



## *Salmonella* Outbreaks Linked to Poultry – United States

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Centers for Disease Control and Prevention

NPIP Biennial Conference

June 26, 2018

# CDC Outbreak Response and Prevention Branch

- Rapid response and management of multistate foodborne and animal contact disease outbreaks
- Coordinate investigations with state and federal partners
- Consultations with state partners on single state investigations
- Consultations with other CDC Branches on activities related to animal contact



## Research Paper

# Utility of Combining Whole Genome Sequencing with Traditional Investigational Methods To Solve Foodborne Outbreaks of *Salmonella* Infections Associated with Chicken: A New Tool for Tackling This Challenging Food Vehicle

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# Using Whole Genome Sequencing (WGS) to Solve Salmonellosis Outbreaks linked to Poultry

- Multistate foodborne outbreaks of *Salmonella* infections associated with chicken challenging to investigate
  - High consumption rates and a multitude of brands
- WGS of pathogens isolated from clinical, environmental, and food

# Subcluster Analysis Example

- WGS allows isolates with same PFGE pattern to be broken down into smaller groups of isolates
- In clade 7: clinical isolates and those from company C chicken and its subsidiary, company D, suggests their chicken linked to *Salmonella* Heidelberg illness outbreak

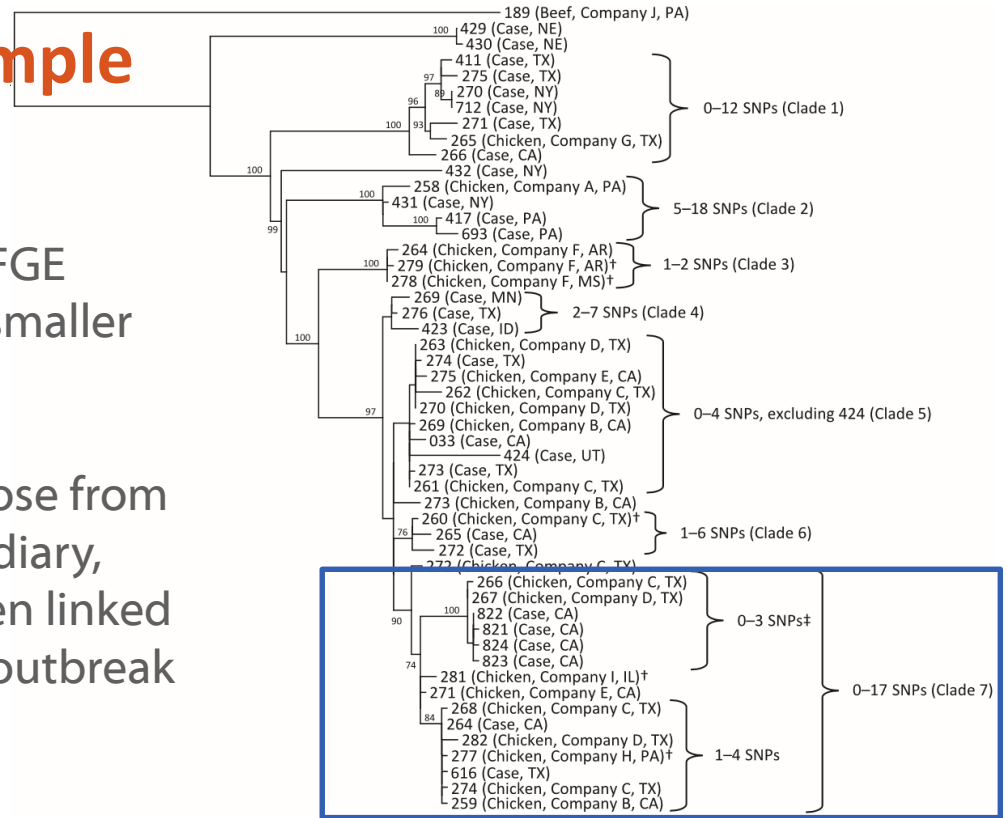


FIGURE 3. Phylogenetic tree of select human ( $n = 27$ ) and food ( $n = 24$ ) isolates. *Salmonella* Heidelberg outbreak, United States, 2014. Reads were trimmed using `run_assembly_trimClean.pl (2)` with reads less than 50 bp in length removed. `LYVE-SET` version 1.1.4e was used with mapping by `SMALT`. SNPs were called using `VarScan` at  $>20\times$  coverage,  $>95\%$  read support, and  $<5$  bp apart. Reference *Salmonella* Heidelberg strain SL476 CP001120 with prophages was detected by `PHAST` and masked at coordinates 376790 to 417006, 1008480 to 1038446, 1102544 to 1148741, 2000469 to 2022881, 2870372 to 2902633, 3368422 to 3401394, and 4413389 to 4434285. † Food isolates selected from before the beginning of the outbreak; ‡ includes Kern County illness subcluster isolates.

