

About Antibiotic Stewardship

Project by The Ohio State University,
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 among people and higher death rates among calves than normally seen in *Salmonella* outbreaks.

Public health, veterinary, environmental, and agricultural experts came together to help slow the spread of disease. As part of the response, animal health officials provided technical assistance on farms to control the outbreak, showing the effectiveness of farm-level interventions.

Farm-level interventions are not only important in outbreak control, but can also play a critical role in prevention of disease and antibiotic resistance spread. Tools to educate producers and guide judicious use of antibiotics may help reduce the emergence and spread of resistant bacteria, such as those causing the *Salmonella* Heidelberg outbreak.

Neonatal dairy calves are especially susceptible to bacterial infections that may require antibiotic treatment. Although veterinarians prescribe and dispense antibiotics, producers are responsible for deciding whether to start antibiotic treatment based on their judgments of disease severity. These decisions are sometimes made quickly on the farm without accurate case definitions, leading to potential unnecessary antibiotic use.



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



Antibiotic Use Survey Among 21 Producers

- 95% have veterinary-written treatment protocol indicating when antibiotics should be used for navel infection, diarrhea, and pneumonia, common diseases of neonatal veal calves.
- However, nearly 2 in 3 producers reported using antibiotics when not indicated by the protocol to treat mild cases of diarrhea or pneumonia cases.



Education as an Antibiotic Use Intervention

Researchers designed an intervention comprised of informative in-person meetings, calf-side case discussions with the veterinarian, and decision-making tools to guide producers' antibiotic use decisions. The decision-making tools provided pictures showing different signs of illness in calves and give a numeric system for assessing severity. Calves with a higher level of illness severity may need antibiotic treatment according to the veterinary-written treatment protocol. The intervention was implemented at four farms and evaluations compared results with farms that did not receive the intervention (controls).

- Antibiotic use knowledge test scores **improved about 20%** from before to after introduction of tools and training.
- Farms that received tools and training **used fewer antibiotics** compared to control farms.
- Farmers had better adherence to the veterinary written protocol.

Overall, intervention farms used numerically fewer antibiotics than control farms. However, additional data is needed to confirm these results and better understand the impacts of these interventions over time.

FUTURE DIRECTIONS

Veterinarian-informed antibiotic stewardship training and decision-making tools can help reduce unnecessary antibiotic use and slow the spread of antibiotic-resistant bacteria in calf production.

Expanding the use of this intervention to more farms and examining the intervention over time will provide more information regarding the impact on preventing overuse of antibiotics. Future research will be looking at environmental samples from farms receiving the intervention and farms that did not receive the intervention to measure and compare the presence of resistant bacteria and resistance genes.