MANAGING THE HAZARDS IN A FOOD OPERATION TO CONTROL THE RISKS THAT COULD CAUSE A CUSTOMER FOODBORNE OUTBREAK

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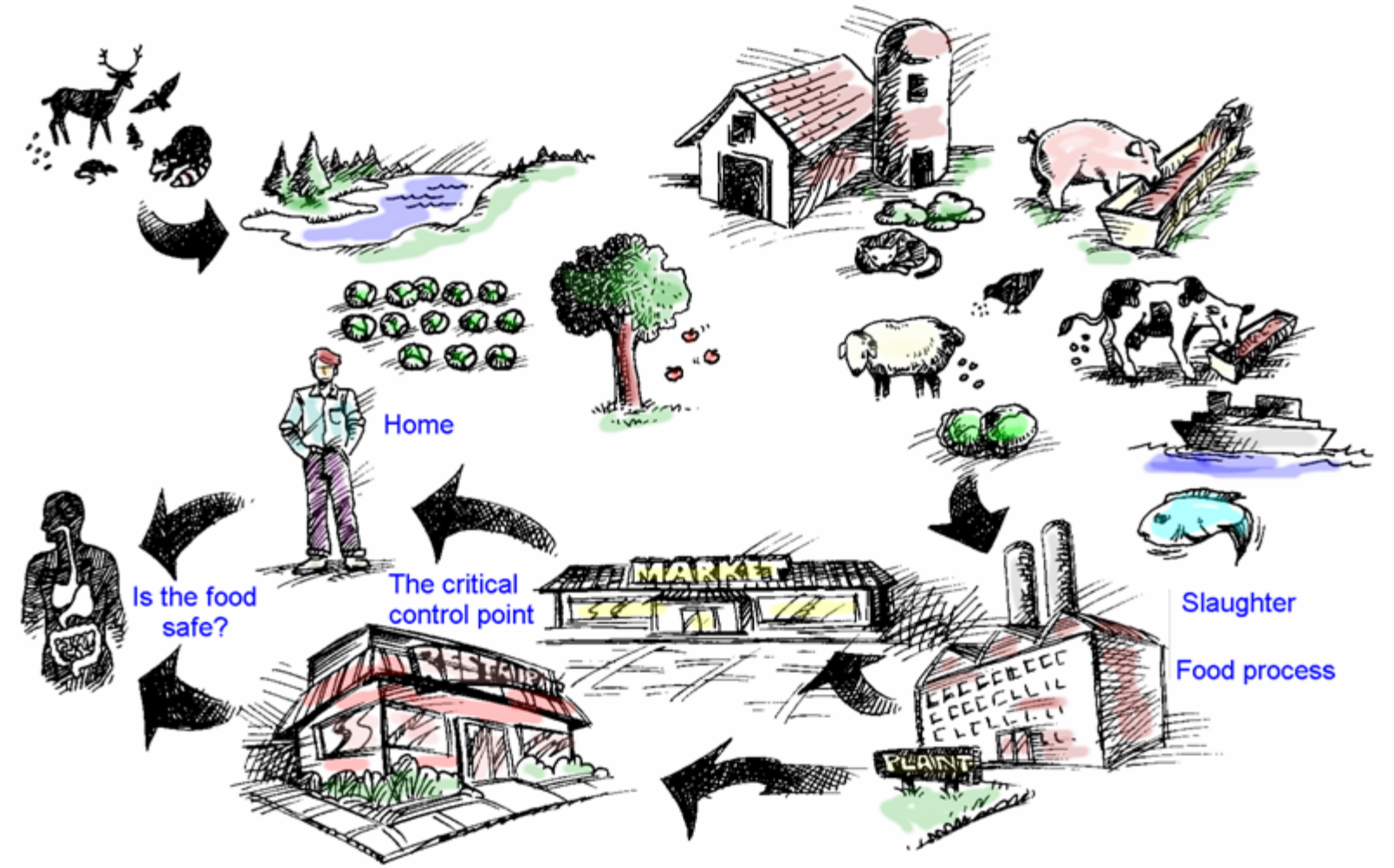
THE RAW FOOD CONTAMINATION PROBLEM



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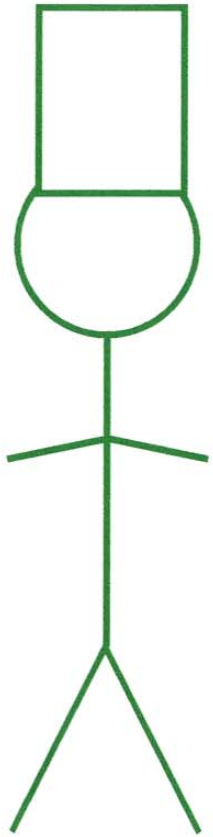
FOOD PREPARERS DO RISK MANAGEMENT AND REDUCE THE HAZARD TO AN APPROPRIATE LEVEL OF PROTECTION (ALOP)



- Food preparers know the expected hazards in their kitchens; the amount / size and tolerable limits and decide if control is necessary.
- Food preparers know how to validate processes and prove that the controls prevent, eliminate, or reduce the hazards to a tolerable level.

Hazard Analysis	Risk Analysis	Control Analysis	Risk Management
What is the probability of illness?	Assuming no control – the cost per year.	What it will cost to control the risk.	Decide if control is necessary for an ALOP.

Food preparers make the food safe through control of the processes, monitoring, and corrective action.

- Purchasing
- Prevention of cross-contamination
- Fingertip washing
- Fruit and vegetable washing
- Pasteurizing food
- Hot holding
- Fermentation, acid, a_w, Rh, Eh
- Cooling, cold holding

pictures:chef-foodpreparers-make-food-safre#2

STAGES OF FOOD OPERATION SELF-CONTROL

COOK PREPARING FOOD AT HOME (about 40% of outbreaks)

No government inspection. Control is by luck and experience.

- Will never take a class to learn control of the hazards.
- Will use controls taught by parents and what they believe from their experiences to be safe.
- Government outreach education will be general.

LICENSED KITCHEN (one to two inspections a year)

- Government code / rules are mostly cleanliness and construction of the facility. Controls are based on regulatory judgment, not scientifically correct validation studies. Inspector is not required to check processes or adequacy of control of processes by employees. Manager does not know the code.
- Manager has no training in food process hazard identification and control.
- Manager keeps no records such as food time and temperature; does no training.

ACTIVE MANAGER CONTROL

- Food code the same as for the licensed kitchen; not based on science.
- Manager is trained to know the code and cleanliness standards and food critical limits. Manager trains employees. Manager inspects.
- Manager keeps records if CCP such as number of ill employees and food storage temperatures. Inspector checks records and employee capability.

STAGES OF FOOD OPERATION SELF-CONTROL (cont'd)

HACCP PROCESS CONTROL AND INNOVATION

Not based on regulatory controls. Managers determine hazards and risks, and set controls and critical limits (CL) based on science. Managers / cooks can innovate any process that they can validate as meeting a Food Safety Objective (FSO) / Appropriate Level Of Protection (ALOP). Government approves the Food Safety Management Plan and food HACCP plans.

- Cooks learn the hazards and how to test / monitor to validate that their Critical Control Point (CCP) procedure is capable of adequate control.
- They write the food safety management plans to control the significant hazards that could be in the food served to customers.
- They write controls for all prerequisite processes and all food HACCP processes.
- The cook looks at each meal as it leaves the kitchen and checks that all hazards were controlled.

HAZARDS IN THE FOOD SYSTEM

In terms of HACCP, for each hazard, you must know the risk, severity x frequency.

1. Proof that it is a hazard (ill people).
2. Level at which normally healthy people get ill.
   (Sensitive people need to tell the server for added control.)
3. Likelihood of a given level / size.
4. Likelihood that a person will become severely ill.

MICROBIOLOGICAL

Food pathogens

Bacteria (vegetative cells)

Spores (survive cooking)

Viruses

Parasites

Mold, fish, and shellfish toxins

PHYSICAL

Hard foreign objects

Functional hazards

CHEMICAL

Poisonous substances

Adverse food reactions
(food sensitivity)

FOOD HAZARDS (H_0) AND FOOD SAFETY OBJECTIVES (FSO)

Hazards	Raw Product Contamination (H_0)	Process Performance Criteria (ΣR)	Food Safety Objective (FSO)
MICROBIOLOGICAL			
INFECTIVE			
Vegetative pathogens - infection			
Salmonella spp.	10^3 cfu/g	10^{-5} cfu/g - reduce	10^{-2} cfu/g or 1cfu per 100 g
Shigella spp.	10^3 cfu/g	10^{-5} cfu/g - reduce	10^{-2} cfu/g or 1cfu per 100 g
Escherichia coli O157:H7	10^3 cfu/g	10^{-5} cfu/g - reduce	10^{-2} cfu/g or 1cfu per 100 g
Parasites			
Cryptosporidium parvum	1 cyst	prevent / reduce	undetectable
Toxoplasma gondii	1 cyst	prevent / reduce	undetectable
Trichinella spiralis	1-500 larvae	prevent / reduce	undetectable
Viruses			
Hepatitis A	>10 virus / g	prevent / reduce	undetectable
Norovirus	>100 virus / g	prevent / reduce	undetectable
TOXIN PRODUCING			
Staphylococcus aureus (exotoxin)	10^3 cfu/g	$<10^3$ cfu/g increase	$<10^6$ cfu/g (toxin dose: <1 microgram)
Clostridium botulinum (exotoxin)	10^0 spores / g	$<10^3$ cfu/g increase	$<10^3$ cfu/g (toxin dose: ≤2 nanograms)
Bacillus cereus (exotoxin, enterotoxin)	10^2 spores / g	$<10^3$ cfu/g increase	$<10^5$ cfu/g (toxin dose: unknown)
Clostridium perfringens (enterotoxin)	10^2 spores / g	$<10^3$ cfu/g increase	$<10^5$ cfu/g (toxin dose: unknown)
CHEMICAL			
Sulfites	Unk	none added	<10 ppm
Nitrates	Unk	<500 ppm added	<500 ppm
Nitrites	Unk	<200 ppm added	<200 ppm
Monosodium glutamate	Unk	≤0.5 g / serving	<3.0 g / meal
Aflatoxins (from mold)	<20 ppb	no increase	<20 ppb
Histamine (from fish, cheese)	<20 ppm	no increase	<20 ppm
PHYSICAL			
Hard foreign objects (broken tooth)	>1/16 inch diameter	prevent / remove	undetectable
Choking	>1/4 inch diameter	prevent / remove	undetectable