# Identifying Source of Outbreaks

- WGS, epidemiologic, traceback, and routine product sampling and testing data
- WGS allows heterogeneous clusters of isolates grouped by PFGE patterns to be broken into smaller groups of illnesses more likely to share common source
- Routine product testing at slaughter and processing facilities provides source of chicken isolates from variety of companies that can be added to the phylogenetic trees
- Can also use to exclude unrelated illnesses

# Salmonella Reading Illnesses Linked to Turkey Exposure

## Raw-meat pet food tainted with salmonella sickens 2 Minnesota children

Raws for Paws ground turkey recalled after salmonella was found.

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By **Jeremy Olson** Star Tribune | FEBRUARY 9, 2018 — 9:10PM

Two Minnesota children suffered salmonella infections and illnesses after coming in contact with bacteria from tainted pet food, the state Health Department reported Friday.

Testing found the same salmonella DNA patterns in the siblings, one of whom was hospitalized last month for a painful bone infection known as osteomyelitis.

Subsequent investigation found that the children's home in the Twin Cities area contained ground turkey from the Minneapolis-based company Raws for Paws and that the pet food was contaminated.

Health officials urged pet owners to discard or return pet food with this brand and to thoroughly clean bowls or surface areas that could have come in contact with the food.

“When you're feeding raw meat to an animal, and putting that food on the floor, any bacteria that is there will spread around,” said Carlota Medus, epidemiology supervisor for the Health Department's food-borne diseases unit.

# *Salmonella* Reading Case Finding

- CDC reviewed clinical *Salmonella* Reading isolates in PulseNet
  - Multidrug resistant strain
    - Streptomycin, tetracycline, sulfisoxazole, ampicillin
  - WGS used to determine relatedness between isolates
    - Additional clinical isolates related to MN illnesses and 20 FSIS isolates and several NVSL isolates
- Ill people report variety of turkey products, no common brand



