

# Local Acts

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Local health departments often grapple with how best to collaborate with frustrated communities concerning potential health hazards, particularly when the likelihood of a true health hazard is unclear. This article describes how the Henry County Health Department in Ohio actively engaged in collaborative baseline data collection prior to the launch of a mega-dairy, which served to both legitimize and allay the community's concerns.

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## PROPOSED MEGA-DAIRIES AND QUALITY-OF-LIFE CONCERNS: USING PUBLIC HEALTH PRACTICES TO ENGAGE NEIGHBORS

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Major animal agriculture sectors in the United States are rapidly undergoing transformation and adopting large-scale production methods for their operations. Large-scale animal production operations are commonly referred to as *mega-farms* or *factory farms*. The changing nature of livestock production during the 1990s has been associated with the rapid growth of mega-farms.<sup>1</sup> Mega-farms achieve economies of scale through specialization, larger size, and close confinement that allows animals to be concentrated into small areas.<sup>2,3</sup>

Similar to other types of mega-farm operations, large-scale dairies raise public health concerns. Mega-dairies generate large amounts of manure (e.g., a single dairy cow produces approximately 120 pounds of wet manure per day).<sup>4</sup> Most manure is stored as a liquid in large earthen ponds called lagoons. The liquid manure is later spread on fields as fertilizer. Potential public health problems can occur if manure is accidentally discharged from lagoons, intentionally released from overly full lagoons, or is over-applied on fields. If any of these situations occurs, nitrogen and other contaminants can potentially pollute ground- and surface water, making water unsafe for drinking.<sup>5,6</sup> Seepage from lagoons is also a source of potential groundwater contamination.<sup>7</sup>

Odors are one of the most common concerns associated with living near mega-dairies. A majority of odors from mega-dairies can be attributed to improper manure storage and land application procedures.<sup>8</sup>

Studies of people living near mega-farms have reported that in sufficient concentrations, odors may induce adverse health effects including fatigue, confusion, respiratory problems, excessive coughing, burning eyes, and runny noses.<sup>9-12</sup>

The presence of large amounts of manure can attract flies that have the potential to create both nuisance and public health problems.<sup>13</sup> Flies breed in mixtures of manure and decaying litter around barns.<sup>14</sup> Several types of flies can be found at mega-dairies. Most are basically pests, while some have the potential to transmit diseases to both cows and humans.<sup>15,16</sup>

Mega-dairies tend to be developed in rural areas where they often rely on wells for their water needs. They require large amounts of water for daily operations (50–55 gallons/cow/day). A lactating cow drinks about 35 gallons of water per day during the summer.<sup>17</sup> An additional 15–20 gallons of freshwater per animal is needed for manure flushing and cow washing. Freshwater requirements of mega-dairies have the potential to stress or deplete groundwater supplies shared by neighboring residents.<sup>18</sup>

Increasing numbers of mega-dairy operations are being built. In Ohio, the number of dairy farms with 500 or more cows increased by 500%, from 10 in 1997 to 50 in 2007.<sup>19</sup> In Ohio, the Department of Agriculture has regulatory authority over mega-dairies with herd sizes numbering more than 700 cows. New operators in Ohio generally prefer to begin operations below the regulatory threshold.

Mega-dairies are generally viewed as undesirable neighbors even before they move in. Media reports about public meetings discussing perceived problems with mega-dairy operations reveal four primary concerns: (1) a decrease in the quality of drinking water, (2) concerns about odors produced by manure, (3) fly infestation problems, and (4) declining property values.<sup>20-22</sup> Fear and anger over concerns about quality-of-life issues and decreased property values are often

strongly voiced at public meetings. Neighbors feel helpless and look to government regulatory agencies for assistance.

Focusing on the three core public health functions (assessment, policy development, and assurance),<sup>22</sup> this article discusses actions that the Henry County Health Department (HCHD) in Ohio took to identify and gather baseline data on potential public health impacts and help alleviate some frustrations experienced by neighbors when it was revealed that a new 690-cow mega-dairy was going to be built in their community.

