

Food Safety of Low-Acid Pressure Canning in Electric Programmable Pressure Cookers

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Background

The current popularity of electric programmable pressure cookers (EPPCs) has raised concerns regarding the safety of low acid pressure canning in EPPCs, particularly at altitudes above 2,000 feet. Underprocessed low acid canned foods are at risk to develop deadly botulism toxins.

Regardless of USDA and manufacturers warnings, blogs show the public is increasingly using these appliances for small batch, low acid food canning.

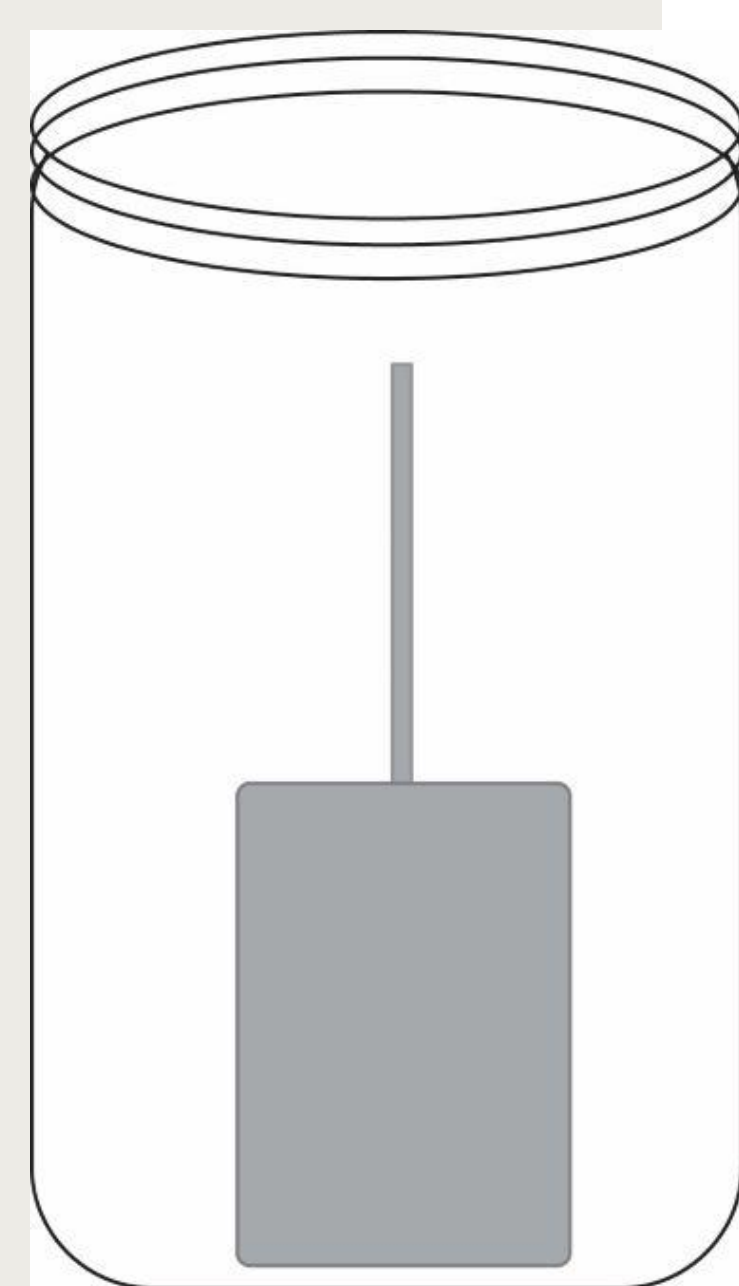
Three popular brands of EPPCs were chosen for this study, two because they are marketed for canning capabilities and have instructions recommending use of USDA canning time to process foods. The third was chosen because of its overwhelming popularity as a kitchen appliance.

The objective of this study was to determine:

1. If temperatures in these EPPCs reached the commercial standard of 121.1° C deemed necessary to destroy botulism toxin spores.
2. If altitude affected the maximum temperatures reached within the canning jars in the EPPCs.

Materials and Methods

- Three brands of EPPCs utilized: the Carey Smart Canner and Cooker, the Duo80 Instant Pot, and the Power Pressure Cooker XL
- EPPCs were tested at three elevations: Monticello, 7,070 feet; Provo, 4,500 feet; and St. George, 2,917 feet
- Temperature patterns were recorded using a Hi Temp 140 data logger enclosed in canning jars with low acid food product.
- Three complete replicates (EPPC x food type x altitude) were performed (n = 81). Main effects and interactions were evaluated using Analysis of Variance at the $\alpha = 0.05$ significance level.



Impact

Two of the three cookers (the Instant Pot and Power Pressure Cooker XL) tested did not reach an adequate temperature to kill botulism spores in low acid canning. One cooker (the Carey Smart Canner) reached 121.1° C in most conditions, but it was dependent on altitude and the type of food.

Further research is needed before the Carey can be recommended for low acid canning, including microbial challenge studies to determine whether the time at 121.1° C is adequate to destroy spores in different food types.

Altitude plays a significant role in maximum temperatures in all brands tested.

Regardless of manufacturer advertising, EPPC's should not be used for low acid canning.

