



HOSPITALITY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

670 Transfer Road • Suite 21A • Saint Paul, Minnesota 55114 • USA • TEL: (612) 646-7077 • FAX: (612) 646-5984
e-mail: osnyder@hi-tm.com • web site: <http://www.hi-tm.com>

COOKED BACON HACCP STUDY

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O. Peter Snyder, Jr., Ph.D.

Introduction

In foodservice operations such as restaurants that sell salads with bacon, bacon sandwiches, and breakfast all day, it is common to parcook the bacon. The question is: Is this partially cooked bacon safe? The FDA in 1984 (FDA CSFAN, 1984) said that crisp, fully cooked bacon was safe – but what is "crisp, fully cooked," and does the bacon have to be fully cooked?

Applying HACCP, the hazard would be the *Staphylococcus aureus* from the cook's fingers touching the precooked bacon as it sat in the kitchen. The contamination from the cook's fingers would be low, perhaps 10 *S. aureus*, and would have to multiply to 1,000,000 per gram to produce enough toxin to cause illness. This would be about 16 generations of growth after the 10 bacteria had come out of lag. This will take many hours, depending on temperature, even on ideal growth media.

Methods

Hormel bacon was used in this study (Fig. 1).



Fig. 1. Hormel raw and Hormel precooked bacon



Fig. 2. Hormel Precooked bacon, a_w 0.71

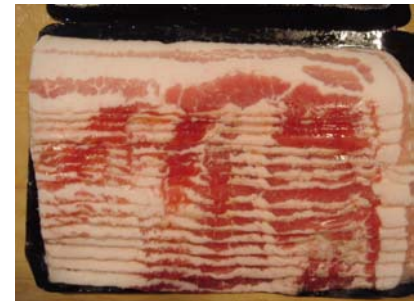


Fig. 3. Hormel raw bacon, a_w 0.92

To have an example of a safe bacon, Hormel manufactures a fully cooked, shelf-stable bacon. It is pre-cooked in the process plant to have a water activity at or below 0.85 to control *S. aureus* (Brown, 2005). The cook yield is 40% of raw weight. Fig. 2 shows the bacon. The water activity

was measured with an Aqualab Series 3 water activity meter (Decagon Devices, Pullman, WA) and was 0.71. Hormel Black Label raw bacon (Fig. 3) was used for the cooking study and had a water activity of 0.92. The raw bacon was cooked in the electric broiler of a home stove to determine what the appearance and water activity would be at various stages of doneness.

Results

Figures 4, 5, and 6, and Table 1 show the results.



Fig. 4. Bacon broiled 3 minutes, a_w 0.89



Fig. 5. Bacon broiled 4 minutes 45 seconds, a_w 0.76



Fig. 6. Bacon broiled 7 minutes 15 seconds, a_w 0.64

Table 1. Bacon Cooking Results

Sample	Cook Time	Water Activity
1	3 minutes	0.89
2	4 minutes 45 seconds	0.76
3	7 minutes 15 seconds	0.64

Sample 1, the 3-minute cooked bacon (Fig. 4), looked undercooked and raw, but had a water activity of 0.89, almost safe. The Sample 2 bacon cook, 4 minutes 45 seconds, was normal parcooked, slightly undercooked and limp bacon. It had a very safe water activity of 0.76. Sample 3, with a cook of 7 minutes 15 seconds, was crisp bacon, what customers normally expect to be served with their breakfast or in a sandwich in a restaurant. It had a very safe water activity of 0.64.

Discussion and Summary

This study shows that normal parcooked bacon (Sample 2) would be safe for holding at kitchen temperature to be finished, cooked for service later. It is not a potentially hazardous food, having a water activity of 0.85 or less. Even for severely undercooked bacon (Sample 1), the water activity was much less than optimal and, if used within 17 hours after cooking, the equivalent time-temperature at 70°F to 41°F and 7 days (Snyder, 1998), there would be no significant risk.

Conclusion

Normal precooked bacon that would need further cooking to be served (Sample 2) has a very safe water activity of 0.76, which is well below the critical limit of 0.85. Even if the bacon were severely undercooked (Sample 1), if used the day it was cooked, before the close of a restaurant (i.e., less than 17 hours), it would be safe. These results indicate that there is no significant risk in parcooking bacon in a retail food operation, to be finished cooked to a customer order.

References:

- Brown, D. 2005 (June). Hormel. Personal communication with author.
- FDA CFSAN. 1984. Definitions – Potentially Hazard Food – Cooked Bacon. Retail Food Protection Program Information Manual #1-102(q). Washington, D.C.
- Snyder, O.P. 1998. Updated guidelines for use of time and temperature specifications for holding and storing food in retail food operations. Dairy Food Environ. Sanit. 18(9):574-579.