AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Agribusiness and Applied Economics Report No. 449 **December 2000**

Societal Perceptions of Agriculture

Cheryl Wachenheim
Richard Rathge

Department of Agribusiness and Applied Economics
Agricultural Experiment Station
North Dakota State University
Fargo, ND 58105

ACKNOWLEDGMENTS

Our appreciation is extended to the Office of Research at North Dakota State University for partial support of this research under the Grants in Aid Program (Grant Number 1119) and the Census and Data Bureau at North Dakota State University for developing the questionnaire and conducting the survey.

Thanks are also extended to Norma Ackerson for document preparation and Dwight Aakre, Dean Bangsund, and Larry Leistritz for their useful comments and suggestions. While their input helped strengthen this report, any errors of omission, logic, or otherwise are the sole responsibility of the authors.

We would be happy to provide a single copy of this publication free of charge. You can address your inquiry to: Carol Jensen, Department of Agribusiness and Applied Economics, North Dakota State University, PO Box 5636, Fargo, ND 58105-5636, (Ph. 701-231-7441, Fax 701-231-7400), (email: cjensen@ndsuext.nodak.edu) or electronically from our web site: **http://agecon.lib.umn.edu/ndsu.html**

NOTICE:

The analyses and views reported in this paper are those of the author(s). They are not necessarily endorsed by the Department of Agribusiness and Applied Economics or by North Dakota State University.

North Dakota State University is committed to the policy that all persons shall have equal access to its programs, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

Information on other titles in this series may be obtained from: Department of Agribusiness and Applied Economics, North Dakota State University, P.O. Box 5636, Fargo, ND 58105. Telephone: 701-231-7441, Fax: 701-231-7400, or e-mail: cjensen@ndsuext.nodak.edu.

Copyright © 2000 by Cheryl Wachenheim and Richard Rathge. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

TABLE OF CONTENTS

Page

List of Tables ii

List of Figures iii

ABSTRACT iv

HIGHLIGHTS v

INTRODUCTION 1

LITERATURE REVIEW 1
- Perceptions of Farm Size and Organization 2
- Perceptions of Agriculture's Relationship with the Environment 3
- Perceptions of the Economic Contribution of Agriculture to Local Areas 4
- Impact of Social and Physical Distance on Perception 4

METHODS 6

RESULTS 8
- Respondent Population 8
  - Farms Owned and Operated by Respondents 9
  - Respondent Locale 11
  - Association with Farming 14
  - Demographics 14
- Perceptions of Farming 16
  - General Perceptions 16
    - Environmental Impact 17
    - Farm Size 18
    - Economic Impact 18
  - Experience with or Exposure to Livestock 19
  - Locale of Residence 23

CONCLUSIONS 26

REFERENCES 28

APPENDIX 32

LIST OF TABLES

Table Page

1. Contact with Farm Workers, Percent of Those Responding/ Type of Farm Associate 14

2. Respondent Agreement/Disagreement with Statements Regarding Farming 16

3. Correlation in Respondents' Level of Agreement with Statements Regarding Agriculture and the Environment 18

4. Perception Comparison, Livestock Workers versus Other Respondents 20

5. Perception Comparison, Livestock Associates versus Other Respondents 22

6. Perception Comparison by Locale of Residence 24

7. Significance of Difference in Average Perception by those Residing on a Farm, in a Rural Area but not on a Farm, or in a City or Town 25

APPENDIX TABLE

1. Categorical Level of Agreement with Statements Regarding Farming 33

LIST OF FIGURES

Figure Page

1. North Central Region 7

2. Respondents Who Lived on Farm (yes) and Length of Time Lived on Farm (years) 8

3. Tenure of Respondents in Community 9

4. Acres Owned or Operated 9

5. Net Household Income from Farming Operation 10

6. Source of Net Farm Income of Farm Respondents 11

7. Distance to City of at Least 100,000 Inhabitants 11

8. Population of Nearest City or Town 12

9. Distance to Nearest Farm 13

10. Years Living On or Within Five Miles of Farm 13

11. Respondent Level of Education 15

12. Respondent Education Level by Farm Owner or Operator Status 15

ABSTRACT

Tension between farm operators and their surrounding neighbors within rural communities continues to escalate as residents become increasingly removed from production agriculture. An expanding gap exists between public perceptions of the effects of the structure and production practices of modern agriculture, and reality. Combined with a shrinking farm population and support base, misperceptions may have important consequences for farm legislation and regulations. Obtaining knowledge about how the public views agriculture is a necessary step in correcting misperceptions and may help the industry and policy makers understand the beliefs and values of the populace. Collecting information about perceptions of agriculture among residents of the North Central Region of the United States was the goal of this study. Data came from a two-stage random sample of households in the North Central Region. Counties in the region were first stratified by location relative to a metropolitan center and by population change between 1980 and 1998. Next, 50 households within each of 5 counties in a strata were surveyed by telephone. The survey included 13 questions eliciting perceptions regarding the impact of agriculture on the local economy, environmental concerns, appropriateness of current farming regulations, and consequences of farm structure.

In general, respondents had a favorable view of agriculture. They overwhelmingly agreed that farmers have a positive impact on their local economy. Three-fourths agreed that a loss of farmers in the region would greatly hurt the local economy; respondents living near small towns were the most likely to agree. Overall, farmers were considered good environmental stewards and existing environmental regulations were perceived as appropriate. A majority of respondents agreed that noise, odor, and other environmental issues associated with farming in their area are minimal. Respondents had strong negative opinions about how the consolidating structure of agriculture will influence the environment, society, and local economies, and a majority agreed the government should do more to help farmers in their area stay in business. Perceptions of those who are or have associates who are economically dependent on livestock differed from those held by other respondents. Respondents themselves receiving or with associates who receive income from or work with livestock were less likely than other respondents to agree that there exist environmental issues associated with farming and that additional environmental legislation is needed. Place of residence also influenced perception. In general, farm residents expressed greater concern about the impact of farm consolidation, perceived there to be less of an environmental concern associated with farming, and more strongly agreed existing legislation regulating agriculture is appropriate than either rural non-farm or city residents.

Key Words: perceptions, rural issues, agriculture, structural change, environment

HIGHLIGHTS

Dominant themes of public debate related to production agriculture include changes in the industry's structure, the impact of structural changes, and agriculture's effect on the environment and local economies.

- ❏ Although there is no generally accepted definition of a family farm, policies designed to protect its existence continue to hold tremendous public sway.
- ❏ Public concern exists regarding the impact of modern agricultural practices on the environment and the role of the government in regulating those practices.
- ❏ Evidence regarding the impact of farm structure on rural communities is inconclusive.

The experience, knowledge, socioeconomic characteristics, attitudes, and temporal attributes of an individual may influence their perception of agriculture. The perceptions of 584 residents of the North Central Region of the United States were elicited by phone survey. Respondents shared their perceptions of the impact of agriculture on the local economy, farmers' interaction with the environment, the role of farm structure on the environment, economy, and society, the responsibilities of non-farm residents, and the role of government in assisting farmers, protecting the environment, and restricting the size of livestock farms.

✓ Characteristics of Respondents

- ❏ Forty-two percent lived in a city or town, thirty-three percent in a rural area but not on a farm, and twenty-five percent on a farm. Nearly two-thirds of respondents have lived or currently live on a farm.
- ❏ Twenty-eight percent reported owning or operating a farm. Farms were, in general, specialized in crops or livestock.
- ❏ Two-thirds had lived in their current community for more than fifteen years; nearly all for more than one year.
- ❏ Respondents lived an average of 108 miles from a city with at least 100,000 inhabitants. One-third lived within 50 miles, one-third lived between 50 and 100 miles, and one-third lived over 100 miles from a city of at least 100,000 inhabitants.
- ❏ More than half lived in or resided near a town of fewer than 2,500 inhabitants, nearly eighty percent lived in or resided near a town of fewer than 10,000 inhabitants.
- ❏ Ninety percent lived within five miles of the nearest farm, over half lived within one mile.
- ❏ Twenty-seven percent had worked on a farm during the past five years. Forty-two percent had a family or household member, fifty-two percent had a relative, sixty-four percent had a close friend or associate, and sixty percent had an acquaintance who worked on a farm during the past five years.
- ❏ Eighty-nine percent were high school graduates and twenty-five percent had a bachelor's degree. Nineteen percent of those owning or operating a farm had a bachelor's degree compared to thirty percent of other respondents who had obtained the same level of education.
- ❏ Twenty-eight percent reported owning (at least one-third interest) or operating a business, including farms.

✓ Perceptions of Agriculture

‣ GENERAL PERCEPTIONS -- Overall, respondents had a favorable view of agriculture. A majority of respondents strongly agreed that farmers have a positive impact on their local economy, noise, odor, and other environmental issues associated with farming in their area are minimal, the loss of farmers in the region will greatly hurt the local economy, and the government should do more to help farmers in their area stay in business.

❑ Overall, farmers are considered good environmental stewards and existing environmental regulations are perceived as appropriate.
❑ Respondents overwhelmingly agreed that farmers have a positive impact on their local economy. Three-fourths agreed that a loss of farmers in the region would greatly hurt the local economy; respondents living near small towns were more likely to agree than those living closest to larger towns or cities.
❑ Respondents had strong negative opinions about how the consolidating structure of agriculture will influence the environment, society, and local economies.

‣ INFLUENCE OF EXPOSURE TO LIVESTOCK — Perceptions of respondents who are or have associates who are economically dependent on livestock differed from other respondents.

❑ Respondents receiving income from or working with livestock were less likely than other respondents to agree that there exist environmental issues associated with farming and that additional environmental legislation is needed.
❑ Respondents who worked or knew someone who worked on a livestock farm were also more supportive of the current role of agriculture in the environment.

‣ INFLUENCE OF PLACE OF RESIDENCE – Perceptions of agriculture and the associated responsibilities of residents and the government differed between farm, rural non-farm, and city residents. In general, farm residents expressed greater concern about the impact of farm consolidation, perceived there to be less of an environmental concern associated with agriculture, and more strongly agreed existing legislation regulating agriculture is appropriate.

❑ Farm residents more strongly agreed than rural non-farm residents that farmers shop locally, loss of farmers in the region will greatly hurt the local economy, and consolidation of farms will have an undesirable social and economic consequence, and that poor economic conditions will likely lead to this consolidation.
❑ Farm residents less strongly agreed than city residents that farmers are creating an environmental concern and more strongly agreed that environmental issues associated with farming are minimal and that environmental laws regulating farming practices are too strict.
❑ Farmers less strongly agreed than either rural non-farm or city residents that more restrictive ordinances should be allowed as areas develop. Level of agreement among rural non-farm residents was lower than among city residents.
❑ Farm residents more strongly agreed than either rural non-farm or city residents that, in farming areas, non-farm residents need to become accustomed to concerns related to farming. Rural non-farm residents more strongly agreed than city residents.
❑ Farm residents more strongly agreed than non-farm rural residents that there should be no restrictions on the size of livestock operations regardless of locale. Mean level of agreement among city residents was between that of farm or rural residents.

Societal Perceptions of Agriculture

Cheryl Wachenheim and Richard Rathge[1]

INTRODUCTION

In a true free market economy, which exists only in textbooks and other academic work, competitive forces determine what mixture of productive activities will exist in a state, region, or country. In reality, people also influence the type, structure, and practices of industries through their voice in public policy. Legislative and other policies result in rules designed to reflect values, goals, and beliefs of citizens. If citizens misjudge the value or impact of an industry, they may work against the competitive forces otherwise defining its role in our economy, society, and environment. Fortunately, misperceptions about industries whose impacts are not widely understood by the general public can be corrected. However, those perceptions must first be recognized and, whenever possible, understood. Public perceptions are an important input into the policy making process and understanding them can help an industry select strategies to articulate its value to the public.

Unfortunately, there is little unbiased information on general public opinion regarding issues important to forming, implementing, and interpreting legislation that may have implications on agricultural production. This information is important as the work of state legislatures and even local governments continues to influence the industry. This effort is a step in responding to the challenge of accumulating information relevant to policy makers who are charged both with understanding public opinion and developing responsive legislation. The specific purpose of this research is to examine perceptions residents in the North Central Region of the United States have about agriculture.

LITERATURE REVIEW

There is a growing body of literature that explores the public's perceptions about production agriculture and the issues they consider important (e.g., Wachenheim and Lesch 2000; Roper Starch Worldwide Inc. 2000[2]). Three dominant themes emerge as focal points of discussion[3]. The first centers on the changing structure and organization of farming. Most of the controversy involves debate regarding family versus corporate farming. A second general theme sparking public debate centers on environmental issues related to farming. This debate is heating

---

[1] Cheryl Wachenheim is an Assistant Professor of Agribusiness and Applied Economics at North Dakota State University. Richard Rathge is a Professor in the Departments of Sociology and Agribusiness and Applied Economics at North Dakota State University. In a separate article, Rathge and Wachenheim (2000) employ a model of social distance to predict respondents' perceptions of critical farm issues. Measures of social distance performed poorly in predicting respondents' perceptions on three constructs relating to farm size, environmental concerns, and the impact of agriculture on the local economy.

