MITIGATING ZOONOTIC TRANSMISSION OF

Salmonella in Dairy Calf Production

A project by The Ohio State University and University of Wisconsin-Madison, funded through CDC's Antibiotic Resistance Solutions Initiative

In 2016, CDC responded to an outbreak of multidrug-resistant *Salmonella* Heidelberg in people who had contact with dairy calves. These infections caused more hospitalizations in people and higher death rates in calves than normally seen in *Salmonella* outbreaks and were resistant to multiple antibiotics.

CDC found that this strain of *Salmonella* had a novel antibiotic resistance gene[1] and recognized that additional scientific investigation was needed to learn how this multidrug-resistant strain emerged and spread.

Dairy calves are susceptible to some strains of *Salmonella*. There are multiple opportunities for introduction of this bacteria along the farm-to-fork continuum of veal calves and dairy beef products, including transmission (spread) of multidrug-resistant strains between calves and through the environment.

[1] Conferring resistance to trimethoprim/sulfamethoxazole

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SNAPSHOT

- The project examined the presence and transmission of *Salmonella* at different points in the dairy calf production process: in markets, at farms, during transportation, and in slaughter holding pens.
- The findings informed mitigation strategies to reduce the spread of antibiotic-resistant bacteria among calves, people, and the environment.
- Improving infection control throughout calf production will reduce the spread of antibiotic-resistant *Salmonella* in people, animals, and the environment.

RESULTS

Salmonella in Livestock Markets

- 191 environmental samples were tested from 24 livestock markets in the Midwest. More than 97% were positive for *Salmonella*.
- Serotypes that typically cause severe disease in calves and people were found, including Newport, Dublin, and Typhimurium. Many of the strains identified were resistant to several antibiotics.[2]

Salmonella in Barns, Trailers, and Harvest Plant Holding Pens

- Environmental samples were tested from five barns, 10 trailers used to haul calves to the harvest facility, and the holding pen at a slaughter plant.
- *Salmonella* was found in 22% of barn samples, 74% of trailer samples, and 93% of holding pen samples.

Salmonella Transmission in Calves

- 30% of calves were infected with *Salmonella*. Infection may lead to contamination of ground beef products.
- Genetic similarity provides evidence that exposure to *Salmonella* in trailers and holding pens may have resulted in infection in calves.

FUTURE DIRECTIONS

Evidence-based cleaning and disinfection protocols throughout calf production will help protect calves and people, reduce burden of *Salmonella* in food production, and reduce the spread of antibiotic resistance and resistance genes in animals and the environment.

[2] Ampicillin, clindamycin, florfenicol, gentamicin, neomycin, penicillin, sulfadimethoxine, spectinomycin, tetracycline, tiamulin, tilmicosin

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