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Enrichment Procedures for Isolating Salmonellae from Raw Meat and Poultry

BERENICE M. THOMASON* AND DAVID J. DODD
Center for Disease Control, Public Health Service, U.S. Department of Health, Education, and Welfare, Atlanta, Georgia 30333

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The combined use of direct enrichment in tetrathionate broth containing brilliant green dye and preenrichment in buffered peptone-water followed by enrichment in tetrathionate broth yielded the maximal recovery of salmonellae from raw meat and poultry samples.

Preenrichment of raw meat samples for isolating salmonellae has been advocated by a number of investigators. Gabis and Silliker (4) recommended using lactose broth (LAC) in the culture of raw meats and poultry. Edel and Kampelmacher (2) reported increased recovery of salmonellae when they preenriched frozen meat samples with 1% buffered peptone-water (PEP).

Thomason and Dodd (5) found no advantage in preenriching raw chicken livers and pork sausage when they compared results obtained by using LAC preenrichment and direct enrichment in selective media. Their conclusions were supported by Cox et al. (1), who found that direct enrichment of unfrozen broiler carcasses in selenite-cystine broth (Difco Laboratories, Detroit, Mich.) was as effective as preenrichment with LAC. In a study that compared the effects of using PEP and LAC broth as preenrichment media for isolating salmonellae from environmental samples, Thomason et al. (6) found that PEP increased recovery by approximately 25%, whereas LAC decreased the recovery of salmonellae. In view of these findings, we decided to compare results obtained when LAC and PEP were used as preenrichments for raw meat samples with results obtained from culture of the specimens placed directly into selective media.

Samples of fresh chicken livers and pork sausage were purchased from various supermarkets. Samples of fresh-frozen hamburger meat purchased in Puerto Rico for other laboratory investigations also were examined.

The samples were mixed thoroughly by blending, and 25-g portions were placed in 225 ml of tetrathionate broth containing a 1:100,000 concentration of brilliant green dye (TET), 1% PEP (peptone, 10 g; sodium chloride, 5 g; sodium phosphate (Na_2HPO_4), anhydrous, 3.57 g; potassium phosphate (KH_2PO_4), 1.5 g; distilled water, 1,000 ml, pH 7.2), and LAC. All media used were obtained from Difco. Tergitol 7 (sodium heptadecyl sulfate; Union Carbide Corp., Chicago, Ill.) was added to the pork sausage samples to a concentration of 1% (vol/vol). The preenrichment broths were incubated for 24 h at 35°C. After 24 h, 1-ml amounts of the LAC and PEP cultures were transferred to 10 ml of TET broth and incubated for 48 h at 42°C.

All enrichment cultures were streaked onto brilliant green agar for isolating salmonellae. After 24 h of incubation at 35°C, suspect colonies were confirmed by biochemical and serological procedures (3). The results are shown in Table 1.

A total of 208 samples were examined. Twenty-four samples were positive by culture for salmonellae from all three enrichment media. Three samples were positive from both TET and LAC-TET and negative from PEP-TET. Nine of the samples that were positive after direct enrichment in TET were negative when either of the preenrichment broths was used. Four samples that were negative in both TET and LAC-TET were positive in PEP-TET. No samples were positive in LAC-TET that were not also positive in TET. Salmonellae were isolated from 40 of 208 samples examined. Direct enrichment in TET yielded 36 positive samples. LAC-TET and PEP-TET cultures yielded 27 and 28 positive samples, respectively.

When we previously used LAC and PEP preenrichments for environmental samples (6), PEP yielded 25% better recovery of samonellae than did either LAC-TET or direct enrichment in TET. In the study being reported on here, however, we obtained a 20% better recovery of salmonellae from raw meat samples placed directly into TET. This difference could result from the presence of "sublethally injured" salmonellae in the environmental samples which

TABLE 1. *Detection of salmonellae in 208 samples of raw meat and poultry, using various enrichment procedures*

No. of samples	Culture results in various media[a]		
	TET	LAC-TET	PEP-TET
24	24	24	24
3	3	3	–
9	9	–	–
4	–	–	4
168	–	–	–

[a] Numerals denote the number of positive results; – denotes negative results.

may have required a preenrichment period for metabolic repair before enrichment in a selective medium (2).

Our studies indicate that a combination of direct enrichment in TET and preenrichment in PEP followed by enrichment in TET yields the maximal recovery of salmonellae from raw meat and poultry samples.

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