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CENTER *for* A LIVABLE FUTURE

The Johns Hopkins Center for a Livable Future  
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September 19, 2016

Mayor Getzschman and Fremont City Council  
400 E. Military Ave.  
Fremont, NE 68025

*Disclaimer: The opinions expressed herein are our own and do not necessarily reflect the views of The Johns Hopkins University.*

RE: Costco Wholesale and Lincoln Premium Poultry Processing Plant and Broiler Production

Dear Mayor Getzschman and members of the Fremont City Council,

We are researchers at The Johns Hopkins Center for a Livable Future, based at the Bloomberg School of Public Health in the Department of Environmental Health and Engineering. The Center engages in research, policy analysis, education, and other activities guided by an ecologic perspective that diet, food production, the environment, and public health are interwoven elements of a complex system. We recognize the prominent role that food animal production plays regarding a wide range of public health issues surrounding that system.

We have been contacted by citizens of Dodge County who are concerned about Lincoln Premium Poultry and Costco Wholesale's proposed poultry processing plant south of Fremont. Citizens have also voiced concern about plans for approximately 400 new broiler\* houses in the area, which would house a combined 17 million broilers (approximately 19 times larger than Nebraska's 2012 broiler inventory).† In response to local citizens' concerns, below we present a summary of the peer-reviewed scientific literature on the human health and environmental concerns associated with poultry processing facilities and industrial broiler production. Detailed

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\* Chicken raised for meat

† U.S. Department of Agriculture. Nebraska State Profile, 2012 Census of Agriculture. National Agricultural Statistical Service Website.  
[https://www.agcensus.usda.gov/Publications/2012/Online\\_Resources/County\\_Profiles/Nebraska/cp99031.pdf](https://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Nebraska/cp99031.pdf).  
Published 2012. Accessed July 18, 2016.

information regarding these concerns can be found in Appendices I and II. We have also reviewed information provided by the Greater Fremont Development Council regarding plans Lincoln Premium Poultry and Costco Wholesale have to address some community concerns, such as worker safety, water use, wastewater treatment, poultry transport, traffic, waste management and spread of disease.<sup>‡</sup> It is possible that these planned activities and practices could reduce risks to workers and community members, but many of the proposed plans lack regulatory requirements and enforcement mechanisms. Therefore, we are considering all relevant literature related to poultry processing plants and production operations to fully describe potential risks.

Based on evidence from numerous scientific studies of industrial poultry operations and processing facilities, the operations proposed by Costco Wholesale and Lincoln Premium Poultry may present a range of health risks to members of the surrounding communities. We recommend that these risks are taken into account as decisions are made about i) the future of this project and ii) requirements for active monitoring and plans for responding if human health risks or environmental degradation are identified.

## **Summary**

There are serious human health and environmental concerns associated with large poultry processing plants, including occupational risks, exposure to air pollution and pathogens, and the environmental impacts of excessive water use and wastewater discharge (for a more in-depth review of these concerns and references, please refer to Appendix I on pages 5-6). The poultry processing industry has some of the highest injury rates among U.S. industries, and processing plant workers are at risk of exposure to pathogens, including those that are drug resistant, which can be spread to family members and the surrounding community. The anticipated increase in vehicular traffic to and from the processing plant may increase traffic-related air pollution, increasing the risk of developing or exacerbating respiratory and other conditions. Johns Hopkins researchers have also found that poultry trucks driving to processing plants can spread harmful bacteria, including drug-resistant bacteria, into the environment, exposing other drivers, pedestrians, and rural communities to these bacteria. Lastly, poultry processing plants require a substantial amount of water and discharge potentially hazardous wastewater. The extensive water needs of processing plants may affect the availability of water that neighboring communities need for drinking and household use, and wastewater high in nutrients, suspended solids, fecal coliforms and possibly pathogenic bacteria could threaten water quality if discharged into waterways.

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<sup>‡</sup> Greater Fremont Development Council. Project Rawhide FAQ. [http://www.fremontecodev.org/media/userfiles/subsite\\_34/files/RAWHIDE/Project%20Rawhide%20FAQ%204%2022%2016.pdf](http://www.fremontecodev.org/media/userfiles/subsite_34/files/RAWHIDE/Project%20Rawhide%20FAQ%204%2022%2016.pdf). Published April 22, 2016. Accessed August 5, 2016.