### INITIATIVE SUMMARY

Concerned citizens often look to local health districts (LHDs) for assistance when attempting to stop the development of mega-dairy operations. Citizens anticipate problems associated with water quantity and quality, offensive odors, flies, and lower property values. In the wake of the proposed mega-dairy operation, HCHD determined that there were several services it could provide.

An LHD has no authority to stop a proposed mega-dairy from being built based on the premise that it has the potential to cause nuisances (Personal communication, Charles C. Butler, Office of the Prosecuting Attorney, Williams County, Ohio, April 2000). Once word was out that a large-scale dairy operator had purchased property for the purpose of building a new facility, local residents began convening public meetings to voice their opposition. While listening to residents' concerns at these meetings, the HCHD decided to take a leadership role and convene their own meetings with the goal of developing policy.

Being certain to maintain a neutral position, the HCHD determined that it needed to educate constituents about the limitations of its authority. Concerns about drinking water and fly nuisances are sensitive issues for neighbors of proposed mega-dairies. HCHD felt that it could gather baseline data that might help reduce citizen frustrations while at the same time assessing potential public health impacts.

Within a few weeks, meetings were organized that were open to the public. Local elected officials and mega-dairy developers were informed about activities planned at these meetings. HCHD and mega-dairy operators communicated with each other. Mega-dairy operators declined to attend the public meetings to maintain harmony. It was at these meetings (held in a neighborhood church) that residents were educated about what the LHD could and couldn't do. Jointly, HCHD and residents developed a plan of action. Copies of the plan, which included services that would be

provided and a time schedule, were distributed to all interested parties.

Residents first became aware that the property was purchased in February 2002. The dairy farm developer then announced that the facility would be constructed during the summer. Cows would be delivered and milking was scheduled to begin in December 2002. The developer agreed to coordinate a pump test of the dairy's new well with neighboring wells in April 2002. Water quality testing of neighboring residential wells was planned as a one-day event in May. A fly trapping and counting program was coordinated from the first week of July through the second week of August 2002. A report was generated and distributed to neighbors, elected officials, and the dairy operator at the end of September. Simultaneously, local property values were reviewed. A chronology of these activities is shown in the Figure.

