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Workers at industrial farms carry drug-resistant bacteria associated with livestock

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A new study found drug-resistant bacteria associated with livestock in the noses of industrial livestock workers in North Carolina but not in the noses of antibiotic-free livestock workers. The drug-resistant bacteria examined were *Staphylococcus aureus*, commonly known as "Staph," which include the well-known bug MRSA (methicillin-resistant *Staphylococcus aureus*). New Staph strains are emerging in people who have close contact with livestock animals and for this reason have been given the name livestock-associated Staph. While everyone in the study had direct or indirect contact with livestock, only industrial workers carried antibiotic-resistant Staph with multiple genetic characteristics linked to livestock. The study by researchers at the Johns Hopkins Bloomberg School of Public Health, the University of North Carolina at Chapel Hill, the Rural Empowerment Association for Community Help, the George Washington University, and the Statens Serum Institute, published July 2 by the journal *PLOS ONE*, confirms earlier findings in Iowa and raises concern about antibiotics use in livestock production.

Many industrial livestock operations raise animals in large conferment buildings and use antibiotics, including non-therapeutically in animals' feed and water to promote their growth. Previous studies have detected strains of drug-resistant *S. aureus* from livestock, first among farm workers, and subsequently in hospital and community settings in Europe. In the United States, such strains have been detected among industrial livestock operation workers in Iowa and now North Carolina making scientists concerned that these bacteria could follow a similar trajectory into the community. North Carolina is a major livestock producer,

ranking second behind Iowa in hog production in the United States.

S. aureus can cause a range of illnesses in humans, from minor to life-threatening skin, bloodstream, respiratory, urinary and surgical site infections. Like most illnesses caused by bacteria, *S. aureus* infections are treated with antibiotics. According to the Centers for Disease Control and Prevention, some Staph cannot be killed by antibiotics, meaning they are resistant. MRSA is a strain of Staph bacteria that is resistant to methicillin and certain first-line antibiotics called beta-lactams. Infections with drug-resistant strains, like MRSA, can be particularly difficult to treat.

The study was based on interviews and nose swabs that were collected and analyzed from individuals who worked at two different types of livestock operations in North Carolina. At industrial livestock operations, animals are grown in large confinement buildings using antibiotics. At antibiotic-free livestock operations, animals are grown without the use of antibiotics, typically outdoors on pasture. Researchers tested the *S. aureus* isolated from nose swabs for resistance to a range of antibiotics and for genetic markers considered to indicate that the bacteria may have come from livestock.

"This study shows that these livestock-associated strains are present among workers at industrial livestock operations and that these strains are resistant not just to methicillin, but to multiple antibiotics – including antibiotics that are used to treat human infections," said Christopher Heaney, PhD, corresponding author of the study and assistant professor of Environmental Health Sciences and Epidemiology at the Johns Hopkins Bloomberg School of Public Health.

Workers were not experiencing Staph infections at the time of the study, but when antibiotic resistant bacteria do cause infections, they can be harder to treat. Researchers found that *S. aureus* that were multidrug-

resistant were roughly twice as prevalent among individuals exposed to the industrial compared to the antibiotic-free livestock operation environment and *S. aureus* that were resistant to tetracycline – an antibiotic that has been used in industrial livestock production since the 1950's – were 19 times as prevalent among industrial compared to antibiotic-free livestock operation workers.

More information: "Livestock-associated methicillin and multidrug resistant Staphylococcus aureus is present among industrial, not antibiotic-free livestock operation workers in North Carolina" *PLOS ONE*, 2013.

Provided by Johns Hopkins University Bloomberg School of Public Health

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