

Developing a Baseline of Air/Odor Control Technology Use By Iowa Pork Producers^a

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Introduction

Air/odor issues related to livestock production have received much attention recently. This attention has come from many fronts - policy makers, media, state residents, and agribusiness including livestock producers. While the discussions have been lengthy and regulations have been instituted, little is known about the current status of the livestock producers' use of air/odor control measures. There is not a baseline of air/odor control measures currently in use.

An Iowa Pork Producers Association survey showed that about two-thirds (63 percent) of the respondents felt air quality/odor was an issue to be evaluated. They encouraged development of odor and air quality solutions that minimize odor effects. Moreover, in the 2001 survey, environmental concerns were ranked as the biggest obstacle for producers to prosper.

This report focuses on establishing a baseline of air/odor control measures currently in use by Iowa pork producers. Baseline information on air/odor control measures currently in use can serve multiple purposes. First, it can be used for societal and industry education on the current technologies in use. This can be used to help reaffirm the industry's commitment to the issue. Secondly, it will assist in documenting changes in technology adoption over time. Third, it can be used to establish a producer educational focus on the air/odor issue and help identify air/odor control technologies that are effective and low cost control technologies. Fourth, it can be established as the base for use in evaluating industry impacts of selected air/odor control technologies. This would aid in analyzing industry impacts of alternative regulatory actions. Regulatory action has been taken with limited evaluation of industry and/or producers impacts.

This report provides a summary of the odor control methods used by Iowa pork producers. The producer's level of satisfaction with those methods is provided. General information on the industry is also provided.

Method

Surveys were structured to obtain information on level of use of odor control methods. Level of satisfaction of respective odor control methods which were in use or had been used was also obtained from the respondents. Additionally, information was obtained on type of production systems such as confinement, hoop, etc., in use. Information on type of producer (farrow-to-finish, finisher, etc.) was also obtained. Other information included distance of production facilities from the nearest neighbors and other methods that producers use to improve neighbor

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relations. Two surveys were conducted. One was a mail survey. The mail survey was followed by a telephone survey.

Mail Survey

To obtain information on odor control methods used in the Iowa swine industry and level of satisfaction by the users a mail survey was sent to Iowa pork producers. The mailing list was coordinated with the Iowa Pork Producers Association. There were 3,249 surveys sent in early August 2002. Of these, 575 were returned; thirteen were no longer raising pigs leaving 562 usable surveys.

Telephone Survey

The telephone survey was conducted to help verify the results of the mail survey. It was conducted by ISU Statistics Department personnel during spring 2003. One issue was the representativeness of the mail survey. There were 354 telephone surveys completed. The telephone survey population was selected independently from the mail survey population. Questions were similar to the mail survey, but not identical due primarily to time constraints in conducting the phone survey. A major focus of the telephone survey was level of odor complaints received by pork producers and where the complaints originated. This information was not clearly identifiable in the mail survey response.

Comparison of Mail and Telephone Survey Respondents

Table 1. Comparison of Respondents to Mail and Telephone Odor Surveys.

Item	Percent of Respondents	
	Mail Survey	Telephone Survey
<u>Number of Hogs Marketed Annually</u>		
Less Than 500	5.68	7.00
500-999	5.13	8.60
1,000-1,999	16.85	13.70
2,000-2,999	15.02	12.42
3,000-4,999	15.57	19.10
5,000-9,999	22.71	19.75
10,000-14,999	7.51	11.47
15,000-24,999	5.31	3.18
25,000 Or More	6.23	4.78
<u>Type of operation</u>		
Farrow-To-Finish	38.83	44.10
Farrow-To-Feeder Pig	5.21	3.08
Farrow-To-Early Wean	4.03	4.62
Feeder Pig Finisher	30.76	28.97
Early Wean-Pig Finisher	18.32	16.15
Seedstock Supplier	1.68	1.03
Nursery, Isoweane 10-40 lb/other	1.18	2.05
<u>Distance facility from nearest neighbor</u>		
less than 1/8 mile	12.70	14.41
1/8 to 1/4 mile	32.85	30.23
1/4 to 1/2 mile	37.02	37.29
1/2 to 1 mile	16.88	16.38
more than 1 mile	0.54	1.69

The mail and phone survey respondents were similar as shown in Table 1. The similarity validates the results from both surveys, and allows the use of both for analysis and discussion of results.