### OUTCOME AND EVALUATION

#### Water quantity concerns

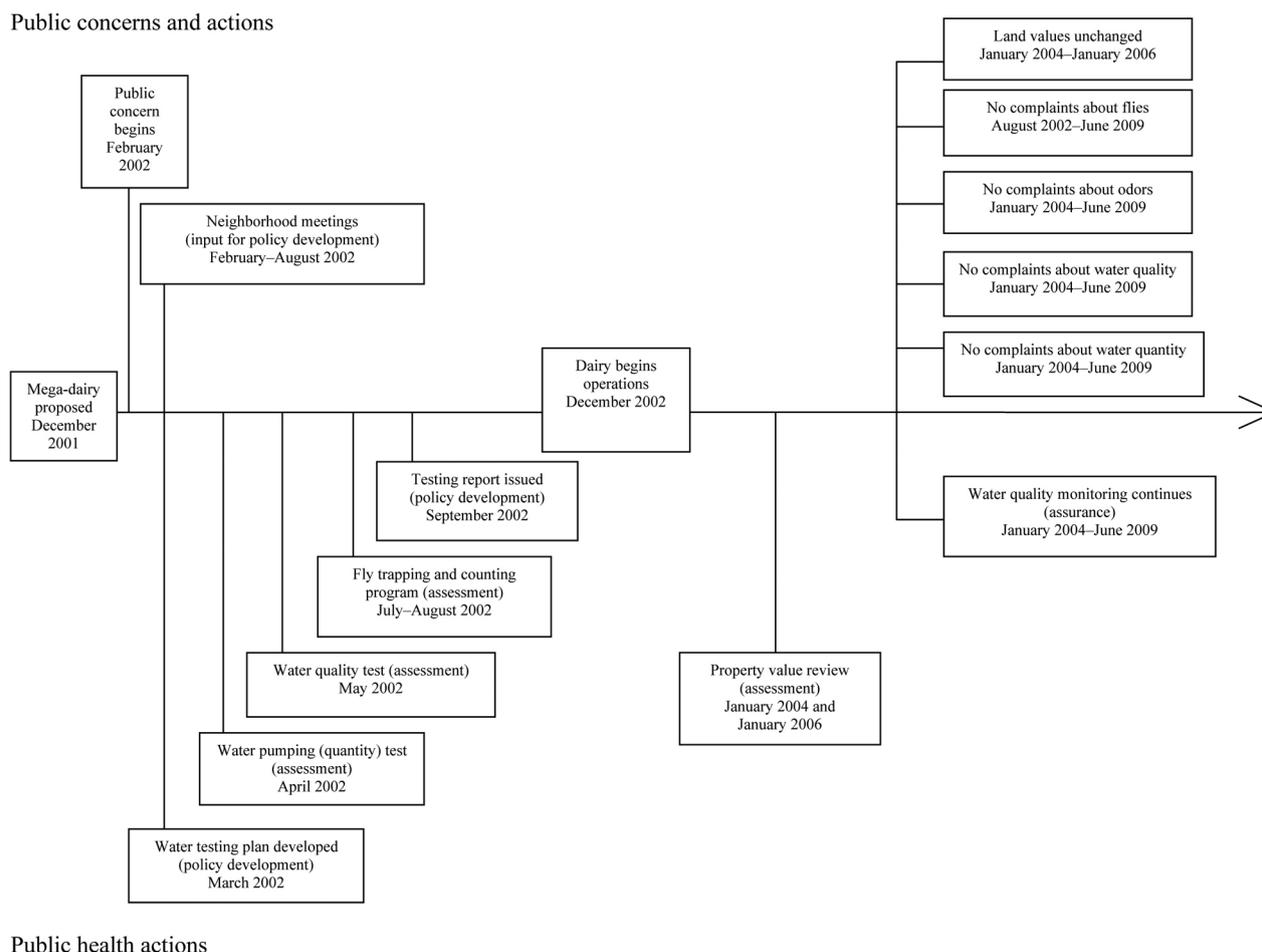
A mega-dairy with 690 cows will normally have water requirements of approximately 35,000 gallons per day. To address concerns about water quantity, HCHD sanitarians coordinated a pumping test in April 2002 to assess groundwater levels around the proposed mega-dairy and predict the effect that estimated daily water withdrawal would have on surrounding residential and farm wells.

Water was not extracted from the test well or any nearby wells for 24 hours, allowing groundwater levels to reach equilibrium. Pre-pumping (static) water levels on all wells were measured. The mega-dairy well was pumped for 24 hours. Water was not extracted from any neighboring wells during the test period. Data collected from the test wells were plotted and analyzed to calculate subsurface water flow rates and aquifer recovery rates. Using a mathematical formula, accurately predicting potential long-term drawdown effects at various distances from the proposed operation and over various time periods becomes possible.<sup>18</sup>

Stressing the fragile aquifer in this area by over-pumping could diminish the aesthetic quality of the water, making it more mineralized (e.g., black sulfur), or deplete the aquifer. Higher levels of naturally occurring hydrogen sulfide gas may indicate changes in groundwater flows or capacity caused by over-pumping.

A final report was published in September 2002 indicating that groundwater volumes were sufficient to supply the needs of both the proposed large-scale dairy and surrounding residential wells. The report

**Figure. Local health department actions utilizing the core public health functions<sup>a</sup> to allay neighbors' concerns about living near a mega-dairy: Ohio, December 2003 to June 2009**



<sup>a</sup>The three core functions are assessment, policy development, and assurance.

contained positive findings that assured neighbors and helped to ease anxieties about the effects of the proposed mega-dairy on their drinking water supplies.

### Water quality concerns

Neighbors to the future mega-dairy operation expressed concerns about declines in water quality in their private water supplies. Water quality testing was conducted to provide baseline data about drinking water supplies for residents. Twenty neighbors within a one-mile radius surrounding the proposed mega-dairy volunteered as participants. Each well site was tested by an LHD sanitarian. Wells were sampled from outside taps to ensure that the water had not been treated. All samples were collected from all locations on a single day.

Residential well water supplies were tested for coliform bacteria and field-tested for the presence of

nitrites and hydrogen sulfide gas. Coliform bacteria and nitrate levels can be influenced by inappropriate agricultural practices such as manure spills, leaky manure storage lagoons, and over-application of manure on fields. Coliform bacteria and nitrate tests are inexpensive procedures that can provide baseline data about specific characteristics of groundwater supplies.

