



**HUMANE SOCIETY
INTERNATIONAL**

An HSI Fact Sheet: Pig Factory Farming in Mexico

Introduction

Since the mid-20th century, small farms raising pigs have given way to massive, industrial pig production facilities.¹ Between 1980 and 2000, although world pork production nearly doubled, there was a decrease in the total number of farms.² Large industrial farm animal production facilities, or factory farms, that often confine thousands of pigs indoors,³ are becoming more widespread throughout the world, particularly in developing countries.⁴ In 2009, more than 1.3 billion pigs were raised and slaughtered globally,⁵ and factory farms are now responsible for more than half of all global pork production.⁶

A significant implication of the shift toward factory farms has been the “movement of large numbers of animals from pastures and open-air lots into confined spaces with no grass or vegetation for grazing.”⁷ Factory farms may have particularly severe implications for animal welfare, including the intensive confinement of farm animals in enclosures that prevent them from moving comfortably or expressing most basic natural behaviors.⁸ Around the world, millions of breeding sows (female pigs) in industrial systems are confined in 0.6 m (2 ft)⁹ wide gestation crates for nearly their entire lives. These crates are about the size of the animals’ bodies, denying the sows the ability to exercise, turn around for months on end,¹⁰ or perform other integral, instinctual, and natural behaviors, including rooting, foraging, nest-building, and grazing.¹¹ In addition to causing tremendous animal suffering, factory farms degrade the environment¹² and negatively impact public health¹³ and rural communities.¹⁴

Pig Factory Farming in Mexico

Traditional and small scale production systems once dominated Mexico’s pig industry,¹⁵ but the majority of pig production in Mexico now takes place in factory farms.¹⁶ Between 1990 and 2005, pig production in Mexico increased by 50%,¹⁷ and by 2009 more than 15 million pigs were raised and slaughtered for human consumption annually.¹⁸ The industrialization of this sector, while resulting in a rise in domestic production,¹⁹ has also resulted in a drop in the number of small commercial pig farms.²⁰ Unable to compete with large factory farms, many small-scale commercial producers have had to exit the industry.²¹ In 1993, US-based corporation Smithfield Foods, the largest pork producer in the world,²² joined with Mexican company Agroindustrias Unidas de México (Mexico United Agribusiness) to create Granjas Carroll de México (GCM), to produce meat in the country’s Perote Valley in the Eastern states of Veracruz and Puebla.²³ GCM, the largest pig producer in Mexico, operates sixteen factory farms scattered throughout the Perote Valley, housing more than one million animals per year.²⁴

Mexico has the lowest environmental standards with respect to industrialized farm animal production in North America,²⁵ and does not have any regulations, at a regional level, regarding location, geographic concentration, or size of pig factory farms.²⁶ More than a quarter of domestic pork production is located in only two states—Sonora and Jalisco. Out of thirty-one Mexican states plus the Federal District,²⁷ only six—Jalisco, Sonora, Guanajuato, Puebla, Yucatan, and Michoacán—produce more than half of total pork production in Mexico.²⁸

Environment

In 2006, the FAO published “Livestock’s Long Shadow: Environmental Issues and Options,” its landmark report assessing the impacts of animal agriculture. The FAO concluded that “the livestock sector emerges as one of the top two or three most significant contributors to the most serious environmental problems, at every scale from local to global.”²⁹ In that same year, representatives from the Mexican Congress Commission on the Environment and Natural Resources visited pig factory farms in Puebla and Veracruz in the Perote Valley, and reported various environmental issues of concern, including decreased water levels of local aquifers and fetid odors, “calling into question air quality.”³⁰ Residents of the Perote Valley have also filed numerous complaints regarding localized environmental impacts of GCM factory farms.³¹

