

YERSINIA

**SURFACE MATERIAL, TEMPERATURE AND SOIL EFFECTS ON THE SURVIVAL
OF SELECTED FOODBORNE PATHOGENS IN THE PRESENCE OF CONDENSATE**

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Survival of foodborne pathogens in food processing facilities is affected by factors including surface materials, nutrients, moisture and temperatures. The effects of surface-type [stainless steel, Delrin[®] (DuPont) acetal resin, and fiberglass reinforced plastic wall paneling (FRP), and mortar surfaces], soil, and temperature on the survival of *Listeria monocytogenes*, *Salmonella* spp., and *Yersinia enterocolitica* were evaluated in the presence of condensation. Surface coupons soiled and non-soiled with sterile porcine serum were exposed to cell suspensions made from five-strain cocktails of each organism (10^7 cfu/ml) in Butterfield's phosphate buffer (BPB) and incubated for 2 h at 25°C allowing attachment of cells. Three surfaces, stainless steel, Delrin and FRP, were included in the same experiment. The coupons were rinsed to remove unattached cells, incubated at either 4°C or 10°C under condensate-forming conditions, and sampled at six time intervals over a 15-day period. For enumeration, cells were removed from the coupons by vigorous shaking in 100 ml BPB with 3 g of glass beads and the BPB was plated on tryptic soy agar with 0.6 % yeast extract. The results showed that stainless steel did not support the survival of *Listeria* as well as acetal resin or FRP. Acetal resin and stainless steel were less supportive of *Salmonella* than FRP. All three surfaces supported the survival of *Yersinia* over the 15-day trial equally at 10°C. Temperature had little effect on survival of *Listeria* or *Salmonella* across all three surfaces. However, *Yersinia* displayed growth on FRP at 10°C, but death at 4°C. Serum had a protective effect on *L. monocytogenes* on all surfaces, but did not affect survival of *Salmonella* or *Yersinia* on stainless steel, acetal resin, or FRP.

Since mortar surface is very different from the three surfaces described above, it was tested separately. The method to enumerate bacterial cells on the mortar surface involved applying sonication to remove bacterial cells and determining the cfu/coupon at 9 to 10 sampling periods over a total of 120 h. In general, the mortar surface had a significant inhibitory effect against all the bacteria tested compared to the three surfaces described above because of alkaline pH (increased to pH 11 within 6 h) when submerged in BPB. *Listeria* and *Salmonella* survived better on mortar than *Yersinia* throughout the 120-h incubation period, partially due to the alkaline resistance of *L. monocytogenes* and *Salmonella* spp. Serum had a protective effect on the survival of all three organisms. Differences in temperature did not affect the survival of *Salmonella* or *Yersinia*, whereas populations of *L. monocytogenes* declined more rapidly at 10°C than at 4°C after 24 h.