Table 1 shows that items such as pork production operation size or type and distance to nearest neighbor were similar between the mail and telephone survey respondents. For example, the operation size distribution was similar between the two surveys. The largest number of respondents was in the 5,000 to 9,999 number of market hogs marketed annually size category. About one-in-five producers were in this category. About one-in-twenty respondents marketed 25,000 or more market hogs annually. Similarly, about one in twenty respondents marketed less than 500 market hogs annually. The predominant type of producer was the farrow-to-finish producer. About four-in-ten respondents were farrow-to-finish producers. The next largest group, about three-in-ten producers, were feeder pig finishers. About one-third of the respondents had the nearest neighbors one-eighth to one-fourth mile from their facility. Slightly more than one-third had their nearest neighbor located one-fourth to one-half mile from the facility. Or, two-thirds of the producers had neighbors with one-eighth to one-half mile from the facility.

Survey Results

Facility Size, Type of Producer, Distance to Neighbor, and Number of Production Sites

Information on the number of pigs marketed in 2001 by the mail survey respondents is provided in Table 2. This shows that about 11 percent marketed less than 1,000 pigs. About one-third of the respondents marketed from 1,000-2,999 pigs in 2001. Approximately 16 percent marketed from 3,000-4,999 pigs while about a fourth (22.71 percent) marketed from 5,000 to 9,999 head. Thirteen percent marketed 10,000-24,999 pigs while about 6 percent marketed 25,000 or more pigs annually. As shown above, these results for the telephone survey respondents were similar.

Table 2. Number and Percent of Producers by Number of Pigs Marketed in 2001 (Mail Survey Respondents).

Number of Pigs Marketed	Number of Producers	Percent of Producers
Less Than 500	31	5.68
500-999	28	5.13
1,000-1,999	92	16.85
2,000-2,999	82	15.02
3,000-4,999	85	15.57
5,000-9,999	124	22.71
10,000-14,999	41	7.51
15,000-24,999	29	5.31
25,000 Or More	34	6.23

The largest number of respondents (40.2 percent) had a farrow-to-finish operation (Table 3). About one-in-five finished early weaned pigs (19.4 percent) or finished feeder pigs (18 percent). About one-in-seven (14.6 percent) had a contract finishing operation.

Table 4 corresponds to questions where producers provided information on the type of facilities that they used for each production phase. The facility types were hoop structures, open lot with shelter or pastures, naturally ventilated confinements, and mechanically ventilated confinement. The producers were able to mark multiple facility types.

Table 3. Type of Pork Production Operations (Mail Survey Respondents).

Type of Operation	Number of Producers	Percent of Producers
Farrow-To-Finish	226	40.2
Early Wean-Pig Finisher	109	19.4
Feeder Pig Finisher	101	18.0
Contract Finisher	82	14.6
Farrow-To-Early Wean	24	4.3
Farrow-To-Feeder Pig	20	3.6
Contract Farrowing/Nursery	11	2.0
Seedstock Supplier	10	1.8
Contract Farrow-To-Finish	3	.5
Farrow-Feeder Pig, Contract Finishing	2	.4
Other	7	13

Table 4 shows the number of respondents with each facility type by production phase. It shows that there are large differences in facility types used by production phase. The primary type of facility for both farrowing and nursery was confinement with mechanical ventilation. Breeding-gestation and finishing were more varied but still were predominately confinement facilities. Open lots with shelters or pasture was used for breeding-gestation and/or finishing. The primary use of hoop structures was for finishing. Of those indicating they used hoop structures, 77 percent were finishing facilities.

Table 4. Number of Producers With Respective Production Systems By Phase of Production (Mail Survey Respondents).

Production Phase	Hoop Structures	Open lot with shelters or pastures	Confinement natural ventilation	Confinement mechanical ventilation	Total
Breeding-gestation	15	147	89	113	364
Farrowing	0	14	33	260	307
Nursery	3	9	29	346	387
Finishing	59	159	352	227	638

The greatest variation in facility use was for breeding gestation facilities. About one-in-four respondents, 26.2 percent (147 out of 562) had open lot with shelters or pasture facilities for breeding-gestation; one-in-five had confinement facilities with mechanical ventilation (113/562), while one-in-six (15.8 percent) had confinement with natural ventilation facilities. Of those with breeding-gestation facilities, 40.4 percent had open lot with shelters or pasture facilities. Almost all farrowing facilities were confinement with mechanical ventilation. Of those with a farrowing facility 85 percent of the systems were confinement with mechanical ventilation systems. Similarly, respondents reported that the predominant nursery facility was confinement with

mechanical ventilation. For those with nurseries, 89 percent of the systems were confinement with natural ventilation systems. Six-in-ten producers had finishing systems with natural ventilation. Four-in-ten reported confinement with mechanical ventilation. About one-in-four had open lot or pasture finishing facilities while one in ten had hoop finishing facilities.