[2]Two points are noteworthy. First, public perception does not define reality. Second, in large part the result of a real or perceived level of ignorance about modern agriculture among the populace, most information collected about public perception does not include detail about what residents believe to be an appropriate structure for agriculture or what they view to be acceptable production practices. That is, apparently researchers assume the populace does not know enough about these issues to identify appropriate alternatives.

[3]Other issues also serve as focal points for debate (e.g., animal welfare).

up as residential developments continue their expansion into formerly rural areas and the structure of agriculture continues to evolve. A third general theme considers the economic contribution of agriculture to local economies.

Literature presenting evidence related to these issues and how they are perceived by the public is inconclusive, especially regarding the effect of farm structure on local economies. Existing literature about public perception regarding farm structure and the impact of production agriculture on the environment and economy is reviewed in the following sections. Literature regarding how social distance from agriculture influences perception is then presented.

Perceptions of Farm Size and Organization

The public is clearly concerned about the "industrialization of agriculture" and the demise of the "family farm" (Benjamin 1997; Kennedy 1999). However, no generally accepted definition of a "family farm" exists (Economic Research Service). The term "family farm" may in fact be too broad or too value laden to be useful in policy making (Carmen 1980). However, although some economists continue to discount supporting arguments, policies that explicitly support the family farm continue to hold tremendous public sway.

Wachenheim and Lesch (2000) asked Illinois residents to indicate the degree to which they agree with statements regarding the motivations of farmers and the performance and role of their farms. Respondents held a much less favorable view of corporate farms than of family farms. They clearly viewed family farmers as better stewards of the environment and as doing more to ensure the protection of water and air resources, and the welfare of livestock than corporate farms. Family farmers were perceived to be much more strongly motivated by tradition and independence than corporate farmers, but less motivated by financial gain. However, financial gain appeared to be an acceptable motive for either type of farm business. Family farmers were perceived to be harder working than corporate farmers. Corporate farmers were viewed as being more educated. Respondents considered family farms to be more common in their area, as purchasing most of their inputs from local suppliers, and as having a stronger positive impact on the local economy than their corporate counterparts.

Ample literature exists regarding the effect of farm structure on social and economic welfare and the environment. Although the effects are far from definitive, the focus of existing literature and popular press is asymmetrically weighted towards the virtues of "small and medium sized farms", "family farms", and "independent producers" and against "large farms" and "corporate farms." For purposes of this discussion, the term "small farms" is used to represent the former and the term "large farms" the latter, although a multitude of terms are used in the literature and the question of whether "large farms" and "corporate farms" are or can be lumped together for discussion has not been sufficiently addressed.

Concerns about the evolving structure of agriculture are rooted in perceptions about how these changes will affect the environment and local communities, as well as the notion that structural changes are destroying the viability of family farms (Kennedy 1999; Drabenstott 1994; Cecelski and Kerr 1992). There is also some support for the notion that, as the foundation of our nation's principles and our earliest public policies, family farms inherently deserve protection

(USDA 1998; MacCannell 1983). Perceptions about farm structure on the environment and local economy are discussed in the following sections.

Perceptions of Agriculture's Relationship with the Environment

The impact of production agriculture on the environment continues to be a source of concern and debate. Issues range from the adoption of technologies such as the use of fertilizers and chemicals to the effect of manure storage and management systems designed to accommodate large single-site concentrations of livestock on air and water quality (Thomas et al. 1996). Perceptions about the impact of modern production practices on the environment vary. Roper Starch Worldwide Inc. (2000) found that perceptions differed between farmers and consumers, although both groups expressed concern. Their 1999 survey revealed that a large majority of both farmers and consumers considered chemicals and fertilizers entering groundwater and surface water to be problems. However, a much larger percentage of *consumers* considered them to be *major* problems (68 percent versus 30 percent of *farmers*). A majority of both farmers and consumers also considered soil erosion and the disposal and odors of animal wastes to be environmental problems.

While progress has been made in reducing the effects of production agriculture on the environment (e.g., wind and water erosion), some argue they remain unacceptably high. The public's growing concern about environmental quality has had and likely will continue to have important implications for producers, particularly those raising livestock (Farnsworth 1994). The rapid expansion of the swine industry into nontraditional production areas, particularly when large, integrated producers replace smaller independent "family farmers", has been an important catalyst in growing societal concern about the impact of agriculture on the environment (Palmquist, Roka, and Vukina 1997; Lawrence, Otto, and Meyer 1997). Residents have complained that living near hog farms has decreased their quality of life and fear odors and water quality problems resulting from livestock concentration may pose long-term health risks and reduce property values (Palmquist, Roka, and Vukina 1997)[4]. In some areas, environmental concerns are expressed through strong "not in my backyard" sentiments (Federal Reserve Bank of Chicago 1996; Benjamin 1997).

Palmquist, Roka, and Vukina, (1997) argued that debates over the impact of agriculture in general, and the hog industry in particular, on the environment are being waged with little scientific evidence. Thelen (1991) concurred, attributing such conflicts in part to a lack of knowledge of farm practices among rural non-farm residents. For example, 45 percent of investigations regarding swine operations in Michigan during 1991 resulted from unverifiable complaints; that is, a problem was perceived but was not identified during the subsequent investigation. However, even perceived environmental impacts may have indirect costs for residents. For example, evidence from the literature suggests that close proximity to a hog operation can reduce property values (Palmquist, Roka, and Vukina 1997; Marbery 2000).

[4] The literature is, for the most part, in agreement that the two key issues of environmental concern regarding livestock production are potential odor problems from large livestock operations and potential water pollution from animal waste disposal (Palmquist, Roka, and Vukina 1997; Federal Reserve Bank of Chicago 1996; Lohr 1996; Westenbarger and Letson 1995; Leroux, et al. 1994; Van Kleeck and Bulley 1985).

The literature, in general, asserts or interprets public opinion to be that small farms are more sustainable than large farms and better protect the environment (Paul 1997; Bahls 1997; Thomas, et al. 1996; Northwest Area Foundation 1994; MacCannell 1983). However, the environmental effect of farm structure and organization is far from conclusive. Several authors argue that public perception of such does not reflect reality (e.g., Thomas et al. 1996) or that the effect of future changes in farm structure on the environment will depend on factors not yet well explored such as pollution processes, availability and use of technology, and the adoption of environmental regulations (Ervin and Smith 1994). Ervin and Smith assert that evidence from other sectors suggests that more industrialized farms will adopt new technology, including that which reduces the negative impact of production agriculture on the environment, earlier and at a faster pace than smaller farms. Furthermore, more industrialized farms may have more ability, but less willingness, to do so.

Perceptions of the Economic Contribution of Agriculture to Local Areas

A rich body of literature discusses the effect of farm structure on social and economic welfare. One of the first research efforts to consider the effect of farm structure on local rural communities was a study by Goldschmidt (1946). Goldschmidt attributed differences in the health of two rural communities to differences in the structure of their surrounding agriculture. The methods employed in and the conclusions drawn from this classic study have since been criticized by a number of authors (e.g., Day 1981). Others have asserted that the results of subsequent research efforts have been less definitive (Johnson 1995). Hefferman and Campbell (1986), for example, concluded that the presence of "corporate agriculture" in the Midwest appears to enhance, rather than harm, as asserted by Goldschmidt, the viability of rural communities. Still others argue that agriculture has little effect on the economy and that other factors such as social relations, political sentiments, and traditions may be more important (Lobao and Schulman 1991).

Regardless of the arguments, the majority of the relevant literature provides evidence and/or asserts that a structure of production agriculture based on smaller sized farms results in more socially and/or economically healthy rural communities (USDA 1998; Bahls 1997; Drabenstott 1994; Lins 1994; Northwest Area Foundation 1994; Cecelski and Kerr 1992; MacCannell 1983; Wallace 1987; Goldschmidt 1946). Two thesis have been put forth to explain why smaller farms may better support rural communities. First, smaller or independently owned farms are more likely to purchase their agriculture inputs and do their personal shopping locally (USDA, 1998; Lawrence, Otto, and Meyer, 1997; Paul, 1997; Drabenstott, 1994; Northwest Area Foundation, 1994; MacCannell, 1983). Second, independent producers or those with smaller farms more strongly believe they have a stake in, and are therefore more involved in, the local community (USDA 1998; Paul 1997; Fulton and Gillespie 1995; MacCannell 1983). Bahls (1997) and MacCannell (1983) argued that this is, at least in part, due to an increase in absentee ownership of larger farms.

Impact of Social and Physical Distance on Perception

Social and physical distance from production agriculture is important to perception. The experience, knowledge, socioeconomic characteristics, attitudes, and temporal attributes of an individual are likely to influence perception. Roper Starch Worldwide Inc. (2000) found differences in perceptions between farmers and consumers. They asked each to report their

perceptions about the practices and attitudes of farmers with different size operations. Both farmers and consumers perceived that the practices and attitudes of farmers with large farms differ from those with small farms, although farmers perceived less difference between the groups than did consumers. The consumer and farmer respondent groups differed most in the percentage of respondents who saw no difference between large and small farms. The percentage of farmers perceiving no difference was, in all cases, at least twice the percentage of consumers perceiving no difference. And, as previously noted, farmers were less likely than consumers to see environmental issues associated with production agriculture to be major problems.

Knapp and Griffieon (1999) also reported that perceptions of farmers differ from those of non-farmers. Both groups held similar perceptions about what constitutes quality of life and that the least attractive part of farming was risk. However, non-farmers considered risks to be those resulting from the use of chemicals and fertilizers, while farmers were more concerned about outside influences, those over which they did not feel they had any control (e.g., prices, weather, government influence)[5]. Non-farmers believed that farmers did not always realize that their production practices impact suburban life and that urban dwellers are concerned about soil erosion and water quality.

Wachenheim and Lesch (2000) used a mail questionnaire to elicit the perceptions of Illinois residents regarding agriculture. Overall, residents ranked agriculture as that with the most important economic impact (total dollars). However, their perception varied by proximity to a population center and their social distance from production agriculture. Agriculture was ranked in the bottom half of industries in the three counties containing or adjacent to a population center with more than 100,000 residents. Respondents close to production agriculture, those who lived on a farm, worked on a farm, or had a family or household member working on a farm considered agriculture to be more important than did other respondents.

Additional factors influencing perceptions of agriculture and its role in the economy and environment have been identified from research regarding odor. While, in general, odor annoyance increases with odor concentration, residents' perceptions of odor from neighboring swine units is context dependent (Lohr 1996). That is, perceptions are dependent on the emotions and memory of the perceiver[6]. If odors are consistent with the perceiving individual's expectations about a rural landscape, they are considered more acceptable than otherwise. The experience, knowledge, socioeconomic characteristics, attitudes, and temporal attributes of the perceiver all play a role in determining whether an unpleasant odor is perceived as annoying. For example, DeBoer, Van Der Linden, and Van Der Pligt (1987) and Cavalini, Koeter-Kemmerling, and Pulles (1991) suggested the lower likelihood that longer term residents will report annoyance under greater intensity and continuity of odor may be due to their acclimation to its presence. Evans and Tafalla (1987) alternatively hypothesized that longer term residents may simply become passively resigned to odors while newer residents are more likely to take action to alter an environment that does not match their expectations. This concurs with the conventional wisdom

---

[5] Although not an interpretation by the authors, both groups appear to be concerned about outside influences over which they have no control. Non-farmers would not believe they have control over risks associated with modern production practices.

[6] The theory of context dependence is well described in Almagor (1990a, b).

that suburbanites unfamiliar with farming practices are those making complaints (Lohr 1996) and is consistent with research on the correlation between familiarity or economic dependence and odor perceptions in urban settings (DeBoer, Van Der Linden, and Van Der Pligt 1987; Evans and Tafalla 1987; Winneke and Kastka 1987). Evans and Tafalla also reported a negative correlation between odor annoyance and a belief that those generating odors could control them but did not.

In a survey of residents residing near sugarbeet and tobacco processing plants in The Netherlands, Cavalini, Koeter-Kemmerling, and Pulles (1991) found that age and time in residence were negatively, and time spent at home was positively, correlated with annoyance. Perrin (1987) concurred, reporting that those who spent more time at home were more likely to be annoyed by odors from a paper mill and organic waste plant in France. Perrin also found that rural residents were less likely to be annoyed than urban residents.