Water scarcity

Raising animals for food contributes to water scarcity in numerous ways. Globally, the farm animal sector uses significant amounts of the water available to humans, mostly for the production of animal feed.³² Farm animals also require water for hydration, and an increasing amount of water is needed—particularly at industrial operations—to clean enclosures (e.g. cages, stalls, pens) and sheds, to dispose of waste, and to cool the animals.³³ Processing animal products also requires large volumes of water and can result in significant amounts of wastewater.³⁴ Water levels in the aquifer that sits under the Perote Valley in Mexico, for example, have reportedly declined precipitously since industrial pig production first took hold in the region in the mid-1990s.³⁵

Water and air pollution

Not only are water supplies shrinking, but the farm animal sector is also increasingly polluting the available water. According to the FAO, “[t]he livestock sector... is probably the largest sectoral source of water pollution, contributing to eutrophication, ‘dead’ zones in coastal areas, degradation of coral reefs, human health problems, emergence of antibiotic resistance and many others.”³⁶

Much of the environmental damage caused by factory farms is due to the volume and content of animal waste, and the consequent challenges of storage and disposal.³⁷ Pigs produce four times more waste than human beings³⁸ and “one animal facility with a large population of animals can easily equal a small city in terms of waste production.”³⁹ This is particularly worrisome for certain regions in Mexico like the Perote Valley, which is home to the highest concentration of pig factory farms in the country, and has a pig population five times greater than that of its human population.⁴⁰

While traditional farming systems combine animal agriculture with crop agriculture, thereby balancing the number of animals with the crops’ ability to absorb the animals’ manure, at industrial farm animal production facilities, the amount of manure typically exceeds the ability of the surrounding land to absorb it. Waste from pig factory farms, which is stored in lagoons or pits,⁴¹ may contain harmful chemicals as well as pathogens.⁴² Such hog waste lagoons can leak or break, contaminating nearby water sources with excess nitrogen and phosphorous, pathogens, and other pollutants that are found in the manure.⁴³ The minimally treated (or even untreated) waste is also often sprayed on nearby fields, potentially contaminating water, soil, and air.⁴⁴

In 2006, Mexico’s National Commission for Water (La Comisión Nacional del Agua, CONAGUA) estimated that only 20% of the waste water originating from pork production in Mexico is treated.⁴⁵ In their 2006 visit to Perote Valley, the Mexican Congress Commission on the Environment and Natural Resources also observed that “[a]reas for disposal of waste and pig manure [were] not far enough from water sources” at visited pig factory farms. In fact, various studies carried out by CONAGUA have shown contamination of Perote Valley aquifers from fecal bacteria.⁴⁶

Public Health

Factory farm manure contains a number of components of concern to human health, including heavy metals and pathogenic bacteria, and may emit volatile gases.⁴⁷ Numerous studies have shown adverse physical and mental health effects from ammonia (NH₃) and hydrogen sulfide (H₂S), and nuisance odors originating from industrial pig factory farms, on both factory farm workers and neighboring communities.⁴⁸ In fact, rural communities located less than two kilometers from geographically clustered pig operations can be exposed to ammonia levels that can be 40 times greater than average ambient ammonia concentrations.⁴⁹ The closest pig factory farm to the city perimeter of Perote, in the Perote Valley, is located at a distance of only two kilometers⁵⁰ and an increased incidence of health problems has been reported among both those working in the farms and local residents.⁵¹

Reports of adverse human health effects associated with odors from industrial pig production facilities have been recorded by numerous studies in the United States.^{52,53,54} The most frequently reported problems include eye, nose, and throat irritation, headache, nausea, diarrhea, cough, chest tightness, palpitations, shortness of breath, stress, and drowsiness.⁵⁵ People suffering from asthma or allergies complain that the odors exacerbate their existing illness.⁵⁶ Another study conducted in the U.S. state of North Carolina reported a significantly higher incidence of mental health symptoms, including increased levels of tension, depression, anger, fatigue, and confusion, amongst residents living near industrial pig production facilities, in comparison to a control group.⁵⁷ [See HSI's Fact Sheet: Human Health impacts of odors from industrial farm animal production facilities for more information.](#)

