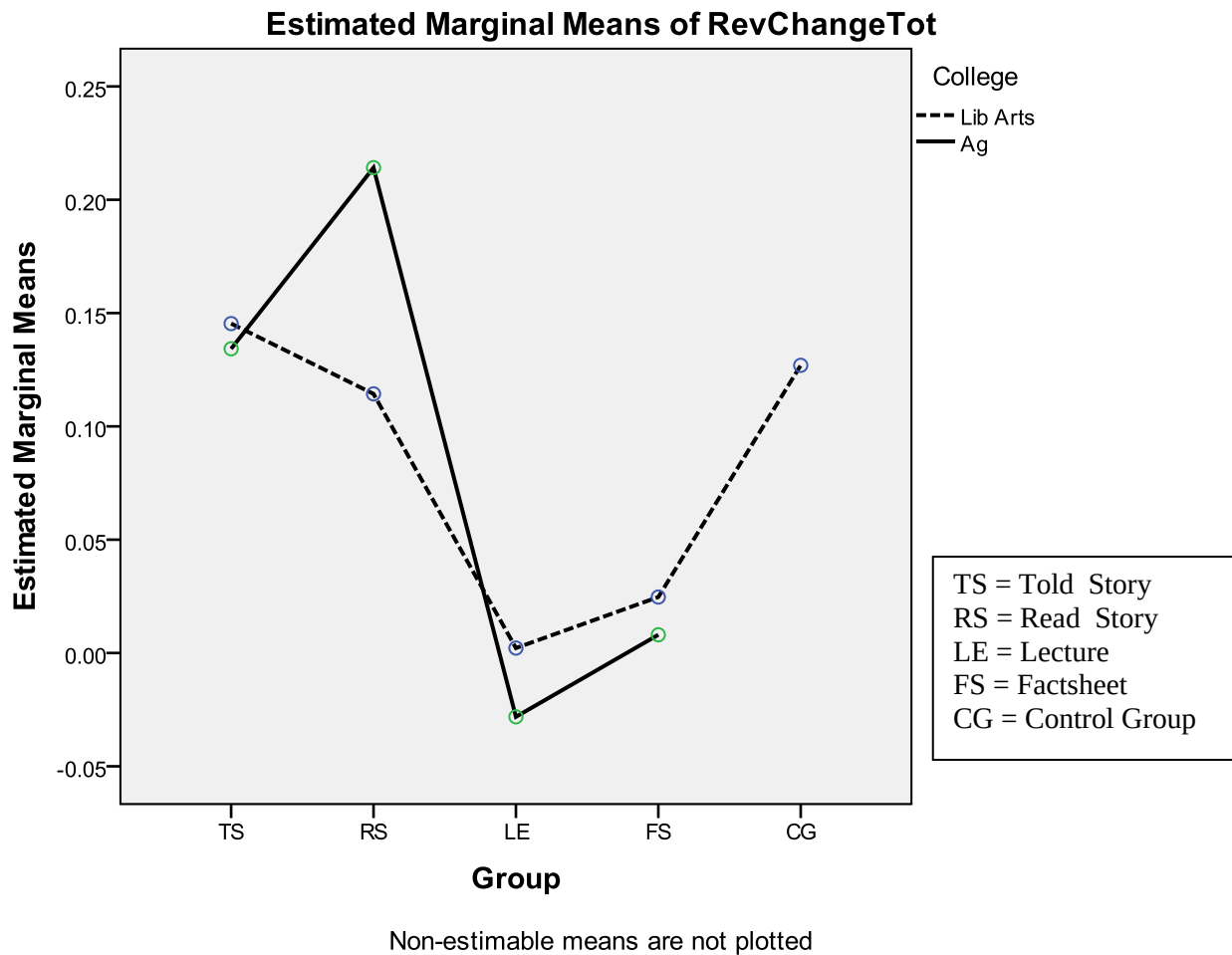


Figure 4-3. Change scores by treatment group split by college.

Objective 3 – Qualitative Data and Analysis

Objective 3 was to explore what qualities of the treatment story were associated with change in attitudes toward Sustainable Agriculture as experienced by study participants. The quantitative data was used to determine participant's degree of change by subtracting pre-test scores from post-test scores. The result was considered the Change Score. The qualitative data was analyzed using Colaizzi's (1978) phenomenological method. Qualitative and quantitative data were then mixed to explain connections and/or relationships among the quantitatively

derived constructs about attitudes toward sustainable agriculture (Creswell & Plano Clark, 2007). Presented here are the results of these analyses.

Quantitative Data

Change Scores were broken into quartiles. Scores in the top quartile ranged from +.25 to +.76. This upper quartile was designated as the “High Change” group (n=35). Scores in the bottom quartile ranged from -.12 to -.60. This lower quartile was designated as the “Low Change” group (n=34).

Table 4-13

Range of Change Scores by Quartile

Range of Scores by Quartile			
Lower Quartile (n=34)	Low Middle Quartile (n=36)	High Middle Quartile (n=37)	Upper Quartile (n=35)
-.12 to -.60	-.10 to +.08	+.10 to +.22	+.25 to +.75

Qualitative Data Analysis

Colaizzi's (1978) phenomenological method was used in analyzing the qualitative data. Written responses from the “High Change” group and the “Low Change” group were read several times to get an overview of their content. Significant phrases or sentences that referred directly to the participant's experience of the treatment were selected and recorded. I then reviewed these statements to determine meanings. The meanings were then clustered into themes which resulted in the emergence of 11 themes common to the written responses. Five of the themes emerged in responses to specific questions. The remaining six themes were not in response to a particular question but appeared randomly throughout the data. Listed here are examples of significant statements or phrases representative of those themes. They are preceded

by information regarding the question to which participants were responding and/or commentary on their statements or reactions.

The first theme to emerge when asked to describe anything about the treatment that was especially helpful or effective “in informing you about industrial farm animal production in the United States” was “First-hand personal view made it meaningful.” Quite a few participants in the Story-based groups commented on the effectiveness of the personal approach to the topic.

Examples of comments included:

- “...it made it more personal...like something I myself could do.” (ST15-L)
- “Hearing it from a person...made it real for me.” (ST3-L)
- “...the first hand view...was extremely insightful.” (ST16-L)
- “I thought that a personal story was a good way to present a viewpoint.” (ST6-A)
- “It gave me a first-hand account of a CAFO.” (RS-10A)

The second theme to emerge in response to the same question was “Vivid description made it real.” The in-depth portrayals provided in the Story-based treatments, especially those of the conditions in the CAFO, seemed to catch the imagination of the participants, allowing them to really “see” the farm as if through their own eyes. Typical comments included:

- “The descriptions of what the animals were put through...helped me realize how horrific the treatment of these animals was.” (RS8-L)
- “Great detail...put me in this setting in my mind.” (ST24-A)
- “Liked that the story was so detailed...I could create a defined picture in my head of the farm.” (ST19-A)
- “The entire story did an excellent job of describing the setting...especially in the factory.” (RS4-A)

The next theme “Sadness, concern, and empathy” emerged when participants were asked to describe their emotional reaction to the treatment. Many participants in the Story-based groups expressed a depth of feeling not present in the Information-based groups. Their expressions of sadness, concern, and empathy were for the people in the story as well as the pigs. The following comments are typical of their responses:

- “When I heard about the conditions of the animals...I literally started to tear up.” (ST12-L)
- “I was deeply saddened when the author describes the one sow as “having given up on life.” (RS12-A)
- “It was sad how that beautiful town was turning into a ghost town.” (ST16-L)
- “I love animals...I hate to hear about or see them experience inhumane treatment.” (RS7-A)
- “I was saddened by the treatment of the livestock...at the high level of human disregard.” (ST24-A)
- “I felt very sorry for the animals that died...no one seemed to care.” (ST13-L)

“Identification with the narrator” was the next theme to emerge. Participants in the Story-based groups overwhelmingly identified with the teller of the story. Those in the Information-based groups did not report identification with the lecturer or any of the animals or people mentioned. Comments from those who identified with the narrator included:

- “I would have reacted the same way. I really put myself in his shoes.” (ST12-L)
- “I can relate to the storyteller [because] I have great concern for animal welfare.” (ST15-A)
- “I could see myself as the narrator...the same situation could happen to me.” (ST15-L)
- “I identified with the main character...he was in a situation that I might find myself in.” (RS10-A)
- “Main character. Because I would have had the same reaction if I went through the plant.” (RS3-L)
- “Main character because he wanted to make a change.” (RS7-A)

“Behavior change intentions,” the next theme to emerge, were reported frequently among participants in the Story-based treatment groups and were mainly concerned with food buying decisions. Similar intentions emerged from the Information-based groups but to a lesser extent. Examples of comments included:

- “I will be more aware of where my steak or chickens are coming from.” (RS12-A)
- “When I do eat meat...I’ll look into how it was produced.” (ST12-L)
- “I plan to do more research on what I am eating and who is producing that food.” (ST24-A)
- “I would like to get involved.” (LE2-L)

- “I will consume meat in a more ecological way rather than an economic way.” (ST13-L).
- “I will be a voice for animals based on the knowledge I possess.” (ST15-A)

Some participants in all treatment groups reported “prior knowledge of CAFOs,” the next theme to surface. Some expressed their concern over these operations, others indicated support for them. There seemed to be a reluctant acceptance of the inevitability of CAFOs by some participants. Comments included:

- “Nothing I haven’t heard before.” (FS2-6)
- “I have seen videos...of the treatment of the animals in those facilities.” (FS12-L)
- “I have already heard a lot about these farms but didn’t realize how many there were.” (RS4-A)
- “I was already aware of what was going on and I’m OK with it.” (ST6-L)
- “I’m aware of the weaknesses and problems with large scale farming.” (RS3-A)

Participants from all treatment groups expressed a desire for change captured in the theme “Want to see change.” The various comments were qualitatively different, however. Some seemed hopeful that change could occur but others expressed doubt if it were possible. Others expressed a reluctant acceptance of current conditions similar to that found under the theme “Prior knowledge of CAFOs.” Comments included:

- “I’d like to see farms move to a more sustainable way of operating.” (FS15-L)
- “I was always against mass production and this story solidified my beliefs.” (RS12-A)
- “I do not like it; I am willing to pay more for better animal treatment.” (FS11-L)
- “I would support efforts to decrease industrial farms and animal cruelty.” (ST19-A)
- “I wish change could occur, but large farming operations have become standard and it is difficult for the industry to change now.” (FS9-A)
- “I feel strongly against this and wish there was something I could to change it.” (ST12-L)

Some participants expressed doubt about the accuracy of the information being presented in the treatment, giving rise to the theme “Information was biased/not true.” These doubts came primarily from the Story-based, College of Agriculture and Life Sciences treatment groups

although it was also expressed by several participants in the Information-based groups. The theme only emerged in the Low Change groups. Participant comments included:

- “It was highly biased against the meat industry.” (ST6-L)
- “I think this story was a little one-sided. I thought the class was only being told one side of the story.” (ST2-A)
- “I felt the story was ineffective in the obvious bias of it.” (ST7-A)
- “What he said is not true about the overwhelming majority of traditional Ag.” (ST12-A)
- “...it goes against a lot of facts.” (RS5-A)

Another theme which emerged primarily from participants from the College of Agriculture and Life Sciences classes, was the complaint that “People are uneducated about agriculture,” our next theme. It is this lack of understanding that causes them to question common industry practices. This theme only occurred in the Story-based, Low Change group. Comments included:

- “The story...seemed to demonstrate the ignorance of the average American consumer.” (ST6-L)
- “I don’t think he was informed about the why of hog production.” (ST2-A)
- “Americans are so ignorant of agriculture and then with one experience become “concerned citizens”. (ST4-A)
- “We farm kids have lived it our whole lives. Ask us questions!” (ST4-A)

A number of participants pointed out that CAFOs were necessary to feed the growing population resulting in the theme “Need CAFOs to feed population.” Once again, the responses were qualitatively different. Some participants indicated a reluctant acceptance of CAFOs. Others offered no apologies for them. The issue of cost came up several times in the responses. For some students, it is not only necessary to provide meat for the population; the meat must be “cheap.”

- “Industrial farm animal production is necessary to provide cheap meat to large amounts of people.” (ST6-L)
- “...there are no other feasible options. People have to eat.” (FS6-L)

- “...the human population is so large and we need to produce so many animals to feed the world.” (ST2-A)
- “...until someone comes up with a more sustainable way of cheap meat, we’re kind of stuck with them [CAFOs].” (ST18-A)
- “I do not know how you would feed the growing world population without CAFOs.” (ST10-A)

Finally, there was a group of participants solely from the College of Agriculture and Life Sciences, Story-based groups that expressed heated anger about the content of the treatment. I could sense the depth of their anger while observing them during the treatment, and again while reading their responses to the open-ended questions. This theme “Angry about treatment content” emerged primarily in the Story-based, Low Change group and included comments such as the following:

- “I’m furious. If someone wants to spew their crap...Spreading lies!” (ST12-A)
- “I was pretty disgusted because it reminded me of PETA.” (ST7-A)
- “Made me mad...it goes against facts.” (ST5-A).
- “IRRITATION with the fact that Americans are so ignorant of agriculture...” (ST4-A)
- I was very irritated by the speaker. He had a very detrimental view of production agriculture. (LE6-A)

Mixing of the Quantitative and Qualitative Data

The data was mixed by using qualitative data about participants’ experience during and immediately following the intervention to explain connections and/or relationships among the quantitatively derived constructs about attitudes toward sustainable agriculture (Creswell & Plano Clark, 2007). Themes derived from the qualitative data were matched to the High Change Story-based treatment group, the Low Change Story-based treatment group, the High Change Information-based group, and the Low Change Information-based group. Table 4-14 displays the results of this analysis.