Most producers had a deep pit as the primary manure storage system (Table 5). Sixty-eight percent of the producers indicated that they had this system as a primary manure storage system. Sixty percent of the primary systems utilized were deep pit systems. About twenty percent indicated they had a solid/bedded manure storage system. Eighteen percent had an outdoor slurry pit system while six percent had an anaerobic lagoon as the primary manure storage system.

Table 5. Primary Manure Storage System (Mail Survey Respondents).

Manure Storage System	Number of Producers	Percent of Producers	Percent of Systems
Deep pit	383	68.2	60.3
Solid/bedded	116	20.6	18.3
Outdoor slurry pit	102	18.2	16.0
Anaerobic lagoon	34	6.1	5.4

Information on the distance from the main production facility to the nearest neighbor is provided in Table 6. One in eight respondents (12.7 percent) indicated that the nearest neighbor was within one-eighth of a mile from the production facility. About one-third (32.8 percent) had the nearest neighbors from one-eighth to one-fourth mile from the facility. The nearest neighbor was from one-fourth to one-half mile from the facility for about another one-third (37 percent) of the respondents. About one percent had the nearest neighbor located more than one mile from the facility.

Table 6. Distance from Main Production Facility to Nearest Neighbor (Mail Survey Respondents).

Distance	Number of Operations	Percent of Operations
Less than 1/8 mile	70	12.7
1/8 to 1/4 mile	181	32.8
1/4 to 1/2 mile	204	37.0
1/2 to 1 mile	93	16.9
More than one mile	3	.6

Most respondents to the telephone survey (about one-half) had one production site (Table 7). About another one-in-five (22.9 percent) had two production sites. Ten respondents (2.8 percent) had 10 or more production sites.

Most producer respondents (52.8 percent) were in the 35-49 age bracket (Table 8). Only 21 (5.9 percent) were in their 20's. Twenty-five (7 percent) were 65 or older. Another one-in-seven (14.4 percent) were in the 55-65 age bracket. Only 12 percent were under 35 years of age.

Many years of experience were represented by the respondents. Thirty-nine (11.2 percent) had 40 or more years experience as a pork producer (Table 9). At the other end of the age bracket, 23 (6.6 percent) had 9 or fewer years experience as a pork producer.

Table 7. Number of Hog Production Sites (Telephone Survey Respondents).

Number of Production Sites	Number of Respondents	Percent of Respondents
1	169	47.9
2	81	22.9
3	49	13.9
4	19	5.4
5	10	2.8
6	8	2.3
7-9	7	2.0
10-14	5	1.4
15-19	2	.6
20 or more	3	.8
TOTAL	353	

Table 8. Age of Telephone Survey Respondents.

Age	Number of Respondents	Percent of Respondents
20-24	6	1.7
25-29	15	4.2
30-34	23	6.5
35-39	51	14.4
40-44	67	18.9
45-49	69	19.5
50-54	47	13.3
55-59	32	9.0
60-64	19	5.4
65-69	15	4.2
70 or over	10	2.8
TOTAL	354	

Table 9. Years as Pork Producer for Telephone Survey Respondents.

Number of Years	Number of Respondents	Percent of Respondents
1-4	6	1.7
5-9	17	4.9
10-14	42	12.1
15-19	36	10.3
20-24	69	19.8
25-29	63	18.1
30-34	57	16.4
35-39	19	5.5
40-45	28	8.0
45 or more	11	3.2
TOTAL	348	

Odor Complaint Results

Odor Complaints Received by Survey Participants

Odor complaints were initially examined through the mail survey. The telephone survey also focused on odor complaints received by pork producers to help verify the mail survey results. The summary below represents the telephone survey results. There were 354 total respondents in the telephone survey. Odor complaints were categorized as formal or informal. A formal complaint was one where a producer was contacted by an attorney, the state Department of Natural Resources or a city/county town council representative, either through a phone call, letter or personal visit. An informal complaint includes a personal visit from a neighbor, call or letter from a private individual or hearing an off-hand remark in public. The telephone survey results showed that 77 respondents (21.7 percent of the producers) had received an odor complaint in the last five years; which means that 78.3 percent have not received a complaint in the last five years. Most were informal complaints. The breakdown between formal and informal complaints is:

- 1.7 percent had received only a formal complaint;
- 15.5 percent had received only an informal complaint; and
- 4.5 percent had received both types of complaints.