Lohr (1996) tested for relationships between characteristics of 17 residents living within one mile of a swine farm with less than 300 sows, their domicile, and activities in the area *and* their perception of odors from the swine operation and subjective evaluation of the extent to which these odors hindered their enjoyment of property. Length of residence, economic dependence on farming, previous contact with the farm owner, and the number of beef operations located nearby were negatively correlated with annoyance. The negative correlation between odor annoyance, and term of residence and economic dependence were consistent with other studies reviewed. Lohr reported that residents with previous contact with the farm owner had a lower level of odor annoyance and perceived that the farm owner was positively involved with the community. An opportunity for greater awareness of the agricultural context within which a neighboring swine operation lies may explain the negative correlation between the number of beef operations in the area and odor annoyance. Residents living in a suburban or small town home were more likely to have negative odor perceptions and had a higher level of odor annoyance than rural residents; again attributed to the difference between residents' context expectations and reality.

METHODS

Data were derived from a telephone survey of households in the twelve-state North Central Region using a two-stage disproportional random sample (Figure 1)[7]. Counties in the region were first dichotomized based on their metropolitan status. Metropolitan and adjacent counties where grouped together and nonmetropolitan and nonadjacent counties were grouped together. Second, counties were stratified into six groupings based on population change that occurred in the county between 1990 and 1998. Three groupings were for population growth (less than 10 percent, 11 to 30 percent, and greater than 30 percent) and three groupings were for decline (less than 5 percent, 6 to 10 percent, and greater than 10 percent). Five counties in each of the twelve groups were randomly selected. Next, approximately 50 households were randomly surveyed in each county. An equivalent number of households was selected for survey regardless of the population within the county or the state and responses, as reported, were not weighted. Thus, responses represent only the respondent group and not the general population of the region.

[7] The complete survey instrument is available upon request from the authors.

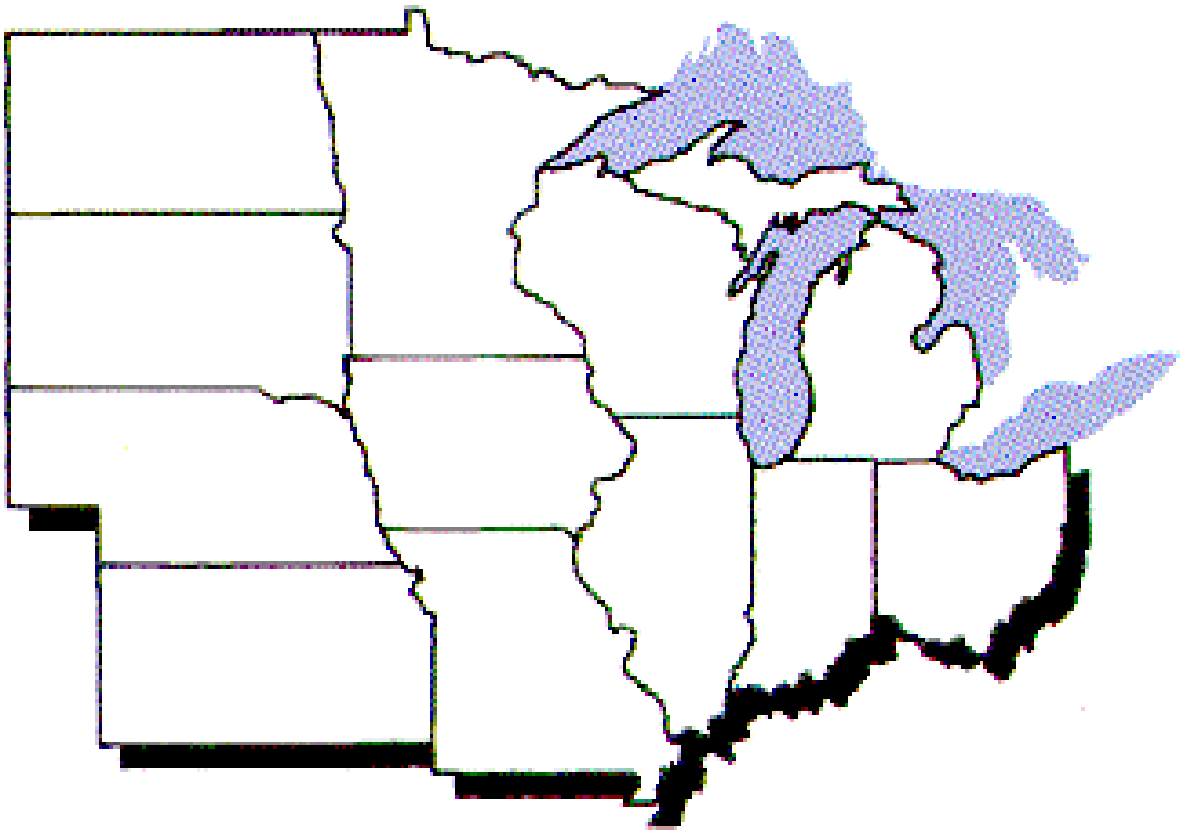

Figure 1. North Central Region

Two context variables were included in the model. The first was a measure of the social economic status (SES) of each respondent based on education and income. The literature demonstrates that respondents' SES may independently shape their farm perceptions and thus it was necessary to control for possible interactions. Similarly, the context of respondent's location may independently affect their perceptions, particularly the magnitude of recent population change and their metropolitan status. Therefore, the second measure was an index of county size and population change as previously noted.

Farm perceptions were measured by respondents' level of agreement with statements modified from those originally designed by Buttel and Jackson-Smith (1997), used for a study exploring Wisconsin farmers' views on livestock expansion, and Wachenheim and Lesch (2000), used to explore rural residents' perceptions of corporate and family farms in Illinois. A 13-item index was used which asked respondents to indicate their level of agreement using a five point *Likert* scale with a series of statements regarding farming. The index was designed to represent five specific themes; a) the impact of agriculture on the local economy; b) farmers' interaction with the environment; c) the role of farm structure on the environment, economy, and society; d) responsibilities of non-farm residents; and e) the role of government in assisting farmers, protecting the environment, and restricting the size of livestock farms. The total useable sample was 584. The refusal rate was 55 percent. The relatively large non-response rate is becoming more common as a result of increased use of telemarketing and screening devices.

RESULTS

Respondent Population

Nearly 42 percent of respondents lived in a city or town, 33 percent lived in a rural area but not on a farm, and 25 percent lived on a farm, Twenty-eight percent of respondents reported owning or operating a farm. Slightly over half of those respondents not living on a farm stated that they had previously lived on a farm (52.5 percent). Of those, over two-thirds lived there more than 15 years, 86 percent more than 5 years (Figure 2). Two-thirds of respondents said they had lived in their current community for more than 15 years (67.8 percent) (Figure 3). Nearly all had lived there more than one year.

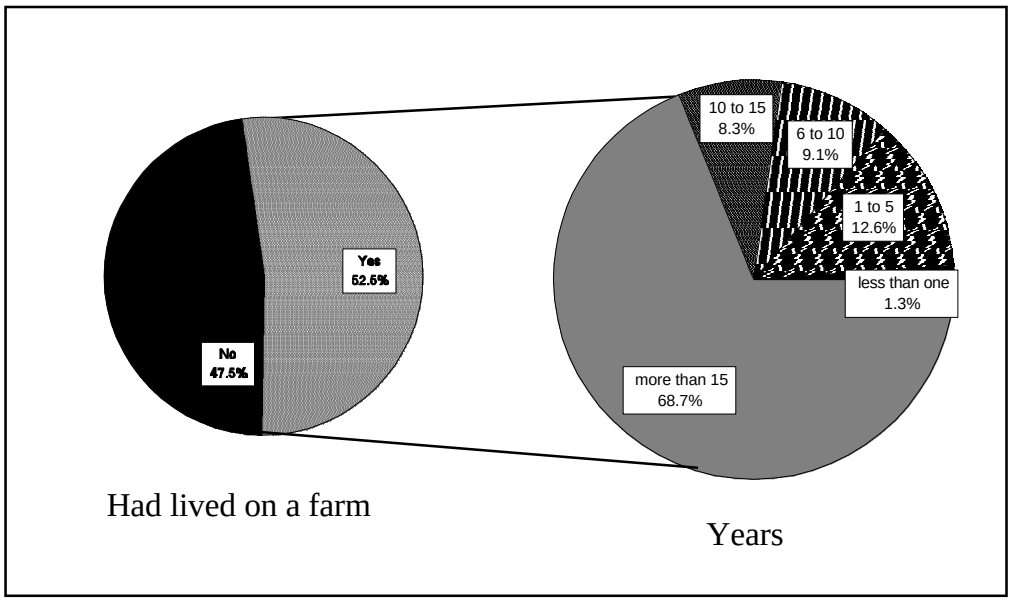

Figure 2. Respondents Who Lived on Farm (yes) and Length of Time Lived on Farm (years)

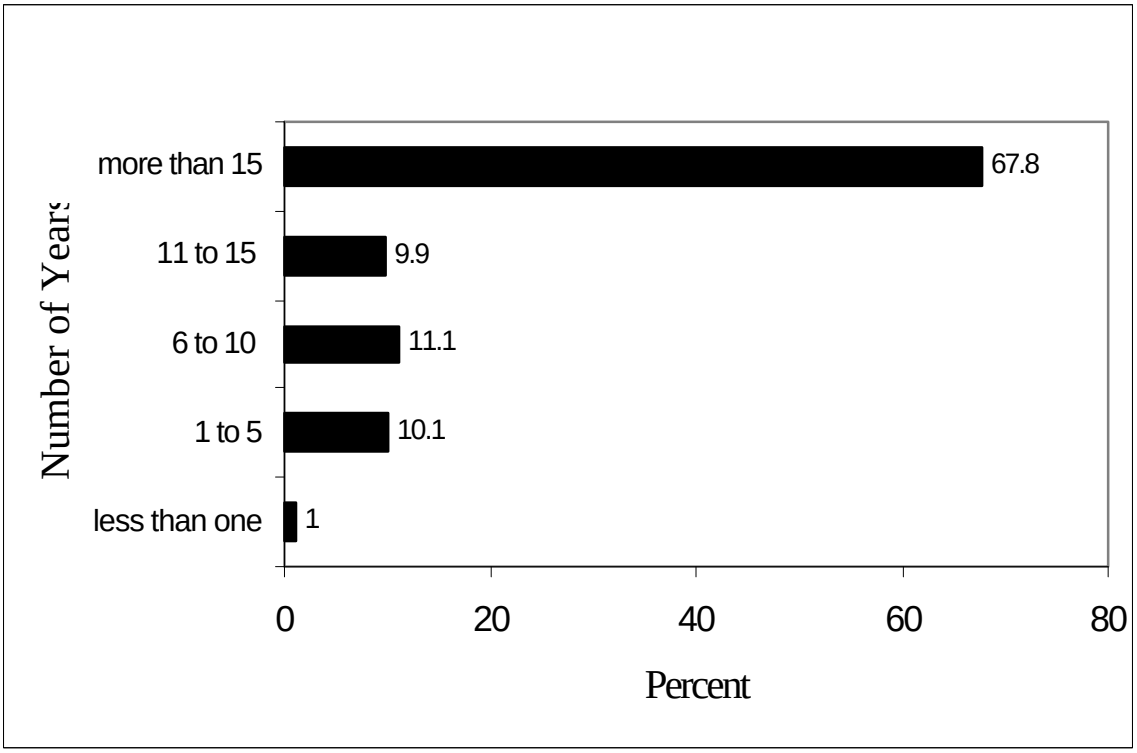

Figure 3. Tenure of Respondents in Community

Farms Owned and Operated by Respondents. The average farm size among all respondents owning or operating a farm was 1,080 acres (n = 149), with 395 tillable acres. Average farm size of those with 2,000 acres or less (n = 135) was 440 acres. Three-fourths of the farms were less than 1,000 acres. Twelve percent were between 1,000 and 2,000 acres and 12 percent were more than 2,000 acres (Figure 4). Twenty-eight percent of farm owners had no tillable acres. Over three-fourths of these farmers receive no income from crops (77.5 percent).