To accelerate weight gain and prevent disease in the stressful and unhygienic conditions characteristic of these industrial settings, many factory farms feed farm animals classes of antibiotics critical to human medicine. Antibiotic-resistant bacteria at pig factory farms can transfer by air from the animals to laborers and others who live near the operation.^{58,59} Because the animal's digestion does not degrade all of the drugs, residues of antibiotics may also be transferred to the environment when manure is spread over agricultural land,^{60,61} and have been found in ground and surface water near pig factory farms.⁶² Studies have shown that retail pork products can also expose consumers to antibiotic-resistant bacteria.⁶³ The use of antibiotics in farm animal production contributes to antibiotic resistance in humans,⁶⁴ and a study of airborne concentrations of resistant bacterial forms at pig factory farm operations found that bacteria were recovered inside and outside the facilities at concentrations that could cause a potential human health hazard.⁶⁵ By fostering antimicrobial resistance in pathogens, factory farms create new challenges for physicians trying to treat human disease.⁶⁶

Social Costs

A 2010 report on the economic impacts of industrialized pig production estimated that if industrialized pig production facilities replaced independent farms producing the same amount of animals, approximately two pig farmers would be left without a job for each new job created.⁶⁷ Furthermore, the report concluded that "a new [US] \$5 million investment in contract production would generate 40-50 new jobs but would displace approximately three times that number of independent hog farmers."⁶⁸

In 2008, the Pew Commission on Industrial Farm Animal Production released the results of a 2.5-year investigation⁶⁹ into the problems associated with industrialized animal agriculture. The commission concluded that:

Research consistently shows that the social and economic well-being of rural communities benefits from larger numbers of farmers rather than fewer farms that produce increased volumes. In rural communities where fewer, larger farms have replaced smaller, locally owned farms, residents have experienced lower family income, higher poverty rates, lower retail sales, reduced housing quality, and persistent low wages for farm workers.... In fact, industrialization actually draws investment and wealth away from communities with [industrial farm animal production] facilities.⁷⁰

Many of the pig factory farms in Mexico are now vertically integrated and “owned by firms involved in every stage of the production process, from hog-raising to the packaging, sale and distribution of pork products.”⁷¹ The industrialization of Mexico’s pig industry has harmed small commercial producers, decreasing their share of the Mexican pig market.⁷²

Conclusion

The Pew Commission determined that industrial farm animal production poses unacceptable risks to public health, the environment, and animal welfare.⁷³ A key recommendation of their report was to phase out the most inhumane production practices on industrial farm animal production facilities, including the confinement of breeding sows in gestation crates, in order to reduce risks to public health and improve animal welfare.⁷⁴ The spread of factory farms in Mexico is already likely to have long-lasting negative impacts on the environment, public health, and well-being of nearby communities.⁷⁵ Stronger environmental and animal welfare regulations are needed to stem further spread of this damage.

Humane Society International (HSI) and its partner organizations together constitute one of the world’s largest animal protection organizations — backed by 11 million people. For nearly 20 years, HSI has been fighting for the protection of all animals through advocacy, education, and hands-on programs. Celebrating animals and confronting cruelty worldwide — On the web at hsi.org.

¹ MacDonald JM and McBride WD. 2009. The transformation of U.S. livestock agriculture: scale, efficiency, and risks. U.S. Department of Agriculture, Economic Research Service, bulletin 43. www.ers.usda.gov/Publications/EIB43/. Accessed September 5, 2011.

² Cameron, RDA. 2000. A review of the industrialisation of pig production worldwide with particular reference to the Asian region. Animal Health and Area-Wide Integration. pp. 2-3. http://www.fao.org/ag/againfo/resources/en/publications/agapubs/awi_concept_pig_product.pdf. Accessed February 1, 2012.

³ Pew Commission on Industrial Farm Animal Production. 2008. Putting meat on the table: industrial farm animal production in America. p. 33. <http://www.ncifap.org/bin/e/j/PCIFAPFin.pdf>. Accessed September 12, 2011.

