Table 7. Objective texture evaluation[z] of reprocessed[y] tomato flavored yogurt made from fortified milk systems.

	Control	Soybean	Peanut
Normal process	307.9a	363.7b	273.8c
Reprocessed	109.7d	289.9e	202.4f

[z]Work (gm cm) required to penetrate to a depth of 6 cm with a 10 mm probe on Instron.
[y]Fortified with cream to 7.0% fat, heated at 70°C for 10 min. and rehomogenized.
Means followed by the same letter are not different ($P<0.05$).

panels more accurately reflect the general consuming population than do selected trained sensory panels.

The data suggest that a heat processed tomato yogurt salad base may be a potential means of expanding utilization of oilseed proteins, especially soy protein. Considerable improvement and modification of peanut protein technology may be necessary before optimum acceptance of this protein in yogurt systems will be possible.

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EFFECT OF DUMP-TANK WATER TEMPERATURE ON THE INCIDENCE OF BACTERIAL SOFT ROT OF TOMATOES

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Additional index words. Erwinia carotovora, energy.

Abstract. **The incidence of bacterial soft rot in tomatoes was higher after immersion in contaminated dump-tank water at 90°F (32.2°C) than after immersion in contaminated water at 60°F (15.6°C). As the concentration of bacteria** (Erwinia carotovora **Jones) increased in the water, the incidence of subsequent decay of immersed tomatoes increased accordingly. Heating dump-tank and wash waters to 90°F not only wastes energy, but also increases the decay of tomatoes during their subsequent ripening and marketing.**

In Florida, mature-green tomatoes are transported from the field to the packinghouse in pallet bins and then dumped into large tanks of water that cushion their fall. The water in the dump-tank and the water used in the subsequent washing operation, if not properly treated to reduce bacterial contamination, can contaminate the tomatoes (1, 2, 3). Chlorine has been shown to be effective in reducing the incidence of bacterial soft rot in tomatoes when added to dump-tank and spray-washer waters in the recommended amounts (1, 2, 3).

Packinghouse operators maintain water at about 90°F (32.2°C) in both dump-tanks and spray-washers. This practice aims to increase washing efficiency and to prevent the cracking of skin caused by the water being at a temp lower than that of the tomatoes (4).

In one typical packinghouse, the spray-wash water, which is not recirculated, is heated by a gas hot-water heater rated at 5.0×10^5 Btu (1.265×10^5 kg-cal). Water temp in the dump-tank is maintained by a gas burner rated at 1.5×10^6 Btu (3.795×10^5 kg-cal). The heated exhaust gases pass through a 10-inch (25.4-cm) pipe submerged in the dump-tank that acts as a heat exchanger. When operating at full capacity, the 2 heaters use 20.5 gal (77.5 liters) of liquified petroleum gas per hr at a cost of about $9.25.

This study compares the rates of decay of tomatoes exposed to dump-tank water at 2 temps and 5 levels of bacterial contamination.

Materials and Methods

Mature-green 'Walter' tomatoes were obtained from 2 packinghouses in Ft. Pierce, 1 in Ruskin, and 2 in Immokalee. The tomatoes were collected from pallet bins as they came from the field (before they received any packinghouse treatment) and were brought to the U.S. Horticultural Research Laboratory in Orlando for postharvest treatment. The fruit from each packinghouse were graded to eliminate culls, randomly divided into 10 lots of 50 fruit each, held overnight at 70°F (21°C), and then treated as shown in Table 1.

Water temps were 90°F (32.2°C) or 60°F (15.6°C) in the laboratory dump-tank containing 75 gal (284 liters) of tapwater. Contamination was simulated by adding a suspension of *Erwinia carotovora* Jones, the cause of bacterial soft rot, at a concn of 1×10^8 cells/ml. The suspension was added in progressive increments to produce the 5 concns shown in Table 1. One lot of tomatoes from each packinghouse was exposed to each of the 10 treatments. Each lot

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was held in the dump-tank for 5 min; then the tomatoes were spray-washed and waxed with a petroleum-based commercial tomato wax. Tomatoes were exposed to 500 ppm ethylene for 3 days to promote color development and held at 70°F (21°C) for 3 weeks to simulate ripening and marketing.