Industrial broiler production is also associated with a range of human health and environmental risks (a more in-depth review of these risks, including references, is provided in Appendix II on pages 7-10). The dense confinement used in industrial broiler operations present opportunities for disease transmission among animals, and between animals and humans. Nearby residents, especially if they live in proximity to multiple operations, may have an increased risk of infection from the transmission of harmful microorganisms from broiler operations via flies or contaminated air and water. Community members living near broiler operations also face increased exposure to air pollution from broiler operations, which can exacerbate respiratory conditions including asthma, bronchitis, and allergic reactions. Manure from broiler operations can also contaminate ground and surface waters with nitrates, drug residues, and other hazards. Increased exposure to these agents is associated with adverse health effects, including cancer, birth defects, thyroid problems, methemoglobinemia, neurological impairments, and liver damage.

### **Recommendations**

We recognize that the Greater Fremont Development Council, Costco Wholesale, and Lincoln Premium Poultry have identified some steps to reduce risks to poultry workers and the community. Many of these plans fall outside of the current regulatory structure that applies to poultry production and processing facilities, so monitoring and enforcement is unlikely to occur without strict requirements developed by the City Council and other government agencies. To address existing regulatory gaps, we recommend developing a plan for robust, transparent environmental monitoring that includes baseline and periodic testing of air and water quality around production sites and the processing plant facilities. The plan should also clearly state what actions would be required of Costco Wholesale and/or Lincoln Premium Poultry if environmental contamination and increased human health risks were found.

### **Conclusion**

We appreciate your consideration of environmental and human health risks associated with industrial poultry production and processing. We are available to answer any questions about the information we have presented. Through our research, we know that local government agencies

often face barriers related to regulating industrial food animal production due to narrow regulations and limited resources,<sup>§</sup> and we are prepared to serve as a resource to your office.

Sincerely,

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<sup>§</sup> Fry JP, Laestadius LI, Grechis C, Nachman KE, Neff RA. Investigating the role of state and local health departments in addressing public health concerns related to industrial food animal production sites. *PLoS one*. 2013;8(1):e54720.

Fry JP, Laestadius LI, Grechis C, Nachman KE, Neff RA. Investigating the role of state permitting and agriculture agencies in addressing public health concerns related to industrial food animal production. *PLoS one*. 2014;9(2):e89870.

## **Appendix I. Environmental and human health concerns associated with poultry processing**

The main environmental and human health concerns associated with large poultry processing plants are:

- Occupational safety risks including injury and exposure to pathogens;
- Air pollution from increased traffic;
- Exposure of citizens to pathogens from poultry transport trucks; and
- Environmental impacts due to excessive water use and wastewater discharge.

### **Occupational safety risks for workers**

There are significant occupational safety risks for slaughterhouse workers. According to the U.S. Government Accountability Office, the poultry processing industry ranks among the highest among all industries in the U.S. for occupational injury rates.<sup>1</sup> In addition, poultry processing plant workers, particularly those who are in contact with live poultry or carcasses, are at risk of exposure to pathogens.<sup>2</sup> Researchers have also found that poultry processing plant workers are at a higher risk than the general public of being carriers of drug resistant pathogens, such as methicillin-resistant *Staphylococcus aureus* (MRSA).<sup>3</sup> These pathogens can cause infections that are harder to treat due to their resistance to certain antibiotics, and workers can spread these pathogens to their families and other community members.<sup>4-6</sup>

Our understanding is that Costco Wholesale and Lincoln Premium Poultry may plan to raise poultry without the routine use of antibiotics. While this practice would likely lessen the risk to workers and community members of infection with antibiotic-resistant bacteria, pathogens (antibiotic-resistant or otherwise) may still spread from industrial livestock operations to workers and into communities.<sup>7</sup>

### **Air pollution from increased traffic**

The proposed poultry processing facility will increase vehicular traffic significantly due to the transportation needs of the 1,100 anticipated employees, the poultry transport trucks traveling to and from the 400 planned broiler houses, as well as other transport related to management and distribution operations. Air pollution from traffic increases the risk of developing or exacerbating respiratory and other conditions.<sup>8</sup>

### **Exposure to pathogens from transport trucks**

Poultry transportation also has another important health risk. In 2008, Johns Hopkins researchers found that poultry trucks driving to processing plants spread harmful bacteria into the environment, exposing other drivers, pedestrians, and rural communities to these bacteria.