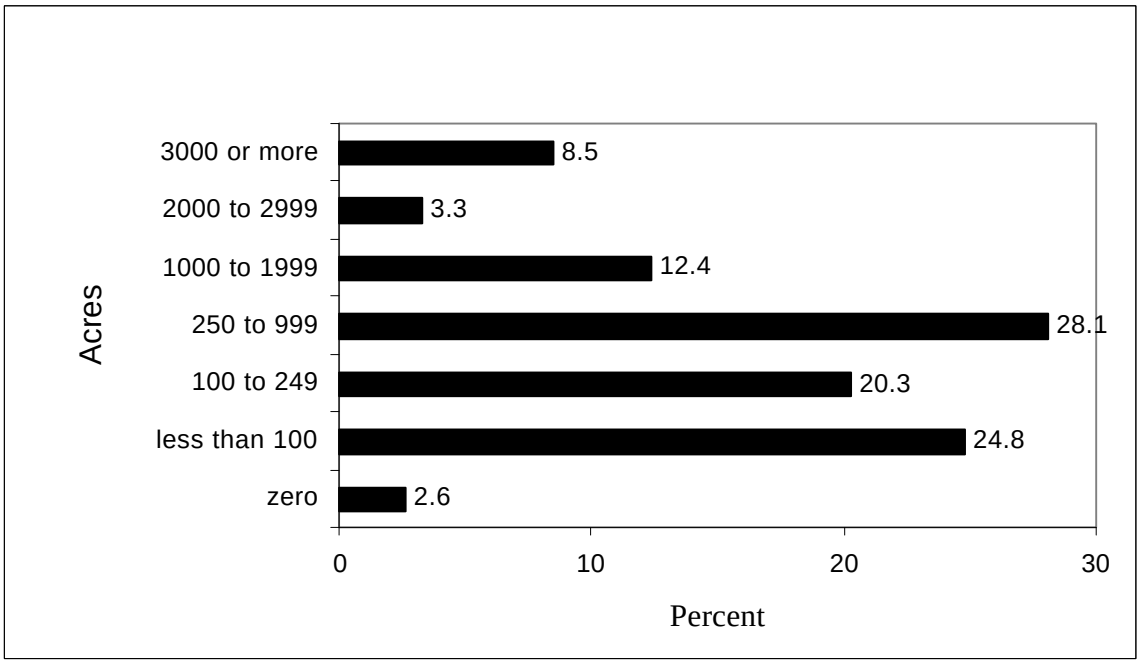

Figure 4. Acres Owned or Operated

Most farms were classified as individual or family farms (94 percent). Other types of farm classification included partnership (3.8 percent) and corporation (1.9 percent). All of the corporate farms were organized as family corporations.

Over half of respondents who owned or operated a farm said none or less than one-fourth of their net household income came from their farming operation during the past five years; 17 percent received no net farm income from their farming operation (Figure 5). Twenty-one percent of respondents received over three-fourths of their net household income from their farming operation. Farms were generally specialized in livestock or crops. Among respondents owning or operating a farm, the percentage that received none of their net farm income from crops (37.3 percent) or from livestock (39 percent) was similar (Figure 6). Thus, between thirty-five and forty percent of farms of the respondent population were specialized in either livestock or crops. Approximately sixty percent of farms received none or less than 25 percent of their income from crops (60.8 percent), or received none or less than 25 percent of their income from livestock (59.1 percent).

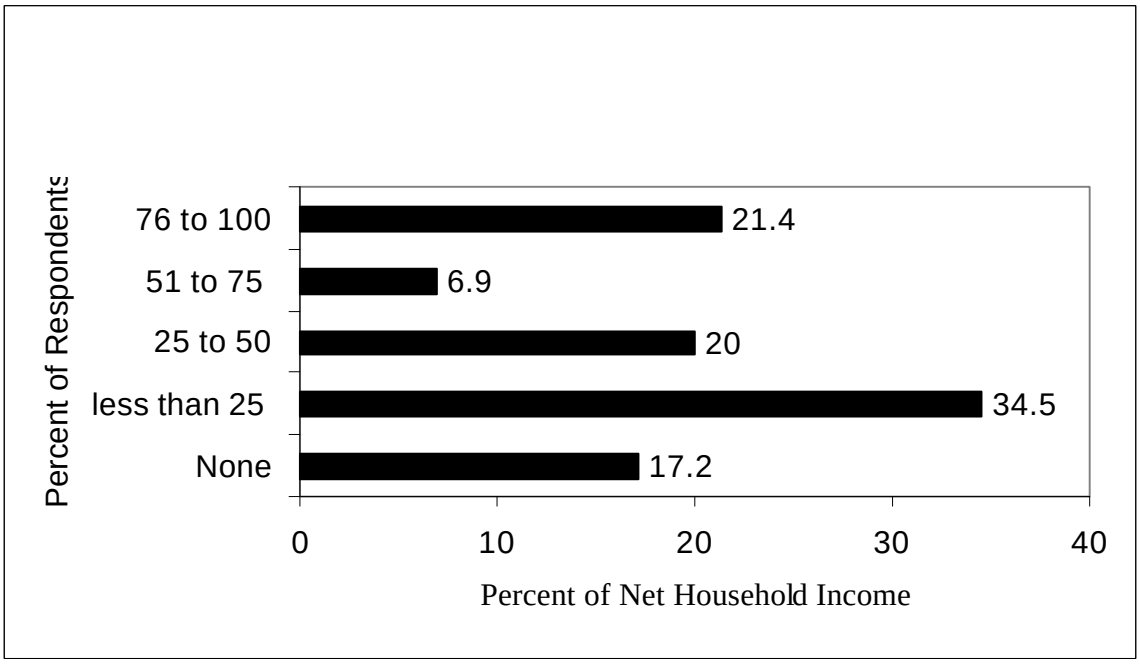

Figure 5. Net Household Income from Farming Operation

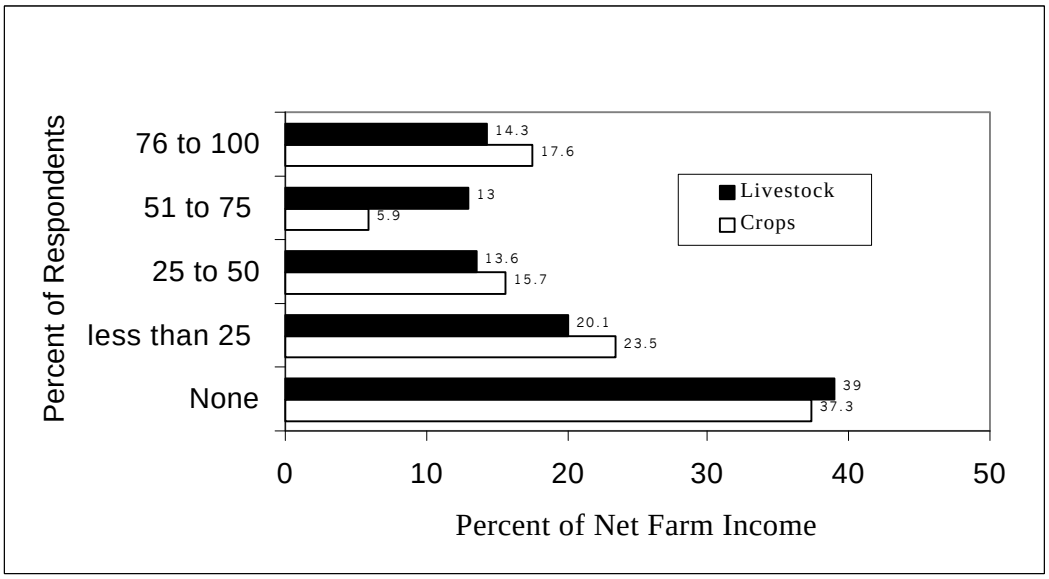

Figure 6. Source of Net Farm Income of Farm Respondents

Respondent Locale. The respondent population was generally rural and comprised of long-term residents. Respondents lived an average of 108 miles from a city with at least 100,000 inhabitants (Figure 7). Fourteen respondents (2.5 percent) lived within and just over 10 percent lived within 20 miles of a city of at least 100,000 inhabitants; one-third lived within 50 miles (34.7 percent). As another one-third of respondents lived between 51 and 100 miles of a large city, a total of two-thirds of respondents lived within 100 miles of a city of at least 100,000 inhabitants. Eighty-nine percent lived within 200 miles.

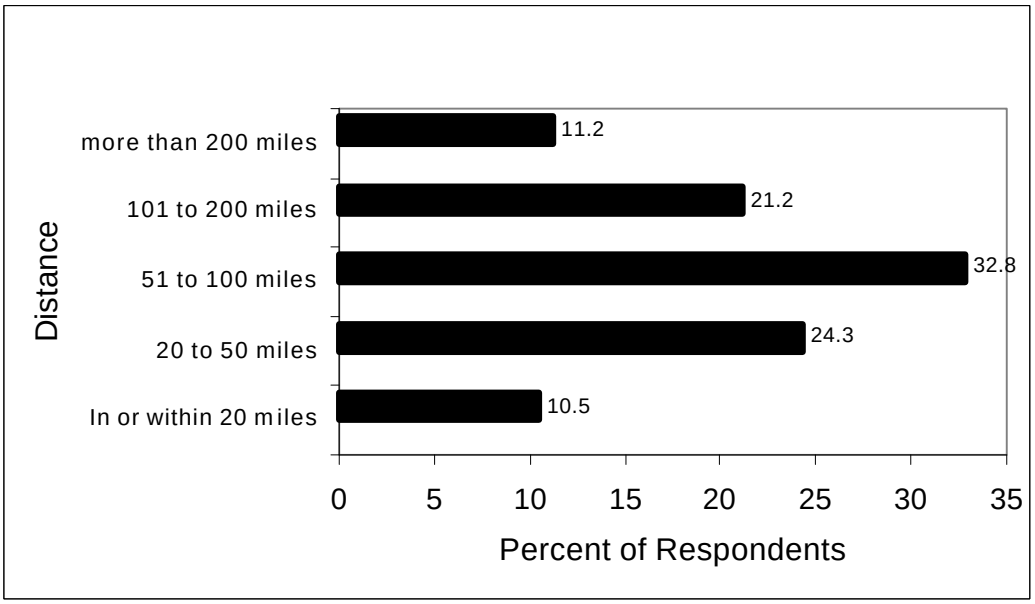

Figure 7. Distance to City of at Least 100,000 Inhabitants

More than half of respondents said the city or town closest to them had fewer than 2,500 inhabitants (53.2 percent) and nearly eighty percent said there were fewer than 10,000 inhabitants in the nearest town (79.4 percent) (Figure 8). Only five percent of respondents lived in a city with a population of 50,000 or greater.

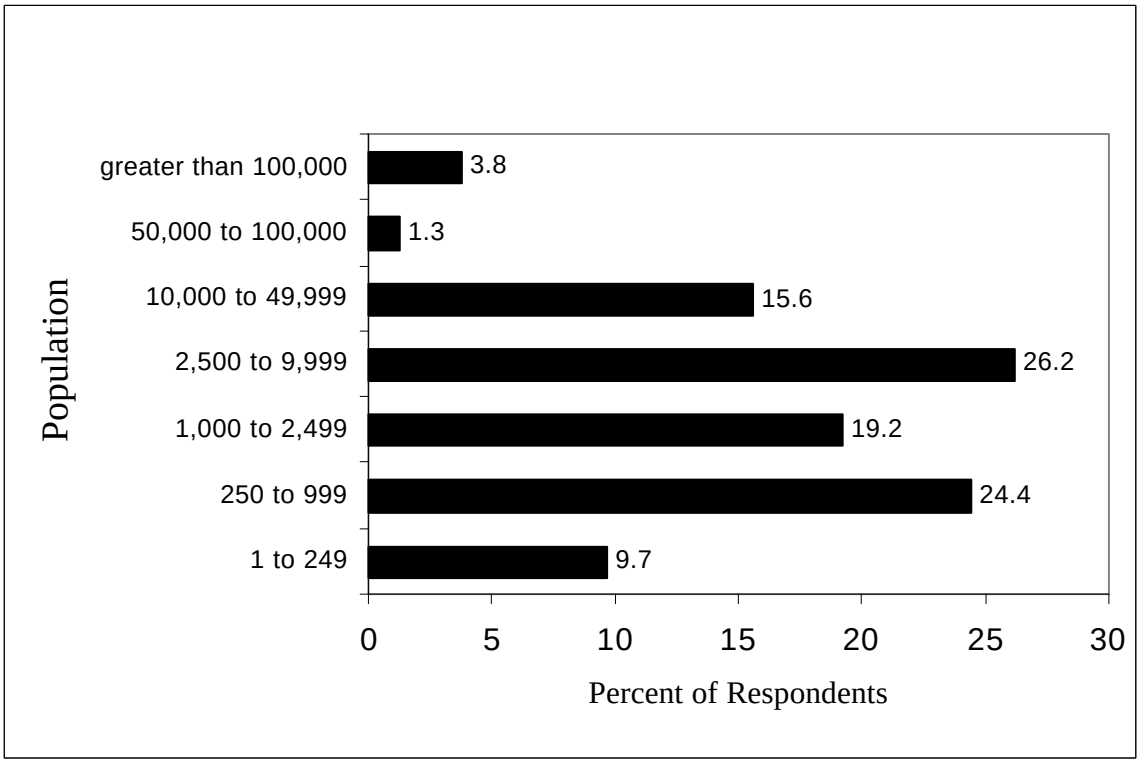

Figure 8. Population of Nearest City or Town

The respondent population generally had experience with or, because of close proximity, exposure to both crop and livestock farming. Ninety percent of respondents lived within five miles of a farm (89.3 percent); 55.6 percent said they lived within one mile (Figure 9). Of the respondents who lived more than five miles from a farm, 47.8 percent said they had at one time lived within five miles of a farm. Of all respondents who do or have lived within five miles of a farm, over three-fourths said the nearest farm raised both livestock and crops. More than half of respondents had either lived on or within five miles of a farm for more than fifteen years; nearly eighty percent for more than five years (Figure 10).