Table 1. Average incidence of bacterial soft rot in tomatoes after 3 weeks at 70°F (21°C) as influenced by the temperature and bacterial contamination of water in the dump-tank (average from 5 packinghouses).

Bacterial concn (cells/ml)	Incidence of decay[z] 60°F (15.6°C) (%)	90°F (32.2°C) (%)
0.0	3.6	2.8
3.5 x 10^2	8.0	13.2
7.0 x 10^2	14.4	20.0
1.4 x 10^3	20.4	21.6
2.8 x 10^3	16.4	27.2

[z]Decay incidences at different water temperatures and bacterial concns were significant at the 5% and 1% levels, respectively.

Twice a week, the tomatoes were inspected and the decayed fruit removed to prevent secondary infection. Data were recorded as percentage of fruit decayed during the holding period.

Results and Discussion

The incidence of bacterial soft rot in tomatoes exposed to contaminated water was higher than in controls, which were exposed to uncontaminated tapwater only (Table 1). The level of contamination also influenced the incidence of soft rot, ranging from 13.2% when tomatoes were exposed to 90°F (32.2°C) water contaminated with 3.5 x 10^2 cells/ml to 27.2% when the bacterial suspension was 8 times as high.

Maintaining the dump-tank water at 90°F (32.2°C) did not prevent the development of bacterial soft rot. In fact, at all levels of water contamination, incidence of soft rot was greater at 90°F than at 60°F (Table 1). Also, examination of tomatoes exposed to 60°F (15.6°C) water revealed no skin cracks or other detrimental effects after the 3-week holding period.

These data show that heating the dump-tank water above the temp of the tomatoes does not help prevent decay and may actually be detrimental if the water is not otherwise treated to reduce bacterial contamination. This unnecessary heating also increases the cost of operation.

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EFFECT OF REFRIGERATED TEMPERATURES ON THE INCIDENCE OF CHILLING INJURY AND RIPENING QUALITY OF MANGO FRUIT

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Abstract. Kent **mango fruits harvested at physiological maturity were stored at 8, 10 and 13°C and 85-90% RH for 10, 16 and 22 days and subsequently transferred to ripening at 25°C and 85-90% RH. Physiological loss in weight was less in fruits stored at lower temp and higher in those stored at higher temp. Respiratory trend of refrigerated fruits showed an extended preclimacteric trough lasting throughout the storage period until they were transferred to conditions for ripening. Chilling injury of fruits occurred in all temp tested regardless of the length of storage, the manifestation of the injury being more severe when transferred to ripening conditions. Refrigerated storage prior to ripening reduced the rate of ripening followed by inhibited formation of sugars, carotenoids and flavor as corroborated by chemical analysis and organoleptic evaluation. It was concluded that temp below 13°C were critical in the development of chilling injury in** Kent **mango fruit.**

One of the methods commonly used to extend the storage life of fresh fruits and vegetables is to employ refrigeration which retards the metabolic processes controlling the post harvest changes in respiration and ripening. In the case of mango however, there is a controversy regarding the benefits of refrigeration in extending the storage life. Mango is a highly perishable tropical fruit and use of refrigeration to extend its short storage life presents serious problems. Movement of fruits to distant markets is therefore achieved by costly air transport.

Cool storage of mangos has been the subject of study all over the world since the turn of the century. Several workers have reported the advantages or disadvantages of refrigeration in extending the storage life of mangos (2, 8, 10, 16, 19, 23, 24) grown in India and other tropical countries. Unfortunately, the existing literature on the refrigerated storage of mango cultivars from Florida and Mexico is very scanty. The most serious disadvantage of refrigeration in extending the storage life of mangos is the incidence of chilling injury caused even at the so-called optimum temp (7, 17). Symptoms of chilling injury