* cfu = colony forming units

00lh2&lh80: fd-haz-saf-obj (from Dennys jan05mtg;p47) rev 12/28/06 print 12/29/06

FDA CONTROL VS. HACCP PERFORMANCE CRITERIA

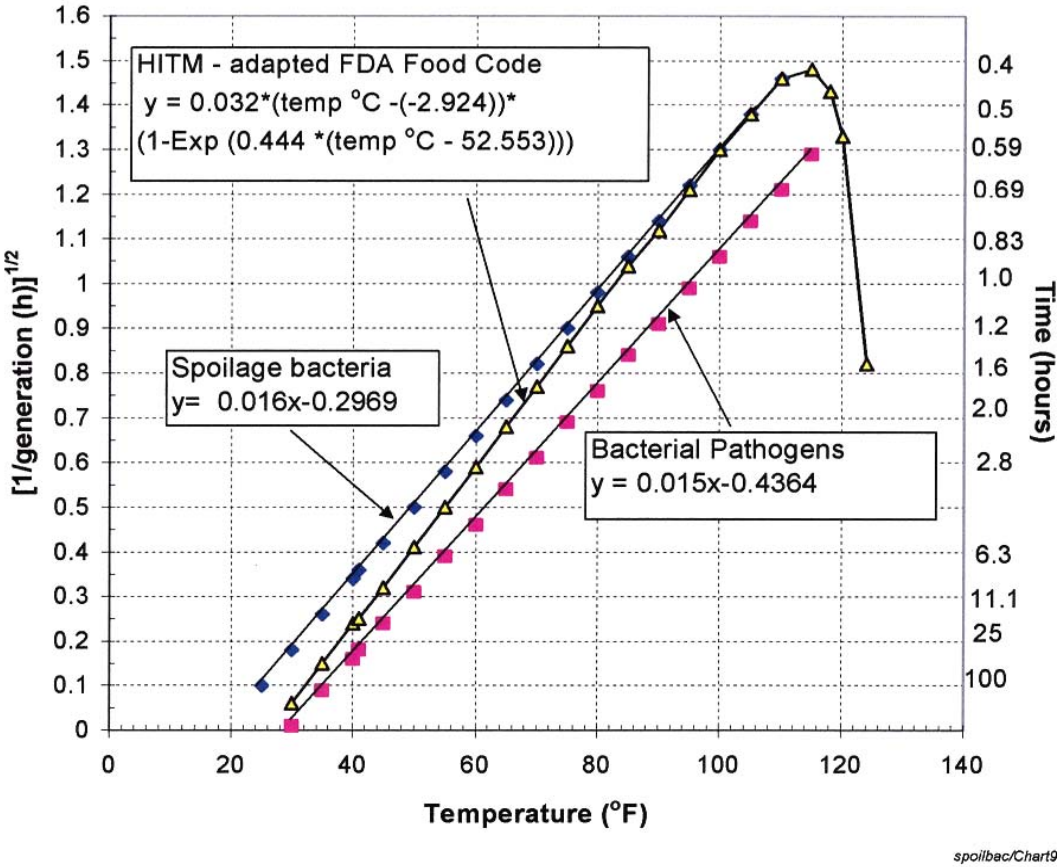
Process Step	FDA Control Measure	HACCP Performance Objective
Receiving, storage, pre-preparation	41ºF.	Not a CCP. Receive at any temperature. 5D cooking reduces vegetative pathogens on meat, poultry, and fish to a tolerable level. Growth of pathogens on raw vegetables not an identified significant hazards. If food is to be served without washing or pasteurization, the supplier assures safety.
Preparation		
Fruit and vegetable washing	Wash.	2D wash *E. coli* reduction; 5D surface blanch *E. coli* reduction.
Pasteurization		
Beef	130ºF, 112 min.	5D *Salmonella* (*E. coli*) reduction.
Eggs	135ºF, 27 min.	
Meat, fish, fruits, vegetables, bakery	140ºF, 9 min.; 145ºF, 3 min.; 150ºF, 1 min.; 155ºF, 15 sec.	
Poultry	165ºF, 15 sec.	7D *Salmonella* reduction
Hot hold, transport, serve, package	130ºF beef; 135ºF everything else.	<1-log increase *Clostridium perfringens*, which begins to multiply ~125ºF, and at 105ºF, multiply every 15 min.
Cool	135 to 70ºF, 2 hr.; 70 to 41ºF, 4 hr.	<1-log increase of *C. perfringens* (USDA), 120 to 55ºF, 6 hr. and continue to 40ºF (14.2 hr.).
Packaging ready-to-eat food	None.	No detectable *Listeria monocytogenes* (<1 / 25 g) in ~3 samples every 3 months.
Cold hold	41ºF, 7 days.	No time limit. Until spoiled <50ºF *Clostridium botulinum* and *C. perfringens* control, <40ºF *Bacillus cereus* control.
Shelf stable processed food		
Vegetative cells	<4.6 pH *C. botulinum*, <0.86 a_w *Staphylococcus aureus.*	4.2 pH *Salmonella*, <0.86 a_w *Staphylococcus aureus.*
Spores		<4.6 pH *C. botulinum*, <4.2 pH *B. cereus*, <0.92 a_w *B. cereus.*
Reheat	41 to 165ºF, 15 sec., 2 hr.	None. Reheating not used for control.
Consumer abuse	None.	<3-log increase *B. cereus* or *C. perfringens.*

pics:FDA-vs-HACCP

TIME-TEMPERATURE CONTROL FOR SAFETY

Growth of Bacteria in Food

BASED ON FDA FOOD CODE HOLDING / STORAGE RECOMMENDATIONS



Temp (ºF)	1 Generation	10 Generations
<30	Safe	Safe
30	297.14 hr.	123.8 days
35	46.34 hr.	19.3 days
40	17.99 hr	7.5 days
41	15.55 hr.	6.5 days
45	9.49 hr.	4.0 days
50	5.85 hr.	2.4 days
55	3.96 hr.	1.7 days
60	2.86 hr.	1.2 days
70	1.69 hr.	16.9 hr.
80	1.12 hr.	11.2 hr.
90	0.79 hr.	7.9 hr.
100	0.59 hr	5.9 hr.
110	0.47 hr.	4.7 hr.
120	0.56 hr.	5.6 hr.
125	3.10 hr.	31.0 hr.

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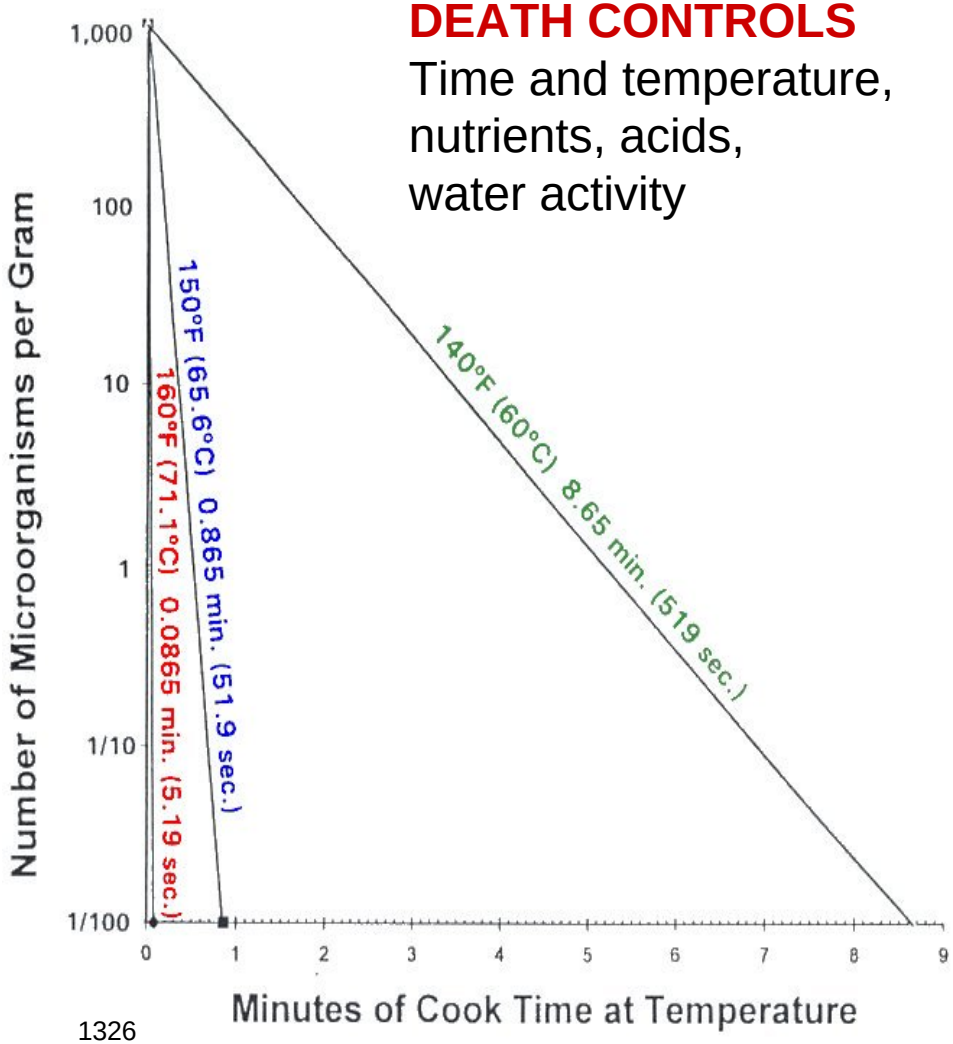
DESTRUCTION OF *SALMONELLA* IN FOOD