Researchers consistently detected drug-resistant bacteria in the air and on surfaces inside vehicles while driving behind poultry trucks.<sup>9</sup> The study was conducted on a roadway as poultry trucks were transporting live birds to a processing plant. It is likely that driving behind poultry trucks in Dodge County would produce similar outcomes. This study exemplifies one facet of the increased burden of risk that the community may face as a result of having hundreds of thousands of birds transported to the proposed processing plant each day. According to the Greater Fremont Development Council, poultry transport trucks and the processing plant receiving dock will be enclosed.<sup>10</sup> These steps may reduce the risk to community members, and should therefore be both required and monitored.

### **Excessive water use and wastewater discharge**

Poultry processing is a water-intensive endeavor, requiring, on average, seven gallons of potable water per bird.<sup>11</sup> The Fremont City Council's decision to annex the land under consideration for the poultry processing plant allows the city to extend utilities services, including water, to this area. It is essential that the water allocation to the processing plant not impact the availability of water to the neighboring communities that also rely on this water source for drinking and household use.

In addition, the discharge of processing plant wastewater is a potential hazard to nearby waterways and communities. Poultry processing plant effluents are high in nitrogen, phosphorus, and total suspended solids,<sup>12</sup> all of which could threaten water quality if discharged into waterways. The proposed poultry processing plant would be a source of these nutrients, as well as fecal coliforms and possibly other pathogenic bacteria,<sup>13</sup> discharged into the surrounding waterways including the Platte River, a major tributary of the Missouri River. Dodge County encompasses four watersheds (the Lower Platte-Shell, Lower Platte, Lower Elkhorn and Logan), all of which contain water bodies considered impaired in 2014, the most recent reporting year.<sup>14</sup> Nitrogen, phosphorus and pathogens are already among the listed contaminants causing the impairment of these water bodies.<sup>14</sup>

In light of these concerns, it is especially important to ensure that the City of Fremont and Costco Wholesale maintain their commitment to treat all wastewater from the processing facility at the city's municipal wastewater treatment plant.<sup>10</sup> Baseline and periodic monitoring should be conducted to ensure that the processing plant does not adversely affect the water quality in the area.

## Appendix II. Human health concerns associated with industrial broiler production

The main human health concerns associated with industrial broiler production include:

- Infections resulting from the potential transmission of harmful microorganisms from broiler operations to nearby residents, for example, via flies or contaminated air and water;
- Increased exposure to air pollution from broiler operations associated with health effects, including exacerbation of asthma, bronchitis, and allergic reactions; and
- Increased exposure to nitrates, drug residues, and other hazards that may be present in ground and/or surface waters contaminated by manure from broiler operations associated with health effects, including thyroid problems, methemoglobinemia, neurological impairments, and liver damage.

### Disease transmission

Crowded conditions in industrial broiler operations present opportunities for the transmission of bacterial pathogens among animals, and between animals and humans.<sup>15</sup> Human exposure to infectious agents can occur through multiple routes, including breathing contaminated air and drinking contaminated water.<sup>6,9,16-18</sup>

Of additional concern is exposure to pathogens that are resistant to antibiotics used in human medicine. The non-therapeutic use of antibiotic drugs as a means for growth promotion<sup>\*\*</sup> in animals is commonplace—an estimated 80 percent of antibiotics sold for human and animal uses in the U.S. are sold for use in food-producing animals.<sup>19</sup> Administering antibiotics to animals at levels too low to treat disease fosters the proliferation of antibiotic-resistant pathogens. Resistant infections in humans are more difficult and expensive to treat<sup>20</sup> and more often fatal<sup>21</sup> than infections with non-resistant strains. As mentioned previously, it is our understanding that antibiotics may not be used in the proposed broiler production. While this may reduce the risk of infection with antibiotic resistant-bacteria to community members and workers, pathogens can still spread from poultry operations to communities.<sup>7</sup>