⁴ Pew Commission on Industrial Farm Animal Production. 2008. Putting meat on the table: industrial farm animal production in America, p. 9. <http://www.ncifap.org/bin/e/j/PCIFAPFin.pdf>. Accessed October 5, 2011.

⁵ Food and Agriculture Organization of the United Nations. 2010. FAOSTAT Statistical Database. <http://faostat.fao.org/default.aspx>. Accessed May 15, 2011.

⁶ Food and Agriculture Organization of the United Nations. 2009. The state of food and agriculture: livestock in the balance, p. 27. www.fao.org/docrep/012/i0680e/i0680e.pdf. Accessed May 18, 2011.

⁷ Ponette-González, AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. Land Use Policy 27: 1107-1110.

⁸ Pew Commission on Industrial Farm Animal Production. 2008. Putting meat on the table: industrial farm animal production in America, p. 33. <http://www.ncifap.org/bin/e/j/PCIFAPFin.pdf>. Accessed January 18, 2011.

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- ⁹ Commission of the European Communities. 2001. COM(2001) 20 final 2001/0021 (CNS) Communication from the Commission to the Council and the European Parliament on the welfare of intensively kept pigs in particularly taking into account the welfare of sows reared in varying degrees of confinement and in groups. Proposal for a Council Directive amending Directive 91/630/EEC laying down minimum standards for the protection of pigs.
- ¹⁰ Commission of the European Communities. 2001. COM(2001) 20 final 2001/0021 (CNS) Communication from the Commission to the Council and the European Parliament on the welfare of intensively kept pigs in particularly taking into account the welfare of sows reared in varying degrees of confinement and in groups. Proposal for a Council Directive amending Directive 91/630/EEC laying down minimum standards for the protection of pigs.
- ¹¹ Stolba A and Wood-Gush DGM. 1989. The behaviour of pigs in a semi-natural environment. *Animal Production* 48:419-25.
- ¹² Pew Commission on Industrial Farm Animal Production. 2008. Putting meat on the table: industrial farm animal production in America, p. 23, 25. . <http://www.ncifap.org/bin/e/j/PCIFAPFin.pdf>. Accessed November 5, 2011.
- ¹³ Pew Commission on Industrial Farm Animal Production. 2008. Putting meat on the table: industrial farm animal production in America, p. 17. <http://www.ncifap.org/bin/e/j/PCIFAPFin.pdf>. Accessed November 5, 2011.
- ¹⁴ Pew Commission on Industrial Farm Animal Production. 2008. Putting meat on the table: industrial farm animal production in America, p. 9. <http://www.ncifap.org/bin/e/j/PCIFAPFin.pdf>. Accessed February 4, 2012.
- ¹⁵ Batres-Marquez SP, Clemens RL, and Jensen HH. 2007. Mexico's changing pork industry: The forces of domestic and international market demand. *Choices* 22(1): 7-12.
- ¹⁶ Ponette-González, AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. *Land Use Policy* 27: 1107-1110.
- ¹⁷ Batres-Marquez SP, Clemens RL, and Jensen HH. 2007. Mexico's changing pork industry: The forces of domestic and international market demand. *Choices* 22(1): 7-12.
- ¹⁸ Food and Agriculture Organization of the United Nations. 2010. FAOSTAT. <http://faostat.fao.org/>. Accessed January 14, 2011.
- ¹⁹ Batres-Marquez SP, Clemens RL, and Jensen HH. 2007. Mexico's changing pork industry: The forces of domestic and international market demand. *Choices* 22(1): 7-12.
- ²⁰ USDA-ERS. 1999. Mexico's Pork Industry Structure Shifting to Large Operations in the 1990's. *Agricultural Outlook*.
- ²¹ Batres-Marquez SP, Clemens R, and Jensen HH. 2006. The changing structure of pork trade, production, and processing in Mexico. MATRIC Briefing Paper 06-MBP 10. p.11.
- ²² Smithfield Foods. About Smithfield Foods. http://www.smithfieldfoods.com/our_company/about_us.aspx. Accessed February 4, 2012.
- ²³ Granjas Carroll de México. Welcome. http://www.granjascarroll.com/ing/index_ing.php. Accessed February 4, 2012.