D value: time at a temperature for 1 log (10 to 1) reduction



DEATH CONTROLS

Time and temperature, nutrients, acids, water activity

DESTRUCTION OF *SALMONELLA* SPP. IN FOOD

Temp. ºF (ºC)	5D Ground meat, fish (100,000:1)	6.5D Roast beef (3,160,000:1)
130 (54.4)	---	112 min.
135 (57.2)	---	35 min.
140 (60.0)	---	11.2 min.
145 (62.8)	3 min.	3.5 min.
150 (65.6)	1 min.	67.sec.
155 (68.3)	15 sec.	21 sec.
158 (70.0)	Instant	Instant

VEGETATIVE BACTERIAL PATHOGENS (5D / 7D Pasteurization or 2D Wash)

Bacteria	Source	Min. temp. (°F)	Max. temp. (°F)	Min. pH	Max. pH	Min a_w	Time 1D reduction at 140°F (minutes)	Toxin Destruction
Aeromonas hydrophila	Feces / food	29.3	111	4.0	7.2	-	0.02 m.	n/a
Listeria monocytogenes	Feces / food	29.3	113	4.4	9.4	.92	3.8 m.	n/a
Yersinia enterocolitica	Feces / food	29.3	111	4.2	10	.945	1.6 m.	n/a
Salmonella spp.	Feces / food	41.4	115.2	4.2	8.0	.94	1.7 m.	n/a
Shigella spp.	Feces / food / water	43	116.8	4.8	9.3	.96	1.7 m.	n/a
Escherichia coli O157:H7	Feces / food / water	44.6	114	4.0	9.0	.95	1.7 m.	n/a
Vibrio cholerae	Feces / food / water	50	109.4	5.0	10	.97	D_{120} =8.15 m.	n/a
Vibrio parahaemolyticus	Seafood / water	41	111	4.8	11	.94	D_{120} =0.82 m.	n/a
Vibrio vulnificus	Seafood / water	46.4	109.4	5.0	10	.96	D_{122} =0.66 m.	n/a
Campylobacter jejuni	Feces / food	86	113	4.9	9.3	.987	0.25 m.	n/a
Staphylococcus aureus growth toxin production	Nasal cavity, skin, infected cuts, boils, wounds	 44.6 50.0	 122 118	 4.0 4.5	 10 9.8	 .83 .86	3 m.	68.6 minutes at 210°F

presentations: veg&spore-paths

SPORE-FORMING BACTERIAL PATHOGENS

Prevent outgrowth to the vegetative state

Bacteria	Source	Min. temp. (°F)	Max. temp. (°F)	Min. pH	Max. pH	Min a_w	Time for veg. cell destruction at 140°F (minutes)	D-value (°F) Spores	Toxin Destruction
Clostridium perfringens	Soil, feces, sewage, water, dust	50	125	5.5	9.0	.93	3.5 m.	D210°F = 31.4 min. Beef Gravy (varies with type)	**n/a**
Bacillus cereus	Soil, dust, grains, cereals	39.2	122	4.3	9.3	.92	1 m.	D212°F = 3.1 min. Skim milk D212°F = 22 to 36 min. in rice	D132.8°F = 5 min for diarrheal illness D250°F = 90 min for emetic illness
Clostridium botulinum, type A, and proteolytic B and F	Soil	50	118.4	4.6	9.0	.935	Not available	D250°F = 0.23 to 0.3 min.	D174°F = 20 min. D185°F = 5 min.
Clostridium botulinum, type E, and non-proteolytic B and F	Water, sludge near bodies of water	37.9	113	5.0	9.0	.97	Not available	D180°F = 0.8 to 6.6 min. (depending on type of food)	(same as above)

presentations: veg&spore-paths

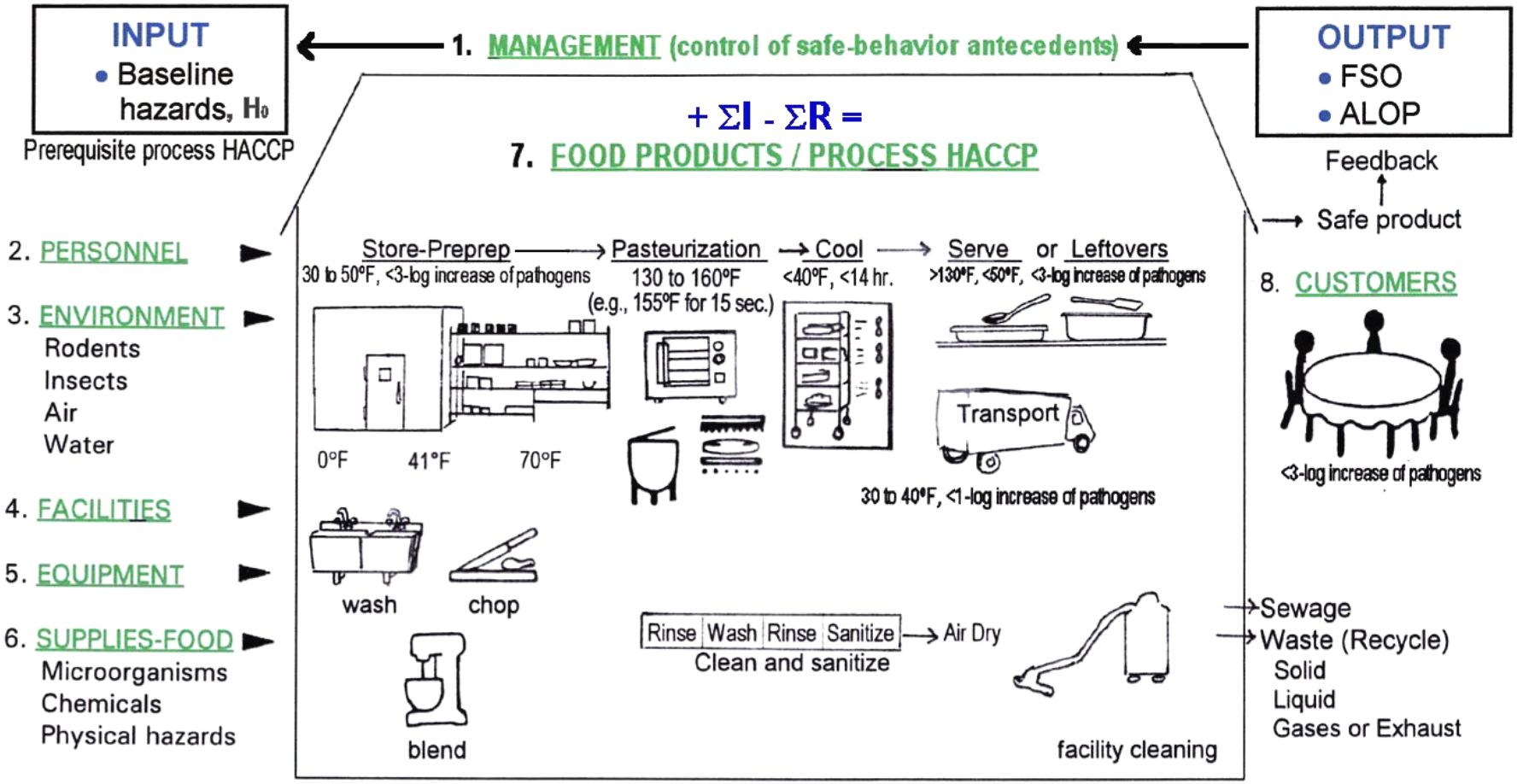
HACCP ALLOWS OPERATORS TO DO ANY PROCESS THAT CAN PRODUCE SAFE FOOD

- Vacuum packaging / sous vide / chilled food: 90-day shelf life at 40ºF.
- Chilled and frozen take-out entrees and meals: CO_2 and MAP to extend shelf life.
- Pasteurized: sous vide and chilled food; 5-to-60 day / 38ºF shelf life (just like milk).
- Sterilized: soups and sauces in jars; canning.
- Acidified: sauces, dressings; use of acids and additives in glazes.
- Produce low-water-activity food such as jams, jellies, jerky.
- Produce all kinds of packaged pastries and cookies.
- Fermented foods: sausage, cheese, yogurt, sauerkraut, kimchee, beer / wine / vinegar.
- Thawing on the counter.
- Hot food will be precooled at room temperature.
- Slow cook at 130ºF, 90% Rh.
- Food can be held at any temperature from 30 to 130ºF, for up to 10 multiplications of microorganisms.
  41ºF at 7 days=50ºF at 4 days=70ºF at 17 hours=110ºF at 4 hours, etc.
- Hot holding at 130ºF.
- Displaying and selling food at room temperature (sushi); meat fondue.
- Produce food for home meal replacement; delivered in town or anywhere in the U.S. by UPS, FEDEX, etc.
- Pumping food with flavored water to increase yield and improve safety

HACCP helps the operator.

