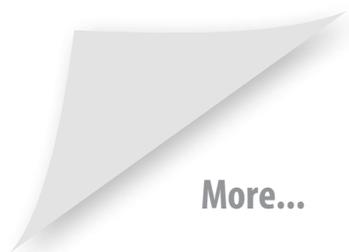




## Salmonella

For effective pre-harvest food safety intervention against *Salmonella* in livestock or poultry, a program must show proven impact in all measurements below.

MEASUREMENT	DEFINITION	MEASURED RESPONSE	IMPACT
<b>Prevalence</b>	Proportion (%) of a population of animals infected with <i>Salmonella</i> at a given time	<b>Prevalence</b> ↓	<b>Reduces the percentage</b> of animals infected.
<b>Number</b>	Count of <i>Salmonella</i> organisms present	<b>Number</b> ↓	<b>Reduces the TOTAL load</b> or amount of <i>Salmonella</i> entering a processing facility. <b>Load</b> is a factor of Prevalence and Number.
<b>Virulence</b>	Count of <i>Salmonella</i> organisms required to cause illness in someone who consumes infected product	<b>Virulence</b> ↓	<b>Increases the infectious dose</b> by a factor of 5-10, which indicates lower virulence.  <b>Reduces the likelihood</b> that someone consuming infected product becomes ill.
<b>Antibiotic Resistance</b>	Ability of <i>Salmonella</i> to grow in the presence of a chemical, such as a drug or other compound, that would normally kill them or limit their growth	<b>Antibiotic Resistance</b> ↓	<b>Increases the likelihood</b> of someone who is infected to <b>respond to antibiotics</b> .  <b>Lowers the probability of transmission</b> of antibiotic resistance to other bacteria.



KEY POINTS	BENEFITS
<p>Effective pre-harvest food safety intervention against <i>Salmonella</i> requires proven reduction in:</p> <ul style="list-style-type: none"> <li>✓ Prevalence</li> <li>✓ Virulence</li> <li>✓ Number</li> <li>✓ Antibiotic Resistance</li> </ul>	<ol style="list-style-type: none"> <li>1. Reduces <i>Salmonella</i> load upon entry to processing facility</li> <li>2. Helps processors and packers comply with regulations, directives, etc. issued by FSIS</li> <li>3. Helps mitigate risk of product recall, which helps maintain brand integrity and consumer confidence</li> <li>4. Helps producers support public health goal of preserving efficacy of antibiotics</li> </ol>

**BACKGROUND: *Salmonella* Virulence in Livestock and Poultry**

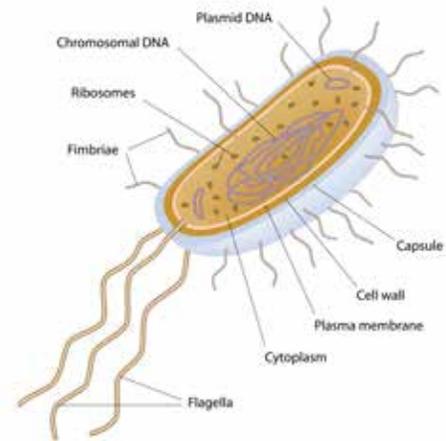
*Salmonella* uses a unique mechanism to invade epithelial cells of both humans and animals, including livestock and poultry. *Salmonella* DNA includes the *hilA* gene, which directs the invasion of host epithelial cells.

After *Salmonella* attaches to the epithelial cells, its DNA initiates a process that helps it:

- Invade host tissue (e.g. gut epithelial cells)
- Cause inflammation
- Suppress response from host’s immune system

Decreasing activation of the *hilA* gene reduces *Salmonella*’s ability to invade epithelial cells, which also reduces its virulence. This reduced virulence can be measured by reduced genetic expression of the *hilA* gene.

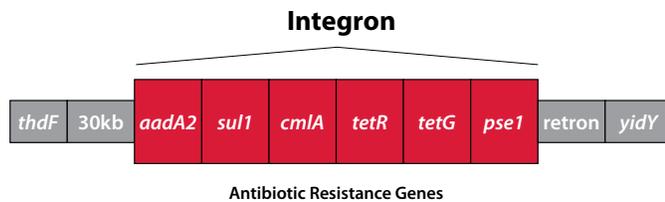
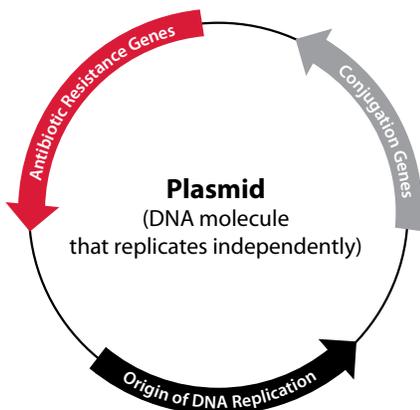
**Lowering virulence reduces the likelihood that *Salmonella* can make a person ill.**



**BACKGROUND: *Salmonella* Resistance to Antibiotics in Livestock and Poultry**

Genes for resistance to antibiotics are coded within either the integron section of *Salmonella*’s DNA or within the DNA of the plasmid. The expulsion or removal of these antibiotic resistance genes from the DNA, and ultimately from the bacteria itself, decreases the antibiotic resistance of *Salmonella*.

This reduction in antibiotic resistance can be measured by the reduced presence of the plasmid or integron that contain the genes for antibiotic resistance.



**Reducing antibiotic resistance has two major impacts:**

- More *Salmonella* organisms lack antibiotic resistance genes
- *Salmonella* are more susceptible to antibiotics