Of the 77 producers receiving a complaint, 74 had the hog finishing phase as part of their operation. Over half of the complaints were related to manure application to land. The average number of hogs marketed annually by those receiving complaints was 13,461 hogs. The average number of hogs marketed by all telephone survey respondents was 7,560 hogs. Thus, odor complaints tend to be registered against the larger producers. However, an association cannot be drawn between respective size of production site and an odor complaint. Information was not available on size of the respective production systems or sites. Information was available only for the number of hogs marketed. A number of respondents had multiple production sites.

Source of Odor Complaints

Telephone survey respondents receiving odor complaints were asked to provide information on what generated the complaint. Over half of the complaints were linked to manure application. Of the 77 complaints, 45 were related to manure application. This is 58 percent of the complaints. Seventeen (17) were related to a specific building and nine (9) were related to manure storage. Of the 45 complaints related to manure application, 16 were related to spreading on top of the ground, and 12 were application in general. Seven were related to manure handling. This would involve such things as spilling manure on roads and the resulting odor, etc. Of the 17 building complaints, 13 were related to confinement buildings. Two were related to an open lot while one was incinerator related. Of the nine related to manure storage, three were related to lagoons, three to open storage with solid waste, and three were associated with deep pits. There were the same number of complaints associated with lagoons as deep pits and there were 4.5 times more deep pits. There were 383 pit systems (Table 5) in the survey which means that less than one percent received a complaint. Open storage with solid waste was used by 116 producers. Three (2.59%) received a complaint. There were 34 using lagoons and 3, or 8.8 percent, received a complaint.

The source of odor complaints indicates that manure application is a key area to reducing odor complaints, as more than half the complaints were related to application. It is an activity that is not conducted many days of the year, for some operations less than 7 days or a week. A

Table 10. Source of Odor Complaints.

Reasons Received Odor Complaint	Number of Respondents	Percent of Complaints
Manure application	45	58.4
Building/facilities	17	22.1
Manure storage	9	11.7
Other	6	7.8

function that is done only a few days leads to many of the complaints. Extra caution and care is needed during those few days.

Respondents were also asked where the complaint came from. Of the 77 complaints, 61 came from rural residents. Thirteen were from town residents and three were anonymous. About half (36) came from other farmers and 38 were from non-farmers. Of the 77 who indicated they received an odor complaint, 64 indicated they ‘very rarely’ received a complaint. Only two of the 354 respondents indicated they received an odor complaint ‘somewhat often’.

Producers were asked how far their operations are from the nearest neighbor. Figure 1 shows the results when complaints are compared to distance to nearest neighbor.

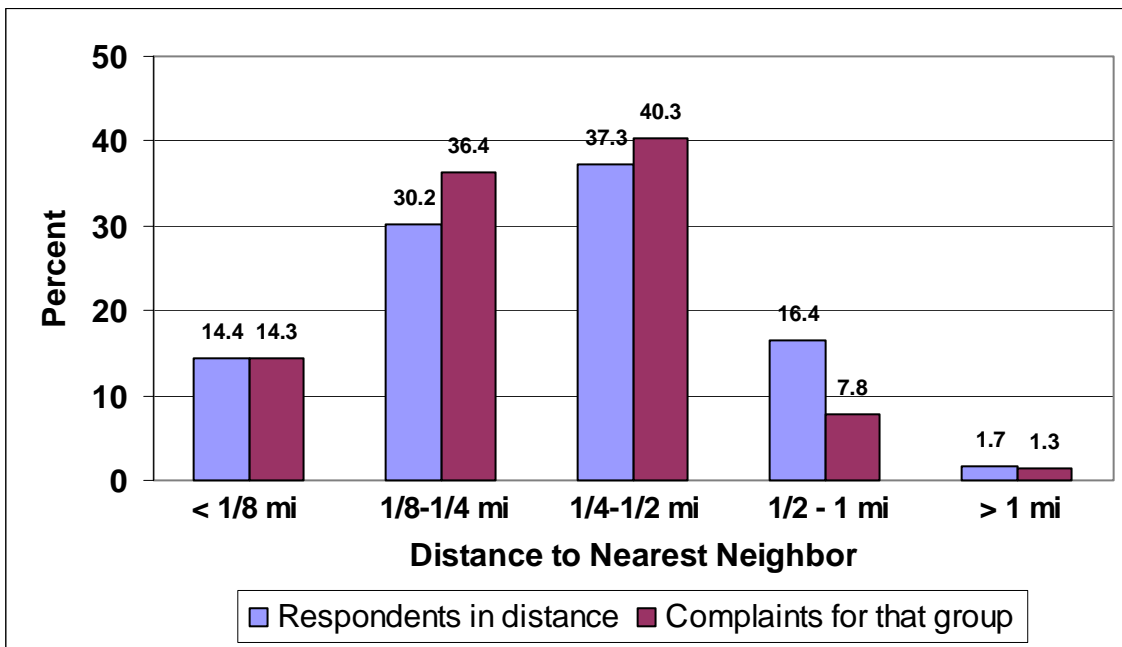


Figure 1 shows that about 67 percent of the respondents had the nearest neighboring residence from one-eighth to one-half mile from their swine facilities. Those producers received proportionately more complaints than producers with the nearest neighbor either closer or further from their facilities.