- Kitchen energy requirement will be cut to 1/3 of present use.
- Suppliers will have HACCP programs and tell the cook the level of pathogens in the food that the cook must control.
- Retail food operators can do any process that food manufacturers do.
- New equipment technology and processes can be used.

THE UNIT AS A FOOD PROCESS SYSTEM



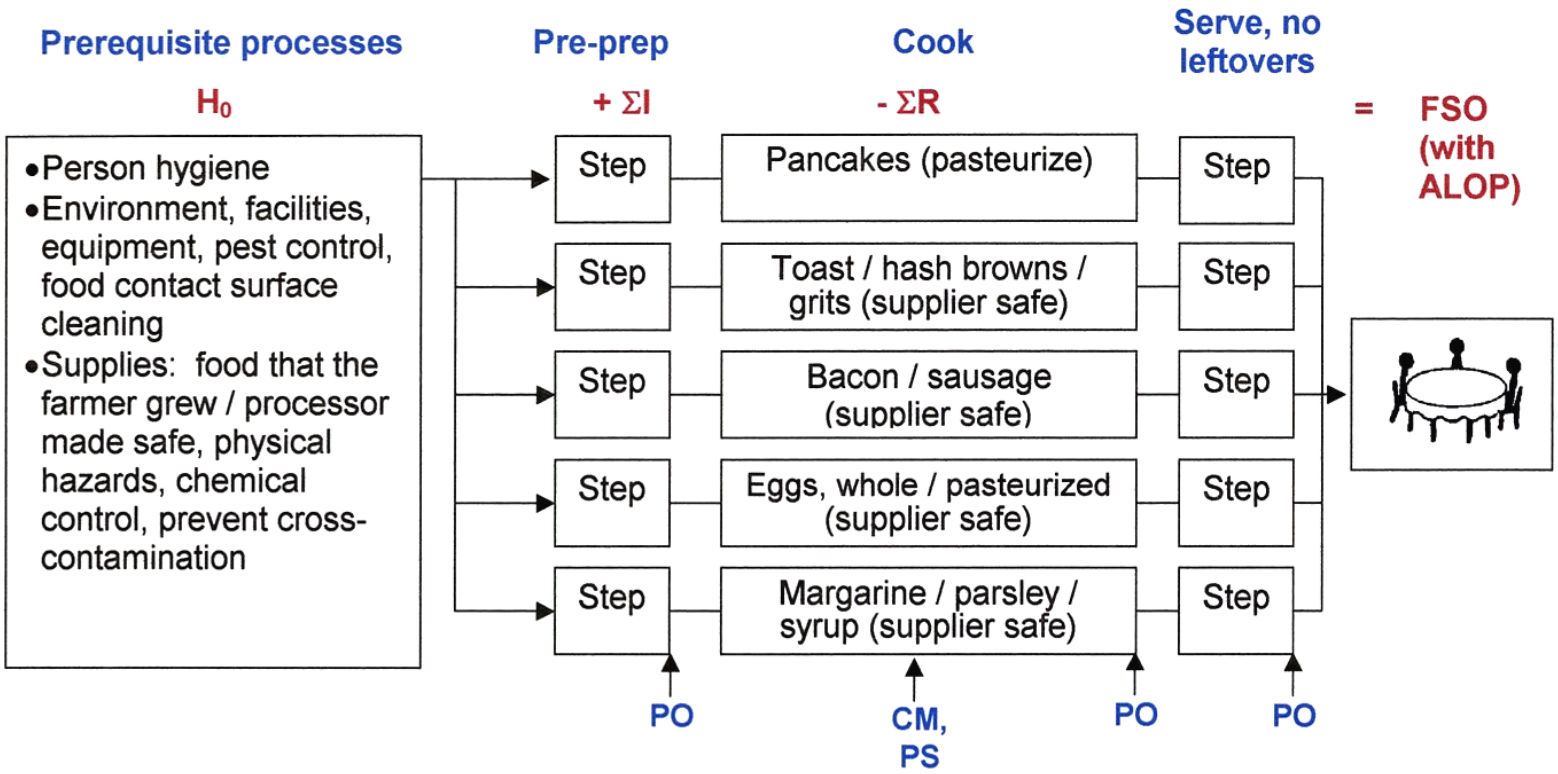
HAZARDS: Microorganisms [bacteria (vegetative cells and spores), viruses, parasites]; chemicals; hard foreign objects.

CONTROLS: Management involvement; hazard analysis and control; written procedures; employee training and empowerment; process measurement, control, and improvement; discipline and consequences.

FOOD GROUPS HACCP PROCESS ANALYSIS

HACCP Process Groups (USDA HACCP, 9 CFR 417) Prerequisite / GMPs working		Control	Shelf life
I	**Not heat treated, not shelf stable (raw).** Not PHF / no RPG: sprouts; raw meat, fish; sushi, sashimi; poultry; eggs, raw fruits and vegetables	Grown safe, with H_0 that meets FSO. May require Temperature Control for Quality.	<14 days (bact. spoilage)
II	**Not heat treated, with inhibitors to make shelf stable.** Water activity: flour, corn meal, nuts, salt, sugar, sugar icing, honey, spices and herbs, oil, lard; salted, dried fish, fresh pasta Fermentation: pepperoni, salami; olives; dairy (cheese, yogurt, sour cream / milk / crème fraîche); bread; sauerkraut; kimchee; beer, wine Acidified: salad dressing; cole slaw; salsa; condiments	Grown safe, made safe by supplier, with H_0 that, with $+\Sigma I\text{-}\Sigma R$ (5-log *Salmonella*), meets FSO. Does not require TCS because of product aw, pH, or additives.	>2 years, 70ºF (chem. spoilage)
III	**Fully cooked, not shelf stable.** hot or cooled, refrigerated ready-to-eat food; meat, fish, poultry; fruits, vegetables, dairy, pastry filling, pudding	Pasteurized (5-log to 7-log *Salmonella*) so that $+\Sigma I\text{-}\Sigma R$ meets FSO. Requires TCS.	41 to 135ºF, ≤4 hours or Cold 41ºF, 14-90 days
IV	**Fully cooked, with inhibitors to make shelf stable.** marinara sauce; fruit pie fillings; cake icing, bread and pastry, dry cereals, dry pasta, smoked fish; packaged, low-pH fruits and vegetables	Pasteurized (5-log to 7-log *Salmonella*) so that $+\Sigma I\text{-}\Sigma R$ meets FSO. Does not require TCS because of product a_w, pH, or additives.	>5 years
V	**Commercially sterile, shelf stable.** "packaged" meat, fish, poultry, fruits, vegetables, dairy / UHT milk	Sterilized, *Clostridium botulinum* spores reduced 9 log to 12 log. Does not require TCS.	>5 years

MENU ITEM PROCESS HACCP
(FARM TO FORK)



FSO	Food Safety Objective – Safe level of hazard
ALOP	Appropriate Level Of Protection – Acceptable ill / 100,000
PO	Performance Objective – Level of a hazard at end of step
CM	Control measure – Any action taken to reduce / control hazard
PS	Performance Standard – hazard reduction in a step