# *Salmonella Infantis*

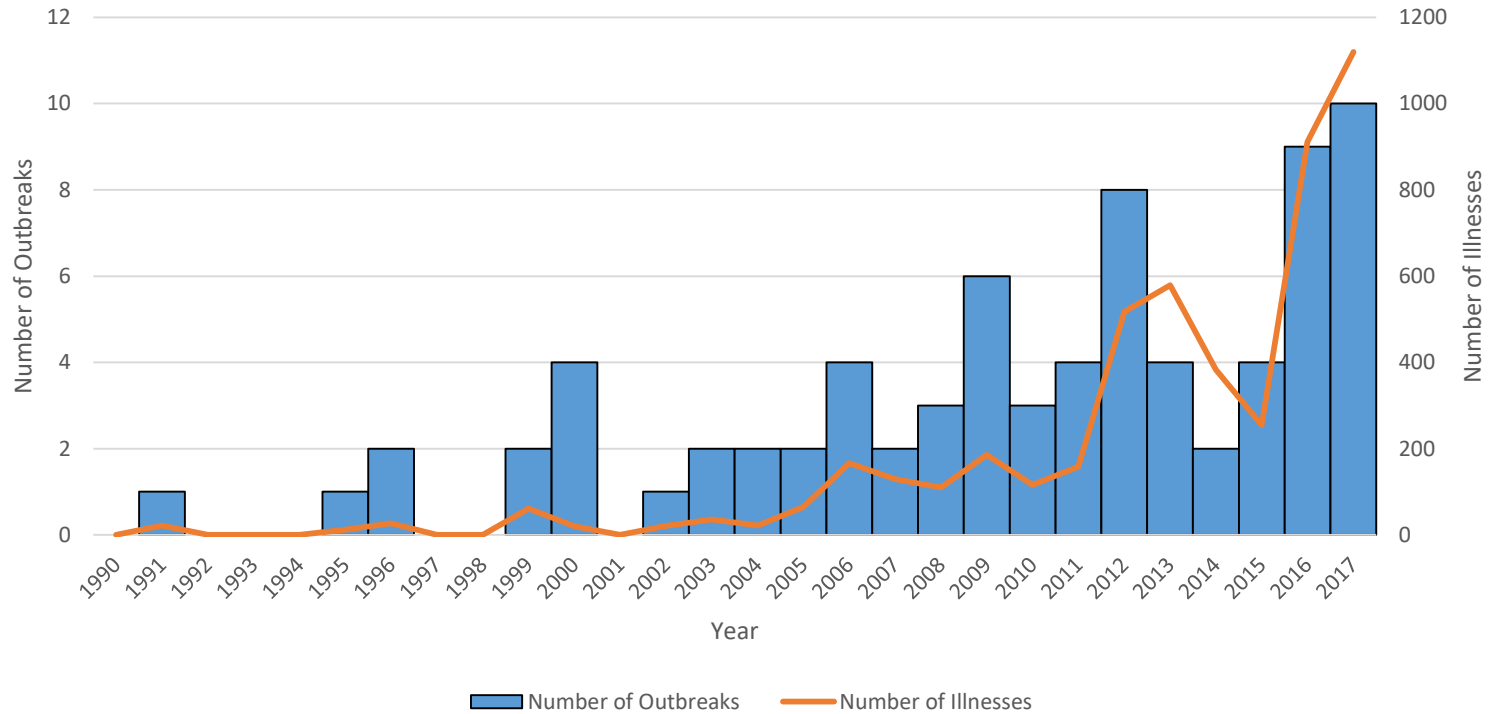
- Identified in clinical and poultry isolates
- Isolates are multidrug resistant
  - Tetracycline, chloramphenicol, kanamycin, streptomycin, sulfisoxazole, hygromycin, gentamicin, ampicillin, ceftriaxone, ceftiofur, and fosfomycin.