Table 4-14

Mixing Table: Themes by Treatment and Change Group

	High Change Group (+.25 to +.76, n=35)	Low Change Group (-.60 to -.12, n=34)
Story- Based Treatment (n=35)	• First-hand personal view made it meaningful. • Vivid description made it real. • Identification with narrator. • Sadness, concern, & empathy • Behavior change intention	• Information was biased/not true. • People are uneducated about agriculture. • Sadness, concern, & empathy. • Angry about treatment content
Information- Based Treatment (n=29)	• Sadness, concern, & empathy • Behavior change intention	• Information was biased/not true. • Prior knowledge of CAFOs • Want to see change. • Sadness, concern, & empathy

Note: Four participants from the Control Group were in the High Change Group and one participant from the Control Group was in the Low Change Group.

It is interesting and instructive to observe some of the similarities and differences among the groups. Note that the theme “Sadness, concern, and empathy” occurs in all the groups. “Behavior change intention” only occurs in the High Change Groups and “Information was biased/not true” only occurs in the Low Change Groups. The High Change Story-based Group contains three unique themes: “First-hand personal view made it meaningful,” “Vivid description made it real,” and “Identification with narrator.” The Low Change Story-based Group contains one unique theme: “Angry at treatment.”

Summary

This chapter presented the findings of the study. The development process of the Sustainable Agriculture Paradigm Scale was explained including the literature review, expert panel review, pilot test analysis, and full study analysis, concluding with presentation of the resulting final instrument. Results of data analysis from the full study (N=142) were given

starting with description of the study population and followed by the outcomes of the statistical analyses conducted including ANOVA with post hoc test, Two-way ANOVA, and Multiple Linear Regression. Results of the split-file analysis including a t-test and ANOVA were reported next. Findings from the analysis of the qualitative data were then reported including the results of the mixing of the quantitative and qualitative data. The findings presented in this chapter will be discussed in detail in Chapter 5. Conclusions, recommendations, and implications will also be presented.

CHAPTER 5

SUMMARY, DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

This final chapter of the dissertation restates the research problem and reviews the principal methods used in the study. The major sections of the chapter summarize the results and discuss their implications.

Statement of the Problem

There is evidence that the American agrifood system is a significant contributor to environmental, economic, social, and ethical damage to the earth and to society and is unsustainable, yet the worldview of a substantial percentage of the population conflicts with this assessment (Ikerd, 2009; Krisberg, 2008; Pew Commission on Industrial Farm Animal Production, 2008; Pretty, 2007; Shiva, 2000; Tegtmeier & Duffy, 2004; Union of Concerned Scientists, 2008). A significant number of researchers, non-governmental organizations, and government entities assert that the detrimental effects of industrial agriculture must be addressed without delay and sustainable agricultural practices implemented (Badgley & Perfecto, 2007; Badgley et al., 2007; Horne & McDermott, 2001; Ho, 2007; Ikerd, 1996; Millennium Ecosystem Assessment, 2005; Pretty, Morison, & Hine, 2003; Tilman, Cassman, Matson, Naylor, & Polasky, 2002).

Attempting to change a long-held worldview is not an easy task. Just the suggestion that change should be considered may raise negative emotions in some people and increase resistance to change. A growing body of research in other disciplinary areas suggests that storytelling can serve as an effective method of fostering change (Denning, 2007; Festinger, 1957; Kunda, 1990; Lord, Ross, & Lepper, 1979; Westen, Blagov, Harenski, Kilts, & Hamann, 2004). With the exception of changes inspired by Rachel Carson's (1962) *Silent Spring*, storytelling has not been

explored within the domain of agriculture. There is a need for research to determine if this method of promoting change can be effective in this setting.

Research Objectives and Hypothesis

The specific objectives of the study were to:

1. Develop an instrument to measure attitudes toward sustainable agriculture including economic, environmental, social, and ethical-animal welfare dimensions.
2. Examine the impact of a carefully crafted story on college students' attitudes toward sustainable agriculture.
3. Explore what qualities of the story were associated with change as experienced by study participants.

This study hypothesized that Story-based treatments would be more effective than Information-based treatments in fostering positive change in attitudes toward sustainable agriculture among students taking a class in either the College of Liberal Arts and Human Sciences or the College of Agriculture and Life Sciences at Virginia Tech.

Review of the Methodology

A brief review of the methodology used in the study is presented here. Objective 1 is addressed first. This is followed by Objectives 2 and 3 which are combined due to the mixed-method study design.

Objective 1

The instrument development process began with a review of the literature to identify dimensions of the construct. I then operationalized the dimensions by creating a series of items designed to optimally represent each area of emphasis. The response format used was a Likert-type scale containing six options. A panel of experts reviewed the resulting instrument and the

scale was modified according to their recommendations (N=9). I conducted a pilot test of the instrument followed by practical and statistical analysis including determination of internal consistency using Cronbach's alpha and factor analysis (N=70). This led to further changes. The resulting instrument was then used as both a pre and post-test in the dissertation study to quantitatively measure change in attitudes toward sustainable agriculture (N=296). I conducted statistical analysis of responses including principal components analysis with Varimax rotation and determination of internal consistency using Cronbach's alpha. As a result, further changes were made resulting in a final instrument containing 20 items, all of which strongly loaded ($>.4$) on a single factor with a computed Cronbach's alpha of .931.

Objectives 2 and 3

This study used an embedded mixed methods design. In this type of design, one data set, in this case the qualitative, provides a supportive, secondary role in the study based primarily on the quantitative data. The study employed a two-phase (sequential) approach, using quantitative and qualitative data to answer different research questions within the study. Addressing Objective 2, the quantitative data examined the impact of a carefully crafted story on college students' attitudes toward sustainable agriculture. Study participants completed the Sustainable Agriculture Paradigm Scale which served as a pre-test. They were then exposed to one of four treatments: an oral story, a read story, a lecture, or a read factsheet. Following treatment, study participants again completed the Sustainable Agriculture Paradigm Scale to which had been added a series of open-ended questions designed to solicit qualitative data regarding participants' experience of the treatment. Addressing Objective 3, the qualitative data explored what qualities of the story were associated with change as experienced by study participants. The study mixed quantitative and qualitative data by using change scores from pre to post-test to create a "High

Change” group and a “Low Change” group. I then analyzed data from these groups using Colaizzi’s (1978) phenomenological method.

Summary and Discussion of the Results

This section presents summaries and discussion of Objectives 1, 2, and 3. Each section begins with a brief summary of the findings previously presented in detail in Chapter 4. This is followed by discussion which generally includes the relationship of the current study to prior research, theoretical implications of the study, an explanation of unanticipated findings, implications for practice, and recommendations for further research.

Objective 1 Results Summary

Objective 1 was to develop an instrument to measure attitudes toward sustainable agriculture including economic, environmental, social, and ethical-animal welfare dimensions. Principal components factor analysis and the computation of internal consistency using Cronbach’s alpha resulted in a final iteration of the Sustainable Agriculture Paradigm Scale containing 20 items all strongly loading ($>.4$) on a single factor with an internal consistency of .931 (Appendix E). The instrument appears to provide reasonably reliable and defensible estimates of college students’ attitudes toward sustainable agriculture with a somewhat greater emphasis on the environmental and ethical-animal welfare dimensions of the construct.

Relationship of the instrument to prior research. While reviewing the literature regarding the measurement of attitudes toward sustainable agriculture, I found that the number of instruments was extremely limited. The instrument most closely related to what I wanted to measure was The Alternative-Conventional Agricultural Paradigm Scale created by Beus and Dunlap in 1991. Although developed approximately 20 years ago, a more recent study of the instrument concluded that the scale was still suitable for measuring such attitudes (Katltorf &

Rasmussen, 2001). I was able to adapt some of the items from this scale for use in the instrument I was developing. The scale did not, however, contain any items related to ethical-animal welfare. Early definitions of sustainable agriculture such as that of Gips (1984) and the National Campaign for Sustainable Agriculture (as cited by Allen, 2004, p.41) included references to the humane treatment of agricultural animals. Later definitions (Ikerd, 1990; Horne & McDermott, 2001; and Lyson, 2004) did not. Due to the significant negative effects of widespread industrial livestock production, as discussed previously in Chapters 1 and 2, it was critical to include this dimension in the construct. In order to develop suitable items for this dimension, I researched surveys and studies which solely addressed attitudes toward agricultural animal welfare. These included “Attitudes of Consumers toward the Welfare of Farmed Animals” (TNS Opinion & Social, 2005), a study of almost 25,000 adults from 25 European Union countries, “Assessing Attitudes Toward Farm Animal Welfare: A National Survey of Animal Science Faculty Members” (Heleski, Mertig, & Zanella, 2004), and “Putting Meat on the Table: Industrial Farm Animal Production in America” (Pew Commission on Industrial Farm Animal Production, 2008), which included information regarding the European standards defining basic animal welfare known as “The Five Freedoms” which originated with the “Report of the Technical Committee to Enquire into the Welfare of Animals kept under Intensive Livestock Husbandry Systems” (Brambell, 1965). From these sources I was able to develop items designed to measure attitudes toward ethical-animal welfare in the context of sustainable agriculture as well as ascertain potentially pertinent demographic variables likely to affect such attitudes.

Explanation of unintended findings. I expected that the factor analysis procedures conducted on data collected using the Sustainable Agriculture Paradigm Scale would result in the

identification of the four dimensions of the construct originally discerned during the literature review as economic, environmental, social, and ethical-animal welfare. These dimensions are also referred to as “latent variables” because they are not directly observable (DeVellis, 2003). We construct scales, such as this one, to measure the presence and strength of the latent variable(s). It is the strength or quantity of the latent variable that causes a scale item to take on a certain value. Factor analysis allows us to examine the strength of the relationships between the scale items or how they “hang together” to determine the number of underlying latent variables. I expected to see four separate underlying variables. Instead, 20 of the 24 items on the scale strongly loaded ($>.4$) on a single factor. That is, 20 of the 24 items were strongly related to each other indicating the presence of a single construct underlying those items rather than the four I anticipated. The four items not loading on this factor were reflecting something other than the construct of interest. As a result, I removed them from the scale, which resulted in an instrument containing 20 items all measuring the construct “sustainable agriculture.”

The scale, therefore, does not contain the same number of items for each dimension as was originally intended. The environmental and the ethical-animal welfare dimensions contain six items, while the economic dimension contains five, and the social dimension contains three. Thus the scale is more heavily weighted with environmental and ethical-animal welfare items, slightly less so with economic items, and less so with social items. I theorize that this imbalance is associated with the overall emphasis of the study on raising livestock for human consumption, and the difficulty I encountered developing reliable items representing the social dimension and, to a lesser extent, the economic dimension of the construct.

Theoretical implications of the study. The inclusion of the ethical-animal welfare dimension was fitting for this study and appropriately enlarges the construct of “sustainable

agriculture” beyond the commonly used economic, environmental, and social dimensions. The fact that items representing all four dimensions loaded on a single factor provides evidence that they are all significantly related to the construct. I strongly recommend that future studies concerning sustainable agriculture consider the role of ethical-animal welfare as a significant dimension of the construct.

Objective 2 Results Summary: Main Effects-All Participants

Objective 2 was to examine the impact of a carefully crafted story on college students’ attitudes toward sustainable agriculture. The first section presented here reviews the findings from the analysis of all participants in the study, that is, the main effects (N=142). The second section reviews the findings from analysis of participants split by college, that is, the interaction effects between academic curriculum and attitudes toward sustainable agriculture.

A one-way between groups analysis of variance (ANOVA) exploring the impact of treatment group (Told Story, Read Story, Lecture, or Factsheet) on attitudes toward sustainable agriculture as measured by Change Scores, indicated a moderate, statistically significant difference from the pre-test to the post-test (N=142). Post hoc comparisons indicated that the mean Change Score for the Read Story group was significantly different from the Lecture group.

Following the combination of the two Story-based treatments, Told Story and Read Story, into the Story-based group, and the two Information-based treatments, Lecture and Factsheet, into the Information-based group, the results of a two-way ANOVA made the differences between treatments even more apparent. There was a moderate, statistically significant effect for the Story-based treatment group but not for the Information-based treatment group (N=142). There was also no effect for Oral (Told Story and Lecture) versus Read

treatments (Read Story and Factsheet) or an interaction between Oral versus Read and Information versus Story.

These results provide evidence in support of the study hypothesis that Story-based treatments would have a greater effect on positive changes in attitudes toward sustainable agriculture among the study population than would Information-based treatments.