A report with the results of all tests was provided to each participant. Some residential wells tested unsafe for bacteria. This result was anticipated and homeowners were given instructions on how to use standard procedures to disinfect their wells. Follow-up testing was recommended to these homeowners. No other water quality standards were exceeded during the baseline testing.

### Fly nuisance concerns

Three types of flies are considered to be nuisances: cluster flies, stable flies, and face flies.<sup>23</sup> Having baseline data about the number and species of flies trapped provides information that can help to define the existence or extent of a future problem once a dairy is built.<sup>13</sup>

The act of trapping, identifying, and counting flies has limited scientific validity. Temperature, wind, and precipitation affect fly populations. Scientific validity can be improved if controls are established for these factors. However, controlling for these factors is usually beyond the scope of resources available to most LHDs.

Neighbors within a one-mile radius surrounding the location of the proposed mega-dairy operation were targeted as volunteer participants; eight residents agreed to participate. The fly trapping program lasted for six weeks, ensuring the fly population in the area was appropriately assessed. Fresh outside and inside flytraps were placed at each sampling location weekly by an LHD sanitarian. Outdoor traps were placed within 50 feet of homes to capture live flies.

Hanging fly strips were used to trap indoor flies. Fresh fly strips were placed inside of participants' homes for 24-hour periods.

The species of captured flies were identified and the number of flies on each trap strip were counted and documented. Data from fly trapping and counting were compiled into a written report and copies were provided to all interested parties.

### DISCUSSION

People living near a proposed mega-dairy operation in Ohio had concerns about the possible effects of the mega-dairy on their drinking water, as well as potential odors and fly nuisance problems. Consistent with the core public health function of assessment, public health officials provided concerned neighbors the opportunity to do something constructive by participating in the gathering of baseline data. As a result, the community's expressions of frustration and helplessness were visibly diminished. The mega-dairy operator was cooperative and appreciative of the LHD's involvement and how these efforts appeared to have reduced neighbors' anxiety levels.

HCHD chose to collect baseline data and planned to collect post-operation data if needed. A year after the new mega-dairy began operating, HCHD reviewed the situation. HCHD had not received any complaints about odor, flies, or drinking water problems. Property values in the study area had remained stable or

increased. However, negative stereotypes regarding mega-dairy farm operations persisted, though the stereotypes were not confirmed by objective data. Current and future climatic and production changes could have an impact on public health concerns for those living near the large-scale dairy. Furthermore, some conditions could have cumulative effects that might not have been apparent after only one year of operation.<sup>21</sup>

The emotional aspects related to finding suitable sites for mega-dairy operations appear similar to those associated with obtaining sites for airports, nuclear power plants, or sanitary landfills: most people do not want them in their backyards. Care should be taken to locate large-scale dairies in less populated areas and where future residential development is less likely to occur.<sup>21</sup>

### CONCLUSIONS

Driven primarily by economics, the trend in dairy farming is to go large-scale. This trend will likely continue, and public health practitioners will need to understand how neighbors and large-scale dairy operators can coexist, recognizing that their problems are similar although expressed in different terms. The potential public health problems associated with large-scale operations are reinforced by the media. LHDs can work with both neighbors and facility operators to ensure that appropriate preventive measures are in place to safeguard the public. Data obtained prior to operations can be very useful. The core public health functions of assessment, policy development, and assurance provide guidance for LHDs. Using the core functions facilitates customer service, which, in turn, is likely to enhance customer satisfaction.