**ALWAYS WASH YOUR HANDS  
AFTER HANDLING LIVE POULTRY**

**Outbreaks in 2018**

# Live-Poultry Linked *Salmonella* Outbreaks



# Multistate Outbreaks of Salmonella Infections Linked to Contact with Live Poultry in Backyard Flocks, 2018

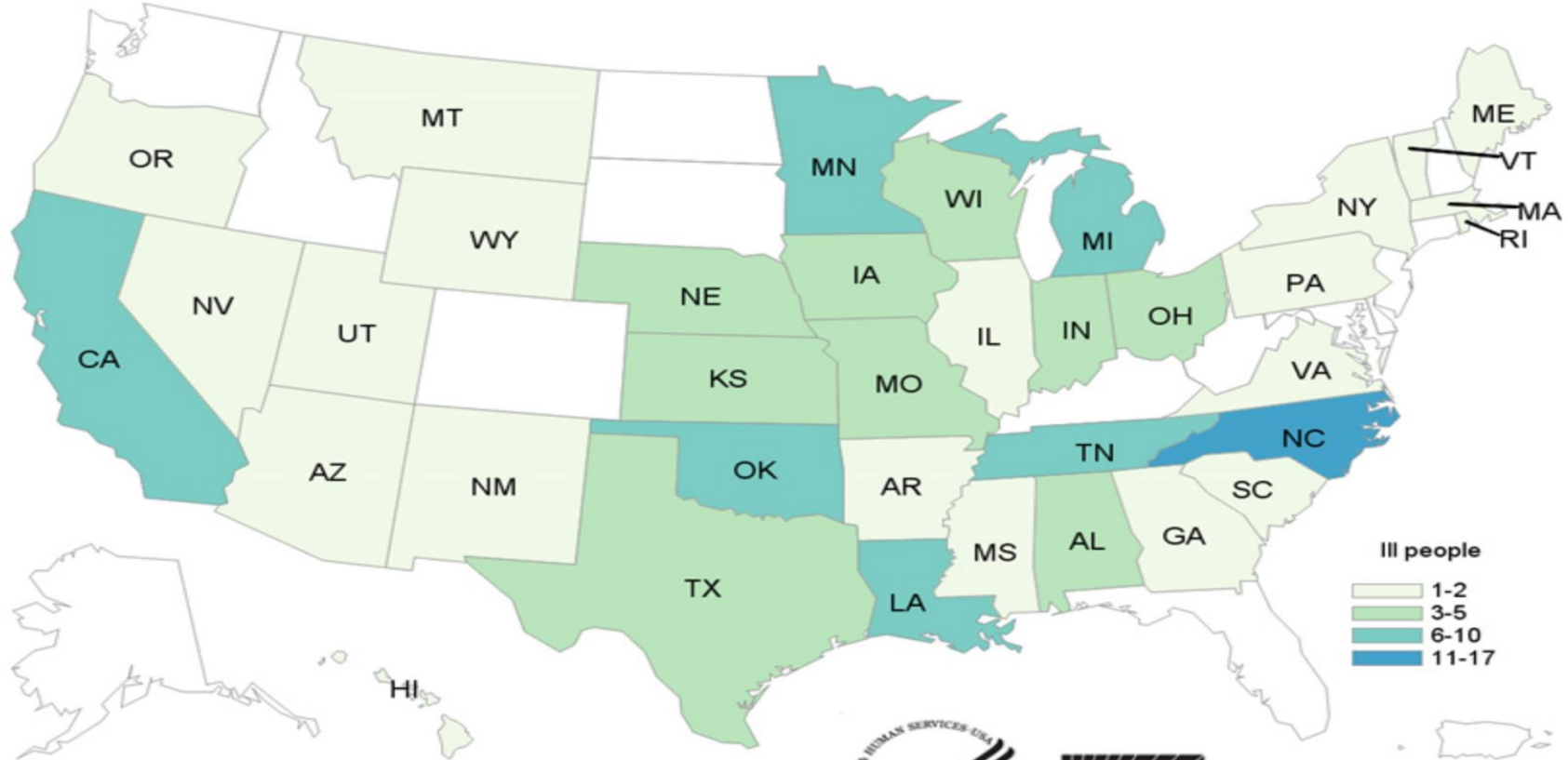
Posted June 8, 2018 9:30 AM ET

## Outbreak Advisory

124	36	21	0
Cases	States	Hospitalizations	Death

- CDC and multiple states are investigating several multistate outbreaks of *Salmonella* infections linked to contact with live poultry in backyard flocks.
  - Several different types of *Salmonella* bacteria have made people sick: *Salmonella* Seftenberg, *Salmonella* Montevideo, *Salmonella* Infantis, *Salmonella* Enteritidis, *Salmonella* Indiana, and *Salmonella* Litchfield.
- As of June 1, 2018, 124 people infected with the outbreak strains of *Salmonella* have been reported from 36 states.
  - Illnesses started on dates ranging from February 2, 2018 to May 14, 2018.
  - 21 ill people have been hospitalized, and no deaths have been reported.
  - 31% of ill people are children younger than 5 years.
- Epidemiologic, traceback, and laboratory findings link these outbreaks to contact with live poultry, such as chicks and ducklings, which come from multiple hatcheries.
  - In interviews, 55 (74%) of 74 ill people with information available reported contact with chicks or ducklings in the week before their illness started.
  - People reported obtaining chicks and ducklings from several sources, including feed supply stores, websites, hatcheries, and from relatives.