To explore which variables in the study had the greatest influence on attitudes toward sustainable agriculture I used Multiple Linear Regression to analyze the data. The regression model resulted in the identification of three significant variables: Visits to a CAFO, Story Treatment, and Pre-test Score (see Figure 5-1).

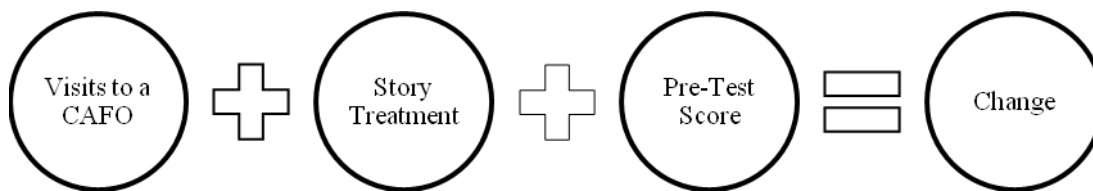


Figure 5-1. Significant variables in regression model.

Visits to a CAFO and Pre-test Score were negatively related to Change Score, while the Story Treatment was positively related. In other words, controlling for Visits to a CAFO and Pre-test Score, experience of the Story Treatment was associated with increased change. Similarly, controlling for Pre-test Score and Story Treatment, as the number of Visits to a CAFO increased, the amount of change decreased. Also, controlling for Visits to a CAFO and Story Treatment, as the Pre-test Score increased, the amount of change decreased.

Objective 2 Results Summary: Interaction Effects-by College

With the splitting of the data file into College of Agriculture and Life Sciences (CALS) classes and the College of Liberal Arts and Human Sciences (CLAHS) class, the findings became even more interesting. Participants from the CLAHS class had a large, statistically significant change from pre-test to post-test. They changed more in response to the Story-based treatments but they also changed, albeit to a lesser degree, by participating in the Information-based treatments. There was no statistically significant difference in Change Scores between the Story-based treatments vs. Information-based treatments for these participants from the CLAHS class.

A different picture emerged for participants from the CALS classes. They had a moderate, statistically significant increase in Change Scores from pre to post-test. However, CALS class participants showed a significant change only in response to the Story-based treatments. They did not change significantly in response to the Information based treatments. These findings raise the question, “Why was there a significant difference between participants from the different colleges, and what does it mean?”

By studying the results of the regression model along with participant frequency data, a possible answer to this question begins to emerge. As reported previously, the regression analysis identified the following variables as significant: Visits to a CAFO, Story Treatment, and Pre-test Score. During the data entry process I observed that students from the College of Agriculture and Life Sciences had visited CAFOs at a much higher rate than students from the College of Liberal Arts. In fact, only three students from the CLAHS class had ever visited a CAFO, whereas 34 students from the CALS classes had done so. Since Changes Scores decrease as Visits to a CAFO increase, it would seem logical that Change Scores would be lower

for participants from the College of Agriculture and Life Sciences (see Figure 5-2). This was not the case, however. The overall mean Change Score for participants from both CALS and CLAHS were quite similar (CALS: $M=0.0848$; CLAHS, $M= 0.0844$). I theorize this occurred because of an apparent interaction effect between Visits to a CAFO and Story Treatment. The CALS population experienced significantly more change due to the Story-based treatments than the Information-based treatments. This differential response seemed to offset the effects of the more frequent Visits to a CAFO. For the CLAHS population, there was no significant difference in Change Scores from one treatment to another.

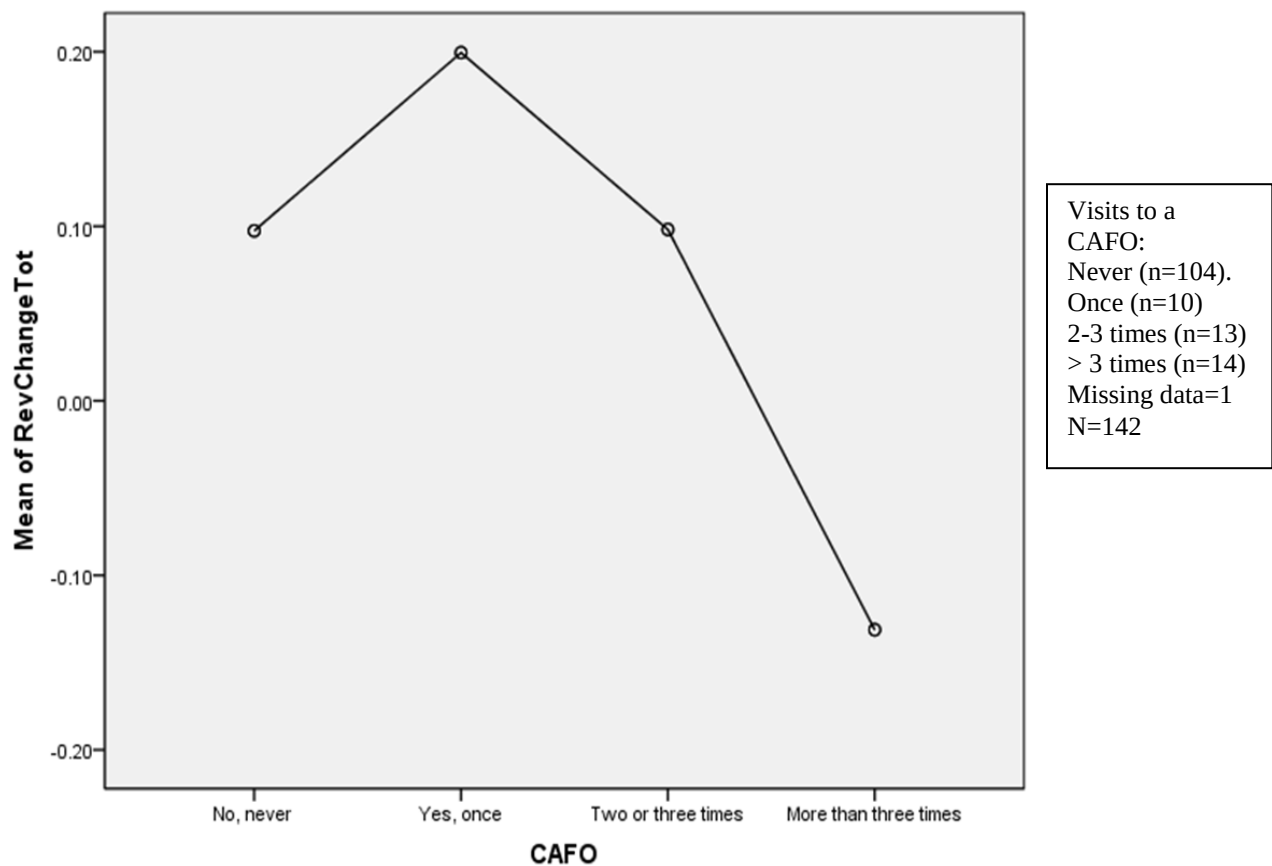


Figure 5-2. Change scores by number of Visits to a CAFO (N=142).

Thus, what appeared to be an effect associated with College affiliation, is actually an interaction effect between Visits to a CAFO and Story-treatment. It raises several interesting questions, however. Do Visits to a CAFO lead to affiliation with the College of Agriculture and Life Sciences, or does affiliation with the College of Agriculture and Life Sciences lead to Visits to a CAFO? At this point we do not have enough information to respond to these questions. More research is necessary to explore this issue.

Relationship of the study to prior research. These findings can be related to several prior studies which used stories to effect change. For example, Vaughan, Rogers, Singhal, and Swalehe (2000) reported that an entertainment-education radio soap opera, *Let's Go with the Times*, which told a story about a number of characters who provided “negative, transitional, and positive role models for HIV prevention behaviors,” was effective in promoting change (p.86). Also, Smith, Down, and Witte (2007) explored the relationship between exposure to a radio drama, *Journey of Life*, on intentions to practice at least one behavior to prevent HIV transmission in Tanzania. They found that identification with characters and emotional involvement were important elements in participants reporting intentions to practice at least one HIV prevention behavior

Numerous researchers have reported that increased knowledge of problems often does not lead to attitude and/or behavior change (Finger, 1994; Geller, Erickson, & Buttram, 1983; Mohr, Nemiroff, Beers, & Desmarais, 1995; & McKenzie-Mohr & Smith.1999).

The finding in the current study that participants who had visited CAFOs, the majority of whom were from the College of Agriculture and Life Sciences classes, *only* changed in response to the Story-based treatments, relates to the prior research on the effectiveness of storytelling to

promote change and also the ineffectiveness of Information-based treatments. It provides additional evidence in support of the study hypothesis and returns us to the theoretical basis of our study in the form of drama theory and the psychology of narratives which contend that storytelling is an effective means of fostering change. It also gives rise to an interesting and important question, “Why do students who frequently visit CAFOs reject the evidence provided in the various treatments?”

To answer this question, I believe we need to turn to several separate but related theories. The first is Festinger’s (1957) theory of cognitive dissonance which suggests that when people encounter ideas which conflict with what they believe, they filter belief-incompatible information in order to reduce the tension that results from having two conflicting thoughts at the same time. In a similar vein, Lord, Ross, and Lepper (1979) studied what happens when people are provided with arguments that run contrary to what they believe. The result was that participants found clever ways to reinterpret or set aside the contradictory evidence and became even more polarized in their beliefs. The researchers called this “confirmation bias.” Finally, researchers Westen et al. (2004) argue that what they term “emotionally based reasoning” leads to “stamping in” of defensive beliefs that allow people to feel good even when their reactions defy logic. Thus, a person can learn very little from new data as previously held beliefs are solidified. Based on these theories, it seems possible that students who had frequently visited CAFOs, that is, more than 3 times ($n=14$), responded to the negative information in one of several ways. They filtered out the negative information about CAFOs (Festinger, 1957), they reinterpreted or set aside the contradictory evidence (Lord, Ross & Lepper, 1979), or they became defensive and responded emotionally, thus “stamping in” their preconceived beliefs (Westen, et al., 2004). This resulted in decreased scores from pre to post-test on the Sustainable

Agriculture Paradigm Scale. Students who had visited CAFOs fewer than three times or not at all responded differently, resulting in small increases in scores from the pre to the post test. It is unclear at this point why three or more CAFO visits seem to activate defensive responses. The results of the qualitative data, and the mixing of qualitative and quantitative data, to be considered next, provide additional insight into this phenomenon.

Mixing of the Quantitative and Qualitative Data

This study used a Mixed Methods research design. As a method, it focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone (Creswell & Plano Clark, 2007, p. 5). Up until this point, we have been examining the findings of the quantitative data. Now we turn to the procedures for mixing the quantitative and qualitative data which must be accomplished prior to addressing Objective 3 of the study.

The first step in mixing the data was to divide study participants into groups based on their Change Scores from pre to post test. I divided the participants into quartiles, that is, four groups. Scores in the top quartile, which represents the top 25% of participants, range from +.25 to +.76. These are the study participants who experienced the largest increase in Change Scores (n=35). I designated this group as the “High Change” group. Scores in the bottom quartile, which represent the bottom 25% of participants, range from -.12 to -.60. These are the study participants who experienced the least change, who, in fact, had decreased scores from pre to post-test (n=34). I designated this group the “Low Change” group. Half of our study participants are not included in these two groups but rather in the two groups representing the middle 50%. It is the High and Low Change groups in which we are interested, however. It is

from these two groups we will learn the most about the qualities of a story that are related to either positive or negative change.

Objective 3 Results Summary

Objective 3 explored what qualities of the story were associated with change as experienced by study participants. Qualitative data had been elicited from study participants by means of written responses to a series of open-ended questions included as the final section of the Sustainable Agriculture Paradigm Scale post-test. I divided the data according to its origin in either the “High Change” or “Low Change” group.

I then analyzed the data using Colaizzi’s (1978) phenomenological method as described earlier in this chapter. This resulted in the emergence of themes common to the written responses. Five themes emerged in direct response to specific questions in the post-test instrument. An additional six themes, not associated with a particular question, but rather appearing randomly throughout the data, emerged as well. Please note that although the questions listed here refer specifically to the storytelling treatment, the word “storytelling” was changed to “reading a story,” “lecture,” or “factsheet” as appropriate.

Emerging themes: The themes which emerged in response to a specific question were:

- Please describe anything about the storytelling that was especially helpful and/or effective in informing you about industrial farm animal production in the United States.

Theme 1: First-hand personal view made it meaningful.

Theme 2: Vivid description made it real

- Please describe any emotional reaction you have had as a result of the storytelling experience.

Theme 3: Sadness, concern, and empathy for pigs and people.

- Did you identify with the person telling the story or any of the characters in the story? If so, please name who you identified with and in what way you identified with them.

Theme 4: Identification with the narrator.

- What, if any, changes will you make in your life as a result of this storytelling experience?

Theme 5: Intended behavior change.

The six additional themes which emerged not associated with a specific question but appearing randomly throughout the data included:

Theme 6: Prior knowledge of CAFOs.

Theme 7: Don't like CAFOs and want to see change.