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### REFERENCES

1. Cole D, Todd L, Wing S. Concentrated swine feeding operations and public health: a review of occupational and community health effects. *Environ Health Perspect* 2000;108:685-99.
2. Environmental Protection Agency (US). Ag 101: dairy production [cited 2009 May 10]. Available from: URL: <http://www.epa.gov/oecaagct/ag101/printdairy.html>
3. Thu KM. Public health concerns for neighbors of large-scale swine operations. *J Agr Saf Health* 2002;8:175-84.
4. Environmental Protection Agency (US). Region 9: animal waste: what's the problem? [cited 2009 Dec 10]. Available from: URL: <http://www.epa.gov/region09/animalwaste/problem.html>

5. Aillery M, Gollehon N, Johansson R, Kaplan J, Key N, Ribaud M. Managing manure to improve air and water quality. Washington: Department of Agriculture (US); 2005.
6. Gollehon N, Caswell M, Rigaud M, Kellogg R, Lander C, Letson D. Confined animal production and manure nutrients. Washington: Department of Agriculture (US); 2001.
7. Ham JM, DeSutter TM. Toward site-specific design standards for animal-waste lagoons: protecting ground water quality. *J Environ Qual* 2000;29:1721-32.
8. University of Iowa Environmental Health Sciences Research Center. Iowa concentrated animal feeding operation air quality study. February 2002 [cited 2009 Dec 9]. Available from: URL: <http://www.public-health.uiowa.edu/ehsrc/cafostudy.htm>
9. Schiffman SS, Miller EA, Suggs MS, Graham BG. The effect of environmental odors emanating from commercial swine operations on the mood of nearby residents. *Brain Res Bull* 1995;37:369-75.
10. Thu KM, Donham KJ, Ziegenhorn R, Reynolds S, Thorne PS, Subramanian P, et al. A control study of the physical and mental health of residents living near a large-scale swine operation. *J Agr Saf Health* 1997;3:13-26.
11. Wing S, Wolf S. Intensive livestock operations, health, and quality of life among eastern North Carolina residents. *Environ Health Perspect* 2000;108:233-8.
12. Zahn JA, DiSpirito AA, Do YS, Brooks BE, Cooper EE, Hatfield JL. Correlation of human olfactory responses to airborne concentrations of malodorous volatile organic compounds emitted from swine effluent. *J Environ Qual* 2001;30:624-34.
13. Greenberg B. Flies and disease. *Sci Amer* 1965;213:92-9.
14. Olsen AR, Hammack TS. Isolation of *Salmonella spp.* from the housefly, *Musca domestica* L., and the dump fly, *Hydrotaea aenescens* (Wiedemann) (Diptera: Muscidae), at caged-layer houses. *J Food Prot* 2000;63:958-60.
15. Fotedar R. Vector potential of houseflies (*Musca domestica*) in the transmission of *Vibrio cholerae* in India. *Acta Trop* 2001;78:31-4.
16. Graczyk TK, Knight R, Gilman RH, Cranfield MR. The role of non-biting flies in the epidemiology of human infectious diseases. *Microbes Infect* 2001;3:231-5.
17. Ohio State University. Intensive grazing/seasonal dairying: the Mahoning County dairy program, 1987-1991. OARDC Research Bulletin 1190 [cited 2009 Dec 10]. Available from: URL: [http://ohioline.osu.edu/rb1190/b1190\\_3.html](http://ohioline.osu.edu/rb1190/b1190_3.html)
18. Wisconsin Department of Natural Resources. Status of ground water quantity in Wisconsin [cited 2010 May 4]. Available from: URL: <http://dnr.wi.gov/org/water/dwg/gw/pubs/quantity.pdf>
19. Ohio Department of Agriculture. 2007 Ohio Department of Agriculture annual report and statistics [cited 2009 Dec 10]. Available from: URL: [http://www.agri.ohio.gov/divs/Admin/Docs/AnnReports/ODA\\_Comm\\_AnnRpt\\_2007.pdf](http://www.agri.ohio.gov/divs/Admin/Docs/AnnReports/ODA_Comm_AnnRpt_2007.pdf)
20. Feehan J. Arrival of dairy farm fuels fear of division. *Toledo Blade* 2001 Dec 31:B1, B2.
21. Schmalzried HD, Fallon LF Jr. Large scale dairy operations: assessing concerns of neighbors about quality-of-life issues. *J Dairy Sci* 2007;90:2047-51.
22. Institute of Medicine. The future of public health. Washington: National Academies Press; 1988.
23. Ohio State University. Ohio livestock manure management guide. OARDC Research Bulletin 604-06 [cited 2009 May 10]. Available from: URL: <http://ohioline.osu.edu/b604/0010.html>