A growing body of evidence provides support that pathogens can be found in and around broiler operations. In broiler operations that administer antibiotics for non-therapeutic purposes, broilers have been shown to be carriers of antibiotic-resistant pathogens<sup>22,23</sup> and these resistant pathogens have also been found in the environment in and around broiler production facilities, specifically in the manure<sup>24,25</sup> and flies.<sup>26</sup> Additionally, *Salmonella* and *Campylobacter* are highly prevalent among U.S. broilers, and *Campylobacter* is found in about 50% of manure samples.<sup>3</sup>

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<sup>\*\*</sup> U.S. Food and Drug Administration (FDA) voluntary industry guidelines continue to endorse the use of antibiotics in livestock production for “disease prevention”, which allows for dosing that is largely indistinguishable from growth promotion, thus tolerating business as usual.

*Campylobacter* infections in people have led to gastrointestinal illness, neuromuscular paralysis, and arthritis.<sup>3</sup> Manure runoff from broiler operations may introduce these harmful microorganisms into nearby water sources. Land application of broiler manure may present an opportunity for pathogens contained in the manure to leach into the ground or run off into recreational water and drinking water sources, potentially causing a waterborne disease outbreak.<sup>25</sup> This is of particular concern for the approximately 16% of Dodge County residents who rely on private wells for drinking water and household use.<sup>27</sup>

Several studies have shown that workers in broiler operations are disproportionately exposed to pathogens: in a Dutch study, 5.6% of workers in broiler houses were carriers of MRSA<sup>28</sup> vs. 0.01% of the general population, and workers in broiler houses on the Delmarva Peninsula were found to have 32 times the odds of carrying gentamicin-resistant *E. coli* compared with other residents in the community.<sup>6</sup> Colonized or infected workers may transport pathogens into their communities.<sup>6</sup>

People living near broiler operations may be exposed to harmful microorganisms, which have been found to spread in the air up to 3,000 meters from broiler operations.<sup>16</sup> The shape and spread of this airflow varies with changes in wind patterns, making it difficult to predict which residents might be most affected.<sup>16</sup> Infectious agents have been found on deposits of particulate matter several miles from operations.<sup>16</sup> Harmful bacteria such as *Campylobacter* have been reported to enter and leave poultry operations via insects and ventilation systems.<sup>18</sup>

The elevated presence of flies near broiler operations can be more than a nuisance; it also may facilitate residents' exposure to pathogens, including antibiotic-resistant strains of *Enterococci* and *Staphylococci*.<sup>9,18</sup> One study found that residences within a 0.5 mile of broiler operations had 83 times the average number of flies compared to control households.<sup>28</sup>

### **Air pollution from broiler operations**

The air inside broiler operations contains elevated concentrations of gases, particulate matter, pathogens, endotoxins, and other hazards.<sup>9,17,18,29,30</sup> While these studies provide important insights on worker exposure to broiler operation air pollution, additional studies are needed to characterize community exposures and health outcomes. Despite the need for more research, some studies suggest that communities face health risks from poultry operation air pollution. For example, airborne contaminants from broiler operations are transported from broiler houses through large exhaust fans and may pose a health risk to nearby residents.<sup>16,18,25,31-36</sup> In addition, ammonia,<sup>37</sup> particulate matter,<sup>25</sup> endotoxins,<sup>35</sup> and microorganisms<sup>16,18,25</sup> have been detected in air samples surrounding poultry operations. While there are currently few data available on odor, nitrous oxide, hydrogen sulfide, and non-methane volatile organic compound levels surrounding poultry operations, odors associated with air pollutants from intensive livestock hog operations

have been shown to interfere with daily activities, quality of life, social gatherings, and community cohesion.<sup>29,33,38</sup>

Exposure to airborne contaminants expelled from broiler operations has been associated with a range of adverse health effects. Ammonia emissions have been implicated in respiratory health issues, with up to 50% of poultry workers suffering from upper respiratory illnesses that are believed to be due to ammonia exposure.<sup>31</sup> Studies have shown that endotoxin exposure can exacerbate pre-existing asthma or induce new cases of asthma, and exposure was found to be a significant predictor of chronic phlegm for poultry workers.<sup>33,39</sup> Additionally, poultry workers demonstrated a high prevalence of obstructive pulmonary disorders, with increasing prevalence associated with longer exposure, regardless of smoking status.<sup>34</sup> Particulate matter—consisting mainly of down feathers, mineral crystals from urine, and poultry litter in broiler operations—may also have detrimental effects on human health, causing chronic cough and phlegm, chronic bronchitis, allergic reactions, asthma-like symptoms in farmers, and respiratory problems in people living in the vicinities of operations.<sup>35</sup>