-
- ²⁴ Ponette-González, AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. *Land Use Policy* 27: 1107-1110.
- ²⁵ Ponette-González, AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. *Land Use Policy* 27: 1107-1110.
- ²⁶ Ponette-González, AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. *Land Use Policy* 27: 1107-1110.
- ²⁷ Servicio de Alimentación Agroalimenticia y Pesquera. 2010. Población Ganadera Porcina: 2001-2010 (Cabezas).
http://www.campomexicano.gob.mx/portal_siap/Integracion/EstadisticaBasica/Pecuario/PoblacionGanadera/ProductoEspecie/porcino.pdf. Accessed January 6, 2012.
- ²⁸ Servicio de Alimentación Agroalimenticia y Pesquera. 2010. Población Ganadera Porcina: 2001-2010 (Cabezas).
http://www.campomexicano.gob.mx/portal_siap/Integracion/EstadisticaBasica/Pecuario/PoblacionGanadera/ProductoEspecie/porcino.pdf. Accessed January 6, 2012.
- ²⁹ Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and de Haan C. 2006. Livestock's long shadow: environmental issues and options. Food and Agriculture Organization of the United Nations, p. xx.
<ftp://ftp.fao.org/docrep/fao/010/a0701e/A0701E00.pdf>. Accessed September 11, 2011.
- ³⁰ Gaceta Parlamentaria. March 17, 2006. pp. 65-6.
- ³¹ Ponette-González, AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. *Land Use Policy* 27: 1107-1110.
- ³² Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and de Haan C. 2006. Livestock's long shadow: environmental issues and options. Food and Agriculture Organization of the United Nations, p. xxii.
<ftp://ftp.fao.org/docrep/fao/010/a0701e/A0701E00.pdf>. Accessed February 15, 2012.
- ³³ Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and de Haan C. 2006. Livestock's long shadow: environmental issues and options. Food and Agriculture Organization of the United Nations, pp. 128-129.
<ftp://ftp.fao.org/docrep/fao/010/a0701e/A0701E00.pdf>. Accessed February 1, 2012.
- ³⁴ Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and de Haan C. 2006. Livestock's long shadow: environmental issues and options. Food and Agriculture Organization of the United Nations, p. 130.
<ftp://ftp.fao.org/docrep/fao/010/a0701e/A0701E00.pdf>. Accessed September 20, 2011.
- ³⁵ Ponette-González, AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. *Land Use Policy* 27: 1107-1110.
- ³⁶ Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and de Haan C. 2006. Livestock's long shadow: environmental issues and options. Food and Agriculture Organization of the United Nations, p. xxii.
<ftp://ftp.fao.org/docrep/fao/010/a0701e/a0701e.pdf>. Accessed February 4, 2012.
- ³⁷ Pew Commission on Industrial Farm Animal Production. 2008. Putting meat on the table: industrial farm animal production in America, p. 23. <http://www.ncifap.org/bin/e/j/PCIFAPFin.pdf>. Accessed January 6, 2011.

