

Environmental Sampling For the Detection of *Salmonella*

BACKGROUND

Salmonellosis has been known to be a food-borne disease since the late 1800s. Today *Salmonellae* remains a major food safety concern throughout the world and is a pathogen of significant interest to FDA. *Salmonellae* are the major cause of bacterial foodborne illness in the U.S. The major reservoirs for *Salmonellae* in the global food chain are raw meats, poultry and eggs; the organism is also isolated from aquaculture products and fruits, vegetable and nut meats. Salmonellosis outbreaks have been associated with a variety of foods, including raw seafood, fresh produce, egg products, cake mixes, unpasteurized milk, peanut butter, chocolate and salad dressings. *Salmonellae* are known to survive and grow in the natural environment and can become persistent in the environment in water sources as in the 2003 and 2005 eastern shore tomato outbreak and the 2008 jalapeno pepper outbreak. It is ubiquitous and has been recovered from some insects and nearly all vertebrates and invertebrates. This makes the recovery and identification of *Salmonellae* critical as an environmental contaminant. As an environmental contaminant *Salmonellae* have the ability to cross contaminate food processing facility or on the farm.

Salmonellae survive drying particularly well and are difficult to kill with heat when they are dehydrated or in low moisture products such as chocolate and peanut butter. Look for *Salmonellae* in areas of the production facility that occasionally get wet, but that dry out for long periods of time. Take large samples and swab as large of a surface area as possible (e.g., one square meter of floor or more). Proper sampling for *Salmonellae* in a food plant involves spending a great deal of time on your hands and knees – the low lying areas of the plant are where the organism is most often found.

SAMPLE COLLECTION

DO Collect Samples From:	DON'T Collect Samples From:
Floors and related areas – Under floor mounted equipment, scales (floor and table mounted)	Employees – work shoes, hands etc
Sanitizing foot mats – if dry	Hand wash or eyewash stations
Cleaning Equipment – central vacuum systems, automated floor cleaning equip (e.g., Tenent type walk-behind or riding sweepers, brooms, mops, etc. Pay particular attention to the collection of floor sweepings or the dry contents of vacuum cleaner bags or tanks.	Packaging materials – jars, lids, etc
Air conveying equipment – air filters; air ducts and intake and exhaust vents; food residue on equipment and floors if old and dry	Direct product contact surfaces – allegedly cleaned often and would not have residual organism growth.
Product conveyors – cables, belts, joints, where product residue accumulates, if the residue is old and dry	Raw material – product raw materials, flour, peanuts etc
Unsealed control and drive chambers; electrical/mechanical service boxes that are not cleaned and/ or sanitized. Look for dry dust and residue in these boxes.	Outside the plant – roof, parking lot, etc
Cracked equipment – boots (shock absorbing equipment), metal joints, etc	Areas with running water
Under sinks / safety stations – Under hand wash or eyewash stations if appearance of leaks, cracks etc	Zone 4
Equipment – areas that are difficult to reach and clean, non-food contact surfaces, nooks and crannies if dry.	
Doorways - floor area in doorways leading into or out of the production facility or onto the roof	
Pallets – Floor under wooden pallets and pallets themselves	
Floor drains - use a sponge to scrub dry residue form floor drain grids and walls	

References:

- 1.FDA. Investigations Operations Manual 2008. 4.3.7.7.2 – Environmental Sampling
2. Doyle, Michael et al. Food Microbiology Fundamentals and Frontiers 2nd Ed. Pgs 141-178.
- Cliver, Dean and Riemann, Hanns. Foodborne Diseases 2nd Ed. Pgs 55 – 67