WARNING



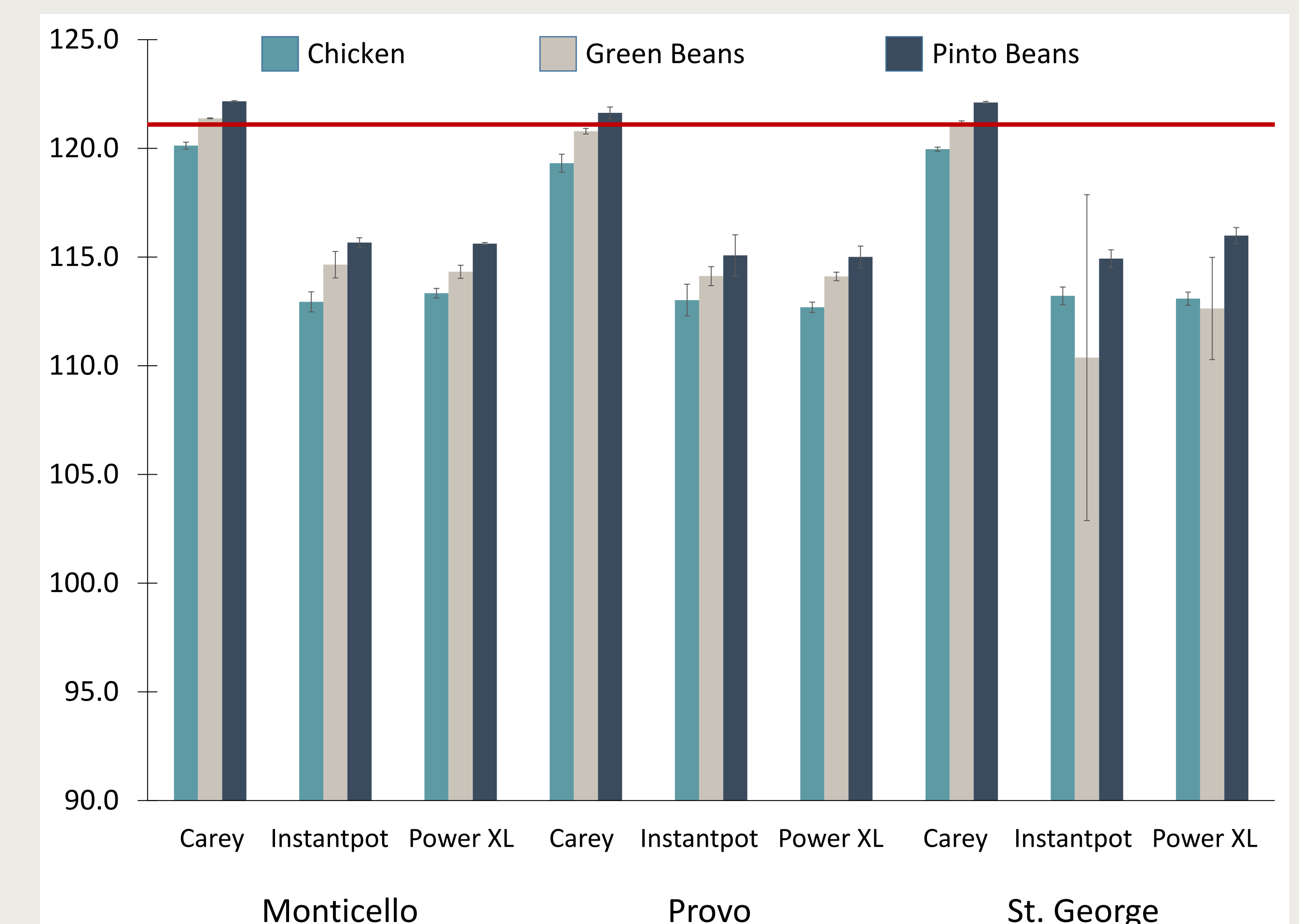
Based on the results of this study, we **CANNOT** recommend any of the three EPPCs tested for pressure canning at Utah altitudes. To do so is to risk botulism poisoning in the home canned product.

A presentation on this research has been submitted to a national Extension convention. Fact sheets and journal articles based on this research are being written to educate the public on these findings.

We urge Extension faculty to express this warning to their constituencies in the strongest terms possible.

Results

Altitude made a significant ($p < .0001$) difference in maximum temperature reached in EPPCs tested. Two of the three tested EPPCs never reached required maximum temperature for safe low acid canning (121.1° C). The Carey reached significantly higher maximum temperatures ($p < .0001$) than the Instant Pot or the Power Pressure XL.



References

- Etzel, M. R., Willmore, P., & Ingham, B. H. (2015). Heat penetration and thermocouple location in home canning. *Food Science & Nutrition*, 3(1), 25–31. <http://doi.org/10.1002/fsn3.185>
- Haws, S., Hunsaker, T., Proctor, D., Serfustini, E., & Allen, K. (2015, July). *Brand comparison for electric programmable pressure cookers.* (USU Extension Fact Sheet FN/FoodPreparation/2015-01pr). Retrieved from https://digitalcommons.usu.edu/extension_curall/766/
- National Center for Home Food Preservation. (2015, September). *"Burning issue: Canning in pressure cookers."* (2015, September). Retrieved from <http://nchfp.uga.edu/publications/nchfp/factsheets/pressurecookers.html>
- National Center for Home Food Preservation. (2014, November 25). *"Can I can in a multi-cooker?"* Retrieved from <https://preservingfoodathome.com/2014/11/25/can-i-can-in-a-multi-cooker/>