-
- ³⁸ Pew Commission on Industrial Farm Animal Production. 2008. Putting meat on the table: industrial farm animal production in America, p. 29. <http://www.ncifap.org/bin/e/j/PCIFAPFin.pdf>. Accessed January 26, 2011.
- ³⁹ United States Environmental Protection Agency. 2004. Risk Assessment Evaluation for Concentrated Animal Feeding Operations. EPA/600/R-04/042. p. iv. <http://nepis.epa.gov/Adobe/PDF/901V0100.pdf>. Accessed January 4, 2011.
- ⁴⁰ Ponette-González, AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. *Land Use Policy* 27: 1107-1110.
- ⁴¹ American Public Health Association. 2003. Precautionary Moratorium on New Concentrated Animal Feed Operations. <http://www.apha.org/advocacy/policy/policysearch/default.htm?id=1243>. Accessed February 4, 2012.
- ⁴² Pew Commission on Industrial Farm Animal Production. 2008. Putting meat on the table: industrial farm animal production in America, p.11. <http://www.ncifap.org/bin/e/j/PCIFAPFin.pdf>. Accessed October 7, 2011.
- ⁴³ Mallin MA and Cahoon LB. 2003. Industrialized Animal Production – A Major Source of Nutrient and Microbial Pollution to Aquatic Ecosystems. *Pollution and Environment* 24(5): 369-385.
- ⁴⁴ Pew Commission on Industrial Farm Animal Production. 2008. Putting meat on the table: industrial farm animal production in America, p.11. <http://www.ncifap.org/bin/e/j/PCIFAPFin.pdf>. Accessed February 4, 2012.
- ⁴⁵ Novelo, MR and Borges, CE, et al. 2009. Estimación del potencial contaminante de las granjas porcinas y avícolas del estado de Yucatán. *Ingeniería* 13-2: 13-21.
- ⁴⁶ Gaceta Parlamentaria. March 17, 2006. pp. 65-6.
- ⁴⁷ American Public Health Association. 2003. Precautionary moratorium on new concentrated animal feeding operations. <http://www.apha.org/advocacy/policy/policysearch/default.htm?id=1243>. Accessed August 19, 2011.
- ⁴⁸ Ponette-González, AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. *Land Use Policy* 27: 1107-1110.
- ⁴⁹ Wilson SM and Serre ML. 2007. Examination of atmospheric ammonia levels near hog CAFOs, homes, and schools in Eastern North Carolina. *Atmospheric Environment* 41: 4977-4987.
- ⁵⁰ Ponette-González, AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. *Land Use Policy* 27: 1107-1110.
- ⁵¹ Ponette-González, AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. *Land Use Policy* 27: 1107-1110.
- ⁵² Schiffman SS, Bennett JL, Raymer JH. 2001. Quantification of odors and odorants from swine operations in North Carolina. *Agricultural and Forest Meteorology* 108: 213-240.
- ⁵³ Wing S, Wolf S. 2000. Intensive Livestock Operations, Health, and Quality of Life among Eastern North Carolina Residents. *Environmental Health Perspectives* 108(3): 233-238.