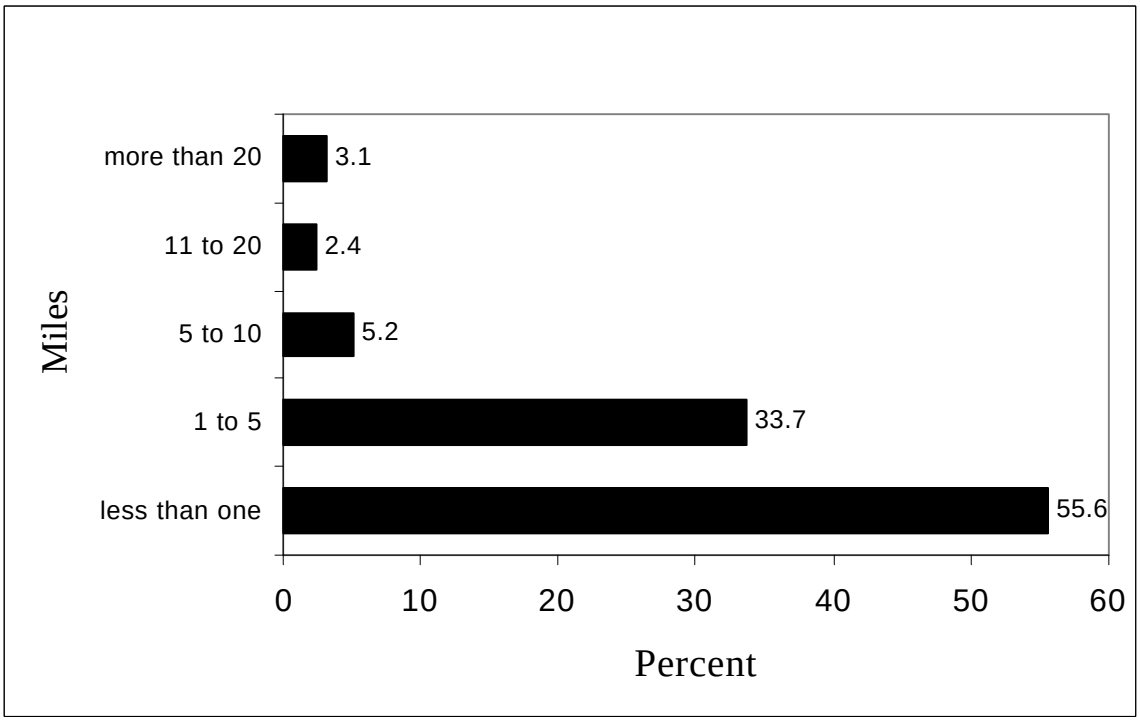

Figure 9. Distance to Nearest Farm

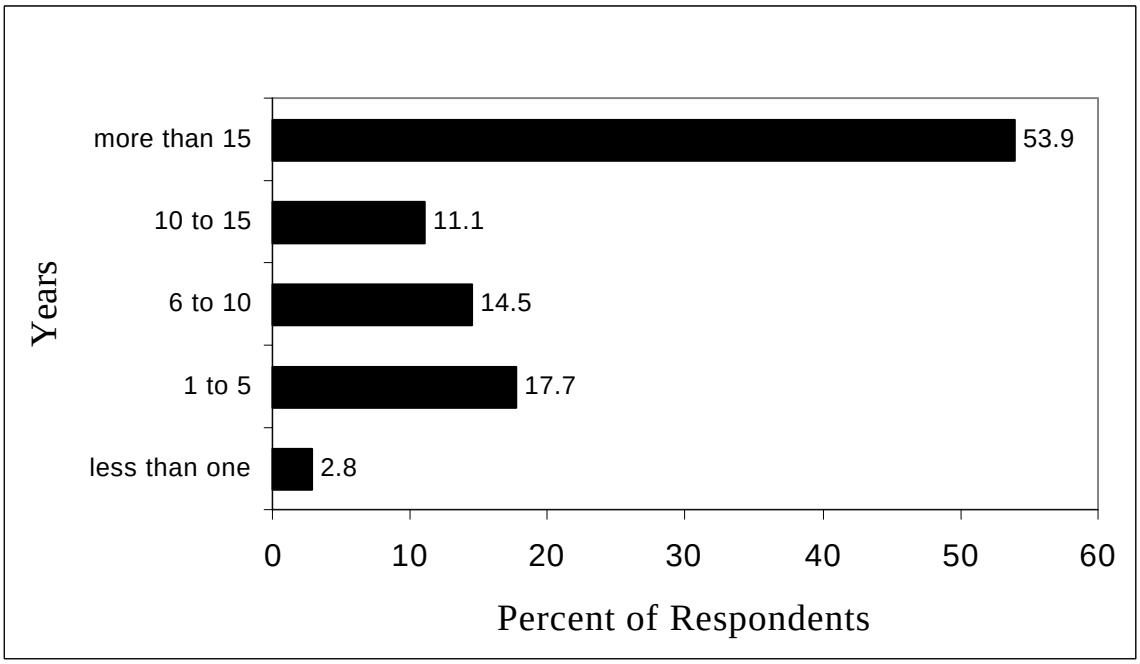

Figure 10. Years Living On or Within Five Miles of Farm

Association with Farming. Respondents were asked to think back over the last five years about their association with farming. Approximately 27 percent had worked on a farm. Forty-two percent had a member of the immediate family or household who worked on a farm, fifty-two percent had a relative who had worked on a farm, sixty-four percent had a close friend or associate who had worked on a farm, and sixty percent had an acquaintance had worked on a farm.

Of the respondents who had an immediate family or household member who worked on a farm, nearly 60 percent had daily contact with this individual (Table 1). Over three-quarters had contact at least several times a week and 86.1 percent had contact at least once per week. Over 70 percent of respondents who reported having a friend who worked on a farm reported contact at least once per week. Less frequent contact was reported between respondents and their acquaintances who worked on farms and, in particular, their relatives who worked on farms. Over one-third of respondents reported contact of no more than a few times per month with their acquaintances (36.5 percent) and relatives (41.1 percent) who worked on a farm. Approximately two-thirds of respondents reported that the type of farm their family or household member (64.3 percent), relative (64.3 percent), friend (70.4 percent), or acquaintance (68.8 percent) worked on was both a livestock and a crop farm.

Table 1. Contact with Farm Workers, Percent of Those Responding/Type of Farm Associate

Contact	Family Member	Relative	Friend	Acquaintance
	---------- percent ----------			
daily	59.3	17.5	21.4	17.5
several times/week	17.3	18.9	23.6	20.8
once/week	9.5	19.5	25.2	23.3
few times/month	9.9	19.2	17.9	19.9
less than once/month	3.7	21.9	11.1	16.6
no contact	0.4	3.0	0.8	1.8

*Demographic*s. Nine percent of respondents did not finish high school or obtain their GED and forty-six percent did not attend college (Figure 11). A lower percentage of those owning or operating a farm (18.6 percent) had a bachelor's degree than of those not owning of operating a farm (27.9 percent) (Figure 12).

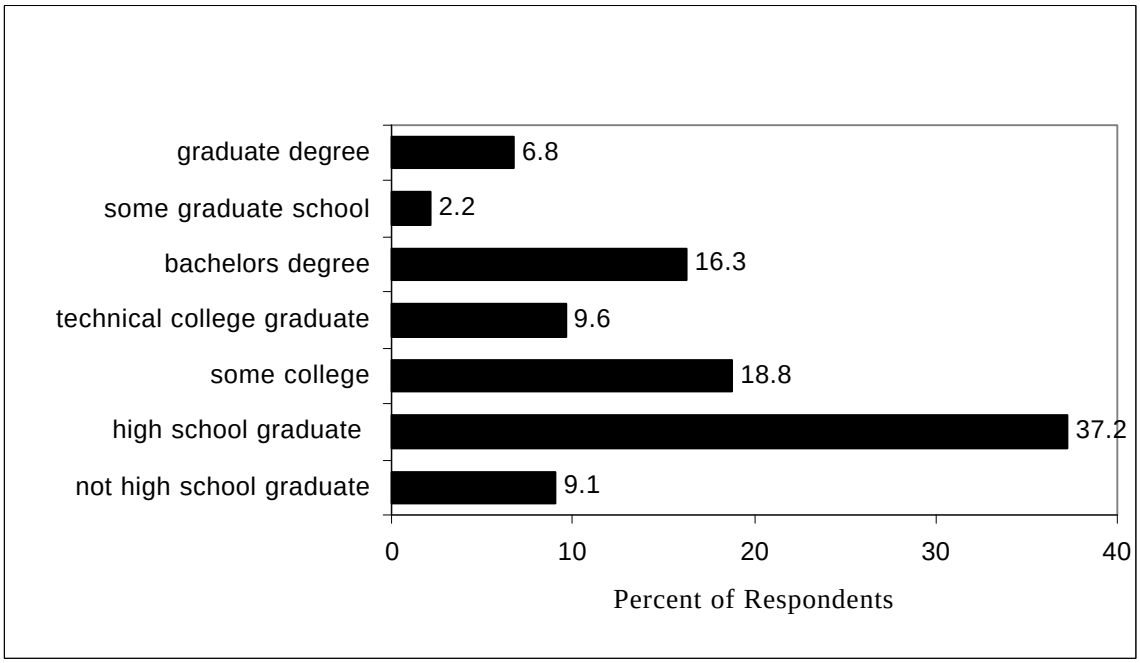

Figure 11. Respondent Level of Education

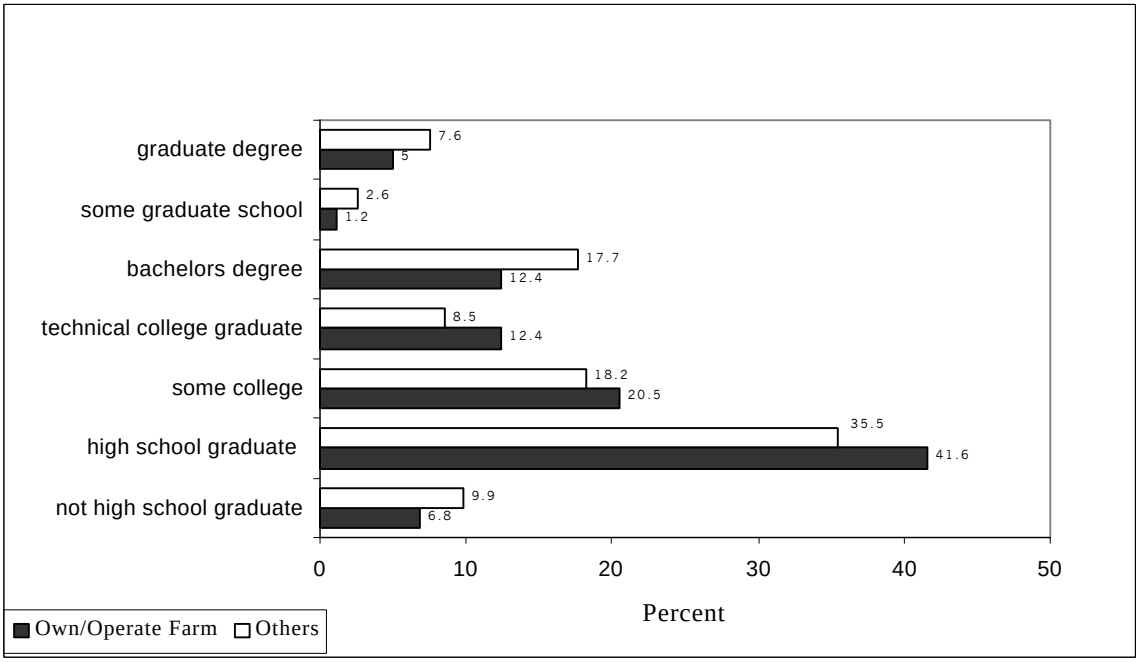

Figure 12. Respondent Education Level by Farm Owner or Operator Status

Nearly two-thirds of respondents did not own or operate a business, 28 percent owned and operated a business, 6 percent owned but did not operate a business, and 1 percent operated but did not own a business. [Business ownership was limited to respondents owning at least one-third of a business. Farming was included as a business.] Nearly 60 percent of respondents reported a net income level of $30,000 or more.

