

## Food Safety and Fresh-cut Cantaloupe

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Fresh-cut fruit and vegetable products have become a high-demand item in the retail and food service industries due to their convenience and quality. Initial studies on fresh-cut products focused on physiological responses to cutting operations and maintenance of quality throughout storage. Quality of these products has been improved using modified atmosphere packaging or postharvest treatments such as calcium chloride to prevent softening or ascorbic acid to prevent browning.

As long as raw agricultural commodities are grown outdoors, the occasional surface contamination of fruits and vegetables with human pathogens is unavoidable. However, the expectation for fresh-cut ready-to-eat fruits and vegetables is that the risk has been reduced to an acceptable level (usually a level at which food-borne illness will not occur) placing the responsibility for safety on the processor.

### Outbreaks associated with cantaloupe

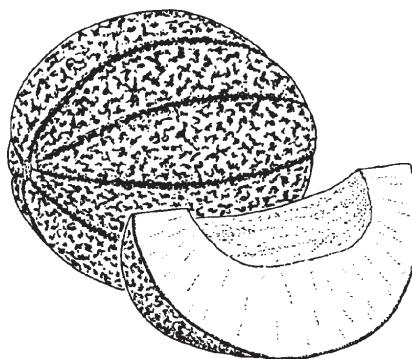
Several foodborne outbreaks have been associated with the consumption of cantaloupe and other melons. Two large multistate outbreaks in 1990 and 1991 were due to *Salmonella*-contaminated rinds. Microorganisms can be transferred from the contaminated rind to the interior flesh during cutting. Fully mature cantaloupes (and other melons) have a pH of between 6 and 7 and serve as excellent substrates for the growth of bacteria especially at warmer temperatures (Golden et al., 1993; Del Rosario, 1995). Other outbreaks involving *Salmonella*, *Campylobacter* and *E. coli* O157:H7 were related to cross-contamination (raw meat) during preparation in restaurant kitchens.

### Postharvest treatments and microbial stability

Controlled atmosphere (CA) storage has proven successful in extending the shelf-life of many fruits and vegetables. Respiration and ethylene production in cantaloupe was inhibited using CA storage thereby slowing deteriorative changes and senescence (O'Connor-Shaw et al., 1996).

Of 40 storage atmospheres assayed, cantaloupe dice stored best under 6% CO<sub>2</sub> and 6% O<sub>2</sub>; 9.5% CO<sub>2</sub> and 3.5% O<sub>2</sub>; and 15% CO<sub>2</sub> and 6% O<sub>2</sub> at 40°F (4.5°C) for

up to 28 days based on sensory characteristics and microbial analysis. Cantwell and co-workers were able to control visual decay and microbial development on fresh-cut cantaloupes by storing under at least 5% CO<sub>2</sub> at 41°F (5°C) (Cantwell, personal communication). Calcium chloride or calcium lactate dips (2.5%, 1 min) either alone or in combination with heat treatments maintained or improved firmness throughout storage at 41°F (5°C) but had a variable effect on microbial population (Luna-Guzmán and Barrett, unpublished data). The effect of CA storage, calcium dips, or heat treatments on the survival or growth of pathogens is unknown. In addition to the use of specialized packaging (CA or edible films), alternative technologies to eliminate contaminants or to inhibit pathogen growth are being evaluated. These range from simple application of lemon juice to retard the growth of pathogens or ultraviolet radiation or ultra-high pressure pasteurization as more sophisticated means of eliminating contaminants.



### Regulations

The 1997 FDA Model Food Code (for food service establishments) recognizes cut melon as a potentially hazardous food, that is one capable of supporting the growth of pathogenic microorganisms. As such, recommendations include

obtaining cut melons from regulated food sources and ensuring receipt at 45°F (7°C) or below. Guidelines for in-house melon preparation include cleaning the surface thoroughly using potable water, preparation using clean and sanitized utensils and surfaces, maintenance of cut fruits at or below 45°F (7°C), and limited display or service to 4 h if above this temperature (Tamplin, 1997).

The International Fresh-cut Product Association (IFPA) recently proposed a model HACCP plan for fresh-cut produce (Beuchat, 1996). For fresh-cut cantaloupe and other melons, HACCP principles should be applied from harvest to retail. Sanitation, personal hygiene, and tight temperature control will go a long way to ensuring the safety of these products.

**References:**

- Beuchat, L.R. 1996. Pathogenic microorganisms associated with fresh produce. *J. Food Prot.* 59:204-216.
- Del Rosario, B.B.L. 1995. Survival and growth of enterohemorrhagic *Escherichia coli* O157:H7 in cantaloupe and watermelon. *J. Food Prot.* 58:105-107.
- Golden, D.A., E.J. Rhodehamel, and D.A. Kautter. 1993. Growth of *Salmonella* spp. in cantaloupe, watermelon, and honeydew melons. *J. Food Prot.* 56:194-196.
- O'Connor-Shaw, R. E. R. Roberts, A.L. Ford, and S.M. Nottingham. 1996. Changes in sensory quality of sterile cantaloupe dice stored in controlled atmospheres. *J. Food Sci.* 61:847-851.
- Tamplin, M. 1997. *Salmonella* and cantaloupes. *Dairy, Food Environ. San.* 17:284-486.
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