People infected with the outbreak strains of *Salmonella*, by state of residence, as of June 1, 2018 (n=124)



Ill people

- 1-2
- 3-5
- 6-10
- 11-17





Information collected during 2016 and 2017 illness outbreak investigations indicates that mail-order hatcheries are receiving fertile eggs from commercial broiler egg suppliers; agricultural supply stores subsequently receive the resulting hatchlings for sale to consumers. We believe that the risk of *Salmonella* contamination might be greater for fertile eggs and resultant hatchlings supplied by egg suppliers which are not participants in the voluntary NPIP programs designed to reduce burden of *Salmonella*.

Data from 2016 investigations suggest that a commercial broiler egg supplier provided fertile eggs to mail-order hatcheries, which subsequently sent the hatchlings to agricultural supply stores for sale to consumers. The egg supplier is not a participant in NPIP programs designed to reduce the burden of *Salmonella*, and it is unclear whether the mail-order hatcheries receiving fertile eggs are aware. Thus, agricultural supply stores might not be aware that some chicks they are selling to the public originated at a supplier which does not participate in efforts to control and monitor for *Salmonella*.

Therefore, we recommend that mail-order hatcheries and agricultural supply stores review their practices and understand the potential risks for *Salmonella* transmission to consumers when eggs are originally shipped from commercial egg suppliers that are not participants in the USDA-NPIP programs designed to reduce burden of *Salmonella*.

# Journal of Agricultural Safety and Health

## Preventing Human *Salmonella* Infections Resulting from Live Poultry Contact through Interventions at Retail Stores

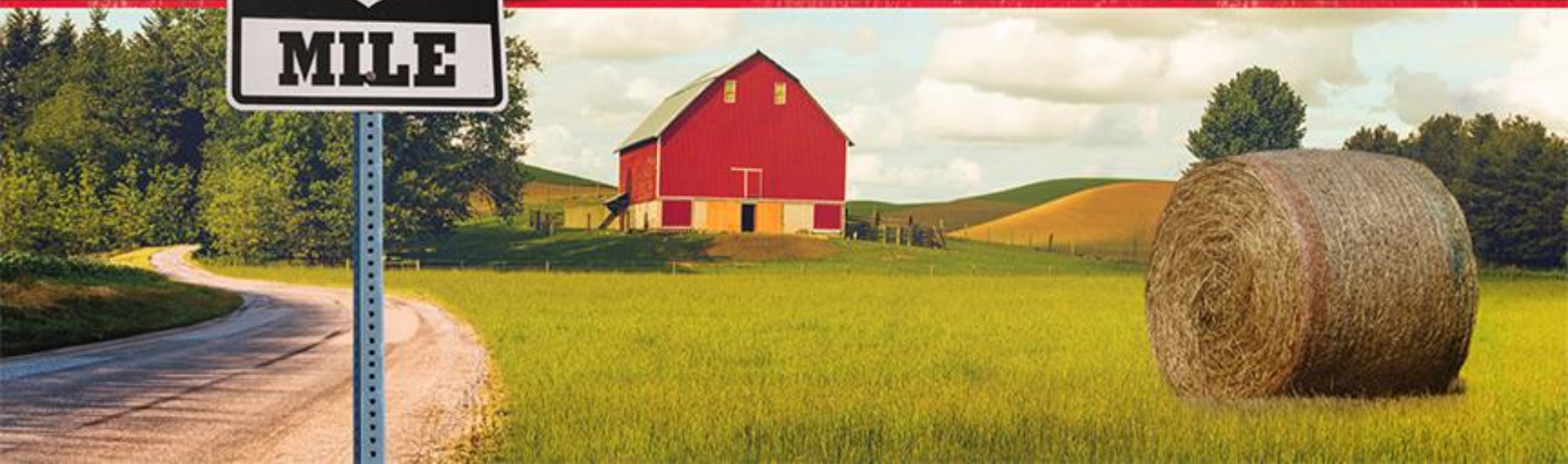
M. Nichols, L. Stevenson, L. Whitlock, K. Pabilonia,  
M. Robyn, C. Basler, T. Gomez, C. Barton Behravesh





**MORE THAN THE EXTRA MILE.**

*We go the*  
**COUNTRY  
MILE.**





# Our Growth & Partnership with the CDC

- Relationship was cultivated in 2011
- Implementation of the flyer to every customer who purchased Chicks/Ducklings
  - Also the prompt on the POS system (in 2015)
- Live poultry is placed in a corral within the store to prevent children and customers from handling live poultry in the store.
- Hand sanitizer and a sign emphasizing safe handling procedures is provided for team members who handle the chicks.
- Posters, including the official CDC salmonella safe handling posters, are prominently displayed around the corralled area. The posters are in English and Spanish.