Perceptions of Farming

General Perceptions. Overall, respondents had a favorable view of farmers. The majority of respondents *strongly agreed* that farmers have a positive impact on their local economy (70.9 percent), noise, odor, and other environmental issues associated with farming in their area are minimal (62.4 percent), the loss of farmers in the region will greatly hurt the local economy (61.8 percent), and government should do more to help farmers in their area stay in business (51.5 percent) (Table 2). Forty-seven percent strongly agreed most agricultural supplies used by farmers are purchased locally.

Table 2. Respondent Agreement/Disagreement with Statements Regarding Farming

Statement	Mean[a]	Percentage of Valid Responses	
		Respondents who strongly disagreed	Respondents who strongly agreed
Farmers have a positive impact on the local economy in my area	4.46	3.8	70.9
Most of the agricultural supplies (e.g., seeds, fertilizers, feed) used by farmers in my area are purchased locally	4.02	5.2	47.4
Loss of farmers in this region will greatly hurt our local economy	4.13	9.6	61.8
The government should do more to help farmers in this area stay in business	3.99	8.6	51.5
Farmers in this region are creating an environmental concern that should be addressed	2.69	32.0	19.7
The noise, odor and other environmental issues associated with farming in this area are minimal	4.29	5.6	62.4
In farming areas, non-farm residents need to become accustomed to the noise, odor, and other concerns associated with farming	3.86	7.1	41.2
Environmental protection laws regulating farming practices are too strict	3.04	14.7	18.6
As residential development of cities/towns moves closer to farming areas, more restrictive ordinances regarding noise, odor, and other environmental concerns should be allowed	2.57	31.2	12.3
There should be no restrictions on the size of livestock operations even though they may be in close proximity to residential development of cities/towns or public recreational areas	2.70	24.7	15.5
The replacement of smaller family farms in this area by large-scale farms using hired labor will have an undesirable economic and social consequence	3.87	6.5	44.9
Poor economic conditions will likely lead to the replacement of family farms in this area by large farms run by hired labor	3.84	8.3	43.2
More environmental concerns are created by large scale farms using hired labor than by small family farms	4.06	4.9	49.1

[a] Means are based on a Likert scale with one being "strongly disagree" and five being "strongly agree." A response of "Do not know" was excluded from the mean.

Respondents tended to have strong negative opinions about evolving farm structure. Nearly half *strongly agreed* that large scale farms create more environmental concerns (49.1 percent) and the trend of larger farms replacing smaller farms will have undesirable economic and social consequences (44.9 percent). Forty-three percent of respondents strongly agreed that poor economic conditions will result in more large scale farms. The specific level of agreement with statements regarding the impact of agriculture on the local economy, farmer's interaction with the environment, the role of farm structure on the environment, economy, and society, responsibilities of non-farm residents, and the role of government in assisting farmers, protecting the environment, and restricting the size of livestock farms is provided in the appendix.

Environmental Impact. Overall respondents indicated farmers are good environmental stewards and existing environmental regulations are appropriate. A majority of respondents *strongly agreed* environmental issues associated with farming in the area are minimal (62.4 percent) and 41 percent strongly agreed that, in farming areas, non-farm residents need to become accustomed to noise, odor and other concerns associated with farming. Fewer (18.6 percent) strongly agreed that environmental regulations are too strict (33.9 percent agreed or strongly agreed). More respondents *strongly disagreed* (32 and 31 percent, respectively) than strongly agreed (20 and 12 percent, respectively) that farmers are creating an environmental concern and that more restrictive ordinances should be imposed to address environmental concerns as residential development of cities and towns move closer to farming areas.

Correlation between respondents' level of agreement with statements about agriculture and the environment were considered (Table 3). Correlations were not strong between level of agreement with statements but the signs were as expected. A weak *negative* relationship existed between level of agreement that farmers are creating an environmental concern that should be addressed and that environmental issues are minimal (Pearson's r = -.145). A slightly stronger *positive* correlation existed between level of agreement that farmers are creating an environmental concern and that more restrictive environmental ordinances should be allowed as residential areas move closer to farming (r = .246). Level of agreement that environmental issues are minimal was positively correlated with level of agreement that nonfarm residents should acclimate to farming (r = .288) and that environmental regulations are too strict
(r = .126) and negatively correlated with the level of agreement that more restrictive environmental ordinances should be allowed as residential development moves closer to farming areas (r = -.100). A positive correlation exists between respondents' level of agreement that environmental regulations are too strict and that there should be no limit on livestock operations regardless of their proximity to residential development or public use areas (r = .206). Finally, there was a weak correlation in the expected direction between respondents' level of agreement that non-farm residents need to become acclimated to farming and that environmental laws are too strict ® = .142) and that there should be no limit on livestock size ® = .144).

Table 3. Correlation in Respondents' Level of Agreement with Statements Regarding Agriculture and the Environment[a]

	Issues Minimal	Laws too Strict	More Restrictive Laws Should be Allowed	Family Farms Better Stewards
Farmers create environmental concern	p = .145 (.001) s = - .169 (.000)	not significant	p = .246 (.000) s = .253 (.000)	not significant
Environmental issues minimal	----------	p = .126 (.007) s = .124 (.008)	p = -.100 (.021) s = -.122 (.005)	not significant
Environmental laws too strict		----------	not significant	p = .126 (.008) s = .139 (.003)
More restrictive environmental laws should be allowed			----------	not significant

[a] Measures of correlation presented include Pearson's r (p) and Spearman's Rho (s). Significance levels indicated are two tailed.

Farm Size. Respondents agreed that economic conditions will lead to the replacement of family farms by larger farms and that this will have undesirable consequences. Two-thirds of respondents agreed (24.4 percent) or strongly agreed (43.2 percent) that poor economic conditions will likely lead to the replacement of family farms in their area by large farms run by hired labor; 18.6 percent disagreed or strongly disagreed. A majority of respondents also agreed (19.4 percent) or strongly agreed (44.9 percent) that the replacement of smaller family farms in the area by large-scale farms using hired labor will have undesirable economic and social consequences; only 15.7 percent of respondents disagreed or strongly disagreed. Nearly three-fourths of respondents agreed (24.9 percent) or strongly agreed (49.1 percent) that large farms using hired labor create more environmental concerns than small family farms; only 12 percent disagreed or strongly disagreed.

Level of agreement that farm structure will change because of poor economic conditions was correlated with a negative view of the expected resulting farm structure[8]. A moderate correlation existed between respondent's level of agreement that poor economic conditions will likely lead to the replacement of family farms in the area by large farms, and that this evolution will have undesirable economic and social consequences (r = .387), and that large farms create more environmental concerns than small farms (r = .267). Respondents' level of agreement with the latter two statements were also positively correlated with one another (r = .262).

Economic Impact. Respondents overwhelmingly agreed (13.4 percent) or strongly agreed (70.9 percent) that farmers have a positive impact on their local economy; only 5.5 percent disagreed or strongly disagreed. Over 70 percent agreed (23.2 percent) or strongly agreed (47.4 percent) that most of the agricultural supplies used by farmers are purchased locally; 10.4 percent

[8] Level of significance was p = .000 for each comparison not otherwise noted.

disagreed or strongly disagreed. Three-fourths agreed (13.8 percent) or strongly agreed (61.8 percent) that a loss of farmers in the region will greatly hurt the local economy. Over two-thirds of respondents also agreed or strongly agreed that the government should do more to help area farmers stay in business.

The relationship between respondents' level of agreement with statements about the impact of agriculture on the local economy was considered. As expected, there was a moderate correlation between level of agreement that farmers have a positive impact on the local economy and that a loss of farmers in the region will greatly hurt the local economy ($r = .325$). Correlations between level of agreement that farmers purchase most inputs locally and that they have a positive impact ($r = .198$, $p = .000$), and the loss of farmers will greatly hurt the local economy ($r = .117$, $p = .008$) were weak.

The effect of size of the closest town on respondent's perceptions of the local economic impact of farmers was considered. In general, perceptions did not differ between respondent categories classified by the population of the nearest town or city. Exceptions were with respondents near very small towns. Respondents reporting the population of their nearest town to be less than 250 were less likely to agree that most of the agricultural supplies used by farmers are purchased locally than those near towns of between 2,500 and 100,000 inhabitants ($p < .05$) and greater than 100,000 inhabitants ($p = .054$). A possible explanation is that towns of fewer than 250 inhabitants are generally not large enough to support agricultural input suppliers. Respondents near the smallest towns (< 2,500 inhabitants) were the most likely to agree that a loss of farmers in the region would greatly hurt the local economy. Those residing near a town of 2,500 to 9,999 inhabitants had a lower level of agreement that the loss of farmers would greatly hurt the local economy than those residing near smaller towns, specifically those near towns of less than 250 inhabitants ($p = .053$), between 250 and 999 inhabitants ($p = .002$), and between 1,000 and 2,499 inhabitants ($p = .020$). Respondents residing near a town of between 10,000 and 49,999 inhabitants were also less likely to agree that a loss of farmers in the region would greatly hurt the local economy than those residing near a town of 250 to 999 inhabitants ($p = .023$). Finally, persons residing near towns of between 2,500 and 9,999 inhabitants were less likely to agree that farmers have a positive impact of the local economy in their area than persons residing near smaller towns.

Experience with or Exposure to Livestock. The impact of respondent's experience with or exposure to livestock on their perceptions was considered. First, differences between farmers receiving some portion of their net income from livestock or individuals who had worked on a farm with livestock within the past five years (thereafter called Livestock Workers) and other respondents were investigated. There was a lower level of agreement among Livestock Workers that there exist environmental issues associated with farming and that additional environmental legislation is necessary. Livestock Workers were more likely than other respondents to agree that environmental issues associated with farming are minimal, that non-farm residents need to become accustomed to farming practices, that environmental protection laws regulating farming practices are too strict, and that there should be no limit on the size of livestock operations regardless of their proximity to urban development (Table 4). Livestock Workers were less likely to agree that more strict ordinances should be allowed as rural areas develop. Finally, Livestock Workers were more likely to agree that poor economic conditions will likely lead to the

replacement of family farms by large farms. And, while the differences between Livestock Workers and other respondents in level of agreement that this shift will have undesirable social and economic consequences and that the larger farms create more environmental concerns were not statistically significant, in each case level of agreement among Livestock Workers was numerically higher.

Table 4. Perception Comparison, Livestock Workers versus Other respondents

Statement	Significance, 2-tailed F Statistic	Mean level of agreement[a]	
		Livestock Workers	Other respondents
Farmers have a positive impact on the local economy in my area	.180	4.55	4.43
Most of the agricultural supplies (e.g., seeds, fertilizers, feed) used by farmers in my area are purchased locally	.842	4.01	4.03
Loss of farmers in this region will greatly hurt our local economy	.241	4.24	4.09
The government should do more to help farmers in this area stay in business	.402	3.91	4.01
Farmers in this region are creating an environmental concern that should be addressed	.233	2.59	2.73
The noise, odor and other environmental issues associated with farming in this area are minimal	.032	4.46	4.23
In farming areas, non-farm residents need to become accustomed to the noise, odor, and other concerns associated with farming	.010	4.09	3.78
Environmental protection laws regulating farming practices are too strict	.001	3.34	2.91
As residential development of cities/towns moves closer to farming areas, more restrictive ordinances regarding noise, odor, and other environmental concerns should be allowed	.035	2.36	2.65
There should be no restrictions on the size of livestock operations even though they may be in close proximity to residential development of cities/towns or public recreational areas	.068	2.89	2.64
The replacement of smaller family farms in this area by large-scale farms using hired labor will have an undesirable economic and social consequence	.132	4.01	3.82
Poor economic conditions will likely lead to the replacement of family farms in this area by large farms run by hired labor	.060	4.01	3.78
More environmental concerns are created by large scale farms using hired labor than by small family farms	.171	4.17	4.02

[a] Means are based on a scale from one to five, with one being "strongly disagree" and five being "strongly agree." "Do not know" was excluded from the mean.