A 2010 USDA study measured volatile organic compounds (VOCs) inside industrial broiler operations and found that not only were ten classes of VOCs present, but that areas of the compound with birds had VOC levels seven fold higher than those without birds.<sup>40</sup> Exposure to VOCs is associated with short- and long-term adverse health effects, including nausea; headaches; eye, nose and throat irritation; and liver and kidney damage, while some are suspected or known to cause cancer.<sup>41</sup> It is important to note that even industrial broiler operations that employ best management practices and mitigation techniques have been shown to generate airborne contaminants.<sup>32</sup>

### **Contaminated ground and surface water**

Based on manure production data from the American Society of Agricultural Engineers,<sup>42</sup> 17 million broilers would produce an estimated 3,910,000 pounds of waste per day (0.23 lbs. per bird), or more than twice the equivalent amount of human waste generated daily by the entire city of Omaha, Nebraska's largest city. Although animal manure is an invaluable fertilizer, waste quantities of this magnitude - concentrated over a small geographic footprint - represent a public health and ecological hazard.

Manure from industrial poultry operations contain nutrients and may contain heavy metals, drug residues, and pathogens that can leach into groundwater or runoff into surface water.<sup>17,28,36,43,44</sup> Studies have demonstrated that humans can be exposed to waterborne contaminants from livestock and poultry operations through the recreational use of contaminated surface water and the ingestion of contaminated drinking water.<sup>30,44</sup> Furthermore, the disposal and decomposition

of diseased poultry carcasses may contaminate water sources and pose a threat to human health.<sup>28</sup>

The nutrients nitrogen and phosphorus--naturally occurring in chicken manure--have been found in both ground and surface water near Maryland broiler chicken operations<sup>45</sup> and can have deleterious effects on water quality and human health.<sup>25,28,30,34,44,46-48</sup> In one study, proximity to broiler chicken and corn production was associated with higher nitrate concentrations in drinking water in Maryland wells.<sup>46</sup> Ingesting high levels of nitrate has been associated with increased risks for thyroid conditions,<sup>30,49,50</sup> birth defects and other reproductive problems,<sup>30,50,51</sup> diabetes,<sup>30,50</sup> various cancers,<sup>50,52</sup> and methemoglobinemia (blue baby syndrome), a potentially fatal condition among infants.<sup>30,53</sup> As stated previously, approximately 16% of Dodge County residents rely on private wells for drinking water,<sup>27</sup> so there is cause for concern regarding the spread of nitrate into groundwater that is used for drinking and other household uses and is not monitored by government agencies.

Nutrient runoff has also been implicated in the growth of harmful algal blooms,<sup>25,28,47</sup> which may pose health risks for people who swim or fish in recreational waters, or who consume contaminated fish and shellfish. Exposure to algal toxins has been linked to neurological impairments, liver damage, gastrointestinal illness, severe dermatitis, and other adverse health effects.<sup>54,55</sup> According to the Nebraska Department of Environmental Quality (NDEQ), water quality degradation is already a concern for sandpit lakes in the state.<sup>56</sup> These lakes, used for fishing, swimming, and other recreational activities, are affected by nutrient loading, especially phosphorus, leading to eutrophication.<sup>56</sup> Fremont Lake #20 near the city of Fremont is one of the lakes affected by nutrient runoff. Algal toxins discovered in the lake from 2005 to 2007 resulted in significant restrictions on recreational water use and monitoring of water quality during this period identified high concentrations of phosphorus and nitrogen as the cause of blue green algae blooms.<sup>56</sup> More recently, eight lakes in the Fremont State Lake System were identified as impaired by nutrients in the NDEQ 2012 Water Quality Integrated Report.<sup>57</sup> Introducing a poultry processing plant and waste from 17 million birds will likely exacerbate existing water quality issues, and introduce nutrient runoff to previously unaffected areas.

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