-
- ⁵⁴ Thu K, Donham K, Ziegenhorn R, Reynolds S, Thorne PS, Subramanian P, Whitten P, Stookesberry J. 1997. A control study of the physical and mental health of residents living near a large-scale swine operation. *Journal of Agricultural Safety and Health* 3(1):13-26.
- ⁵⁵ Schiffman SS, Walker JM, Dalton P, Lorig TS, Raymer JH, Shusterman D, Williams CM. 2000. Potential health effects of odor from animal operations, wastewater treatment, and recycling of byproducts. *Journal of Agromedicine* 7: 7-81.
- ⁵⁶ Schiffman SS, Walker JM, Dalton P, Lorig TS, Raymer JH, Shusterman D, Williams CM. 2000. Potential health effects of odor from animal operations, wastewater treatment, and recycling of byproducts. *Journal of Agromedicine* 7: 7-81.
- ⁵⁷ Schiffman SS, Sattely Miller EA, Suggs MS, Graham BG. 1995. The effect of environmental odors emanating from commercial swine operations on the mood of nearby residents. *Brain Research Bulletin* 37: 369-375.
- ⁵⁸ Barrett JR. 2005. Airborne bacteria in CAFOs: transfer of resistance from animals to humans. *Environmental Health Perspectives* 113(2): A116-7.
- ⁵⁹ Chapin A, Rule A, Gibson K, Buckley T, and Schwab K. 2004. Airborne Multi-drug Resistant Bacteria Isolated from a Concentrated Swine Feeding Operation. *Environmental Health Perspectives* <http://www.sraproject.org/wp-content/uploads/2007/12/airbornemultidrugresistantbacteria.pdf>. p. 17. Accessed February 1, 2012.
- ⁶⁰ Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and de Haan C. 2006. *Livestock's long shadow: environmental issues and options*. Food and Agriculture Organization of the United Nations, p. 143.
- ⁶¹ Sarmah AK, Meyer MT, and Boxall ABA. 2006. A global perspective on the use, sales, exposure pathways, fate and effects of veterinary antibiotics (VAs) in the environment. *Chemosphere* 65(5): 725-759.
- ⁶² Chapin A, Rule A, Gibson K, Buckley T, and Schwab K. 2004. Airborne Multi-drug Resistant Bacteria Isolated from a Concentrated Swine Feeding Operation. *Environmental Health Perspectives* <http://www.sraproject.org/wp-content/uploads/2007/12/airbornemultidrugresistantbacteria.pdf>. p. 8. Accessed January 30, 2012.
- ⁶³ Chapin A, Rule A, Gibson K, Buckley T, and Schwab K. 2004. Airborne Multi-drug Resistant Bacteria Isolated from a Concentrated Swine Feeding Operation. *Environmental Health Perspectives* <http://www.sraproject.org/wp-content/uploads/2007/12/airbornemultidrugresistantbacteria.pdf>. p. 6. Accessed January 30, 2012.
- ⁶⁴ American Public Health Association. 2003. *Precautionary moratorium on New Concentrated Animal Feed Operations*.
- ⁶⁵ Gibbs SG, Green CF, Tarwater PM, and Scarpino PV. 2004. Airborne antibiotic resistant and nonresistant bacteria and fungi recovered from two swine herd confined animal feeding operations. *Journal of Occupational and Environmental Hygiene*. 1(11): 699-706.
- ⁶⁶ Greger, M. 2007. *The Human/Animal Interface: Emergence and Resurgence of Zoonotic Infectious Diseases*. *Critical Reviews in Microbiology* 33: 243-299.
- ⁶⁷ Ikerd JE. 2004. The Economic Impacts of Increased Contract Swine Production in Missouri: Another Viewpoint. p.7. <http://web.missouri.edu/ikerdj/papers/con-hog.htm>. Accessed May 28, 2011.

⁶⁸ Ikerd JE. 2004. The Economic Impacts of Increased Contract Swine Production in Missouri: Another Viewpoint. p. 7.

⁶⁹ Pew Commission on Industrial Farm Animal Production. 2008. Pew Commission says industrial scale farm animal production poses “unacceptable” risks to public health, environment. Press release issued April 29. [www.ncifap.org/ images/PCIFAP Final Release PCIFAP.pdf](http://www.ncifap.org/images/PCIFAP_Final_Release_PCIFAP.pdf). Accessed April 25, 2011.

⁷⁰ Pew Commission on Industrial Farm Animal Production. 2008. Putting meat on the table: industrial farm animal production in America. p. 49.

⁷¹ Ponette-Gonzalez AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. Land Use Policy 27: 1107- 1110.

⁷² USDA-ERS. 1999. Mexico’s Pork Industry Structure Shifting to Large Operations in the 1990’s. Agricultural Outlook.

⁷³ Pew Commission on Industrial Farm Animal Production. 2008. Pew Commission says industrial scale farm animal production poses “unacceptable” risks to public health, environment. Press release issued April 29. http://www.pewtrusts.org/news_room_detail.aspx?id=38438. Accessed February 1, 2011.

⁷⁴ Pew Commission on Industrial Farm Animal Production. 2008. Putting meat on the table: industrial farm animal production in America, p.85. <http://www.ncifap.org/bin/e/j/PCIFAPFin.pdf>. Accessed July 14, 2011.

⁷⁵ Ponette-Gonzalez AG and Fry M. 2010. Pig pandemic: Industrial hog farming in eastern Mexico. Land Use Policy 27: 1107- 1110.