pics:menu-item:proc-haccp

MENU INGREDIENT HAZARD INVENTORY

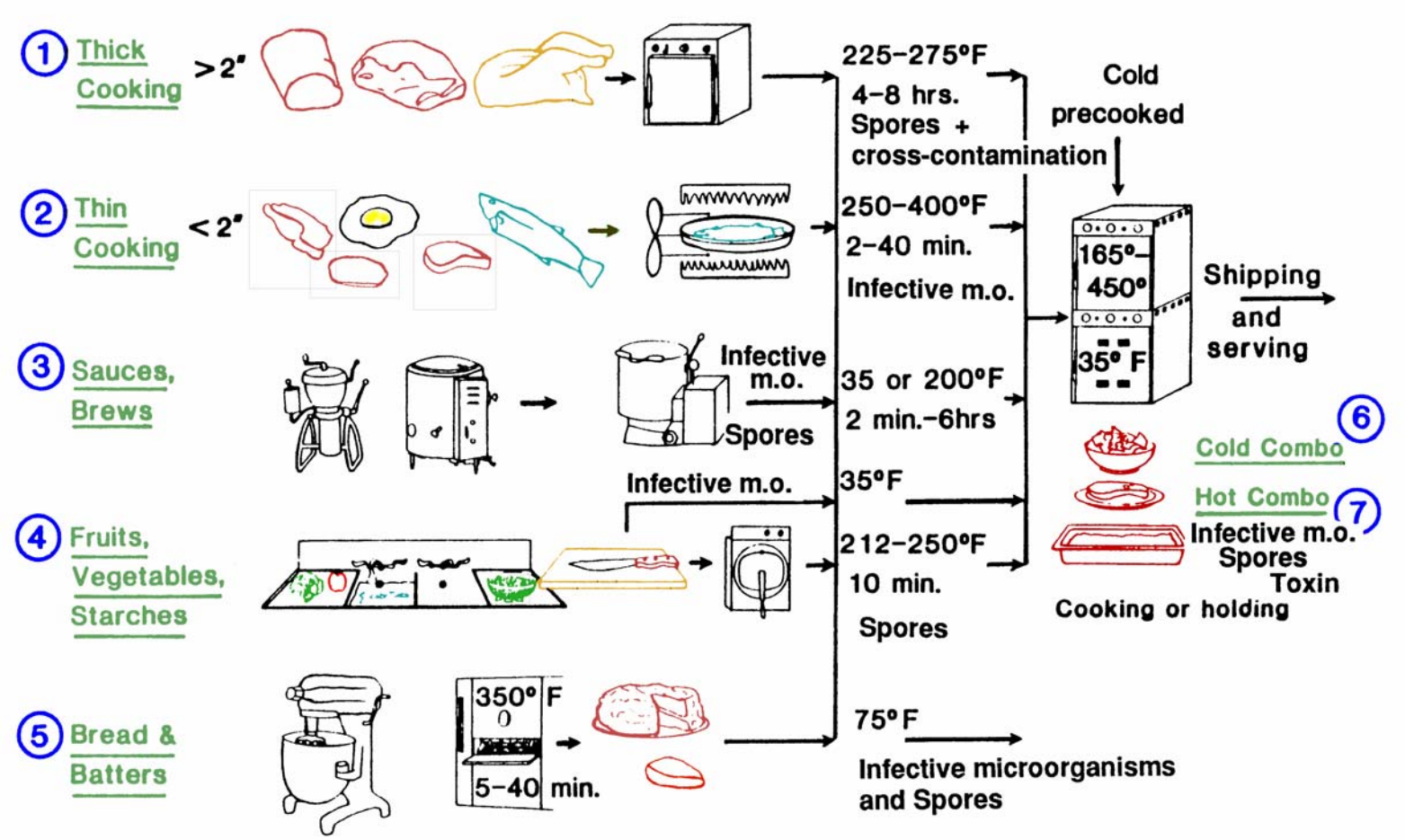
Supplier Makes Safe			Cook Makes Safe
Mozzarella Cheese Sticks	Grits	Cocoa	Baked Potato
Potatoes, parfried	Oatmeal	Teas	Chicken parts and strips
French Fries	Vegetables, frozen	Fruit Juices (e.g., orange, apple, tomato, lemonade)	Charleston
Skillet	Coleslaw Mix	Soft Drinks (dispenser)	Chicken Nuggets
Hashed Browns	Canned Fruits (e.g., Cranberry and Apple Sauce)	Milk (Whole, 2%, skim, chocolate)	Chicken Breast
Mashed	Pico de Gallo	Cream	Chicken Fried Steak
Onion Rings, parfried	Applesauce Swimmers	Assorted Bread Products	Cod, battered
Onion Tanglers, parfried	Taco Chips	Bagels	Shrimp, breaded
Corn Beef Hash	Salsa	Biscuits	Bacon
Sausage Links, precooked	Cheeses (e.g., American, Swiss, Cheddar, Parmesan, Cream Cheese, Cottage Cheese)	Apple Crisp	Hamburger, Junior and Regular
Ham, fully cooked	Pickles	Frozen Pies (Unbaked and prepared)	Eggs (in-the-shell), over-easy, up, hard-boiled, poached
Boca Burger, fully cooked	BBQ Sauce	Frozen Cakes and Brownies	Steak
Cheese Pizza, fully cooked	Cocktail Sauce	Oreo Cookie Crumbles	T-bone
Turkey Breast, fully cooked	Butter	Ice Cream	Sirloin
Smoked Sausage	Margarine	Jams and Jellies	Country Fried Steak
Sausage Crumbles	Spreads (Garlic, Sweet Hickory)	Syrups (pancake)	Fresh Vegetables (e.g., Celery, Cilantro, Cucumbers, Onions, Peppers, Lettuce, Romaine, Mushrooms, Tomatoes, Parsley)
Nacho Meat	Honey	Syrups (for malts, sundaes etc.)	Fresh Fruits (e.g., Lemons, Limes, Grapes, Raw Fruit Mix)
Roast Beef	Salad Dressings (e.g., coleslaw dressing, mayonnaise, tartar sauce, ranch dressing, etc.)	Caramel Sauce	
Eggs, liquid pasteurized	Condiments (e.g., ketchup, mustard)	Vinegar,	
Kraft Macaroni and Cheese	Creamers	Sugar (brown, powdered)	
French Toast Batter (pasteurized ingred.)	Coffees	Crackers and Croutons	
Pancakes (pasteurized ingred.)		Apple Topping	
Waffles (pasteurized ingred.)			
Gravies (pasteurized ingred.)			
Soups			
Marinara Sauce			
Wing Sauce			
Stuffing			

SUPPLIER CONTROLS TO MAKE FOOD SAFE

Safe ingredient	BCP hazards H_0 Frequency	CONTROL						
		Grown safe	Sort, Remove	Wash	Pasteurize	Sterilize	A_w	Acid / Ferment
Cooked potatoes	B veg & spores C solanine P rocks	X	X		X		X	
Beef hash	B veg & spores C not sig. P bones		X		X			
Eggs liquid pasteurized	B veg & spores C not sig. P none				X			
Soup, canned	B veg & spores C not sig. P not sig.					X		
Bread	B veg & spores C not sig. P metal	Aflatoxins X	X		X		X	
Cheese	B veg & spores C not sig. P not sig.				X		X	X

THE SEVEN COOK-THEN-PACKAGE / SERVE RECIPE PROCESSES

Design for control of infective microorganisms and toxin-producing microorganisms



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MENU ITEMS GROUPED BY HAZARD AND CONTROL CATEGORIES

(Assumes that prerequisite programs are effective.)

Thick Food >2"	Thin Food <2"	Sauces, Soups	Fruits, Vegs., Starches	Hot Combo	Cold Combo	Breads, Pastries, Desserts	Miscellaneous
Served hot Prime rib Roast chicken Baked ham	Center pasteurize Hamburger Meatballs Sausage Surface pasteurize Steaks Chops Fillets	Hot ***pH >4.6*** Gravy White sauce Chicken soup ***pH <4.6/4.2*** Hollandaise sauce Bearnaise sauce	Cooked Products ***pH >4.6*** Potatoes Pasta Rice ***pH <4.6/4.2*** Applesauce Sweet and sour red cabbage	Cooked Products ***pH >4.6*** Beef stew Fettucini Alfredo ***pH <4.6/4.2*** Chili con carne BBQ beef	Cold Products ***pH >4.6*** Chicken sandwich Chicken salad ***pH <4.6/4.2*** Cole slaw Salsa Deviled eggs	***pH >4.6*** Eclairs Pumpkin pie Meat pies ***pH <4.6/4.2*** Cherry pie Apple pie Rhubarb crisp	Dairy Products ***pH >4.6*** Milk Cream Most cheese ***pH <4.6/4.2*** Yogurt Cheddar cheese
Served cold Sliced ham Sliced beef Sliced turkey	Eaten raw Fish Eggs Steak Tartar (beef) ***a_w<0.92*** Salted fish	Cold ***pH >4.6*** Vichyssoise Custards ***pH <4.6/4.2*** Mayonnaise Gazpacho ***a_w<0.92*** Honey Jam, jelly Maple syrup	Washed, not cooked ***pH >4.6*** Lettuce Cauliflower ***pH <4.6/4.2*** Apples Tomatoes Strawberries			***a_w<0.92*** Breads Muffins Pancakes	Beverages ***pH >4.6*** Coffee Tea ***pH <4.6/4.2*** Lemonade Cola Beer Wine

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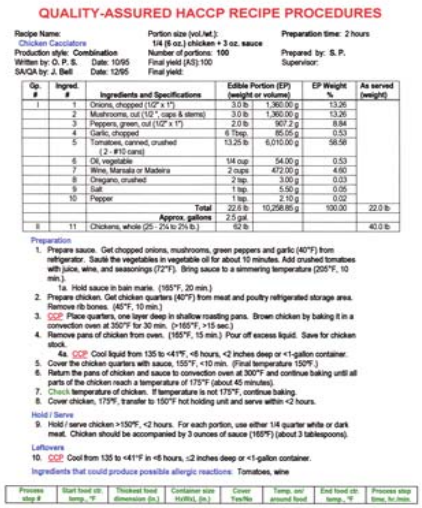
THE RECIPE AS THE BASIC CONTROL

Recipe



QUALITY-ASSURED HACCP RECIPE PROCEDURES

Recipe Name: Chicken Cacciatore
Production style: Combination
Written by: O. P. S. Date: 10/95
SA/QA by: J. Bell Date: 12/95

Portion size (vol./wt.): 1/4 (6 oz.) chicken + 3 oz. sauce
Number of portions: 100
Final yield (AS):100
Final yield:

Preparation time: 2 hours
Prepared by: S. P.
Supervisor:

Gp. #	Ingred. #	Ingredients and Specifications	Edible Portion (EP) (weight or volume)		EP Weight %	As served (weight)
I	1	Onions, chopped (1/2" x 1")	3.0 lb	1,360.00 g	13.26	
	2	Mushrooms, cut (1/2 ", caps & stems)	3.0 lb	1,360.00 g	13.26	
	3	Peppers, green, cut (1/2" x 1")	2.0 lb	907.2 g	8.84	
	4	Garlic, chopped	6 Tbsp.	85.05 g	0.53	
	5	Tomatoes, canned, crushed (2 - #10 cans)	13.25 lb	6,010.00 g	58.56	
	6	Oil, vegetable	1/4 cup	54.00 g	0.53	
	7	Wine, Marsala or Madeira	2 cups	472.00 g	4.60	
	8	Oregano, crushed	2 tsp.	3.00 g	0.03	
	9	Salt	1 tsp.	5.50 g	0.05	
	10	Pepper	1 tsp.	2.10 g	0.02	
		Total	22.6 lb	10,258.85 g	100.00	22.0 lb
		Approx. gallons	2.5 gal.			
II	11	Chickens, whole (25 - 2¼ to 2¾ lb.)	62 lb			40.0 lb

Preparation

1. Prepare sauce. Get chopped onions, mushrooms, green peppers and garlic (40°F) from refrigerator. Sauté the vegetables in vegetable oil for about 10 minutes. Add crushed tomatoes with juice, wine, and seasonings (72°F). Bring sauce to a simmering temperature (205°F, 10 min.).
   1a. Hold sauce in bain marie. (165°F, 20 min.)
2. Prepare chicken. Get chicken quarters (40°F) from meat and poultry refrigerated storage area. Remove rib bones. (45°F, 10 min.)
3. CCP Place quarters, one layer deep in shallow roasting pans. Brown chicken by baking it in a convection oven at 350°F for 30 min. (>165°F, >15 sec.)
4. Remove pans of chicken from oven. (155°F, 15 min.) Pour off excess liquid. Save for chicken stock.
   4a. CCP Cool liquid from 135 to <41°F, <6 hours, <2 inches deep or <1-gallon container.
5. Cover the chicken quarters with sauce, 155°F, <10 min. (Final temperature 150°F.)
6. Return the pans of chicken and sauce to convection oven at 300°F and continue baking until all parts of the chicken reach a temperature of 175°F (about 45 minutes).
7. Check temperature of chicken. If temperature is not 175°F, continue baking.
8. Cover chicken, 175°F, transfer to 150°F hot holding unit and serve within <2 hours.

Hold / Serve

9. Hold / serve chicken >150°F, <2 hours. For each portion, use either 1/4 quarter white or dark meat. Chicken should be accompanied by 3 ounces of sauce (165°F) (about 3 tablespoons).

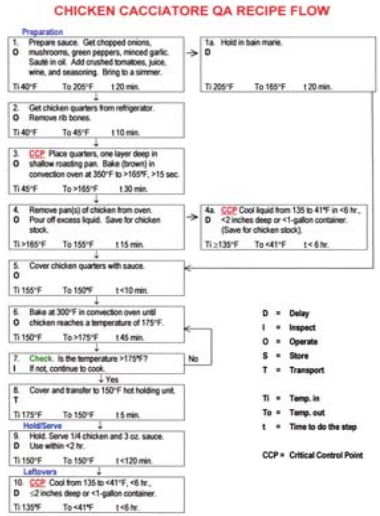
Leftovers

10. CCP Cool from 135 to <41°F in <6 hours, ≤2 inches deep or <1-gallon container.

Ingredients that could produce possible allergic reactions: Tomatoes, wine

Process step #	Start food ctr temp., °F	Thickest food dimension (in.)	Container size HxWxL (in.)	Cover Yes/No	Temp. am/ around food	End food ctr temp., °F	Process step time, hr./min.

Flow Chart



THE HACCP PLAN

HACCP Plan

STEP					
CCP Step Description	B,C,P Hazard Analysis / Risk Assessment	Hazard Control Validation	Monitoring / Self-Check	Corrective Action (by HACCP team)	Verification and Improvement
STEP	←Not sig sig→				

QUALITY-ASSURED HACCP RECIPE PROCEDURES

HERBED WILD RICE

Gp. #	Ingred. #	Ingredients and Specifications	Ingredient Vol.	Ingredient Wt.	Cooked Vol.	Nut. #
1	1	Butter, salted	---	2 lb.		
	2	Green peppers, ½" dice	2 qt.	2 lb.		
	3	Onions, ½" dice	2 qt.	2 lb.		
	4	Mushroom, stems & pieces, #3 can	---	3 lb. 4 oz.		
	5	Chicken base	½ cup	4 oz.		
2	1	Wild rice	---	5 lb.		
	2	Water	5 qt.	10 lb. 6 oz.		

Ingredients that could produce possible adverse reactions (allergic or intolerance):
Whey (milk in butter)

Verification

Preparation

Herbs and vegetables

1. Put butter in 5-gallon pot. Melt.
2. Add green peppers, onions,mushrooms, chicken base, garlic powder, and white pepper.
3. **CCP.** Heat, stir, simmer (>200ºF); 15 minutes. (Reduce *Salmonella* >5 log)
4. **CCP.** Remove from heat. Put 2" deep in 4" pan, uncovered. Place in refrigerator by fans. Cool to 41ºF, 6 hours. (<1 log increase *Clostridium perfringens*)

Steamed rice

5. Get rice. Put in 4" pan. Add water.
6. **CCP.** Steam 50 minutes (>200ºF, >1 minute). (Reduce *Salmonella* >5 log)
7. **CCP.** Put rice in refrigerator by fans. Cool to 41ºF, 6 hours. (<1 log increase *Bacillus cereus*)

Mix

8. **CCP.** Combine herb-vegetable mixture and rice, <50ºF, <15 minutes) (No significant multiplication). Cover. Label. Cool to 41ºF, <4 hours (<1 log increase *Bacillus cereus*) Use in 7 days. (<1 log increase *Bacillus cereus*)

Process step #	Start food ctr. temp., ºF	Thickest food dimension (in.)	Container size HxWxL (in.)	Cover Yes/No	Temp. on / around food	End food ctr. temp., ºF	Process step time, hr./min.

HACCP PLAN

Process Steps and Controls: GMPs and prerequisites are in place *(Ti=temp. in; To=Temp. out; t=Time to do the step)*	B, C, P, Potential Hazards and Risk Analysis	Control Critical Limit (CL) for each Hazard Control	Monitoring & Record; (What, How, Frequency, Who)	Corrective Action & Record	Verification & Record (Procedures and Frequency)
1. Ti To t	B: C: P:				
2. Ti To t	B: C: P:				
3. Ti To t	B: C: P:				
4. Ti To t	B: C: P:				
5. Ti To t	B: C: P:				

B, C, P = Biological, Chemical, and Physical CCP = Critical Control Point Ti=temperature in; To=temperature out; t=time to complete the step D=Delay; I=Inspect; O=Operate; S=Store; T=Transport

RETAIL PROCESS HACCP

Process steps with controls Tasks Steps	Hazard and Risk Analysis • B,C,P hazard identification Tolerable level / size • Risk assessment Severity (cost) Probable hazard levels / size Probable occurrence Acceptable risk ← next step Significant risk →	Control(s) • Critical limit of process control(s) to reduce / prevent / eliminate a significant risk to an ALOP • Validation and reference (FMEA) • Process criterian to achieve a C_{pk}>1 within expected process deviations	Monitoring / Self-check Who, how, when, what to measure process variation and keep inside the critical limit(s). Where is it recorded?	Corrective Action If deviation created a significant risk, what corrective action would be taken?	Verification and Analysis for Process Improvement Who, how, when, what
MANAGEMENT HACCP HACCP team / QC **PREREQUISITE PROGRAMS (HACCP)** Environment: water, trash Personal hygiene: fingertips (10^{-6}) Facility, equipment Wash food contact surfaces (10^{-5}) Supplier: food ingredients, chemicals, hard foreign objects **FOOD PROCESS HACCP** Double wash fruits and vegetables (10^{-2}) Fermentation / acid foods Additives IAW GMPs Pasteurize 10^{-5} Hot hold-transport >125°F Cool <1 log increase of *Clostridium perfringens* Hold 40 to 125°F, <3-log increase *Bacillus cereus*; dry					

(process haccp-00lh2&lh69)

HAND WASHING HACCP

Hazard:
Toilet paper slips and tears, and a person can get 6 log pathogens on fingertips.

Control:
When coming from the toilet, do the double wash with a nail brush for a 6 log reduction by dilution.