Theme 8: Information was biased/not true.

Theme 9: People are uneducated about agriculture.

Theme 10: Need CAFOs to feed population.

Theme 11: Angry about treatment content.

“High Change” themes and “Low Change” themes. The 11 themes were then matched to the High Change Story-based treatment group, the Low Change Story-based treatment group, the High Change Information-based group, and the Low Change Information-based group (see Table 5-1).

Table 5-1

Mixing Table: Themes by Treatment and Change Group

	High Change Group (+.25 to +.76, n=35)	Low Change Group (-.60 to -.12, n=34)
Story- Based Treatment (n=35)	• First-hand personal view made it meaningful. • Vivid description made it real. • Identification with narrator. • Sadness, concern, and empathy • Behavior change intention	• Information was biased/not true. • People are uneducated about agriculture. • Sadness, concern, and empathy. • Angry about treatment content
Information- Based Treatment (n=29)	• Sadness, concern, and empathy • Behavior change intention	• Information was biased/not true. • Prior knowledge of CAFOs • Want to see change. • Sadness, concern, and empathy

Note: Four participants from the Control Group were in the High Change Group and one participant from the Control Group was in the Low Change Group.

Themes tended to be associated with a particular level of change and/or treatment group. The themes, “first-hand personal view made it meaningful, vivid description made it real, and identification with the narrator” were unique to the High Change, Story-based group. The themes, “people are uneducated about agriculture, and angry about treatment content” only emerged in the Low Change, Story-based group. Both High Change groups shared the theme “behavior change intention” while both Low Change groups shared the theme “information was biased/not true.” The Low Change Information-based group had one unique theme which was “want to see change.” All four groups shared the theme which was “sadness, concern, and empathy (*for pigs and people*).”

Returning to the question regarding why multiple visits to a CAFO seem to activate defensive responses, I believe the qualitative data provides some insight. Participants falling in the Low Change group seemed to have a personal connection or particular interest in industrial

livestock production. Some students reported working at a CAFO or knowing people who do, or having superior knowledge regarding agricultural practices as evidenced by the following statements:

- “I know of many students here that their family’s run CAFOs and they treat their animals humanely.” (ST10-A)
- “I’m familiar with agriculture and the reasoning behind many of its techniques.”(RS3-A).
- “I have lived on a CAFO all my life.” (LE13-A).

I theorize that it was this strong connection to industrial agriculture as a way of life that elicited defensive responses from these individuals. Their worldview was defined by their relationship with industrial agriculture. When their worldview was challenged by the presentation of contradictory information, their defenses were triggered.

Relationship of Findings to Theoretical Basis of Study

The two main theories providing the basis for this study include drama theory (Kincaid, 2002), and the psychology of narratives (Slater and Rouner, 2002). The following paragraphs describe how the findings of the study relate to these theories.

Drama Theory

Drama theory contends that identification with characters and emotional involvement in a narrative “induces members of the audience to reconceptualize the central problem depicted in the drama and to resolve it in a similar manner in their own lives” (Kincaid, 2002, p.150). In this study, a major theme emerging from the data of the High Change group was identification with the narrator. When participants were asked if they identified with the narrator of the story or any of the characters, they responded with statements such as the following:

- “I could see myself as the narrator...the same situation could happen to me” (ST15-L)

- “I would have reacted the same way. I really put myself in his shoes” (ST12-L)
- “Main character. Because I would have had the same reaction if I went through the plant.” (RS3-L)

This theme did not emerge in the Information-based, High Change group or in either of the Low Change groups. This provides evidence in support of the importance of identification with characters as critical to change.

The relationship between emotional involvement and change is not as clear since all groups, regardless of treatment or change score, reported having feelings of sadness, concern, and empathy for the people and the pigs. Typical comments consisted of statements such as “when I heard about the conditions of the animals...I literally started to tear up” (ST12-L), it was sad how that beautiful town was turning into a ghost town” (ST16-L), and “it makes me sick that we still treat other living things in this way” (FS12-L). In addition to comments similar to these, participants in the Story-based, Low Change group also expressed a fair amount of anger toward the storyteller and/or the content of the treatment. Perhaps most dramatic was the comment, “I’m furious! If someone wants to spew their crap...Spreading lies!” (ST12-A). More typical responses were, “IRRITATION with the fact that Americans are so ignorant of agriculture and then with one experience become ‘concerned citizens’” (ST4-A) and “I was pretty disgusted because it reminded me of PETA” (ST7-A).

Since all groups expressed similar feelings of sadness, concern, and empathy for the pigs and people, it remains unclear as to the role of this type of emotional reaction in effecting change in response to narrative. On the other hand, the anger expressed by the Story-based, Low Change group in reaction to treatment is clearly associated with lack of change. Thus, what seems to matter is not simply an emotional reaction to the narrative, but a certain type of

emotional reaction. Additional research is necessary to further explore the role of different types of emotional reactions and their relationship to change.

The Psychology of Narratives

According to Slater and Rouner (2002) the manner in which drama can affect human behavior may include the following:

- Absorption – the drama must be compelling enough to cause awareness of persuasive content to fade into the background.
- Suspension of disbelief – stories become real, all information has to be processed as if it were factual.

The theme “Vivid description made it real” emerged in the Story-based, High Change group with statements such as, “liked that the story was so detailed...I could create a defined picture in my head of the farm” (ST19-A), and “great detail...put me in this setting in my mind” (ST24-A), and “the descriptions of what the animals were put through...helped me realize how horrific the treatment of the animals was” (RS8-L). These statements speak to participants’ absorption in the story since they seemed to be creating actual pictures of the farm in their mind. Although harder to judge, it is likely that a suspension of disbelief occurred since the descriptions were making the farm seem real. According to Slater and Rouner (2002), “absorption in narrative and counterarguing are fundamentally incompatible. This blocking of counterarguing provides an extraordinary opportunity to influence individuals who would ordinarily be resistant to persuasion” (p. 174). The participants described here were undoubtedly influenced by the treatment as evidenced by their significant positive change in attitudes toward sustainable agriculture. It seems reasonable to theorize that the factors described by Slater and

Rouner (2002), absorption, suspension of disbelief, and the blocking of counterarguing, may have played a role in participants' positive attitude change.

Researcher's Reflections and Insights

Based on the findings of the data presented here, the study was successful in providing evidence in support of the hypothesis that Story-based treatments would be more effective in promoting positive change in attitudes toward sustainable agriculture than Information-based treatments. A number of additional insights emerged from the data as well.

One particularly significant lesson is the importance of knowing and understanding your audience's perceptions and attitudes toward a subject prior to planning an effective intervention. As was seen in this study, participants from the College of Liberal Arts and Human Sciences class responded with changed attitudes to all treatments including the lecture and the factsheet, albeit to a lesser extent. Students from the College of Agriculture and Life Sciences classes, who were more resistant to change based on their visits to a CAFO, only responded to the Story-based treatments. The lesson being: if you have an audience that is open to the subject you are discussing, both Information and Story-based treatments may produce change. On the other hand, if you have an audience that is resistant to your message, Story-based treatments would be a far better choice.

The Regression Analysis, derived from quantitative self-reports, did not identify "emotional reaction" as a significant variable in the model. It is worth mentioning, however, that in the qualitative follow-up data, participants in the Story-based treatment groups reported experiencing a far greater number and more extreme emotional reactions than participants in the Information-based treatments. Their responses to the open-ended questions were longer, more detailed, and displayed a depth of thought not present in the responses from the other treatment

groups. As the work of Westen et al. (2004) clearly demonstrates, emotions are highly involved in the decision making process. Thus, it is important to engage the emotions to foster change. The storytelling treatments did this effectively.

It is important to note that we were not successful in changing the attitudes of the most resistant study participants which I have identified as those who had visited a CAFO more than three times. Reviewing theories presented in Chapter 2, I believe there are some clues as to why this was the case. The psychology of narratives contends that, in order for a drama to be effective in fostering change, it must be compelling enough to cause awareness of persuasive content to fade into the background. Slater and Rouner (2002) refer to this as “absorption” (p. 174). Similarly, Green and Brock (2000) propose that “transportation” is a mechanism through which narrative can affect beliefs. They define transportation as “absorption into a story” and specify that it involves imagery, affect, and attentional focus. The manner in which these two theories relate to the study is in terms of the story used, “Visiting Jewel: A Porcine Tragedy” (Grace, 2010). After reading through the qualitative data from the “Low Change” group, it seemed as if the story did not succeed in allowing the persuasive content to fade into the background sufficiently. One such comment from a participant in the “Low Change” group was particularly notable in highlighting this. He wrote, “I knew what he was going to describe before he even said ‘pig farm’” (ST7-A).

During an intensive storytelling workshop sponsored by the Storytelling Arts Center of the Southeast in Laurensburg, North Carolina, which I attended in February 2011, I discussed with professional storyteller, Bill Lepp, how the topic of factory farming of pigs might better be addressed. He suggested a story involving the efforts of two workers in a CAFO making efforts to “free the pigs” (B. Lepp, personal communication, February 5, 2011). Upon reflection on this

suggestion, it occurred to me that this approach may do a better job of allowing the persuasive content to be less obvious than a first-person narrative like the one I used in this study.

Although not reaching the level of a “theme,” there were a number of comments that the told story was too long. The actual telling of the story ranged from 35-40 minutes. I observed that some participants started to become fidgety after the first 20 minutes or so. It may be desirable to limit the length of a told story to no more than 20 minutes. The length of the story did not seem to have the same effect on students who read the story as there were no similar complaints from this treatment group.

Revisions to the Storytelling Change Process

Reflecting upon the *Storytelling Change Process* as depicted in Figure 2-1, there are several changes I made following the study (Figure 5-2). I added the additional step “audience analysis,” before “absorption in the story.” I also changed the step concerned with “emotional involvement” and “identification with characters.” I first reversed their order since the study clearly identified “identification with characters” as important to change. I then changed “emotional involvement” to “emotional involvement or reaction” as there was evidence of both occurring in the qualitative data provided by participants. I added the words “unconscious or conscious” preceding “world view” since the qualitative data made it clear that some participants were clearly aware of their view toward sustainable agriculture while others were not. Finally, I added the words “or confirmation” to the “attitude and/or behavior change” step as some participants did not change their attitudes but had them confirmed as a result of the treatment as reported in the qualitative data. The revised figure is presented as Figure 5-3.