Odor Control Methods Used and Producer Satisfaction

The mail survey asked respondents if they were using, or had previously used 24 different technologies to help reduce odors. The technologies were divided into 4 groups, 1) those associated with buildings, 2) those associated with manure storage, 3) manure additive or feed modifications, and 4) land application. Producers who were using, or had used, each technology were asked to indicate whether they were satisfied, indifferent, or unsatisfied with that technology. Table 11 shows the results.

The four technologies that were the most popular with producers were deep pit buildings (77 percent using and 77 percent of the users satisfied), soil injection (69 percent using and 88 percent of the users satisfied), composting mortalities (50 percent using and 75 percent of the users satisfied), and windbreaks (38 percent using and 64 percent of the users satisfied). Each of

Table 11. Odor control technologies used and producer satisfaction level-mail survey.

	Number Using or Previously Used	Percent Using or Previously Used	Level of Satisfaction (%)			Percent Quit
			Satisfied	Indifferent	Unsatisfied	
Biofilter *	9	1.6	25.0	37.5	37.5	11.1
Windbreak **	214	38.1	63.6	35.5	0.9	1.0
Oil Sprinkling	9	1.6	33.3	44.4	22.2	55.6
Bedded System	203	36.1	59.0	34.1	7.0	15.8
Ozone	10	1.8	0.0	62.5	37.5	70.0
Bio Cover	55	9.8	68.9	24.4	6.7	16.4
Impermeable Plastic	6	1.1	33.3	33.3	33.3	66.7
Permeable Plastic	5	0.9	20.0	20.0	60.0	40.0
Deep Pit	433	77.1	76.6	20.5	2.9	1.4
Other Type Cover	21	3.7	84.2	15.8	0.0	4.8
Aeration	33	5.9	55.6	22.2	22.2	21.2
Lagoon ***	48	8.5	45.2	41.9	12.9	4.2
Solids Separation	23	4.1	60.0	35.0	5.0	8.7
Composting-Pigs	280	49.8	75.5	20.2	4.3	5.7
Composting-Manure	114	20.3	65.7	26.5	7.8	13.2
Other	16	2.9	100.0	0.0	0.0	0
Manure Additive	240	42.7	23.4	44.4	32.2	54.2
Feed Additive	152	27.1	38.0	43.8	18.3	30.9
Low Protein Diet	43	7.7	37.1	48.6	14.3	18.6
Other	8	1.4	71.4	28.6	0.0	0
Don't Agitate	111	19.8	54.4	28.3	17.4	20.7
Immediate incorporation	294	52.3	71.2	22.8	6.0	14.6
Soil Injection	390	69.4	88.3	10.8	0.9	7.2
Other	56	9.9	70.8	20.8	8.3	5.4

* Includes Biofilters that included mech. Ventilation.
 ** Combines Windbreak and Shelterbelt.
 *** Includes Lagoons and Anaerobic.

these technologies had a low number of producers discontinuing use...1, 1, 6, and 7 percent for windbreaks, deep pits, composting mortalities, and soil injection, respectively.

Some technologies were well liked by the users, but were not used by many producers, or had a higher dropout rate. Bedded manure systems were used by 36 percent of the respondents and 59 percent were satisfied. However, 16 percent had quit using bedded systems. Biocover users represented only ten percent of respondents, but 69 percent were satisfied. Sixteen percent had quit using the biocovers. Aeration was used by only six percent, of which 55 percent were satisfied. Twenty-two percent who had tried aeration had quit.

Producers were also dissatisfied with some of the technologies. Plastic covers, both permeable and impermeable were tried by only two percent of producers and, of these, only 33 percent were satisfied with the impermeable covers, and 20 percent with the permeable. Thirty-three percent of the users were dissatisfied with the impermeable covers and 60 percent (greatest dissatisfaction of all the technologies) were dissatisfied with the impermeable covers. Of those who had tried them, 67 percent and 40 percent respectively, had quit using them. Manure additives were used by 43 percent of producers, but only 23 percent were satisfied and 54 percent had quit using them. Ozone was tested by nearly 2 percent of producers, but none were satisfied. Most were indifferent (63 percent) and 37 percent were dissatisfied. Seventy percent of ozone users had quit using the technology.