There were similar differences when the livestock group was defined as those individuals who included among their immediate family or household member, relative, close friend or associate, or acquaintance, an individual who works or has worked on a livestock farm (hereafter termed Livestock Associates) (Table 5). As before, those with an association with livestock were more supportive of the current role of agriculture in the environment. Again, the lower level of

agreement among those with a livestock association that farmers are creating an environmental concern that should be addressed was not significantly different from that of other respondents. Unlike Livestock Workers, Livestock Associates also did not differ from other respondents in mean level of agreement that environmental concerns associated with farming are minimal. Mean level of agreement did differ, however, between Livestock Associates and other respondents for other statements regarding the interaction between farmers and the environment, and the appropriate strength of environmental legislation. Livestock Associates were more likely to agree than other respondents that nonfarm residents need to become more accustomed to farming concerns. Fewer Livestock Associates than other respondents disagreed or strongly disagreed (11.8 versus 21.2 percent, respectively) and more strongly agreed with this statement (43.4 and 34.1 percent, respectively). Livestock Associates were also more likely to agree than other respondents that environmental protection laws regarding farming practices are too strict and that there should be no restrictions on the size of livestock operations regardless of their locale. Fewer Livestock Associates disagreed or strongly disagreed that environmental laws are too strict (30.9 percent) than other respondents (47.4 percent). Livestock Associates were more likely to strongly agree than other respondents (17.6 versus 8.5 percent, respectively) and less likely to strongly disagree (21.4 versus 35.7 percent, respectively) that there should be no restrictions on the size of livestock operations. Finally, as was also true when Livestock Workers were compared with other respondents, the mean level of agreement that more restrictive ordinances should be allowed as residential areas expand was lower among Livestock Associates than other respondents. A majority of Livestock Associates (53.4 percent) disagreed or strongly disagreed with this statement (as compared to 39 percent of other respondents). Only 23.2 percent of Livestock Associates agreed or strongly agreed versus 38.1 percent of other respondents.

Table 5. Perception Comparison, Livestock Associates versus Other respondents

Statement	Pearson's X^2	Likelihood Ratio	Linear by Linear Association	Mean level of agreement[a]		Difference between means, Significance level
	Significance Level			LIVESTOCK ASSOCIATES	Other respondents	
Farmers have a positive impact on the local economy in my area	.001	.001	.000	4.54	4.18	.002
Most of the agricultural supplies (e.g., seeds, fertilizers, feed) used by farmers in my area are purchased locally	.717	.726	.744	4.03	3.99	.744
Loss of farmers in this region will greatly hurt our local economy	.593	.611	.302	4.16	4.02	.302
The government should do more to help farmers in this area stay in business	.432	.400	.109	3.94	4.15	.109
Farmers in this region are creating an environmental concern that should be addressed	.385	.365	.218	2.64	2.84	.218
The noise, odor and other environmental issues associated with farming in this area are minimal	.188	.176	.820	4.29	4.31	.820
In farming areas, non-farm residents need to become accustomed to the noise, odor, and other concerns associated with farming	.067	.083	.006	3.94	3.61	.011
Environmental protection laws regulating farming practices are too strict	.042	.046	.006	3.12	2.71	.006
As residential development of cities/towns moves closer to farming areas, more restrictive ordinances regarding noise, odor, and other environmental concerns should be allowed	.003	.004	.012	2.50	2.86	.012
There should be no restrictions on the size of livestock operations even though they may be in close proximity to residential development of cities/towns or public recreational areas	.002	.001	.001	2.81	2.34	.001
The replacement of smaller family farms in this area by large-scale farms using hired labor will have an undesirable economic and social consequence	.179	.208	.075	3.92	3.69	.095
Poor economic conditions will likely lead to the replacement of family farms in this area by large farms run by hired labor	.844	.848	.638	3.85	3.79	.638
More environmental concerns are created by large scale farms using hired labor than by small family farms	.636	.657	.151	4.10	3.92	.151

[a] Means are based on a scale from one to five, with one being "strongly disagree" and five being "strongly agree." "Do not know" was excluded from the mean.

For each of the four statements about the relationship between agriculture and the environment, and resident and government responsibilities regarding such, for which means were significantly different between Livestock Associates and other respondents, the Pearson's Chi-Square and Likelihood ratio statistics were significant. Observed values, i.e., number of respondents indicating each value on the Likert scale, differ from those expected if, alone, each group was representative of the entire population of respondents. That is, the level of agreement expressed is not independent of membership in a group, Livestock Associates or other respondents.

As was true in comparison of Livestock Workers and other respondents, there were no differences between mean level of agreement between Livestock Associates and other respondents that most of the agricultural supplies used by farmers in the area are purchased locally and that the loss of farmers in the region will greatly hurt the local economy. Nearly half of Livestock Associates (47.2 percent) and other respondents (48.1 percent) strongly agreed that agricultural supplies are purchased locally and a majority (62.3 and 59.8 percent, respectively) strongly agreed that a loss of farmers in their region will greatly hurt the local economy. Although not true for Livestock Workers, the mean level of agreement that farmers have a positive impact on the local economy differed significantly between Livestock Associates and other respondents. As noted by the significance of the Pearson's Chi-Square and Likelihood Ratio values, the Lickert scale responses are unique for each group when compared to the overall population of respondents. Livestock Associates were less likely than other respondents to strongly disagree (2.5 versus 8.2 percent, respectively) and more likely to strongly agree (74.1 versus 60.4 percent, respectively) that farmers have a positive impact on the local economy. Although the difference was not statistically significant, the level of agreement that the government should do more to help farmers in the area was lower for Livestock Associates than other respondents.

There was only one statement regarding the evolution of farm structure and its consequences for which mean level of agreement differed significantly between Livestock Associates and other respondents. The average level of agreement that the replacement of small family farms by large scale farms using hired labor will have undesirable economic and social consequences was higher among Livestock Associates than among other respondents. [The difference between Livestock Workers and other respondents was not significant]. A lower percent of Livestock Associates than other respondents disagreed or strongly disagreed with this statement (13.7 and 22.9 percent, respectively). The difference in level of agreement by Livestock Associates and other respondents that poor economic conditions will likely lead to the replacement of family farms in their area by large farms run by hired labor and that these large farms create more environmental concern was not significant. However, as was true when Livestock Workers were compared with other respondents, level of agreement among Livestock Associates was higher than for other respondents.

Locale of Residence. Perceptions were considered by locale of residence. Respondents were grouped by residence on farm (FARM), in a rural area but not on a farm (RURAL), or in a city or town (CITY). Differences were found between the groups in their perceptions about the economic impact of farming (Tables 6 and 7). While no difference existed between groups in level of agreement that farmers have a positive impact on the local economy in the area, mean level of agreement that farmers shop locally was higher for rural than city residents[9]. Farm residents had a higher mean level of agreement that loss of farmers in the region will greatly hurt the local economy than rural residents. There was a slight difference in mean level of agreement that the government should do more to help farmers in their area stay in business between farm residents and city residents. Ironically, city residents *more* strongly agreed. This finding concurs with that of Leistritz and Ekstrom (1988) who found non-farm residents to be more inclined to

[9] Significance level of differences between means are reported using the least significant differences (LSD) test statistic. LSD is less conservative than either the Bonferroni or Tukey statistics. Significance level of differences between means is also reported using the Tukey test statistic in Table 6.

support government financial aid for farmers than were farmers.

Table 6. Perception Comparison by Locale of Residence

Statement	Mean[a]			
	On-farm population	Rural area, not farm	City or Town	Significance of Linear by Linear Association
Farmers have a positive impact on the local economy in my area	4.40	4.53	4.44	.476
Most of the agricultural supplies (e.g., seeds, fertilizers, feed) used by farmers in my area are purchased locally	4.06	4.16	3.88	.060
Loss of farmers in this region will greatly hurt our local economy	4.33	4.02	4.09	.091
The government should do more to help farmers in this area stay in business	3.83	4.03	4.05	.215
Farmers in this region are creating an environmental concern that should be addressed	2.45	2.72	2.81	.077
The noise, odor and other environmental issues associated with farming in this area are minimal	4.46	4.29	4.19	.067
In farming areas, non-farm residents need to become accustomed to the noise, odor, and other concerns associated with farming	4.20	3.90	3.62	.000
Environmental protection laws regulating farming practices are too strict	3.22	3.00	2.92	.136
As residential development of cities/towns moves closer to farming areas, more restrictive ordinances regarding noise, odor, and other environmental concerns should be allowed	2.21	2.56	2.82	.000
There should be no restrictions on the size of livestock operations even though they may be in close proximity to residential development of cities/towns or public recreational areas	2.87	2.58	2.70	.151
The replacement of smaller family farms in this area by large-scale farms using hired labor will have an undesirable economic and social consequence	4.01	3.77	3.86	.217
Poor economic conditions will likely lead to the replacement of family farms in this area by large farms run by hired labor	4.00	3.67	3.87	.067
More environmental concerns are created by large scale farms using hired labor than by small family farms	4.14	4.15	3.94	.143

[a] Means are based on a scale from one to five, with one being “strongly disagree” and five being “strongly agree.” “Do not know” was excluded from the mean.

Table 7. Significance of Difference in Average Perception by those Residing on a Farm, in a Rural Area but not on a Farm, or in a City or Town[a]

Statement	Significance, mean difference farm versus rural non-farm		Significance, mean difference farm versus city		Significance, mean difference rural non-farm versus city	
	Tukeys	LSD	Tukeys	LSD	Tukeys	LSD
Most of the agricultural supplies (e.g., seeds, fertilizers, feed) used by farmers in my area are purchased locally					.019	.050
Loss of farmers in this region will greatly hurt our local economy	.085	.034				
The government should do more to help farmers in this area stay in business			.221	.098		
Farmers in this region are creating an environmental concern that should be addressed	.233	.104	.066	.026		
The noise, odor and other environmental issues associated with farming in this area are minimal			.051	.020		
In farming areas, non-farm residents need to become accustomed to the noise, odor, and other concerns associated with farming	.069	.027	.000	.000	.052	.020
Environmental protection laws regulating farming practices are too strict			.122	.051		
As residential development of cities/towns moves closer to farming areas, more restrictive ordinances regarding noise, odor, and other environmental concerns should be allowed	.058	.023	.000	.000	.143	.060
There should be no restrictions on the size of livestock operations even though they may be in close proximity to residential development of cities/towns or public recreational areas	.125	.052				
The replacement of smaller family farms in this area by large-scale farms using hired labor will have an undesirable economic and social consequence	.189	.082				
Poor economic conditions will likely lead to the replacement of family farms in this area by large farms run by hired labor	.060	.024				
More environmental concerns are created by large scale farms using hired labor than by small family farms					.184	.079

[a] When significance levels as calculated by Tukeys and LSD tests are greater than .10, neither are reported.

There were differences between groups in perception of the relationship between farmers and the environment. Average level of agreement among farm residents was lower than that among city residents that farmers are creating an environmental concern and was higher for the statements that environmental issues associated with farming are minimal and that environmental

laws regulating farming practices are too strict. Mean level of agreement was higher among farmers than among rural and city residents that in farming areas, non-farm residents need to become accustomed to concerns related to farming. Level of agreement among rural residents was higher than among city residents. Mean level of agreement among farmers was lower than among rural and city residents that more restrictive ordinances should be allowed as residential development moves closer to farming areas. Level of agreement among rural residents was lower than among city residents. Average level of agreement among farm residents was higher than among rural residents that there should be no restrictions on the size of livestock operations regardless of locale. Mean level of agreement among city residents was between and did not significantly differ from that of farm or rural residents.

There were differences between groups regarding statements related to farm structure. Average level of agreement was higher among farmers than rural residents that the replacement of smaller family farms in the area by large-scale farms using hired labor will have an undesirable economic and social consequence and that poor economic conditions will likely lead to the replacement of family farms in the area by large farms run by hired labor. Average level of agreement that more environmental concerns are created by large scale farms using hired labor than by small family farms was higher among rural residents than among city residents.

CONCLUSIONS

This effort contributes to a small but growing body of literature about residents' perceptions of agriculture and its role in the environment, economy, and society. In general, respondents from the North Central Region of the United States had a favorable view of agriculture. Respondents overwhelmingly agreed that farmers have a positive impact on their local economy. Three-fourths agreed that a loss of farmers in the region would greatly hurt the local economy; respondents living near small towns were more likely to agree than those living near larger towns or cities. Overall, farmers were considered good environmental stewards and existing environmental regulations were perceived as appropriate. A majority of respondents agreed that noise, odor, and other environmental issues associated with farming in their area are minimal. Respondents had strong negative opinions about how the consolidating structure of agriculture will influence the environment, society, and local economies, and a majority agreed the government should do more to help farmers in their area stay in business.

Past literature supports the finding that an individual's proximity to agriculture influences their perception of agriculture. Perceptions of individuals living near towns or cities of different sizes, with varying levels of exposure to livestock production, and who live on a farm, in a rural area but not on a farm, or in a town or city were found to be unique. Residents living in or near small towns more strongly agree that a loss of farmers in the region would hurt the local economy. Respondents receiving income from or working with livestock were less likely than other respondents to agree that there exist environmental issues associated with farming and that additional environmental legislation is needed. Similar differences were found when the perceptions of those who worked or knew someone who worked on a livestock farm were compared with those of other respondents.