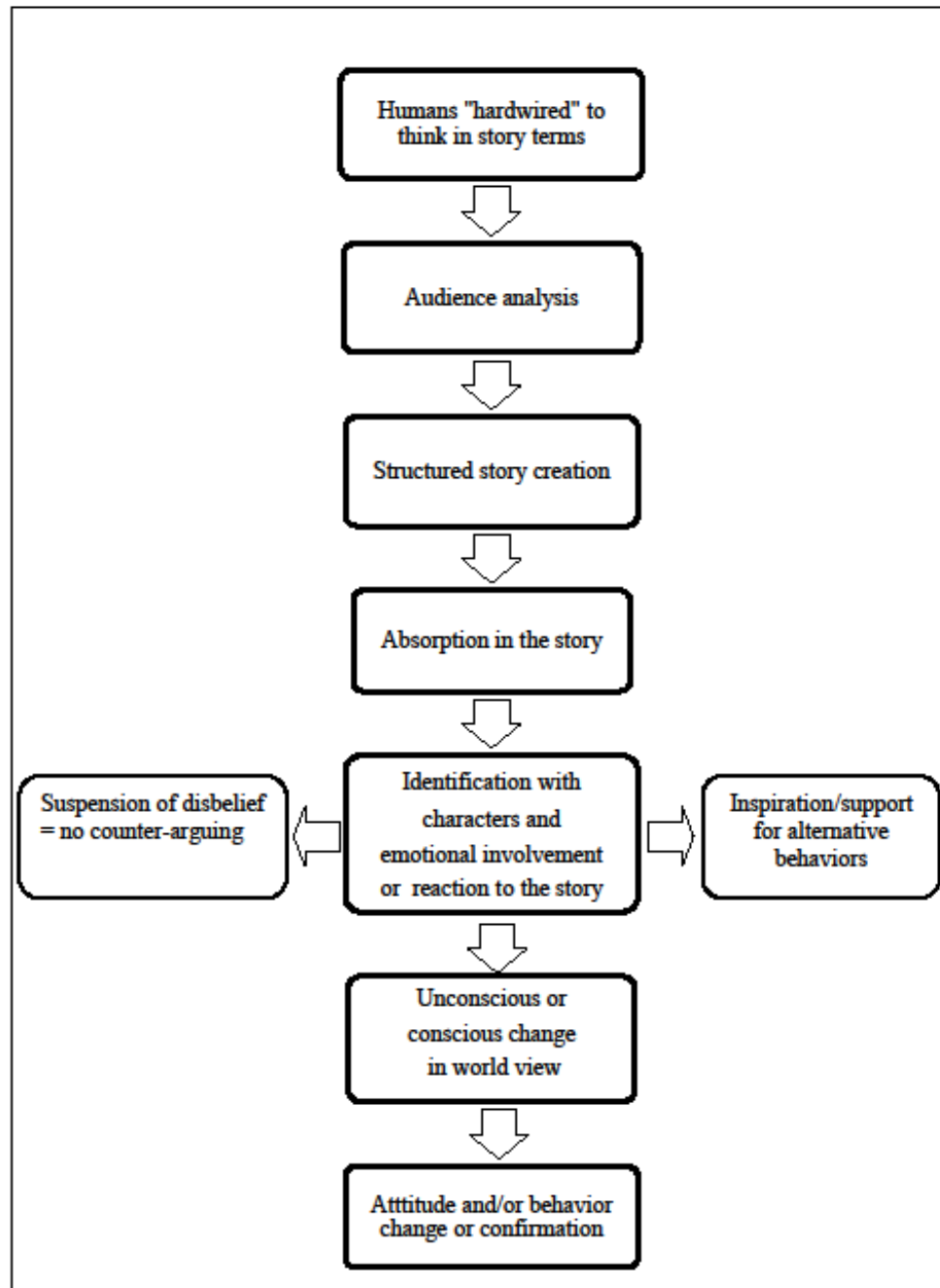


Figure 5-3: Revised Storytelling Change Process

Recommendations for Practice

1. Future studies addressing sustainable agriculture should include an ethical-animal welfare component since it is clearly related to economic, social, and environmental dimensions and plays such a significant role in the construct. The Sustainable Agriculture Paradigm Scale, developed for use in the study and described herein, may be used for this purpose. If a future researcher chooses to use the instrument in a study that focuses more on the growing of crops, it may be desirable to rewrite items 6 and 16. These two items are intended to represent the economic dimension of the construct yet include references to animals. They could easily be reworded to reflect the crop emphasis and be more fitting to that type of study.
2. When the goal of an intervention is to effect change in a particular direction, audience attitudes and characteristics deemed to be relevant to the topic should be explored prior to designing the intervention.
3. When attempting to effect change in a resistant audience, the use of storytelling should be considered as an effective intervention method.
4. Study participants in the told story group seemed to become fidgety after the first 20 minutes or so and some complained about the length of the story in their written comments. It may be wise to limit a told story to a maximum of 20 minutes.
5. When constructing a story, care should be taken to include characters to whom the audience can relate. If the story is to be orally presented, choosing an effective teller is equally important.

6. Given the power of storytelling to effect change, it should be used far more often by individuals and organizations whose mission is to promote positive change in economic, social, environmental, and animal-welfare conditions.

Recommendations for Research

1. Research is necessary to identify several additional items representing the social dimension of the construct as well as at least one more item representing the economic dimension of the construct “sustainable agriculture.” The addition of valid and reliable items in these two areas would create a balance among the dimensions and create a more broadly serviceable scale.
2. It remains unclear as to the role of emotional reaction in effecting change in response to narrative. Additional research is necessary to further explore the role of emotional involvement in a narrative as a factor in change.
3. It is unclear whether visits to a CAFO precede affiliation with the College of Agriculture and Life Sciences or came about because of it. Research into this question is recommended.
4. It seemed as if the story used in the study did not succeed in allowing the persuasive content to fade into the background for some participants. Additional research into alternative methods of story structuring is necessary to identify more effective approaches. Telling the story from a third person perspective, as recommended by Bill Lepp, as well as other options, should be considered.
5. The findings of this study are not generalizable; therefore, research is needed to determine the effectiveness of storytelling to foster change among different populations.

6. There are many problems in our society which could be effectively addressed if people were willing to change their attitudes and behaviors. The most common methods used to change behaviors include education and publicity campaigns which have generally been unsuccessful in promoting lasting change. The use of storytelling could be an effective tool for use in these situations. Research to identify means and methods for incorporating storytelling techniques in such efforts is necessary.
7. Since identification with the story narrator was so important in influencing positive attitude change in the study, further research on desirable characteristics of a story teller is recommended.

Final Thoughts on Story

We live in a world that has changed dramatically over the past 50-100 years and continues to do so. Scientific and technological advances can address some of these emerging issues. The real problem, however, lies in the social and cultural realm, wherein lies the power to change how we respond to new challenges. Thomas Berry, well known and respected cultural historian, ecologist, theologian, and prolific writer offers this commentary:

It's all a question of story. We are in trouble just now because we do not have a good story. We are in-between stories. The Old Story - the account of how the world came to be and how we fit into it is no longer effective. Yet we have not learned the new story... We need a story that will educate us, a story that will guide, heal and discipline us. (Thomas Berry, 1988, pp.123-124)

Stories are not just for children. Each day we wake up and go about living and making decisions according to our own personal "story." Our worldview consists of all the stories we have heard during the course of our lives and reflects the beliefs of those who told us their stories. To cope with the changes to come we must be willing to embrace a new story, a story that has only begun to be written. We all can have a part in writing that story. Future

generations will look back at this time in our history and judge us either wise or foolish from the story we create.

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APPENDIX A

Visiting Jewel: A Porcine Tragedy

by P. E. Grace

Have you ever experienced a time in your life, that when you look back on you think, “That was it. That was what changed everything”? I have a time like that. It was July of 1999. I was on my way from Georgia to Virginia to start my first job out of college, when my old car, which had so faithfully seen me through the last two years of high school and four years of college, started acting strangely. The dash lights were flickering and the headlights seemed to be dimming. I pulled off the highway to try to find a gas station or a 7-11 with a phone. I didn’t have a cell phone back then, and even if I had, I doubt I would have gotten any reception out there. I was on a small rural highway somewhere in North Carolina. It was about 4 in the morning. The air conditioning in my car didn’t work so I liked to travel at night. After about 20 miles, the car finally decided to quit and I found myself stranded on the side of the road. I saw some lights in the distance and started walking. After about 10 minutes, I started to get a whiff of a strange and decidedly foul odor. As I continued on towards the lights, the smell got stronger and more and more nauseating. The wind was blowing in my direction bringing the noxious fumes right into my face. I came close to upchucking that Big Mac I had had a few hours back. I had no idea what the smell was, only that I couldn’t remember ever smelling anything worse.

Soon a tall chain link fence appeared on the right side of the road. I kept walking and finally came to a gate with a sign that read “Wendell Industries.” Beyond the fence were a number of large, long buildings. There didn’t seem to be anyone about – I guess not too surprising at 4 in the morning. The gate was locked so I kept walking. No sooner had I taken a dozen steps, when I heard a series of ear-splitting, screeching sounds coming from the nearest building. I just about jumped out of my skin. Being on a dark road in the middle of the night with spine-chilling shrieks emanating from an unknown source definitely gave me the creeps and caused me to pick up my pace significantly.

Pretty soon I found myself approaching a town. I saw a sign that said “Welcome to Jewel.” Judging by its ragged appearance and fading letters, it had seen better days. I must have been about two miles or so past the gate by this time and the odor was lessening. I was apparently now upwind of the stink and I could no longer hear the painful screeching. Jewel didn’t appear to be much of town. I had passed a few distant houses and was now on what I guessed to be the main street. There were a number of boarded up shops and a couple which still looked to be in business but were closed at this early hour. About half way through the town I finally came to a lighted sign announcing “May Bell’s Café.” I tried the door and sure enough found it open. To my delight, I was greeted by the pungent smell of brewing coffee. I found myself alone in a long, narrow room with counter seating – much like an old fashioned drug store or diner - and a single row of tables draped with red and white checked tablecloths lined up along the windows facing the street. No sooner had I sat down at the counter than I heard a female voice call out from the back, “Be right with ya.” I was soon to discover that the owner of that voice was a tall - and I mean better than six feet tall - middle aged woman, with carrot-red hair tied back in a bun covered by a hair net. She came bustling out of the kitchen, stopped right in front of me, and with a quizzical look on her face announced, “And who might you be?” A little flustered by her directness, I introduced myself and told her about my car breaking down a ways out of town. Her name tag identified her as “June” and she promptly assured me that they had a great mechanic in town whose name was Emery and that his shop opened at about 7:30. She offered me coffee which I gratefully accepted. After my first cup, I asked her, “What is that awful smell outside of town?” “Oh, that’s the pig factory,” she said. “Somedays you just about can’t stand it. The Stewarts had to move out of town ‘cause of that awful smell. Their youngest boy, Jonah, always had a touch of the asthma, but after the pigs moved in, it got so bad when the wind was blowing in the right direction, that the boy could hardly breathe. After one too many trips to the emergency room they left. Lots of folks have left. The smell sticks to your clothes and gets in your house, and there’s nothing you can do to get rid of it.”

I asked, “Isn’t there something you can do about it, someone to complain to who could put a stop to it?”

June replied, “That’s what we all used to think. We complained over and over again starting with the local town council all the way up to the governor with no results. As it turns out, the people who own those farms have a lot of power in places that matter. And you can be sure they don’t live anywhere near here so they don’t have to put up with the smell.”

Just then the door opened and several older men entered and sat at one of the nearby tables. June greeted them all by name and brought them coffee and took their orders. On her way back to the kitchen she said that if I wanted to know more about the pig farm, I should talk to them. She called out to one of the men saying, “Hey, Carl, how about telling this young fella all about the pig farm?” Carl was about as short as wide as June was tall and narrow. He called me over to the table and introduced the other men as Tom and William. All three sported ball caps from various farm supply companies and looked like they spent a lot of time outdoors. Their faces were weathered looking and their hands were rough and callused. Tom said he used to raise a couple hundred pigs but now he was trying to grow some row crops. He said he gave up on the pigs because the only slaughter house within driving distance was owned by Wendell Industries and for a few years in a row they claimed they were too busy to slaughter his hogs. He just about lost his farm over that. Carl, the oldest of the group, said he gave up farming completely and was one of the lucky few who had enough money set aside to retire debt-free. William ran the local feed and seed store but said he didn’t know how long he could hold on. “Most of the local farmers went bankrupt or sold out at a big loss, got out of farming and moved away. The remaining folks – business people and such – didn’t have enough customers to keep them in business so they left too. In the beginning, some of the local folks got jobs at the pig farm but most left after a few months. They couldn’t stand the smell or the noise or the pitiful conditions of the animals. They just couldn’t take it. Now the people who work there are folks who are desperate for any job they can get. Most of them have moved here from someplace else and are barely making ends meet. Those aren’t good paying jobs

out there.” Carl, who used to serve on the town council, said that because of the loss of so many tax-paying residents and businesses and the influx of underpaid workers and their families from outside the community, the town was hard-pressed to keep up with the increased demand for educational and health services. They have also seen an increased crime rate and have struggled to pay for more law enforcement personnel. “I grew up in this town and it’s sad to see what’s happened here – all because of that damned pig farm.”

I thanked June, paid my bill, nodded to the ball-capped trio and headed for Emery’s repair shop. I arrived just as the shop was opening for the day. The building had two bays, one containing a tow truck, the other empty. A few cars were parked off to the side I supposed waiting for repairs. Emery turned out to be the male version of June – middle aged and very tall and narrow with what used to be red hair now faded to a dull bronze color. When he spotted me he asked, “What can I do for you, son?” I explained the problem with my car and asked if he would be able to tow it in and take a look at it. He said, “Sure thing but we need to wait until Todd gets here.” Todd turned out to be his nephew who worked with him in the shop. He showed up around nine and Emery and I headed out to retrieve my car. As we passed the pig farm – which was what the locals seem to all call it – Emery rolled up the windows, closed the vents, and ran the air-conditioner full blast. Even this couldn’t keep out the stench and barely kept it at tolerable levels. I began to notice things I hadn’t seen last night in the dark. Just to the south of the buildings there was what looked like the largest retention pond I had ever seen. It must have been several acres in size. I asked Emery what it was. He told me that it was the “manure lagoon” where the waste from the pigs was stored. “In open pits?” I said. He smiled and replied, “Not pits – lagoons. Makes it sound exotic, don’t you think?, but it’s still just a pile of, pardon the “French,” pig shit.” I asked, “Is that really legal?” “Legal as can be” he replied. He went on to tell me that I was lucky I wasn’t here when they got a lot of rain. That’s when the “lagoon” sometimes overflowed and there would be streams of stinking brown liquefied excrement running right across the road into the ditches which led to a stream which eventually connected up to the Neuse River. “Is that legal too?” I asked. He said it wasn’t

but that no one did anything about it. In fact, the owners of the pig farms considered it a joke. I asked him how he knew that and he told me he had an uncle who had previously been an owner of a pig farm but had gotten out of the business. He told me the Neuse River had experienced massive fish kills over the last 10 years or so and it was no longer safe to swim in the river or eat any of the fish. I was appalled and wondered why I had never known about any of this. I only lived two states away in Georgia.

After he towed my car back to the garage and took a quick look at the engine, he surmised that the alternator needed to be replaced. He'd have to order the part from over in Waterbury and that would take a day or so. The repair would take another day. It looked like I was going to be spending the next couple days in Jewel. Emery directed me to the only local motel still in business. It was about another half mile up the road. Like the rest of the town it was just this side of shabby, but the room was clean and the owner, who went by the name Miss Evelyn, was friendly and more than happy to talk about Jewel and all the local goings-on.