1. Nail brush friction, detergent, and water (45 to 110ºF), 3 log reduction

2. Second wash, no nail brush, 2 log reduction

3. Paper towel dry, 1 log reduction

4. Water flow, no splash, 2 gallons / minute

5. No touch controls are not necessary

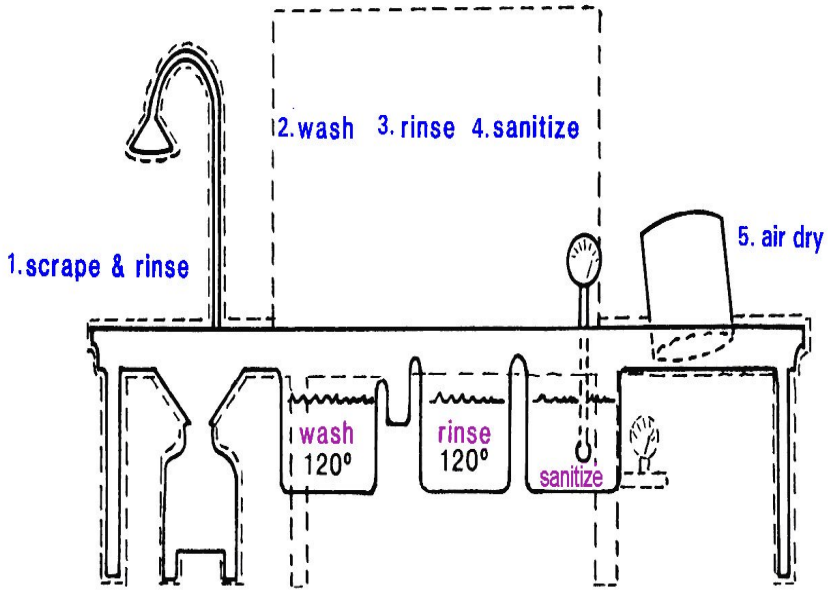
Validation:

1. Contaminate fingertips 7 log with non-pathogenic *E. coli*

2. Double fingertip wash, 6 log reduction

3. Petrifilm™ recovery *E. coli* <10 total

FOOD CONTACT SURFACE WASHING HACCP
(cutting boards, knives)



Sanitize: Chemical: 75°F, water, 50 ppm chlorine; 12.5 ppm iodine; 150-200 ppm quat
Thermal: 171°F, 30 seconds

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Hazard:

Campylobacter jejuni from chicken (1,000 to 10,000 on surface) and *Vibrio* from seafood

Control:

1. With warm water running over the cutting board into a disposal, scrub with a brush for a few seconds; 3 log reduction by dilution

2. In the pot and pan sink, scrub again; 2 log reduction by dilution

3. Rinse to remove soap

4. Sanitize, air dry

Validation:

1. Put 7 log *E. coli* on the cutting board

2. Wash and sanitize

3. Swab 8 square inches, <10 *E. coli*

FOOD RECEIVING AND STORAGE HACCP

Hazard:

Pathogens from raw food can cross-contaminate ready-to-eat food.

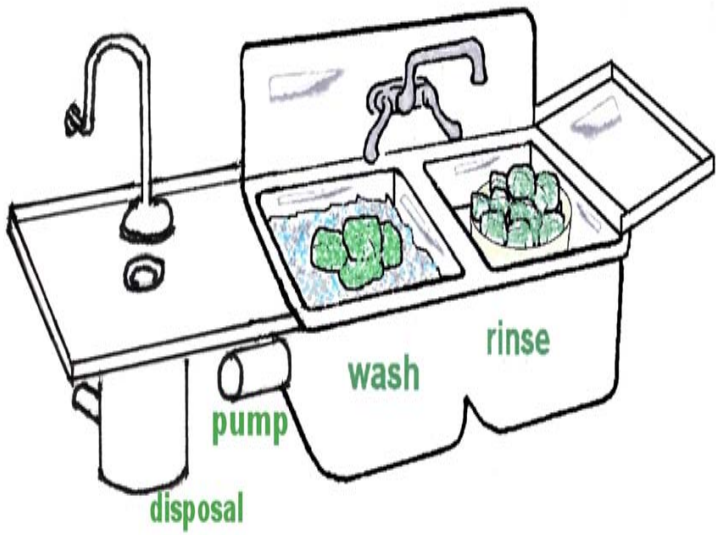
Control:

- Raw food: time and temperature not CCP; washing or cooking makes food safe
- Ready-to-eat food on top
- Air flow: 50 feet per minute holding; 1,000 feet per minute cooling;
  41ºF, 7 days; 45ºF, 4 days; 50ºF, 2.5 days;
  70ºF, 18 hours; 110ºF, 4 hours
- Humidity 70% to prevent mold growth; 95% to prevent drying of fruits and vegetables

Validation:

- Instant mashed potatoes with *E. coli* in a container;
  Store, measure temperature, measure growth

WASHING AND BLANCHING FRUITS AND VEGETABLES (VEGETATIVE BACKERIA) HACCP



Hazard:

Raw fruits and vegetables are contaminated in the pores of the surface. Chemicals do not affect pathogens in the surface.

Control:

The bacteria must be removed by brush friction or water turbulence. The following reduces bacteria, parasites, and viruses about 2 log by dilution.

1. Trim.
2. Wash in turbulent water. Transfer to 2nd sink.
3. Rinse in turbulent water, 2nd sink.
4. Spin dry.

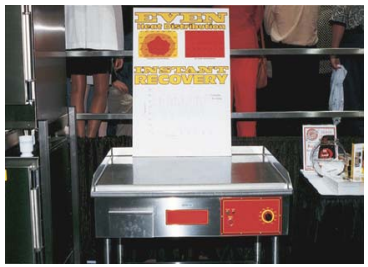
Chemicals can be used in a 3rd sink, but have a limited effect, 1 log.

Blanch fruit or vegetable in 160ºF water, 1 minute, for a 5 log reduction.

Validation:

Put *E. coli* on food and measure before and after treatment, using *E. coli* Petrifilm™.

FOOD PASTEURIZATION HACCP (VEGETATIVE BACTERIA)



Hazard:
Pathogens contaminate raw meat, fish, and poultry.

Control:
Salmonella is the target pathogen.
Reduce *Salmonella* 5 log.
(Assumes the food is contaminated with about 1,000 / gram, and must be reduced by 1 per 100 grams.)

Validation:
- Contaminate with non-pathogenic *E. coli*.

Take sample before heating, <70ºF.

- Take samples about 130ºF, 140ºF, and 150ºF.

By 150ºF, there should be >5 log reduction.

FOOD HOT HOLD HACCP (SPORE CONTROL)

Hazard:

- The surface of food with a center temperature of 140ºF in a steam table exposed to air with a relative humidity of 50% will be about 117ºF because of evaporative cooling.
- *Clostridium perfringens* will grow <125ºF.
- Heat lamps dry food.

Control:

Keep food covered; keep high humidity, >90%, above food; or cover food with something like a butter sauce or cheese.

Validation:

- Make a pan of instant mashed potatoes with cooked ground beef on the surface.
- Measure temperature. Hold in a steam table for 4 hours. Measure *Clostridium perfringens.*

FOOD COOLING HACCP (SPORE CONTROL)

Hazard:

Clostridium botulinum, *Bacillus cereus*, and *Clostridium perfringens* spores will germinate and multiply if cooling is too slow between 125 and 80ºF.

Control:

- Cool fast enough between 120 and 80ºF to prevent outgrowth of spores <1 log.
- Pre-cool room temperature.
- Blast cooler 1,000 feet per minute air, 38ºF, 2-inch pan, 6 hours.
- Ordinary refrigerator 50 feet per minute air, 2-inch pan, 15 hours.

Validation:

- Cook hamburger to 160ºF to pasteurize the food and activate the spore. Put in a test container.
- Cool. Take a center sample before and after cooling. Determine if there is growth using Petrifilm™.

HACCP FOOD SAFETY PLAN (TRAINING) MANUAL

Preface

Log of changes
Reassessment

Operations Description

System description
Organization
Environment (picture)
Facilities (plan)
Equipment (list)
Menu HACCP (processes)

AMC-HACCP Management

Food safety policy
Responsibility and accountability
HACCP team / QC
- Self-inspection
- Corrective action
- Training

Emergencies
Food security / sabotage

Prerequisite Processes

Personal hygiene
Employee illness reporting
Hand washing
- After toilet
- After touching raw food

Cleaning, maintenance, and pest control
Facilities, Environment
Equipment and warewashing

Supplies
Source of supply
- Ingredients
- Supplier safe vs. cook made safe

Receiving inspection
Storage: ambient, refrigerated, frozen
Control of physical, chemical, and biological contamination

Food Process HACCP

Pre-preparation
Physical hazards
Chemical hazards
Allergens
Thawing
Fruit and vegetable washing
Serving raw food

Preparation
Salad and hors d'oeuvres
Pasteurization / sterilization
Ingredients to extend shelf life
Hot holding
Cooling
Cold holding
Leftovers / reprocessing

Distributing / serving food
Communicating safe handling

EMPLOYEE FOOD HACCP TRAINING CHECKLIST

Critical Control Points	Demonstrated Correct Performance	Evaluation Date _____
PREREQUISITES Personal hygiene If I have vomiting or diarrhea, I will tell the PIC. I will double wash my fingertips when coming from an "unknown location" such as the toilet. When handling raw meat / fish / poultry, I will decontaminate my hands and food contact surface before touching RTE food. I do not touch my skin when working with food. Immediately after glove use, I remove the gloves and wash my hands Receiving When receiving food / opening food, any food that is damaged or spoiled will be returned to the supplier / discarded. Refrigerate food 41ºF. Storage I store raw food on the bottom shelves in the refrigerator and RTE food above the raw food. I store chemicals completely separate from food. Equipment I assure that my equipment is clean before I use it. I assure that my equipment is working correctly and calibrated before I begin preparation.		