Additional Items Producers are Using to Improve Neighbor Relations

Table 12 corresponds to an open-ended question that calls for producers to indicate other things that they are doing to improve neighbor relations. There were 251 producers who responded to the question and there were 345 responses due to multiple replies by some respondents. The responses were classified into the following categories.

- **Weather (Rain, Wind, and Temp)-** Indicated applying manure after, before, or during one or more weather conditions.
- **Communications/ Neighbor Relations/ Respect-** Indicated interaction with their neighbors or their community in order to determine suggestions, provide community involvement, friendly interactions with neighbors.
- **Landscaping Upkeep of Facility & Area-** Indicated that they try to improve the appearance of their facilities and area around facilities.
- **Timing of Application-** Indicated that they attempt to spread or avoid spreading manure during certain times such as avoiding holidays, neighbor gatherings, or weekends.
- **Give Pork/Gift/Manure-** Indicated that they tried to provide a gift or service to neighbors. This ranged from gifts of pork; to moving snow; to providing manure.
- **Location of Facility/ and Where Manure Applied-** Indicated that they tried to place or avoid placing facilities and manure in certain areas. This ranged from facility placement to avoiding traveling along highways with manure.
- **Limit Exposure/ Number of Applications-** Indicated that they tried to limit the exposure of neighbors to manure or carcasses. This included everything from the number of applications to volume applied to applying as rapidly as possible.
- **Incorporate/ Inject-** Indicated incorporation or injections. Ranged from knifing the manure in to injecting and disking the manure.
- **Other-** Indicated a response that does not match a category.
- **Facility Type / Operation Type-** Indicated that a system or facility type reduces the odor or complaints.

Weather and communication with neighbors were the most predominant answers with 30 percent of the respondents indicating they did these things. Landscaping, timing of application, gifts, and location of facility or manure application were also very popular with from 10 to 16 percent of the respondents to the questions indicating they did these things. Limiting exposure, incorporation or injection, facility type, and all others received numerous responses but each represented less than 10 percent of the respondents.

Table 12. Items That Producers are Doing to Improve Neighbor Relations (Mail Survey).^(a)

Items	Number of Responses	Percent of Responses	Percent of Respondents
Weather (Rain, Wind, and Temp)	77	22.3	30.7
Communications/ Neighbor Relations/ Respect	75	21.7	29.9
Landscaping Upkeep of Facility & Area	41	11.9	16.3
Timing of Application	38	11.0	15.1
Give Pork/Gift/Manure	31	9.0	12.4
Location of Facility/ and Where Applied	28	8.1	11.2
Limit Exposure/ Number of Applications	18	5.2	7.2
Incorporate/ Inject	17	4.9	6.8
Facility Type / Operation Type	7	2.0	2.8
Other	13	3.8	5.2
Total Number of Responses	345		

(a) There were 251 participants who responded and there were 345 responses.

Reasons Odor Control Technologies Are Not Used

Information was obtained, during the telephone survey on why technologies in selected areas were not used. To obtain this information, technologies were grouped into four areas. They were building odor control, manure storage odor control, land application methods, and manure and feed additives. While the comparison does not provide specific information on specific technologies, it provides insight into the respective technology groups. The groupings were as follows:

- Building odor control: biofilters, windbreaks, oil sprinkling, bedded system, and ozone
- Manure storage odor control: biocovers, plastic covers, aeration, deep pit, lagoon, and composting
- Land application: broadcast, immediate incorporation, and injection
- Additives: diet/feed and manure

Slightly more than one-half of the telephone survey respondents had windbreaks and/or a bedded system incorporated within their production system. Only 11 used oil sprinkling, nine used biofilters, and one used ozone. About half (45.8 percent) of the respondents indicated that they did not use more of these technologies because odor was sufficiently managed already (Table 13). This is consistent with the low level of complaints linked to buildings and facilities.

About 40 percent indicated it was not applicable to their facilities. For example, most confinement barns would not use bedding. Slightly more than 100 respondents (about 30 percent) indicated they were not familiar with the technology, or that it was too expensive. Thus,

there are technologies in this area that producers do not feel are cost effective. Additionally, they were not familiar with some technologies.

Table 13. Reasons Not Using Selected Building Odor Control Methods.^(a)

Reason	Number of Respondents	Percent of Respondents
Not applicable for my facilities	142	40.1
Too expensive	112	31.6
Too much work	14	4.0
Not effective for odor control	35	9.9
Odor managed sufficiently already	162	45.8
Not familiar with technology	103	29.1

(a) Odor control techniques for buildings were biofilters, windbreaks, oil sprinkling, bedding, and/or ozone.

