N.C. industrial livestock workers found to carry drug-resistant bacteria

By Nancy Lamontagne

Industrial livestock operations (ILOs) that use subtherapeutic doses of antibiotics could expose workers to drug-resistant bacteria, according to a new study *(http://www.ncbi.nlm.nih.gov/pubmed/23844044)* co-funded by NIEHS. The researchers found methicillin-resistant *Staphylococcus aureus* (MRSA), with characteristics linked to livestock, in some people working at ILOs in North Carolina, but not in workers from antibiotic-free livestock facilities.

"Part of eastern North Carolina is the nation's densest area of hog production, and producers there commonly use subtherapeutic doses of antibiotics to promote livestock growth, a practice that is of great concern, due to its potential to promote antibiotic-resistant bacteria," said NIEHS grantee Steve Wing, Ph.D. *(http://www2.sph.unc.edu/index.php?option=com_profiles&Itemid=1894&profileAction=ProfDetail&pid=702514616)*

For the study, Wing's research team at the University of North Carolina at Chapel Hill Gillings School of Global Public Health collaborated with a team at Johns Hopkins Bloomberg School of Public Health led by Christopher Heaney, Ph.D. *(http://www.jhsph.edu/faculty/directory/profile/5187/Heaney/Christopher_D.)*

Funding

The research was supported in part by an NIEHS T32 training grant, along with funding from the North Carolina Translational and Clinical Sciences Institute, North Carolina Occupational Safety and Health Education and Research Center, the W.K. Kellogg Health Scholars Program - Community Track, a Gillings Innovation Laboratory award from the UNC Gillings School of Global Public Health, and other sources.

Community involvement

The study presented some challenges for participants and the scientists. Industrial livestock workers in eastern North Carolina are predominantly low-income people of color, working in a region with a history of Jim Crow segregation and white supremacy, according to the researchers. There was also a potential for study participants to be concerned that corporate producers would retaliate against them if their participation in the study became known. To help facilitate the study, the Rural Empowerment Association for Community Help, a community-based organization that helps livestock workers and community members, was part of the research team.

Many industrial livestock operations raise animals in close confinement and use antibiotics for growth promotion, providing an ideal environment for the exchange of new antibiotic-resistant bacteria between animals and humans. (Photo courtesy of the book "CAFO") (http://www.cafothebook.org/)

"Community organizers helped plan the data collection, recruitment of industrial workers, and provision of information about the study results to industrial workers and other community members," said Wing."Community organizers were essential for conducting the study, because they know the industry and community, and they promote workers' interests."

To evaluate the presence of MRSA, the investigators interviewed and obtained a

nasal swab from 80 workers who were employed at ILOs, and 92 workers employed at farms that do not use antibiotics for growth promotion. Workers from ILOs showed a 42 percent prevalence of *Staphylococcus aureus* (*S. aureus*), and workers from antibiotic-free facilities exhibited a 38 percent prevalence. Three workers in each group carried MRSA.

Although the two groups exhibited similar *S. aureus* and MRSA prevalence, only workers from ILOs carried MRSA and multidrug-resistant *S. aureus* with characteristics associated with livestock. These characteristics included lack of the bacteriophage-encoded immune evasion cluster *scn* gene, which is present in most human *S. aureus*, and resistance to tetracycline, an antibiotic widely used as a livestock growth promoter. Additionally, *S. aureus*, belonging to a clonal complex associated with livestock in Europe (CC398), was considered an indicator of livestock association.

Wing said that community organizers were key for this study, which looked at the prevalence of antibiotic-resistant S. aureus in North Carolina livestock workers. (Photo courtesy of Steve Wing)

Health concerns

The study participants did not report any symptoms of infection. However, the presence of drug-resistant *S. aureus* is of public health importance, because if a person develops an antibiotic-resistant *S. aureus* infection, it would potentially be difficult to treat. The findings are also concerning, because strains of drug-resistant *S. aureus*, first detected among farm workers in Europe, showed up later in hospitals and communities there. However, Wing said that it is important to keep in mind that presence of *S. aureus* without infection is common in the general population.

The researchers are now examining the persistence of *S. aureus* in industrial livestock workers. The investigators recently completed data collection for a small repeated-measures study of workers employed in factory hog farms, to evaluate whether *S. aureus* presence is affected by time away from work.

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2013. Livestock-associated methicillin and multidrug resistant Staphylococcus aureus is present among industrial, not antibiotic-free livestock operation workers in North Carolina. PLoS One 8(7):e67641.

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