The first thing I did when I got to my room was take a long, hot shower, trying to get rid of the pig stink. I wasn't completely successful though. It seemed like the odor clung to everything – the curtains at the windows, the carpet on the floor, and even the plastic shower curtain. After that I crashed into the slightly lumpy bed and was dead to the world for most of the rest of that day.

When I woke up, it took me a couple of minutes to remember where I was and what had happened. It was that ever-present odor that jolted my memory. I dressed in clean clothes and headed out to try and find some dinner. I found myself back at May Bell's since it was apparently the only restaurant left in town. This time, a middle aged man, with a strong resemblance to June, was manning the counter. Turns out his name was August and he was June's older brother. I made the comment that August was certainly an unusual name. He chuckled a bit and explained that his mother, May Bell, had named all her children after months of the year. It was a family tradition. He said he was lucky to have been born in August since it would have been a lot

stranger to be named February or December. Turns out May Bell had passed away a few years earlier and had left the restaurant to June and August, her only children still living in Jewel.

There were only a handful of customers in the restaurant – maybe 20 or so. They were gathered in small groups at the tables and seemed focused on their dinners. There weren't any young people among the customers. I wondered about that and questioned August about it. He told me that just about all the young folks had left to find jobs in nearby cities. There wasn't much left for them in Jewel.

The next day, when I woke up and stepped outside, the wind was blowing in the direction of town from the pig farm. I was again reminded of what the people in this community had to live with 365 days a year. After a quick breakfast of toast and coffee at May Bell's – the stink in the air effectively suppressing my appetite, I headed over to the garage to check on my car. The part that was needed would be delayed another day. I had more time to kill so I decided to ask Emery if I would be able to tour the pig factory. By this time, I was really curious about the place and wanted to see close-up what went on there. Emery said they weren't much for visitors but said that he would talk with his Uncle Don to see if he could arrange it. Don had connections in the industry and if anyone could arrange it, it would be Don.

Later that day Miss Evelyn at the motel delivered a scrap of paper to me with a message that said simply "Don worked it out. Todd will give you a ride to the pig farm tomorrow at 8 AM. Wear old clothes and don't eat a big breakfast. Emery." With some trepidation I met Todd the next morning for the ride to the farm. He dropped me off at the gate and wished me "Good luck!" As I approached the closest building I was met by a booted and bespeckled middle-aged man, not much taller than me but about twice as broad in the shoulders. He wore a light-weight plaid shirt under faded blue coveralls. It was hard to tell what nationality he was. He could easily have been of Italian ancestry, Greek, Latino, or 100% American. With no recognizable accent, he introduced himself as Edward and said he was to be my "tour guide" and show me around the facility.

We entered the building and I was told to don a pair of rubber boots and a white jumpsuit that looked like what haz-mat teams might wear to a spill. Outfit accessories included an incongruously blue-flowered shower cap and a white surgical face mask. While I was suiting up, Edward had a coughing fit and then took out what looked like a well-used bandana and noisily blew his nose. I asked him if he was OK, and he said “Sure, sure” and proceeded to don his own protective gear similar to mine. All during this time I was hearing various sounds coming from inside the facility. There were oinks and snorts, squeals and screeches. When we were both ready, Edward led me through a heavy metal door into the first “barn.” Suddenly, the noise level increased exponentially. In addition to the sounds coming from the pigs, loud mechanical noises coming from what appeared to be a ventilation system were deafening. After I got over the shock from the noise level, I was in for a new shock. As I looked into the cavernous building, the sheer enormity of its size overwhelmed me. The common square foot measure used in buildings really didn’t apply here. I was looking into several acres of space; and there were four barns on this site! I couldn’t even guess at the number of animals in the panorama of pigs I was seeing. Edward, shouting in my ear to be heard over the din, told me that this was the finishing barn and currently contained about a thousand hogs. The pigs were housed here once they reached 50 lbs. and remained until they were ready for slaughter at about 250 lbs. The floor of the “barn” consisted of slatted concrete. Edward explained that the slats allowed the hog excrement and urine to drop through into storage tanks underneath the facility where it was liquefied and then flushed out into a lagoon. It was then periodically sprayed on the surrounding agricultural fields to fertilize crops.

I noticed a few obviously dead hogs lying on the floor in the facility. They were surrounded by other hogs that sniffed at them and poked them with their snouts. According to Edward, it was common for a number of hogs to die every day and this was figured into their accounting system. He explained that the most common cause of death was respiratory problems experienced by the hogs. This didn’t surprise me at all since I was having my own respiratory problems. I was finding it more and more difficult to breathe normally, and my eyes

were stinging and watering. I wondered what it was like for the workers who spent hours inside the building. Seemingly on cue, Edward had another violent coughing fit. When he was again able to talk I asked him if anything was done to prevent illness and death among the hogs. He explained that the feed the hogs consumed on a daily basis contained certain antibiotics which helped the hogs survive in the confined conditions as well as increasing their growth rate.

“Without the drugs we’d have a lot more dead pigs,” he told me.

Toward the end of the barn, the hogs seemed particularly crowded together and there was a lot of loud screeching and snorting coming from there. Edward explained that these particular hogs were at maximum weight and being shipped out for slaughter within the week. He said that when they get that crowded, they tended to get aggressive.

The strong smell of ammonia and other vapors was really starting to make me nauseous and dizzy. I was glad when we finally exited the building although I doubt we had been in there more than five minutes. I was later to learn that the major components of those “vapors” were hydrogen sulfide, which can cause severe respiratory and skin problems in humans, carbon dioxide, which was likely responsible for those dead hogs I saw, and methane which contributes significantly to global warming.

Edward then directed me to the building next door which he described as the gestation house. This was where the pregnant sows were kept. He pointed out that each sow was kept in an individual “enclosure” for her “safety and comfort.” I noticed that the size of the enclosure was such that the hog could barely move and couldn’t turn around. A number of the hogs were chewing on the metal bars of the cages repeatedly. I asked Edward about that. He said that lots of the sows did that throughout their entire lifetime – apparently they never stop trying to get out and it drives some of them crazy resulting in the repetitive bar-biting. Each sow spends about 5 years in the barn and is only moved to the farrowing rooms to give birth and nurse their piglets for about 10-21 days. After that she is brought back to the gestation barn where she is immediately re-impregnated.

The cycle repeats itself until the hog is no longer able to reproduce at the desired rate. She is then slaughtered. She never sees the sun, never gets to roll in the mud, root in the soil for food, or make a nest to give birth to her young, behaviors which are all considered “natural and instinctual” for a sow.

We went to the farrowing barn next. This is where the sows give birth and nurse their young. They are placed in what are called “gestation crates.” These crates are just big enough to allow the sow to lie down to nurse. The baby pigs are actually in a separate but connected crate which just allows them enough access to nurse. I noticed that two of the piglets seemed to have gotten caught up in the crate’s gate and weren’t moving. I pointed them out to Edward and he said, “Yeah, that happens.” He proceeded to pick up the dead piglets, and deposit them in a nearby garbage can. I asked what would happen to them. He told me they would wind up in the lagoon where they would decompose pretty rapidly. As we were exiting the barn I took a final look at one of the sows in her crate. She wasn’t moving and her eyes looked dead, like she had given up and was just quietly waiting to die which, I realized, she was.

There was one more barn left to visit but I had had enough and told Edward I was ready to leave. He insisted on showing me the eight acre “lagoon” where the liquefied manure was kept, and the “state of the art” irrigation system they had which automatically sprayed the manure on the surrounding agricultural fields. He explained that the lagoon was about 25 feet deep and lined with clay. When the level in the lagoon reached a certain height, the waste was applied to nearby fields where they primarily grew corn.

After slogging through what looked and smelled suspiciously like the same substance contained in the lagoon, we arrived back at the main entrance. After removing my protective apparel, I thanked Edward and began the hike back towards town. I think I was in a state of shock or disbelief about what I had experienced. I was glad I hadn’t eaten breakfast. It was impossible for me reconcile what I had seen with I had always believed to be true about American farming. I had not just toured a farm. I had toured a factory where they referred to living creatures as “units” and where the animals never saw the light of day from birth to slaughter.

They never got to be pigs. They never had the pleasure of rolling around in the mud or rooting around in the soil – what I had always envisioned the essence of “pig” to be.

When I got back to the motel I couldn’t get in the shower quick enough. I must have spent half an hour and run the motel hot water tank dry just trying to get rid of the stink. I couldn’t wash the vivid pictures out my mind though. I wish I could have. I threw away the clothes I had worn to the farm and put on some clean ones. I then called Emery to see about my car. It was ready so I packed up, picked up the car, paid the bill and headed out of town. I wanted to get as far away from there as fast as I could. I thought putting distance between myself and Jewel would help ease my mind and I still had a couple of hundred miles to drive to reach Charlottesville. After a few hours on the road, I found that the distance didn’t help. I just couldn’t put aside or forget what I had seen and heard and smelled.

For a few days after arriving in Charlottesville, I was busy unpacking, getting my bearings around town, and getting ready for my new job. Every time I went out to eat a meal though I was reminded of Jewel. I found I couldn’t stomach anything that had come from a pig. The thought of what that animal had suffered to provide that barbeque or that piece of bacon was foremost in my mind. I kept asking myself the ethical question, “Do we have the right to cause such suffering to those animals so we can enjoy our morning bacon, or roast pork for Sunday dinner?” I wish I had never seen Jewel or visited “Wendell Enterprises.” Ignorance is indeed bliss. Now that I was no longer ignorant I couldn’t ethically continue eating pork.

Unfortunately or fortunately, depending on how you look at it, I was born a very curious person. I started doing some research on how animals are commonly raised for food production in the U.S. I thought that maybe what I had seen was the exception to the rule. I learned that that was not the case – far from it. Ninety-nine percent of all animals raised for food in the U.S. are raised in animal feeding operations like the one in Jewel. Apparently chickens had it worse than the pigs – particularly laying hens that were crammed in what were called “battery cages” where they each had about the size of a piece of notebook paper to move around in.

I didn't want to become a vegetarian. I always thought that "those people" were kind of strange and weird and I didn't relish the thought of becoming one of them. What pushed me over the edge though was an "act of God" called Hurricane Floyd. The storm dumped 15-20 inches of rainfall on eastern North Carolina in mid September, 1999 – just two months after my visit to Jewel. Ten percent of the state's "CAFO's" (which is the official name for operations such as the pig farm in Jewel) were flooded and thousands of pounds of putrefying waste were washed into the rivers and estuaries in that part of the state. Drinking water was contaminated in many locations. It was at this time that I learned that there were more than 2,000 concentrated animal feeding operations in east North Carolina alone and they were all licensed under the premise that all waste would remain "on site." This was not the only manure spill that had occurred in the state in recent year causing major fish-kills and dangerous algal blooms – it was just the most extensive. But that was only part of it. An estimated 2.4 million chickens, 500,000 turkeys, and 100,000 hogs were drowned in the flooding and became part of the toxic stew that threatened the health of humans and all land and marine life in the region.

Weird or not, I could no longer support these industries with my food dollars. I became a vegetarian and remained one for about five years. Sometime in 2005 I started hearing about farms that were raising animals on pasture in much more humane conditions. I first learned of this while eating at Chipotle's, a popular chain restaurant. I found out that the Charlottesville Chipotle's purchased their beef from a farm located outside of Staunton, Virginia. The name of the farm is Polyface and is run by a farmer by the name of Joel Salatin. Well, I had to see this for myself. I found out that they regularly give tours of the farm and I signed up for one. What I experienced during my visit there was 180 degrees different from what I had seen in Jewel. Polyface is really a farm. Beef, hogs, turkey, and chickens are raised on pasture. They are not subjected to inhumane conditions. The pigs are pigs. They get to roll around in the mud and root around in the soil. This meat I could eat! After my visit there and the contacts I had made, I learned that there were other farmers that were raising animals this way. Most of them sold their meat and poultry at local farmers markets and received top dollar for their

products. Yes, their meat was more expensive than what is available in most supermarkets. I also learned that those supermarket prices were actually deceptively low. For example, who do you think paid for the environmental clean-up in North Carolina after Hurricane Floyd? Who pays for the federal subsidies provided to large grain farmers whose products wind up feeding the hogs, chickens, and beef in the animal feeding operations. It's the taxpayer. It's you and I. So although those prices in the supermarket seem low we are actually paying a whole lot more than we think – it just comes in a different package.

I am no longer a vegetarian although I have come to respect those who are. Some who choose to follow a vegetarian diet object to the killing of animals for any reason including human consumption and, although I don't share their objections, I respect them for standing on their principles.

I feel like I've come full-circle since those days in July more than 10 years ago when I spent some time in the town of Jewel, North Carolina. I'm not the same person I was then. I have a whole new appreciation for the food on my plate and the animals who sacrifice their lives to provide it. It pains me that confined animal feeding operations like Wendell Industries continue to be the primary source of the meat in America and, increasingly, throughout the world. These facilities exist in spite of our knowledge of the significant damage to the environment they can produce, their destructive social and economic effects on rural communities and the people who live there, and the extreme pain and suffering of the animals raised on these "farms." What disturbs me most, perhaps, is the seeming indifference of many of my fellow humans to these practices. I'd like to think that we, as a species, are better than that.