Perceptions of agriculture and the associated responsibilities of residents and the government differed between farm residents and rural non-farm and city residents. In general, farm residents expressed greater concern about the impact of farm consolidation, perceived there

to be less of an environmental concern associated with agriculture, and more strongly agreed existing legislation regulating agriculture is appropriate. Farmers more strongly agreed than rural non-farm residents that farmers shop locally, that loss of farmers in the region caused, in part, by poor economic conditions, will greatly hurt the local economy, that consolidation of farms will have an undesirable social and economic consequence, and that there should be no restrictions on the size of livestock operations regardless of locale. Farmers less strongly agreed than city residents that farmers are creating an environmental concern and more strongly agreed that environmental issues associated with farming are minimal and that environmental laws regulating farming practices are too strict. Farmers less strongly agreed than either rural non-farm or city residents that more restrictive ordinances should be allowed as areas develop and more strongly agreed that, in farming areas, non-farm residents need to become accustomed to concerns related to farming. In both cases, level of agreement of rural non-farm residents was between that of farmers and of city residents.

REFERENCES

Almagor, U. 1990a. Some Thoughts on Common Scents. J. Theory Soc. Behav. 20, pp. 181-195.

Almagor, U. 1990b. Odors and Private Language: Observations on the Phenomenology of Scent. Human Studies 13, pp. 253-274.

Bahls, S.C. 1997. Preservation of Family Farms – The Way Ahead. Drake Law Review 45, pp. 311-329.

Benjamin, G. 1997. Industrialization in Hog Production: Implications for Midwest Agriculture. Economic Perspectives January/February, pp. 2-13. Federal Reserve Bank of Chicago.

Bogardus, E. 1925. "Social Distance and Its Origins." Journal of Applied Sociology 9, pp. 216-226.

Buttel, F.H. and D.B. Jackson-Smith. 1997. Getting Bigger? Wisconsin Farmers' Views on Livestock Expansion. PATS Research Report No. 2. Program on Agricultural Technology Studies, Cooperative Extension, University of Wisconsin-Extension.

Carman, H.F. 1980. Coming: More Corporate Farms in California. California Agriculture. January, pp. 9-10.

Cavalini, P.M. L.G. Koeter-Kemmerling, and M.P.J. Pulles. 1991. Coping with Odour Annoyance and Odour Concentrations: Three Field Studies. J. Env. Psych. 11, pp. 123-142.

Cecelski, D. and M.C. Kerr. 1992. Hog Wild. Southern Exposure. Fall, pp. 9-15.

Day, L.M. 1981. Research and the Family Farm: Implications for Agricultural Economics Research. Journal of Agricultural Economics, pp. 997-1004

DeBoer, J., J. Van Der Linden, and J. Van Der Pligt. 1987. Air Pollution, Annoyance and Coping. Environmental Annoyance: Characterization, Measurement and Control, ed. H.S. Koelega, pp. 165-174. Amsterdam, The Netherlands. Elsevier Science Publishing, B.V.

Drabenstott, M. 1994. Industrialization: Steady Current or Tidal Wave? Choices 9(4), pp. 4-8.

Economic Research Service. Farm Structure Briefing Room. www.econ.ag.gov/briefing/farmstructure/glossary/text/familyfa.htm.

Ervin, D.E. and K.R. Smith. 1994. Agricultural Industrialization and Environmental Quality. Choices 9(4), p. 7.

Evans, G.W. and R. Tafalla. 1987. Measurement of Environmental Annoyance. Air Pollution, Annoyance and Coping. Environmental Annoyance: Characterization, Measurement and Control, ed. H.S. Koelega, pp. 11-27. Amsterdam, The Netherlands. Elsevier Science Publishing, B.V.

Farnsworth, R.L. 1994. Chapter 3: Conservation and Environmental Iissues. In Illinois Agriculture, Agribusiness, and the Rural Economy: Strategic Issues for the Next Century. Department of Agricultural Economics, Illinois Agricultural Experiment Station Cooperative Extension Service Special Publication 85, pp. 20-27.

Federal Reserve Bank of Chicago. 1996. The Changing Rural Economy in the Midwest. March 8. Chicago, Illinois.

Fulton, J. and J. Gillespie. 1995. Emerging Business Organizations in a Rapidly Changing Pork Industry. American Journal of Agricultural Economics 77, pp. 1219-1224.

Goldschmidt, W.R. 1946. Small Business and the Community. A Study in Central Valley of California on Effects of Scale of Farm Operations. Report of the Special Committee to Study Problems of American Small Business. U.S. Senate.

Hefferman, W.D. and R.R. Campbell. 1986. Agriculture and the Community: The Sociological Perspective. Interdependence of Agriculture and Rural Communities in the Twenty-first Century: The North Central Region. Iowa State University Press. Ames, Iowa.

Johnson, B. 1995. Corporate Restrictions in U.S. Production Agriculture: Economic Implications. Professional Forum, pp. 21-26.

Kennedy, R.F. Jr. 1999. I Don't Like Green Eggs and Ham. Newsweek. April 26, p. 12.

Knapp, J. and L. Griffieon. 1999. Non-farmers Guide to Agriculture (Polk County). Leopold Center Competitive Grant Report 98-57, pp. 17-19.

Lawrence, J.D., D. Otto, and S. Meyer. 1997. Purchasing Patterns of Hog Producers: Implications for Rural Agribusinesses. Journal of Agribusiness 15 (1), pp. 1-17.

Leistritz, F. L. and B. L. Ekstrom. 1988. North Dakota Farm and Nonfarm Residents' Views on Financial Assistance Policies. North Central Journal of Agricultural Economics 10(1), pp. 125-134.

Leroux, N, S. Bard, D. Good, and S. Sonka. 1994 February. Chapter 7: Production and Marketing of Livestock and Poultry. In Illinois Agriculture, Agribusiness, and the Rural Economy: Strategic Issues for the Next Century. Department of Agricultural Economics, IAES CES Special Publication 85, pp. 54-62.

Lins, D.A. 1994 February. The Role of Agriculture and Agribusiness in the Illinois Economy. In Illinois Agriculture, Agribusiness, and the Rural Economy: Strategic Issues for the Next Century. Department of Agricultural Economics, IAES CES Special Publication 85, pp. 1-10.

Lobao, L.M. and M.D. Schulman. 1991. Farming Patterns, Rural Restructuring and Poverty: A Comparative Regional Analysis. Rural Sociology 56(4), pp. 565-602.

Lohr, L. 1996. Perceptions of Rural Air Quality: What Will the Neighbors Think? Journal of Agribusiness 14(1), pp. 109-128.

MacCannell, D. 1983. Agribusiness and the Small Community. Background Paper to Technology, Public Policy and the Changing Structure of American Agriculture, Office of Technology Assessment, U.S. Congress, Washington, D.C.

Marbery. 2000. Numbers Game. Feedstuffs 72(13), pp. 17-18.

Northwest Area Foundation. 1994 December. A Better Row to Hod: The Economic Environmental and Social Impact of Sustainable Agriculture.

Palmquist, R., F.M. Roka, and T. Vukina. 1997. Hog Operations, Environmental Effects, and Residential Property Values. Land Economics 73(1), pp. 114-124.

Paul, E. 1997. Agricultural Policy at the End of the 20th Century. In Increasing Understanding of Public Problems and Policies - An Executive Summary. Highlights of the 1997 National Public Policy Education Conference, September 21-24, Charleston, SC, pp. 20-21.

Perrin, M.L. 1987. Annoyance Felt by Populations Living Near Odour-Emitting Industries. Air Pollution, Annoyance and Coping. Environmental Annoyance: Characterization, Measurement and Control, ed. H.S. Koelega, pp.141-144. Amsterdam, The Netherlands. Elsevier Science Publishing, B.V.

Rathge, R. and C.J. Wachenheim. 2000. Societal Perceptions of Agriculture. 2000 Rural Sociological Society Meetings, August 13 to 17, Washington D.C.

Roper Starch Worldwide Inc. 2000. Gap Research: Consumer and Farmer Opinions about Food and Agriculture. The Philip Morris Family of Companies.

Thelen, K.D. 1991. Right to Farm -- Environmental Complaint Response. Michigan Department of Agriculture. Lansing, Michigan.

Thomas, J.K., F.M. Howell, G. Wang, and D.E. Albrecht. 1996. Visualizing Trends in the Structure of U.S. Agriculture, 1982-1992. Rural Sociology 61(2), pp. 349-374.

United States Department of Agriculture. 1998 January. A Time to Act. A Report on the USDA National Commission on Small Farms. USDA National Commission on Small Farms. Miscellaneous Publication 1545.

Van Kleeck, R.J. and N.R. Bulley. 1985. An Assessment of Seperation Distance as a Tool for Reducing Farm/Neighbour Conflict. Proceedings of the 5th International Symposium on Agricultural Wastes. ASAE. St Joseph, Michigan.

Wachenheim, C.J. and W. Lesch. 2000. Public Views on Family and Corporate Farms. Unpublished Manuscript. Department of Agribusiness and Applied Economics. North Dakota State University.

Wallace, L.T. 1987. The Changing Structure of Agriculture. In Agriculture's Futures: America's Food System. Springer-Verlag. New York, NY, pp. 16-25.

Westenbarger, D.A. and D. Letson. 1995. Livestock and Poultry Waste - Control Costs. Choices, 2nd quarter, pp. 27-30.

Winneke, G. and J. Kastka. 1987. Comparison of Odour-Annoyance Data from Different Industrial Sources: Problems and Implications. Environmental Annoyance: Characterization, Measurement and Control, ed. H.S. Koelega, pp. 129-137. Amsterdam, The Netherlands. Elsevier Science Publishing, B.V.

APPENDIX

Appendix Table 1. Categorical Level of Agreement with Statements Regarding Farming

	Strongly Disagree 1	2	3	4	Strongly Agree 5	Total	"Do not know"
	%[b] (N)	% (N)	% (N)	% (N)	% (N)	N	N (%)
Farmers have a positive impact on the local economy in my area.	3.8 (22)	1.7 (10)	10.1 (58)	13.4 (77)	70.9 (407)	574	10 (1.7)
Most of the agricultural supplies (e.g. seeds, fertilizers, feed) used by farmers in my area are purchased locally.	5.2 (27)	5.2 (27)	19.0 (98)	23.2 (120)	47.4 (245)	517	67 (11.5)
Loss of farmers in this region will greatly hurt our local economy.	9.6 (54)	5.1 (29)	9.7 (55)	13.8 (78)	61.8 (349)	565	19 (3.3)
The government should do more to help farmers in this area stay in business.	8.6 (49)	4.0 (23)	18.9 (108)	17.0 (97)	51.5 (294)	571	13 (2.2)
Farmers in this region are creating an environmental concern that should be addressed.	32.0 (174)	19.7 (107)	15.5 (84)	13.1 (71)	19.7 (107)	543	41 (7.0)
The noise, odor, and other environmental issues associated with farming in this area are minimal.	5.6 (32)	3.1 (18)	10.3 (59)	18.3 (107)	62.4 (358)	574	10 (1.7)
In farming areas, non-farm residents need to become accustomed to the noise, odor, and other concerns associated with farming.	7.1 (40)	6.9 (39)	20.0 (113)	24.8 (140)	41.2 (233)	565	19 (3.3)
Environmental protection laws regulating farming practices are too strict.	14.7 (67)	19.7 (90)	31.7 (145)	15.3 (70)	18.6 (85)	457	127 (21.7)
As residential development of cities/towns moves closer to farming areas, more restrictive ordinances regarding noise, odor, and other environmental concerns should be allowed.	31.2 (167)	19.0 (102)	23.3 (125)	14.2 (76)	12.3 (66)	536	48 (8.2)
There should be no restrictions on the size of livestock operations even though they may be in close proximity to residential development of cities/towns or public recreational areas.	24.7 (137)	23.8 (132)	23.3 (129)	12.6 (70)	15.5 (86)	554	30 (5.1)
The replacement of smaller family farms in this area by large-scale farms using hired labor will have an undesirable economic and social consequence.	6..5 (35)	9.2 (49)	20.0 (107)	19.4 (104)	44.9 (240)	535	49 (8.4)
Poor economic conditions will likely lead to the replacement of family farms in this area by large farms run by hired labor.	8.3 (46)	10.3 (57)	13.7 (76)	24.4 (135)	43.2 (239)	553	31 (5.3)
More environmental concerns are created by large scale farms using hired labor than by small family farms.	4.9 (26)	7.3 (39)	13.9 (74)	24.9 (133)	49.1 (262)	534	50 (8.6)

[a] Means are based on a scale from one to five, with one being "strongly disagree" and five being "strongly agree." "Do not know" was excluded from the mean.

[b] Response reported as a percentage of all responses from "strongly disagree" to "strongly agree" [N]. Responses of "Do not know" are not included in the total number of responses when calculating percentage in each category.