

PEKING DUCK HACCP

Person Responsible: _____

Process Authority: O. Peter Snyder, Jr., Ph.D.

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Product specification: That the duck, after skin-drying in the oven for 12 hours at a kitchen temperature of 74°F and a duck skin temperature of 66°F, and fried to >160°F, put on the buffet line, and kept at >140°F, will have a tolerable level of pathogenic microorganisms and toxins.

Assumptions: The raw duck will have moderate levels of *Salmonella*, perhaps 10 per gram, with a D-value and z value at 140°F 1.73 minutes and 10°F respectively. *Campylobacter* will be at higher levels, but is very easy to kill. *Clostridium perfringens* may be at 100 CFU per gram and will survive cooking to grow out. However, it does not multiply below 59°F or above 125°F. The duck, after cooking, will be safe if cooled in 15 hours, which is the case with loose pieces of duck in a pan. [Juneja, V.K., Snyder, O.P., and Cygnarowicz-Provost, M. 1994. Influence of cooling rate on outgrowth of *Clostridium perfringens* spores in cooked ground beef. J. Food Prot. 57(12):1063-1067; USDA FSIS. 2001. Draft compliance guidelines for ready-to-eat meat and poultry products. <http://www.fsis.usda.gov/OPPDE/rdad/FRPubs/97-013P/RTEGuide.pdf>.]

Process Step, Procedure, and Control	Hazard and Control Analysis: a. hazard identification, expected level / size, tolerable limit; b. control effectiveness; c. monitoring procedure / frequency and person, data recording; d. verification-who, when, how
<p>1. Raw duck, frozen Thaw in refrigerator (24 hr.) or in running water (1 hr.)</p> <p>Ti 0°F To <40°F t 1 or 24 hr.</p> <p style="text-align: center;">↓</p>	<p>There might be less than 1 generation of <i>Listeria monocytogenes</i> or <i>Yersinia enterocolitica</i>, but this is a tolerable increase and will be killed during cooking.</p>
<p>2. Stuff with spices and marinade. CCP Put the ducks on the hangers used to hold the ducks in the oven</p> <p>Ti <40°F To <50°F t <1 hr.</p> <p style="text-align: center;">↓</p>	<p>They were stuffed at about 9:00 PM. Temperatures ranged from 57, 46, 56, 51, 29°F (soft ice). This was measured about 1 to 2 inches down with an Atkins 33040 thermocouple. There was a total of 12 ducks. APC was done on one duck, and it was about 28,000 CFU / gram.</p>
<p>3. Blanch in boiling liquid of water, honey, duck sauce, cornstarch, and red color.</p> <p>Ti <50°F To ~60°F t 3 min.</p> <p style="text-align: center;">↓</p>	<p>The sauce, about 3 gallons, was made in the wok. It contained about 2T red tomato (yellow #6 & red #40), 3 T honey, 2 T yellow #5 & 6A. Cornstarch slurry was added, and the liquid in the wok was brought to a boil and thickened. The ducks were blanched for 3 minutes, one at a time. A duck was put into the hot liquid, which was spooned over the top. Three ducks were measured. After blanch, temperatures were: #1 duck: 66, 75, 71, 55°F; surface ~110 to 118°F #2 duck: 52, 64, 76, 72°F; surface ~115°F #3 duck: 51, 70, 56°F; surface ~131°F (Inside temperatures were measured about 1 inch down.) After blanching, the APC count was about 3,200 CFU / gram</p>
<p>4. Hang in smoking oven 12 hr. to let skin crisp. Hung ~9:45 PM. Temperature of kitchen ~74°F.</p> <p>Ti 66°F To 66°F t 12 hr.</p> <p style="text-align: center;">↓</p>	<p>Fig. 1 shows the ducks hanging in the smoking oven. At about 10:00 AM the next morning, the temperature of the ducks was 66°F (evaporative cooling kept them a littler cooler than kitchen all night). The APC was about 90,000 CFU / gram. This is about 5 multiplications of bacteria in 12 hours. If we look at extrapolated FDA growth data (7 days at 41°F, 4 hours at 110°F), at 70°F, we would expect a generation time of 1.7 hours. Using HITM growth prediction over 30 to 125°F, one would predict 7 generations--very close agreement. [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.]</p>
<p>5. CCP Cook duck to >165°F in steam / smoking oven at 350°F ~1 hr. 30 min. It actually steamed.</p> <p>Ti 68°F To >165°F t 1 hr. 30 min.</p>	<p>Started cooking at 10:30 AM. Duck temperature ~68°F. The oven thermostat was set at 350°F, but the actual temperature was less, because the burner boiled a pan of water in the bottom of the oven, creating steam. 10:45: Duck thigh 90-110°F 11:00: Duck center 77-80°F; thigh 105-110°F 11:15: Duck center 110-115°F; thigh 135°F 11:30: Duck center 130-138°F; thigh 145-155°F 11:50: Duck center 161°F; thigh 160-165°F; 2nd row duck 175°F in the oven 12:00: All duck temperatures >165°F The microbiological count was about 30 CFU / gram on the cooked duck. These would be surviving spore formers.</p>

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6. Cut in half. Dressing removed. Ti 160°F To 140°F t 20 min.	This time is too short to be a problem.
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7. CCP Pan <3" deep, cover cool in walk-in. Ti 140°F To <40°F t 6 hr. (140 to 70°F 2 hr. 70 to <40°F 4 hr.)	The density is low, and the duck will cool safely. The microbiology of the finished duck (next step) shows that cooling is safe. [Juneja, <i>et al.</i> , 1994]
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8. Hold <2 days, <41°F. Temperature of walk-in will fluctuate. Ti <40°F To <40°F t 2 days	I did a count on this. Even with the walk-in fluctuating from 33°F at night to 55°F in the middle of the day, the count was 3,300 CFU / gram after more than 2 days--very safe.
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9. Deep fry, 350°F. Serve >150°F. Ti <50°F To >150°F t 4 min.	This would again reduce any microorganisms to essentially zero. There is no chance for toxin production in this process. The overall conclusion is that New Buffet Peking Duck is absolutely safe, with very great tolerance for possible human deviations in process operation.

Regulatory Authority

Date



Fig. 1. Ducks in Smoking Oven