Salmonella associated with poultry and linked to human illness has again surfaced in many news reports. Although most recent outbreaks have not been associated with poultry consumption, the public usually has blamed poultry as the source. Confusion has arisen among consumers because they “know” that Salmonella comes from undercooked poultry or cross contamination.

However, there also is confusion within the poultry industry about Salmonella, particularly about its prevalence and the specific serovars present. Salmonella testing of post-chill poultry conducted by the USDA Food Safety Inspection Service often shows low or very low prevalence levels at many processing plants.

Based on these published results, many in the industry – especially those on the live operations side – believe their company does not have a problem with Salmonella on their products. However, when the company’s processing plant personnel test poultry products a few hours or days post-chill, Salmonella prevalence can exceed 20% on cut-up parts and 50% in ground meat. Therefore, many plant personnel are very concerned about Salmonella levels on poultry products.

Another complicating factor is that serovars found in the growout operations (hatcheries and growout houses or barns) are not always the same serovars found on post-chill product. Obviously, the Salmonella situation is much more complicated than commonly accepted.
Nonetheless, poultry producers bear responsibility for some portion of human *Salmonella* illnesses and must continue efforts to minimize product contamination. Processing plants already are maximizing existing technologies, which typically include expensive chemical treatments. Therefore, further reduction of *Salmonella* must occur pre-harvest.

*Salmonella* prevalence on post-chill chicken and turkey carcasses is shown in Figure 1. Recent levels show that *Salmonella* has decreased in both species, and both were reported at less than 5% prevalence in 2012 and 2013.

Figure 1. *Salmonella* prevalence on post-chill broiler chicken and turkey carcasses in the U.S., compiled from national testing of commercial processing plants

However, Figure 2 shows the rate of human salmonellosis in the U.S. over several years, with multiple lines reflecting different data sources and statistical analyses of the U.S. Centers for Disease Control and Prevention (CDC). Despite the reduction of *Salmonella* in poultry over the past few years, the rate of salmonellosis has not been reduced. Although other sources have been identified for causing *Salmonella* outbreaks, poultry has been and continues to be listed as a major attribution source by the CDC during this time frame.

The disparity between reduced *Salmonella* prevalence from poultry carcasses without any decrease in human disease may be explained by other data. *Salmonella* prevalence on either chicken parts obtained from retail stores or in ground chicken is considerably higher than carcass data (Figure 3). The same trend is evident for turkeys (Figure 4), where ground turkey has higher prevalence than turkey carcasses.

**Figure 2. Human salmonellosis rates (illness cases per 100,000 population) in the U.S. from 1996-2012**

Note: Different lines represent different sources of data and statistical analyses employed by CDC over time.

Source: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC).

**Figure 3. *Salmonella* prevalence of post-chill broiler chicken carcasses, chicken parts obtained from retail stores, and ground chicken product in the U.S.**

Figures 4. *Salmonella* prevalence of post-chill turkey carcasses and ground turkey product in the U.S.


Some of these differences may be due to the effect of technology and subsequent sampling, where dispersion of bacterial cells during grinding could increase apparent prevalence. Also, the carcass surface may protect cells against processing plant chemical interventions, with bacteria seeming to appear again a few hours post-chill. Regardless of the reason, more *Salmonella* actually is present in poultry products than carcass testing indicates.

There is further indirect evidence that *Salmonella* numbers have not been truly reduced in poultry products, as shown in Figure 5. Specific serovars of *Salmonella* isolated from cases of human illness – many of which are associated with poultry sources – have not been reduced, and even may have increased during the past 10 years.
In addition to Salmonella, another poultry pathogen of concern is Campylobacter. Only a small amount of poultry Campylobacter data has been collected from poultry plants and retail outlets, but follows a pattern similar to Salmonella (details in a future PoultryAdvisor article).

Although prevalence of pathogens on food is often tested and discussed, numbers of pathogenic bacteria or “load” on or in food products is just as important. USDA, FDA, and most processors test for pathogen prevalence because the procedure is quick and relatively cheap, while enumerating samples is neither. While low prevalence of pathogens is preferable, if these few samples have high numbers of bacteria, the risk of human illness outbreaks increases, as illustrated in Figure 6.
The best scenario is low prevalence and low numbers, while low numbers are probably more important than low prevalence in most food systems.

Research shows Diamond V Original XPC™ to decrease both prevalence and numbers of *Salmonella* and *Campylobacter* in poultry (McIntyre et al., 2013; Ibukic et al., 2012; Broomhead, 2014; McIntyre, 2013). The pre-harvest effect of reduced numbers of pathogens is likely to carry through the processing plant and into poultry parts and ground product. Commercial testing of this effect is already under way with controlled tests to be completed soon. In this way, decreasing contamination of poultry products can help lower the risk of human illness outbreaks.

**References**


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