The principle manure storage system was a deep pit. Composting was used by over half the producers but much of this was for composting dead animals. The primary reason systems (technologies) were not adopted for manure storage odor control was that it was not applicable for the facilities (Table 14). About seven-in-ten of the respondents provided this response. This is consistent with the fact that many respondents had a deep pit system. Storage covers such as straw, etc. do not fit with a deep pit system. Only about one-in-five felt odors from manure storage was sufficiently managed at the current time. Producers are sensitive to the potential for odors from manure storage. However, the small number of complaints associated with manure storage would indicate a good job is being done. Between 8 and 12 percent of the respondents indicated that the technology was too expensive, was too much work or was not effective for odor control. The issue of not being cost effective was not as important for these types of technologies. Producers were quite familiar with these technologies.

Table 14. Reasons Not Using Selected Manure Storage Odor Control Methods Facilities.^(a)

Reason	Number of Respondents	Percent of Respondents
Not applicable for my facilities	252	71.2
Too expensive	43	12.1
Too much work	31	8.8
Not effective for odor control	28	7.9
Odor managed sufficiently already	79	22.3
Not familiar with technology	15	4.2
Biocovers attract birds and rodents	2	0.6
Have a good rendering service	8	2.3
Biosecurity, pollution	3	0.9

(a) Odor control techniques for manure storage were bio-cover (straw, etc.), plastic cover, aeration, deep pit, lagoon and/or composting.

The primary reason for not using manure additives or modified diets was that odor was managed sufficiently already (Table 15). However, this was only one-third of the respondents. Between 40 and 60 respondents (11-18 percent) indicated that the technology was too expensive, not effective for odor control, they were not familiar with the technology, or it was not applicable to the facility. One-in-six respondents felt they were not an effective odor control technique.

Table 15. Reasons Not Using Modified Diets and/or Manure Additives for Odor Control.

Reason	Number of Respondents	Percent of Respondents
Not applicable for my facilities	42	11.9
Too expensive	64	18.1
Too much work	4	1.1
Not effective for odor control	57	16.1
Odor managed sufficiently already	119	33.6
Not familiar with technology	52	14.7
Pig owner makes decision	16	4.5
Prefer diet promoting weight gain	5	1.4

About 40 percent of the respondents indicated that they did not inject or incorporate manure because it was not applicable for their facilities (Table 16). About one-in-eight respondents indicated that they did not feel it was an effective odor control method. Between 20-30 producers (6-9 percent) indicated that it was too expensive, too much work, that there were fertilizer issues, and/or there were soil quality issues.

Table 16. Reasons Not Injecting or Immediately Incorporating Manure.

Reason	Number of Respondents	Percent of Respondents
Not applicable for my facilities	150	39.5
Too expensive	24	6.8
Too much work	32	9.0
Not effective for odor control	42	11.9
Odor managed sufficiently already	23	6.5
Fertilizer issues	21	5.9
Soil quality issues	22	6.2
Can't do it in winter	17	4.8
Give manure to neighbor with organic farm	1	0.3

It is interesting when evaluating responses across major categories (Table 17). For example, producer responses were consistent with the reason complaints were filed. Over half the complaints were associated with manure application. Only 6.5 percent of the producer respondents felt these odors were managed sufficiently at the current time. Odor complaints associated with buildings were much lower and a larger percent of the producer respondents felt these odors were sufficiently managed already. Cost effectiveness (too expensive) was most important for building odor control technologies and why not injecting or immediately incorporating manure. The technologies being too much work was most evident in the manure storage and not injecting manure areas. About one-in-ten felt the technologies were too much work. When evaluating the not effective for odor control response, diet and manure additives received the highest response. About one-in-six respondents felt there were not effective for odor control. There were technologies (or products) in the building odor and diet and manure additive areas of which the respondents were not familiar with.

Table 17. Reasons Technologies Are Not Used.

Response	Percent of Producer Respondents			
	Building Odor	Manure Storage Odor	Diet & Manure Additive	Not Injecting or Incorporate
Not applicable to my facilities	40.1	71.2	11.9	39.5
Too expensive	31.6	12.1	18.1	6.8
Too much work	4.0	8.8	1.1	9.0
Not effective for odor control	9.9	7.9	16.1	11.9
Odor managed sufficiently already	45.8	22.3	33.6	6.5
Not familiar with technology	29.1	4.2	14.7	---

Biggest Issues in Pork Industry

The telephone survey respondents were asked about what they felt the biggest issue was in the pork industry today. Their responses are provided in Table 18. About one-in-four indicated that the biggest issue was low hog prices/profit margins. About one-in-five indicated: packer ban on ownership, public relations, or odor control. About one-in-eight respondents indicated that big producers have too much power. Education for pork producers was an issue suggested by 5.6 percent of the producers while 4.3 percent mentioned that regulations were too strict.