I don't want you to think that it's all doom and gloom though. I am encouraged with the increasing recognition I sense among my friends and neighbors of the ugly realities associated with industrial meat production and their efforts to purchase meat from farms that strive to raise their animals humanely and sustainably. The percentage of people doing this is as yet small. I hope that with increasing awareness and the growing availability of meat from sustainable sources, the numbers will grow. That's why I'm telling you my

story today. It is my small contribution towards making the world a better, healthier place for all its inhabitants – human and non-human alike.

APPENDIX B

Industrial Farm Animal Production in America**A Summary of a Report of the Pew Commission on Industrial Farm Animal Production (2008)**

The Pew Commission on Industrial Farm Animal Production was established through a grant from the Pew Charitable Trusts to The Johns Hopkins Bloomberg School of Public Health to recommend solutions to the problems created by concentrated animal feeding operations in four primary areas: public health, the environment, animal welfare, and rural communities. The commission heard approximately 54 hours of testimony from stakeholders and experts, received technical reports from academics from institutions across the country, and visited operations in Iowa, California, North Carolina, Arkansas, and Colorado, to gather information on each of the subject areas. In addition, each of the Commissioners brought his or her own unique experiences and expertise to bear during Commission deliberations.

Over the past 50 years, the production of farm animals for food has shifted from the traditional, extensive, decentralized family farm system to a more concentrated system with fewer producers, in which large numbers of animals are confined in enormous operations. While we are raising the same number of swine as we did in 1950, for example, we are doing so on significantly fewer, far larger farms, with dramatically fewer farm workers. This production model—sometimes called industrial farm animal production—is characterized by confining large numbers of animals of the same species in relatively small areas, generally in enclosed facilities that restrict movement. In many cases, the waste produced by the animals is eliminated through liquid systems and stored in open pit lagoons.

The industrial farm animal production system, as it exists today, often concentrates economic power in the hands of the large companies that process and sell the animal products instead of the individuals who raise the animals. In many cases, the “open market” for animal products has completely disappeared, giving the farmer only one buyer to sell to, and one price to be received.

In addition to raising animals in closer proximity, steps were taken to streamline the process of raising animals for food, including standardized feed for rapid weight gain and uniformity; genetic selection to accentuate traits, such as leanness, that create uniform meat products; and mechanization of feeding, watering, and other husbandry activities. This streamlined processing and standardization is typical of the evolution of industrial pursuits, and is intended to be more economical by lowering the amount of input required to achieve a marketable product, as well as to ensure a uniform product. This process in food animal production has resulted in farms that are easier to run, with fewer and often less-highly skilled employees, and a greater output of uniform animal products. However, there are unintended consequences of this type of animal production. Standard methods of industrial farm animal production have led to a number of social, economic, environmental, and animal-welfare related problems.

Environmental Problems

Much of the environmental impact of industrial farm animal production occurs due to the massive quantities of animal waste that are concentrated around such facilities and can cause the following problems.

- Animal waste in such volumes may exceed the capacity of the land to absorb the nutrients and mitigate pathogens.
- Many such facilities are located in vulnerable locations, such as flood plains or close to communities that utilize well water.
- Manure in such large quantities carries excess nutrients, chemicals, and microorganisms that find their way into waterways, lakes, groundwater, soils, and airways.
- Excess application of untreated animal waste on cropland contributes to excessive nutrient loading, and, ultimately, eutrophication of surface waters.
- Runoff from facilities carries antibiotics and hormones, pesticides, and heavy metals which have been found in surface waters of agricultural watersheds.
- Air quality degradation occurs as a result of localized releases of toxic gases, odorous substances, particulates, and bioaerosols containing a variety of microorganisms and human pathogens.
- Greenhouse gases, primarily methane, carbon dioxide, and nitrous oxide are produced by the animals during digestion. Additional emissions result from degradation processes occurring in uncovered waste lagoons and digesters.
- Industrial farm animal production uses high levels of resources including water and fossil fuels.

Animal Welfare

Industrial methods of farm animal production have produced concern and debate over just what constitutes a decent life for animals and what kind of life we owe the animals in our care. Physical health as measured by absence of some diseases or predation, for example, may be enhanced through confinement since the animals may not be exposed to certain infectious diseases or sources of injury that would be encountered if the animals were raised out of confinement. It is clear, however, that good animal welfare can no longer be assumed based only on productivity or absence of disease. The following issues have been raised as cause for concern.

- The intensive confinement practices that are common in these facilities so severely restrict movement and natural behaviors that the animals may not be able to turn around or walk at all. Gestation and restrictive farrowing crates for sows are examples of this type of intensive confinement.
- The stress resulting from such confinement can result in animals that are more susceptible to disease and more likely to spread disease.
- The inability of animals to express natural behaviors such as rooting and social behavior for hogs, walking on natural materials, and enough floor space to move around with some freedom at the minimum.

- Animal scientists in Europe have published a set of standards to define basic animal welfare measures. These include five major categories which must be taken in their entirety: feeding regimens that ensure that animals do not experience prolonged hunger or thirst; a good thermal environment; freedom of movement; health management that prevents physical injury, disease, and pain; and appropriate means to allow animals to express non-harmful social behaviors, and other, species-specific natural behaviors. (Note: The animal industry has resisted codifying these standards as common practice for fear of adding to new costs to animal production practices.)

Economic Impact on Rural Communities

Life in rural America has long been challenged by persistent poverty. The causes are many, but among them is the lack of economic diversity in rural economies. Workers have few options in the event of a plant closure or other dislocation, and unemployment rates are high. Consequently, local economic development officials frequently consider industrialized farm animal production an attractive new source of economic opportunity. It has been found, however, that these facilities fail to economically benefit the community in which they are located and may, in fact, place additional financial burdens upon citizens.

- Higher rates of poverty are equally prevalent in areas of high industrial farm animal production (as in other similar, rural communities).
- In Iowa counties with industrialized hog production it has been found that there are higher rates of food stamp use.
- Industrialization has been accompanied by increasing farm size and gross farm sales but lower family income, higher poverty rates, lower retail sales, lower housing quality, and lower wages for farm workers.
- As the food animal industry shifted to a system with a reduced number of companies for livestock producers to sell to, as well as one controlled by production contracts, economic power shifted from farmers to livestock producers.
- Farmers relinquished their once-autonomous animal husbandry decision-making authority in exchange for contracts that provide assured payment but require substantial capital investment. Once the commitment is made to such capital investment many farmers have no choice but to continue to produce until the loan is paid off. Such contracts make it nearly impossible for there to be open and competitive markets for most hog and poultry products, who must enter into contracts with the meat packing companies if they are to sell their product.
- Industrialization leading corporate ownership has found that the current method of intensive swine production is only economically efficient due to the externalization of costs associated with waste management.
- Industrialization leading to corporate ownership draws investment and wealth from the communities in which specific industrial farm animal production facilities are located.

Social/Health Impact on Rural Communities

One of the most serious unintended consequences of industrial food animal production is the growing public health threat of these types of facilities. The following problems have been identified.

- An increase in the pool of antibiotic-resistant bacteria because of the overuse of antibiotics.
- Industrial farm animal production facilities can be harmful to workers, neighbors, and even those living far from the facilities through air and water pollution, and via the spread of disease.
- Workers in and neighbors of industrial farm animal production facilities experience high levels of respiratory problems, including asthma.
- Workers can serve as a bridging population, transmitting animal-borne diseases to a wider population.
- A lack of appropriate treatment of enormous amounts of waste may result in contamination of nearby waters with harmful levels of nutrients and toxins, as well as bacteria, fungi, and viruses, all of which can affect the health of people both near and far from industrial farm animal production facilities.

Recommendations

As a result of the findings of this study, the Pew Commission on Industrial Farm Animal Production makes the following recommendations:

- The use of antibiotics and other antimicrobials as growth promoters and in the absence of a diagnosed illness in industrial animal operations should be phased out and then banned.
- Improve disease monitoring and tracking by establishing a voluntary animal tracking system.
- Topography, climate, and population density must be taken into consideration when siting a proposed industrial animal production facilities.
- Industrial farm animal production facilities should be regulated as rigorously as other industrial operations, and that a new system of laws and regulations for dealing with farm waste should be implemented.
- Phase out, within ten years, all intensive confinement systems that restrict natural movement and normal behaviors, including swine gestation crates, restrictive swine farrowing crates, cages used to house multiple egg-laying chickens (battery cages), and the tethering or individual housing of calves for the production of white veal.
- Vigorously enforce current anti-trust laws to restore competition in the farm animal market.
- A major focus should be increasing public research dollars into industrial farm animal production, since this form of animal agriculture impacts so many aspects of life.

Reference

Pew Commission on Industrial Farm Animal Production. (2008). Putting meat on the table: Industrial farm animal production in America. Baltimore, MD: The John Hopkins Bloomberg School of Public Health. Complete report can be retrieved from http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Industrial_Agriculture/PCIFAP_FINAL.pdf

APPENDIX C

The Sustainable Agriculture Paradigm Scale-Pilot Study

Welcome! This survey is designed to help us understand your attitudes toward agriculture and the raising of animals for human consumption in the United States. The survey should take approximately 15 minutes. Please follow the directions provided and read through the definitions we have provided for a better understanding of the survey questions.

Definitions

Animal agriculture: The use of this term here refers to livestock raised for human consumption, for example, pigs, meat cattle, and chickens

Concentrated animal feeding operation (CAFO): the practice of raising farm animals in confinement at high stocking densities (i.e. meat cattle > 1,000; pigs > 2,500; chickens > 100,000).

Ecology: The science of the relationships between organisms (including humans) and their environments.

Directions: Listed below are a series of statements. Please indicate the extent to which you agree or disagree with each statement by checking (✓) the corresponding box to the right. If you do not know enough about the statement to have an opinion, select the "Don't know" option. Please mark <u>only one</u> box.		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Don't Know
1.	Farming is first and foremost a business like any other.						
2.	The key to agriculture's future success lies in learning to imitate natural ecosystems and farm in harmony with nature.						
3.	As long as animals are producing, (i.e. gaining weight, producing eggs, etc.) it can be assumed they have good animal welfare.						
4.	Healthy rural communities are essential for American agriculture's future success.						
5.	The cost of food in the U.S. is deceptively low because many costs are externalized (e.g., subsidies to some farmers; pollution due to nutrient leaching and runoff; damage to roads from truck traffic.).						
6.	Modern agriculture is a minor cause of ecological problems.						
7.	Agricultural animals should have adequate space to move around comfortably.						
8.	Farm traditions serve no purpose for modern agriculture.						
9.	As a consumer I am willing to pay more for products coming from facilities that provide for on animal welfare beyond common industry standards.						
10.	Farmland should be farmed to protect the long-term capacity of the land.						

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Don't Know
11. Humans have the right to use agricultural animals as they see fit.						
12. The decline in the number of farmers will result in the loss of farming knowledge and experience.						
13. Production, processing, distribution, and marketing of agricultural products are best done at national and international levels.						
14. Soil and water should be used so as to maximize production.						
15. The production of the food I eat should not cause pain and discomfort to animals.						
16. Concerns over the routine use of antibiotics and hormones in animal agriculture have been greatly exaggerated.						
17. Farming is as much a way of life as it is a business.						
18. Land should be farmed to maximize annual profits; long term productivity must take second priority to the current economic needs of the farm.						
19. Agricultural animals should have access to the outdoors and suitable pasture.						
20. Negative health effects are often experienced by workers in CAFO's.						
21. The primary goal of farmers should be to maximize the productivity, efficiency and profitability of their farms.						
22. Modern agriculture must be modified to become ecologically sound.						
23. Too much attention is given to the welfare of agricultural animals in recent years.						
24. When CAFO's begin operation in a community, small farmers often cannot compete and are ultimately driven out of business.						
25. The "ecological crisis" facing humankind has been greatly overstated.						

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Don't Know
26.	The production of inexpensive meat, eggs, and dairy products justifies maintaining agricultural animals under crowded conditions.						
27.	Additional economic, environmental, and social burdens are placed on rural communities where CAFO's are located.						
28.	The key to agriculture's future lies in the continued development of advanced technologies that will overcome nature's limits.						
29.	Agricultural animal welfare should be improved only if it can be done without increasing costs of production.						
30.	Production, processing, distribution and marketing of agricultural products are best done at local and regional levels.						
31.	Non-resident owners are the main beneficiaries of profits from large CAFO's located in rural environments.						
32.	Agricultural animals should be able to lie down on comfortable bedding.						
33.	High energy use, soil erosion, water pollution, etc. are evidence that U.S. agriculture is not nearly as successful as many believe it to be.						
34.	People who criticize industrial methods of raising livestock just don't understand animal agriculture.						
35.	The crowded conditions of animals raised in CAFO's can lead to increased incidences of food-borne illness in humans.						
36.	Soil and water are critical to life and should be strictly conserved.						
37.	It is important to meet the majority of the behavioral needs of agricultural animals. (i.e., those behaviors animals have evolved to perform and are highly motivated to engage in).						
38.	Animal agriculture raises serious ethical questions about the treatment of animals						
39.	CAFO's have a negative impact on air and water quality in communities.						