## POS Prompt



# 2015's Additions

- We require stores to sign-off on the daily care for the birds and cleaning of the tanks
- Salmonella Prevention information printed on the Chick Boxes
- Incremental exposure on Ag-Wrap signs surrounding the Chick Corral

<p>After you touch ducklings or chicks, wash your hands so you don't get sick!</p>	<p>Si toca pollitos o patitos, ¡lávase las manos para no enfermarse!</p>
 <ul style="list-style-type: none"> <li>• Contact with live poultry (chicks, ducklings, adults, geese, and geese) can be a source of human Salmonella infections.</li> <li>• Salmonella germs can cause a diarrheal illness if you get it on your hands, or even the dressing.</li> <li>• Chicks, ducklings, and other live poultry can carry Salmonella germs and still appear healthy and clean.</li> <li>• Salmonella germs are often in fresh droppings and can easily contaminate their bodies and anything in areas where birds live and roam.</li> </ul>	 <ul style="list-style-type: none"> <li>• El contacto con aves de corral vivas (chicos pollitos, pollitos, patitos, geese, gansos) puede ser una fuente de infecciones por Salmonella en las personas.</li> <li>• Los bacterias de Salmonella pueden causar en las personas enfermedades con síntomas de diarrea. Estas germen a incluso la muerte.</li> <li>• Los pollitos, los patitos y otros aves de corral que pueden ser portadores de Salmonella aun cuando se vean sanos y limpios.</li> <li>• Las bacterias de Salmonella a menudo se encuentran en heces de las aves y el tiempo de los aves, el cual que se desmenuza fácilmente.</li> </ul>
<p>Protect Yourself and Your Family from Germs</p>	<p>Protéjase usted y su familia de los microbios</p>
<p><b>DO:</b></p> <ul style="list-style-type: none"> <li>• Wash your hands thoroughly with soap and water right after touching live poultry or anything in the area where they live and roam.</li> <li>• Adults should use proper hand washing for young children.</li> <li>• If soap and water are not readily available, use hand sanitizer until you can thoroughly wash your hands thoroughly with soap and water.</li> <li>• Clean any equipment or materials associated with raising or caring for live poultry outside the house, such as cages or feed or water containers.</li> </ul> <p><b>DO NOT:</b></p> <ul style="list-style-type: none"> <li>• Drink live chicken stronger than 3 years of age, eating poultry, or people with weak immune systems handle or touch chicks, ducklings, or other live poultry.</li> <li>• Don't let live poultry inside the house, in bedrooms, or especially in areas where food or drink is prepared, served or stored, such as kitchens, or outdoor patios.</li> <li>• Don't smudge or kiss the birds, touch your mouth or eye or drink around live poultry.</li> </ul> 	<p><b>LO QUE DEBE HACER:</b></p> <ul style="list-style-type: none"> <li>• Lávese las manos cuidadosamente con agua y jabón inmediatamente después de tocar aves de corral vivo o cualquier objeto ubicado en el área en que habitan o frecuentan.</li> <li>• Los adultos deben vigilar que los niños pequeños se laven bien las manos.</li> <li>• Si no hay agua ni jabón, use un producto de limpieza para manos que no contenga alcohol y asegúrese de lavarse bien con agua y jabón.</li> <li>• Limpie cualquier equipo o material de la casa que se use en el cuidado o crianza de las aves de corral como los jaulas, recipientes para agua o alimentos.</li> </ul> <p><b>LO QUE NO DEBE HACER:</b></p> <ul style="list-style-type: none"> <li>• No debe que los niños menores de 3 años de edad se coman a las personas que tengan problemas inmunitarios, debilidad o usar o jugar con pollitos, patitos o cualquier tipo de aves de corral.</li> <li>• No traiga aves de corral dentro de su casa, en los dormitorios o cualquier habitación en áreas donde se preparen, sirvan o almacenen alimentos y bebidas, como la cocina o el patio.</li> <li>• No debe besar o besar a las aves, no se toque la boca, ni como hablo cerca de aves de corral vivas.</li> </ul> 