Table 18. Biggest Issue In Pork Production Today.

Issue	Number of Respondents	Percent of Respondents
Low hog prices, profit margin	75	22.9
Packer ban	59	18.1
Public relations	58	17.7
Odor control	55	16.8
Big producers have too much power	38	11.7
Education for pork producers	18	5.6
Regulations too strict	14	4.3
Water quality, N&P in water	5	1.5
Manure storage and application, lagoons	3	.9
Animal rights issues	2	.6
TOTAL	327	

Summary and Conclusion

An issue that has received attention in the livestock industry is that of air quality/odor. An Iowa pork producer survey showed that about two-thirds of the respondents felt air quality/odor was an issue that needed evaluation. This report is aimed at developing a baseline of air quality/odor control measures currently in use by Iowa pork producers. Information is obtained on user level of satisfaction for selected odor control methods. Information on distance of production facility from the nearest neighbor, type of production system, manure storage and application method, and technologies used to control building related odors were obtained. Information was also obtained on level of odor complaints and where complaints originated. Two survey methods were utilized; a mail survey and a telephone survey. The telephone survey followed the mail survey and was used to test the representativeness of the mail survey respondents.

Respondents to the mail and telephone surveys had similar demographic characteristics. Distribution of respondents according to operation size, type of operation, and distance to nearest neighbor were very similar between the two surveys.

About one-third of the respondents marketed from 1,000-2,999 hogs annually while about one-in-four respondents marketed 5,000-9,999 hogs annually. The farrow-to-finish production system was the predominant system. Seventy percent of the producers had the nearest neighbor located from one-eighth to one-half mile from the production facility. Less than one percent of the producers had the luxury of having at least a mile between their facility and the closest neighbor.

The telephone survey indicated that 21.7 percent of the respondents had received an odor complaint in the last five years. Or, about eight-in-ten producers had not received an odor complaint. Most complaints were what are considered informal complaints. Of the 354 respondents, 77 received an odor complaint. Most odor complaints were related to manure application: 45 (58 percent) of the 77 complaints. This is an activity that is done only a few days each year on most farms. Yet, it is leading to many of the odor complaints. Extra care and caution is needed during this time period. Seventeen of the 77 were complaints about the building/facility. Technologies in use to control odors emitted from building/facilities appear to be working well. Odor control in manure storage also appears to be effective as there were nine odor complaints related to manure storage. There was not a trend in where the odor complaints originated. About half were other farmers and half were non-farmers. Most (79 percent) came from rural residents.

Level of use and level of satisfaction with selected odor control methods varied. A deep pit was used by 77 percent of the respondents. About seven-in-ten injected manure. About half of the respondents immediately incorporated manure. One-half composted pig mortalities. About four-in-ten had a windbreak, used manure additives, and/or had a bedded system somewhere in the production system. Level of satisfaction was high for windbreaks, bedded systems, bio-covers, deep pits, composting pigs/manure, and incorporating manure. Satisfaction was low for bio-filters, ozone, manure storage plastic covers, and manure additives.

Producers do things to improve neighbor relations. About 30 percent indicated they check the weather before deciding to apply manure; and/or they communicate with the neighbors informing them when manure will be applied. Another one-in-six respondents indicated they use landscaping around the facility to improve its appearance.

Reasons why odor control technologies were not used varied. A dominant reason was that the technology was not applicable to the production facility. For example, a bio-cover, plastic cover, etc. would not be applicable for a deep pit manure storage system. Another response for non-adoption of some technologies was that odors are managed sufficiently already. This was related to the response for building odors. About one-third of the respondents indicated they did not use selected building odor control technologies because they were too expensive and/or they were not familiar with the technology. Responses for not using modified diets and/or manure additives included too expensive, not effective for odor control, and not familiar with the technology.

This survey shows that swine producers are using a wide variety of techniques to minimize off-site odor and air quality effects. The most common type of manure storage used is deep pits (68 percent of producers) followed by solid manure systems (20 percent). In addition to technical odor control technologies, a high percentage of producers listed other things they do to enhance neighbor relations. While a large number of technologies are available, none provides a perfect solution to air quality. Manure application and operation location were important variables relative to neighbor complaints. Over half the complaints were related to manure application. More caution and care with manure application is needed. Additionally, more communication and coordination with neighbors on manure application timing may be helpful.