**In order to understand our respondents better, we need to ask you a few background demographic questions.
Please complete the following questions as indicated.**

1. What is your age? _____
2. What is your gender?
 - ☐ Male
 - ☐ Female
3. What is your race/ethnicity?
 - ☐ American Indian or Alaska Native
 - ☐ Black or African American
 - ☐ Hispanic or Latino
 - ☐ White
 - ☐ Asian
 - ☐ Hawaiian or Other Pacific Islander
 - ☐ Other _____
4. In what type of area have you spent the greatest portion of your life?
 - ☐ Rural, farm
 - ☐ Rural, non-farm
 - ☐ Small town (25,000 or fewer people)
 - ☐ Urban area (25,001-100,000 people)
 - ☐ Metropolitan area (More than 100,000 people)
5. Do you purchase food for yourself and/or your family?
 - ☐ Yes, regularly.
 - ☐ Often
 - ☐ Sometimes
 - ☐ Hardly ever
 - ☐ Never
6. On a weekly basis, how often do you eat meat (poultry, beef, pork, etc.)
 - ☐ Once a week or less
 - ☐ Two or three times a week
 - ☐ Four or five times a week
 - ☐ More than five times a week
 - ☐ Not at all
7. Have you ever visited a small farm which rears animals?
 - ☐ Yes, more than three times.
 - ☐ Yes, two or three times.
 - ☐ Yes, once.
 - ☐ No, never.
8. Have you ever visited a Concentrated Animal Feeding Operation?
 - ☐ Yes, more than three times.
 - ☐ Yes, two or three times.
 - ☐ Yes, once.
 - ☐ No, never.
9. In political matters people talk of "the left" and "the right." How would you place your views on this scale? Please circle the number you choose.

Left										Right	
1	2	3	4	5	6	7	8	9	10		
10. What is your college major? _____

**Thank you for participating
in our study!**

APPENDIX D

The Sustainable Agriculture Paradigm Scale-VT Full Study

Welcome! This survey is designed to help us understand your attitudes toward agriculture and the raising of animals for human consumption in the United States. The survey should take approximately 15 minutes. Please follow the directions provided and read through the definitions we have given for a better understanding of the survey questions.

Definitions

Animal agriculture: The use of this term here refers to livestock raised for human consumption, for example, pigs, beef cattle, and chickens

Concentrated animal feeding operation (CAFO): the practice of raising farm animals in confinement at high stocking densities (i.e. beef cattle > 1,000; pigs > 2,500; chickens > 100,000).

Ecological: Related to ecology – the science of the relationships between organisms (including humans) and their environments.

Directions: Listed below are a series of statements. Please indicate the extent to which you agree or disagree with each statement by checking (✓) the corresponding box to the right. If you do not know enough about the statement to have an opinion, select the "Don't know" option. Please mark only one box. →		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't Know
1.	Farming is first and foremost a business like any other.						
2.	The key to agriculture's future success lies in learning to imitate natural ecosystems and farm in harmony with nature.						
3.	Healthy rural communities are essential for American agriculture's future success.						
4.	All costs associated with agricultural production should be borne by the producer rather than the taxpayer, although this may raise the price of industrially produced food.						
5.	Agricultural animals should have adequate space to move around comfortably.						
6.	As a consumer I am willing to pay more for products coming from facilities that provide for animal welfare beyond common industry standards.						
7.	Farmland should be farmed to protect the long-term capacity of the land.						
8.	Humans have the right to use agricultural animals as they see fit.						
9.	The decline in the number of farmers will result in the loss of farming knowledge and experience.						

		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree		Don't Know
10.	Food production and marketing done at the national and international level is most beneficial for the average citizen.							
11.	The production of the food I eat should not cause pain and discomfort to animals.							
12.	The cost of improving working conditions that cause negative health effects to employees in animal feeding operations must be weighed against the current economic needs of the business.							
13.	The primary goal of farmers should be to maximize the productivity, efficiency and profitability of their farms.							
14.	Modern agriculture must be modified to become ecologically sound.							
15.	Too much attention has been given to the welfare of agricultural animals in recent years.							
16.	The opening of a large-scale agricultural production facility in a community may have detrimental economic effects on small-scale producers in the vicinity.							
17.	The "ecological crisis" facing humankind has been greatly overstated.							
18.	When workers move to rural communities and become employed by large agricultural enterprises in low-paying jobs, the community may experience increased educational, health, and law enforcement costs.							
19.	Agricultural animal welfare should be improved only if it can be done without increasing costs of production.							
20.	The production and marketing of food is most beneficial to society overall when done at the local and regional level.							
21.	Economic benefits from large corporate agricultural enterprises are more likely to benefit non-resident owners than people living in the community in which the business is located							

		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree		Don't Know
22.	High energy use, soil erosion, water pollution, etc. are evidence that U.S. agriculture is not nearly as successful as many believe it to be.							
23.	Soil and water are critical to life and should be strictly conserved.							
24.	Animal agriculture raises serious ethical questions about the treatment of animals							

**In order to understand our respondents better, we need to ask you a few background demographic questions.
Please complete the following questions as indicated.**

1. What is your age? _____
2. What is your gender?
 - ☐ Male
 - ☐ Female
3. What is your race/ethnicity?
 - ☐ American Indian or Alaska Native
 - ☐ Black or African American
 - ☐ Hispanic or Latino
 - ☐ White
 - ☐ Asian
 - ☐ Hawaiian or Other Pacific Islander
 - ☐ Other _____
4. In what type of area have you spent the greatest portion of your life?
 - ☐ Rural, farm
 - ☐ Rural, non-farm
 - ☐ Small town (25,000 or fewer people)
 - ☐ Urban area (25,001-100,000 people)
 - ☐ Metropolitan area (More than 100,000 people)
5. Do you purchase food for yourself and/or your family?
 - ☐ Yes, regularly.
 - ☐ Often
 - ☐ Sometimes
 - ☐ Hardly ever
 - ☐ Never
6. On a weekly basis, how often do you eat meat (poultry, beef, pork, etc.)
 - ☐ Not at all
 - ☐ Once a week or less
 - ☐ Two or three times a week
 - ☐ Four or five times a week
 - ☐ More than five times a week
7. Have you ever visited a small farm which rears animals?
 - ☐ Yes, more than three times.
 - ☐ Yes, two or three times.
 - ☐ Yes, once.
 - ☐ No, never.

8. Have you ever visited a Concentrated Animal Feeding Operation?

- ☐ Yes, more than three times.
- ☐ Yes, two or three times.
- ☐ Yes, once.
- ☐ No, never.

11. What is your academic standing?

- ☐ Freshman
- ☐ Sophomore
- ☐ Junior
- ☐ Senior

9. In political matters people talk of "the left" (aka "Conservative") and "the right" (aka "Liberal"). How would you place your views on this scale?
Please circle the number you choose.

Left (Liberal)		Right (Conservative)		
1	2	3	4	5

10. What is your college major? _____

Additional comments: _____

**Thank you
for your participation
in our study!**

APPENDIX E

The Sustainable Agriculture Paradigm Scale –VT Full Study-Revised

Welcome! This survey is designed to help us understand your attitudes toward agriculture and the raising of animals for human consumption in the United States. The survey should take approximately 15 minutes. Please follow the directions provided and read through the definitions we have given for a better understanding of the survey questions.

Definitions

Animal agriculture: The use of this term here refers to livestock raised for human consumption, for example, pigs, beef cattle, and chickens

Concentrated animal feeding operation (CAFO): the practice of raising farm animals in confinement at high stocking densities (i.e. beef cattle > 1,000; pigs > 2,500; chickens > 100,000).

Ecological: Related to ecology – the science of the relationships between organisms (including humans) and their environments.

Directions: Listed below are a series of statements. Please indicate the extent to which you agree or disagree with each statement by checking (✓) the corresponding box to the right. If you do not know enough about the statement to have an opinion, select the "Don't know" option. Please mark <u>only one</u> box. →		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't Know
1.	Farming is first and foremost a business like any other.						
2.	The key to agriculture's future success lies in learning to imitate natural ecosystems and farm in harmony with nature.						
3.	All costs associated with agricultural production should be borne by the producer rather than the taxpayer, although this may raise the price of industrially produced food.						
4.	Agricultural animals should have adequate space to move around comfortably.						
5.	As a consumer I am willing to pay more for products coming from facilities that provide for animal welfare beyond common industry standards.						
6.	Farmland should be farmed to protect the long-term capacity of the land.						
7.	Humans have the right to use agricultural animals as they see fit.						
8.	Food production and marketing done at the national and international level is most beneficial for the average citizen.						
		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't Know

		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree		Don't Know
9.	The production of the food I eat should not cause pain and discomfort to animals.							
10.	The primary goal of farmers should be to maximize the productivity, efficiency and profitability of their farms.							
11.	Modern agriculture must be modified to become ecologically sound.							
12.	Too much attention has been given to the welfare of agricultural animals in recent years.							
13.	The opening of a large-scale agricultural production facility in a community may have detrimental economic effects on small-scale producers in the vicinity.							
14.	The "ecological crisis" facing humankind has been greatly overstated.							
15.	Agricultural animal welfare should be improved only if it can be done without increasing costs of production.							
16.	The production and marketing of food is most beneficial to society overall when done at the local and regional level.							
17.	Economic benefits from large corporate agricultural enterprises are more likely to benefit non-resident owners than people living in the community in which the business is located							
18.	High energy use, soil erosion, water pollution, etc. are evidence that U.S. agriculture is not nearly as successful as many believe it to be.							
19.	Soil and water are critical to life and should be strictly conserved.							
20.	Animal agriculture raises serious ethical questions about the treatment of animals							

In order to understand our respondents better, we need to ask you a few background demographic questions.

Please complete the questions on the next page as indicated.

1. What is your age? _____
2. What is your gender?
 - ☐ Male
 - ☐ Female
3. What is your race/ethnicity?
 - ☐ American Indian or Alaska Native
 - ☐ Black or African American
 - ☐ Hispanic or Latino
 - ☐ White
 - ☐ Asian
 - ☐ Hawaiian or Other Pacific Islander
 - ☐ Other _____
4. In what type of area have you spent the greatest portion of your life?
 - ☐ Rural, farm
 - ☐ Rural, non-farm
 - ☐ Small town (25,000 or fewer people)
 - ☐ Urban area (25,001-100,000 people)
 - ☐ Metropolitan area (More than 100,000 people)
5. Do you purchase food for yourself and/or your family?
 - ☐ Yes, regularly.
 - ☐ Often
 - ☐ Sometimes
 - ☐ Hardly ever
 - ☐ Never
6. On a weekly basis, how often do you eat meat (poultry, beef, pork, etc.)
 - ☐ Not at all
 - ☐ Once a week or less
 - ☐ Two or three times a week
 - ☐ Four or five times a week
 - ☐ More than five times a week

7. Have you ever visited a small farm which rears animals?
 - ☐ Yes, more than three times.
 - ☐ Yes, two or three times.
 - ☐ Yes, once.
 - ☐ No, never.
8. Have you ever visited a Concentrated Animal Feeding Operation?
 - ☐ Yes, more than three times.
 - ☐ Yes, two or three times.
 - ☐ Yes, once.
 - ☐ No, never.

9. In political matters people talk of "the left" (aka "Liberal") and "the right" (aka "Conservative"). How would you place your views on this scale?
Please circle the number you choose.

Left (Liberal)		Right (Conservative)		
1	2	3	4	5

10. What is your college major? _____

11. What is your academic standing?
 - ☐ Freshman
 - ☐ Sophomore
 - ☐ Junior
 - ☐ Senior

Additional comments _____

**Thank you for your participation
in our study!**

APPENDIX F

Study Open-Ended Questions

Note: Sufficient space and time was provided to respond to these questions at length.

Directions

Please read these questions carefully and then answer each one as completely as possible. If you need additional space for your answer, please continue writing on the back of the page. Please write or print legibly. Your thoughtful answers to these questions will help us understand in greater depth your ideas and feelings about industrial farm animal production in the United States.

1. Please describe anything about the storytelling experience that was especially helpful and/or effective in informing you about industrial farm animal production in the United States.
2. Please describe anything about the storytelling experience that you considered ineffective in informing you about industrial farm animal production in the U.S.
3. Please describe any emotional reaction you have had as a result of the storytelling experience.
4. How would you categorize your emotional reaction? Please circle your response.

Strong Moderate Slight None

5. If you did not experience any emotional reaction, please describe what the storytelling experience was like for you.
6. Did you identify with the narrator (the storyteller) or any of the characters in the story? If so, please name who you identified with and in what way you identified with them.
7. Have your attitudes toward industrial farm animal production changed after the storytelling experience? If so, please describe how they have changed.
8. How would you categorize your attitude change? Please circle your response.

Very Significant Significant Small None

9. If your attitudes have not changed, please describe how they have been confirmed or reinforced.
10. What, if any, changes you will make in your life as a result of this storytelling experience?
11. Please share any additional comments here.