# 2016's Additions

- Required that all hatcheries participate in the NPIP program
- Messaging on our Social Media platforms to educate customers on safe handling
- Messaging “I’m NOT an Easter gift”



**I'M A BABY CHICK**

**NOT AN**

**EASTER GIFT!**

I need a constant supply of feed, water, shelter, and protection from predators.

I'll quickly outgrow the cute and fluffy stage!

I'm fragile - my bones can break if I'm squeezed.

I shouldn't be kissed or cuddled; like any livestock, I potentially carry disease.

I can live for 10 years! If I'm a hen, I'll produce hundreds of eggs in my lifetime.

# 2017's Additions

- Buying Team traveled to all hatcheries participating in 2017's Chick Days
- Increased messaging on Social Media for Salmonella prevention
- Tested 4 bird minimums in select states



Tractor Supply Co.

March 18 · 🌐

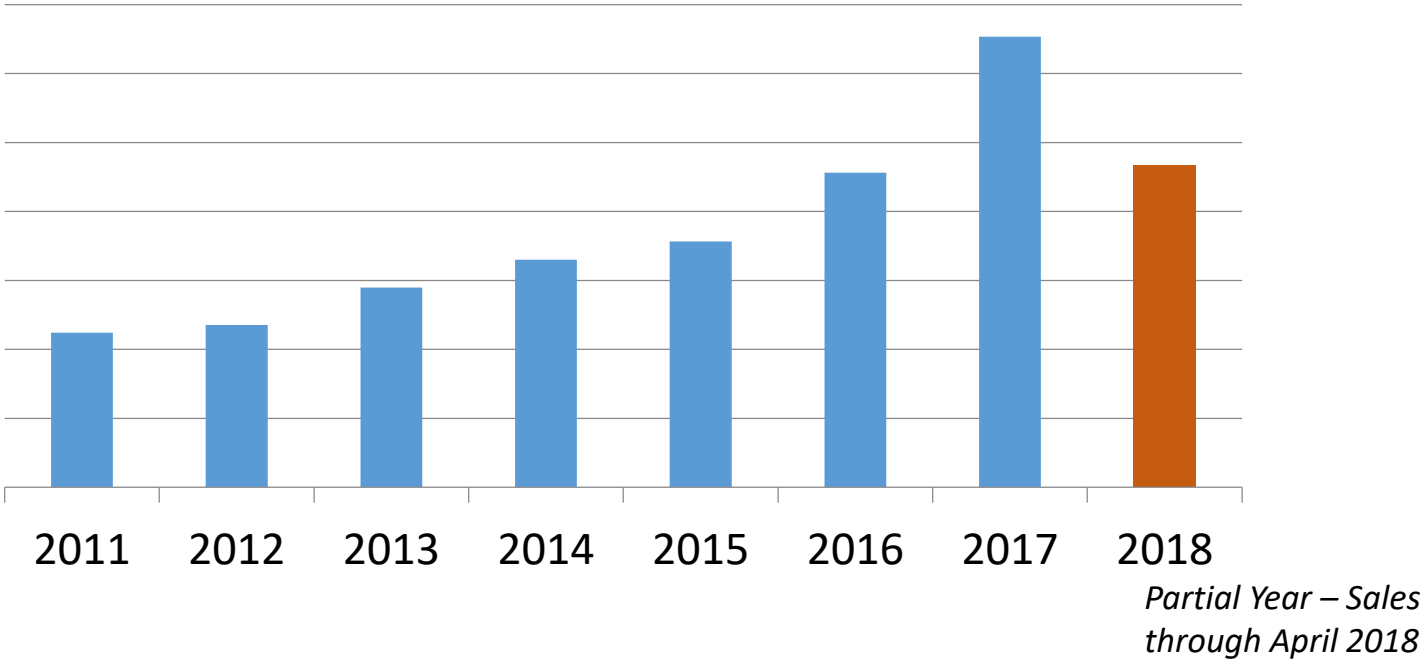
Our mission is helping people raise poultry while staying safe and healthy! Don't forget the [CDC's](#) tips for preventing salmonella when raising backyard flocks:

1. Always wash your hands after touching live poultry.
2. Don't let poultry live inside your house, especially where food is prepared, served, or stored.
3. Don't let children younger than 5, adults older than 65, or people with weakened immune systems handle or touch live poultry.
4. Avoid kissing the birds or snuggling them.
5. Stay outdoors when cleaning any poultry accessories, such as cages, feed or water containers.
6. Buy birds from hatcheries that are NPIP certified to prevent disease (all TSC hatcheries!).



# Chick & Duckling Sales since 2011

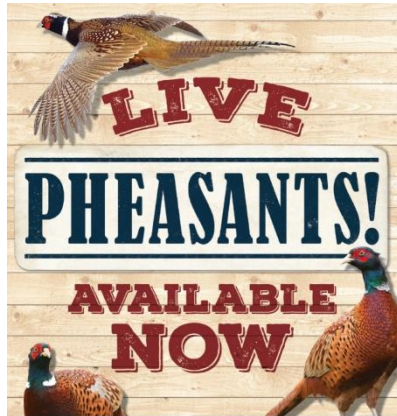
## Unit Sales by Year



# Programs outside of Chick Days

## Pheasant Event – NEW IN 2017

- 62 Stores
- 4/30 Start Date
- 5 Week Event



## Fall Chick Days – Tested in 2016

- 1600 Stores
- 7/23 Start Date
- 8 Week Event



You know that Chick Days are going on in many TSC stores for 2 more weeks, but did you know there are perks to raising chicks in the fall? Our friends The Livestock Conservancy shared these benefits:

- Fall weather tends to be warmer than spring, with less chance of snow – a better time for baby chicks growing up outside.
- Birds need, on average, 6 months before they lay their first egg. Raising birds in the fall lets that time pass during the birds' natural decrease in production, with lots of eggs ready the next spring and all summer.
- Meat birds will be growing during the winter months and ready for production while you shop for spring chicks.

For more info on raising chicks visit [TractorSupply.com/ChickDays](http://TractorSupply.com/ChickDays).





# Online Sales Launched in 2017

- Launched birds online
  - Chicks, Ducks, Turkeys
  - New in 2018 – Pheasants, Guineaas
- Orders are being sourced through Hoover’s Hatchery



Rhode Island Red Chicken - Sold in Quantities of 10

SKU #124168299  
★★★★★ (42)  
Available:  
✓ Order Online

\$14.99-\$34.99

Choose Options



Easter Egger Chicken - Sold in Quantities of 10

SKU #124168299  
★★★★★ (34)  
Available:  
✓ Order Online

\$14.99-\$34.99

Choose Options



Cornish Cross Broilers Chicken - Sold in Quantities of 10

SKU #124168099  
★★★★★ (30)  
Available:  
✓ Order Online

\$24.99

Choose Options



Brown Egg Production Pack Chicken - Sold in Quantities of 10

SKU #124168599  
★★★★★ (29)  
Available:  
✓ Order Online

\$14.99-\$34.99

Choose Options

# NEW in 2018

- Tractor Supply hosted 1<sup>st</sup> State of the Industry Poultry Meeting
- Included 5 hatcheries, 16 vendor partners, Dr. Nichols and Dr. Dunn
- Provided all attendees with:
  - “Healthy Families and Flock” signage
  - TN Dept of Ag/Health signage
  - Wash your hands after handling chicks and duckling stickers
- Challenged everyone in the Poultry Industry to take ownership of mitigating Salmonella
- Optimistically hoping to make this an annual event
  - Potentially coordinating timing and location around NPIP meeting