DAILY QA CHECKLIST

PREREQUISITE HACCP REQUIREMENTS	PERSON / ITEM : OBSERVATION	CORR. ACT #
1. **Personal Hygiene** (Person: Health, cleanliness, double hand washing when coming from toilet, single hand washing for raw food / RTE food control, gloves control)	1. _____ : _____ 2. _____ : _____ 3. _____ : _____	
2. **Environment / facilities** (Item: Cleaned, maintained, pests, trash, chemicals, water, plumbing controlled)	1. _____ : _____ 2. _____ : _____ 3. _____ : _____	
3. **Equipment** (Item: Cleanliness, temperature, maintenance, sanitizer concentration)	1. _____ : _____ 2. _____ : _____ 3. _____ : _____	
4. **Storage** (Food: temperature, use by)	1. _____ : _____ 2. _____ : _____ 3. _____ : _____	
FOOD HACCP PROCESSES	**FOOD : OBSERVATION**	**CORR ACT#**
1. **Physical hazards** (Food: hazard control)	1. _____ : _____ 2. _____ : _____	
2. **Allergen control**; do not add fresh to old; do not combine different leftovers (Food: allergen control)	1. _____ : _____ 2. _____ : _____	
3. **Double wash fruits and vegetables** Food: adequate physical wash)	1. _____ : _____ 2. _____ : _____	

PROCESS PERFORMANCE CRITERIA-BASED AMC-HACCP SELF-INSPECTION, MONTHLY

FOOD SAFETY PERFORMANCE REQUIREMENTS	OBSERVATION	CORR. ACT.
Management Programs		
1. Management, Person In Charge (PIC), HACCP team, trained and performing: a. Self-assessment using hazard and control checklist b. Cooks know hazards and perform controls and monitoring c. Team meeting to verify records that processes are in control and to take corrective action and improve d. HACCP plan validated; all food preparation procedures validated		
Prerequisite Programs		
2. Personal Hygiene a. Ill employee control (no work if vomiting, diarrhea; tell PIC if sick; restricted work if sneezing, coughing, runny nose; Call health department with hepatitis A, norovirus, *Salmonella*, *Escherichia coli* O157:H7, etc.) b. Employees clean (uniform; no body odor, short fingernails, etc.) c. Double hand washing when coming into food prep area, 6 log reduction; sink is convenient, equipped d. Single hand washing when in kitchen working with food, 3 log reduction e. Fingertip rinse bucket at work station, 3 log reduction f. Gloves are optional, except wounds and cuts on hands, arms washed, bandaged, covered		
3. Environment / Facilities a. Cleaned, maintained, pests controlled b. Water, plumbing, sewage, trash controlled (no cross connections; backflow preventers / air gaps installed; water safe source; approved sewer and waste management) c. Toxic items, chemicals controlled (separate storage; labeled)		

THE TEST OF AN EFFECTIVE HACCP-BASED FOOD SAFETY MANAGEMENT PROGRAM

Ask the person / manager / employee selling you the product.

1. What are you preparing and the process?
   - The person should think recipe and flow chart.
2. What are the hazards in this process?
3. The person should answer:
   - All prerequisite processes are controlled.
     - Personal hygiene.
     - Environment, pests, water.
     - Food contact surfaces are washed, rinsed, and sanitized.
     - Supplies come from qualified suppliers.
   - There are the following significant chemical physical, and biological hazards in the food. The critical limits are _____.
   - I perform the following controls. (My target values are _____.)
   - I monitor by _____ to assure that the process is in control, and I record it in the _____.

Operation Process step Description	B,C,P hazard identification / risk assessment	Hazard control; validation; reference	Monitoring / self-check; Who, How, When, recording	Corrective action (by HACCP team)	Verification (Improvement) Direct / record

CONVERTING THE RETAIL FOOD-CODE KITCHEN INTO A HACCP COMMERCIAL PROCESSING KITCHEN

THE 9TH ANNUAL FOOD SAFETY & SECURITY SUMMIT
Washington, D.C. Convention Center

March 6, 2007; 8:00 to 9:00 a.m.

by O. Peter Snyder, Jr., Ph.D.
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HACCP REFERENCE LIBRARY

- Hazard analysis and critical control point principles and application guidelines is the basic document used worldwide to identify the components of HACCP and seven steps to preparing a HACCP plan. (NACMCF) (1992-1998)
- Principles of risk assessment for illness caused by foodborne biological agents adds how to determine in the first step of HACCP, hazard analysis, if the hazard is significant. (NACMCF) (1998)
- 21 CFR 123. FDA fish and shellfish HACCP
- 21 CFR 110. FDA GMPs for all non-meat and poultry and non-fish / shellfish plants such as produce, dairy, bakery, sauces
- 21 CFR 113. FDA thermally processed low-acid food packed in hermetically sealed container
- 21 CFR 114. FDA acidified food
- 9 CFR 416. USDA sanitation / GMP regulations for meat and poultry products
- 9 CFR 417. USDA HACCP regulations
- 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
- USDA FSIS Directive 10,240.3. Sampling protocol for ready-to-eat products (*Listeria*)

ADVANTAGE OF UNIFORM (FEDERAL PERFORMANCE) STANDARDS

(FDA 2005 Food Code Preface. 4)

Use of HACCP and performance standards as the measure of regulatory compliance means establishments are **free to use innovative approaches** in producing safe products such as specified cooling times and temperatures from USDA, that achieve the same end. (Adapted from Preface, page iv)

Retail operators may be given the same opportunity as federally-regulated establishments to use innovative techniques in the production of safe foods. However, to show compliance with the federal performance standard, the retail processor must, like a federally inspected establishment, show that processing controls are in place to ensure that the standard is being met. Thus, a request for a variance based on a federal performance standard must be supported by a validated **HACCP plan** with record keeping and documented verification being made available to the regulatory authority. (Preface, page v)

GOVERNMENT COMMAND AND CONTROL VS. HACCP PERFORMANCE STANDARDS

Item	USDA	FDA Process	FDA Fish	FDA Food Code	HACCP Perform. Stnds.
Cleaning food contact surfaces	Visually clean	Visually clean	Visually clean	Visually clean	2-5-log reduction.
Cleaning feces from fingers	Visually clean	Visually clean	Visually clean	Visually clean	6-log reduction.
Cold raw food storage	40ºF	45ºF	40ºF	41ºF	None. Past. assures safety. Food spoils.
Pre-preparation	None	None	None	None	None. Past. makes safe.
Fruit and veg. wash / blanch	None	5D juice	None	None	2-5-log *Salmonella* reduction.
Acidified food	pH <4.6	pH <4.6	pH <4.6	pH <4.6 (changing to Temperature Control for Safety, TCS)	If pasteurized, pH <4.6 / 4.2 / *B. cereus* If raw, pH <4.2, <1-log increase *Salmonella*.
Cooking / pasteurization	Red meat, 6.5D; Poultry, 7D	None	None	Hamburger 155ºF, 15 sec.; Roast beef 130ºF, 112 min,; Poultry 165ºF, 15 sec.	Supplier certifies fully cooked or 5D center *Salmonella* reduction.
Hot hold	140ºF	140ºF	140ºF	135ºF all except roast beef 130ºF	<1-log increase *C. perf.*
Cooling	<1 log growth *C. perf.*	None	None	135 to 70ºF, 2 hr., 70 to 41ºF, 4 hr.; total 6 hr.	<1-log increase *C. perf.*
Cold holding	40ºF	45ºF	40ºF	41ºF	<3-log increase *B. cereus*

HACCP ALLOWS OPERATORS TO DO ANY PROCESS THAT CAN PRODUCE SAFE FOOD

- Vacuum packaging / sous vide / chilled food: 90-day shelf life at 40ºF.
- Chilled and frozen take-out entrees and meals: CO_2 and MAP to extend shelf life.
- Pasteurized: sous vide and chilled food; 5-to-60 day / 38ºF shelf life (just like milk).
- Sterilized: soups and sauces in jars; canning.
- Acidified: sauces, dressings; use of acids and additives in glazes.
- Produce low-water-activity food such as jams, jellies, jerky.
- Produce all kinds of packaged pastries and cookies.
- Fermented foods: sausage, cheese, yogurt, sauerkraut, kimchee, beer / wine / vinegar.
- Thawing on the counter.
- Hot food precooling at room temperature.
- Slow cook at 130ºF, 90% Rh.
- Displaying and selling food at room temperature (sushi); meat fondue.
- Produce food for home meal replacement; delivered in town or anywhere in the U.S. by UPS, FEDEX, etc.

HACCP helps the operator.

- Kitchen energy requirement will be cut to 1/3 of present use.
- Suppliers will have HACCP programs and tell the cook the level of pathogens in the food that the cook must control.
- Retail food operators can do any process that food manufacturers do.
- New equipment technology and processes can be used.

PROCESS VALIDATION "APPROVAL"
JOURNAL PEER-REVIEWED RESEARCH REPORT

Abstract

Introduction
What is the process; what is the hazard; and what is the purpose of the report?

Methods
How were samples prepared?
What microorganisms were used and source?
What additives were used?
How was the test conducted and controlled?
How were the results measured?

Results
What were the data from the study, and how uniform were results?

Discussion
Discuss results in terms of the purpose of the study

Conclusions
Was or was not the hazard effectively controlled?

Summary

STAGES OF FOOD OPERATION SELF-CONTROL

COOK PREPARING FOOD AT HOME (about 40% of outbreaks)

- No government inspection. Food safety by luck and experience.

LICENSED KITCHEN (one to two inspections a year)

- Government rules based on regulatory judgment, not scientifically correct process validation studies. Inspector does not have time to check process.

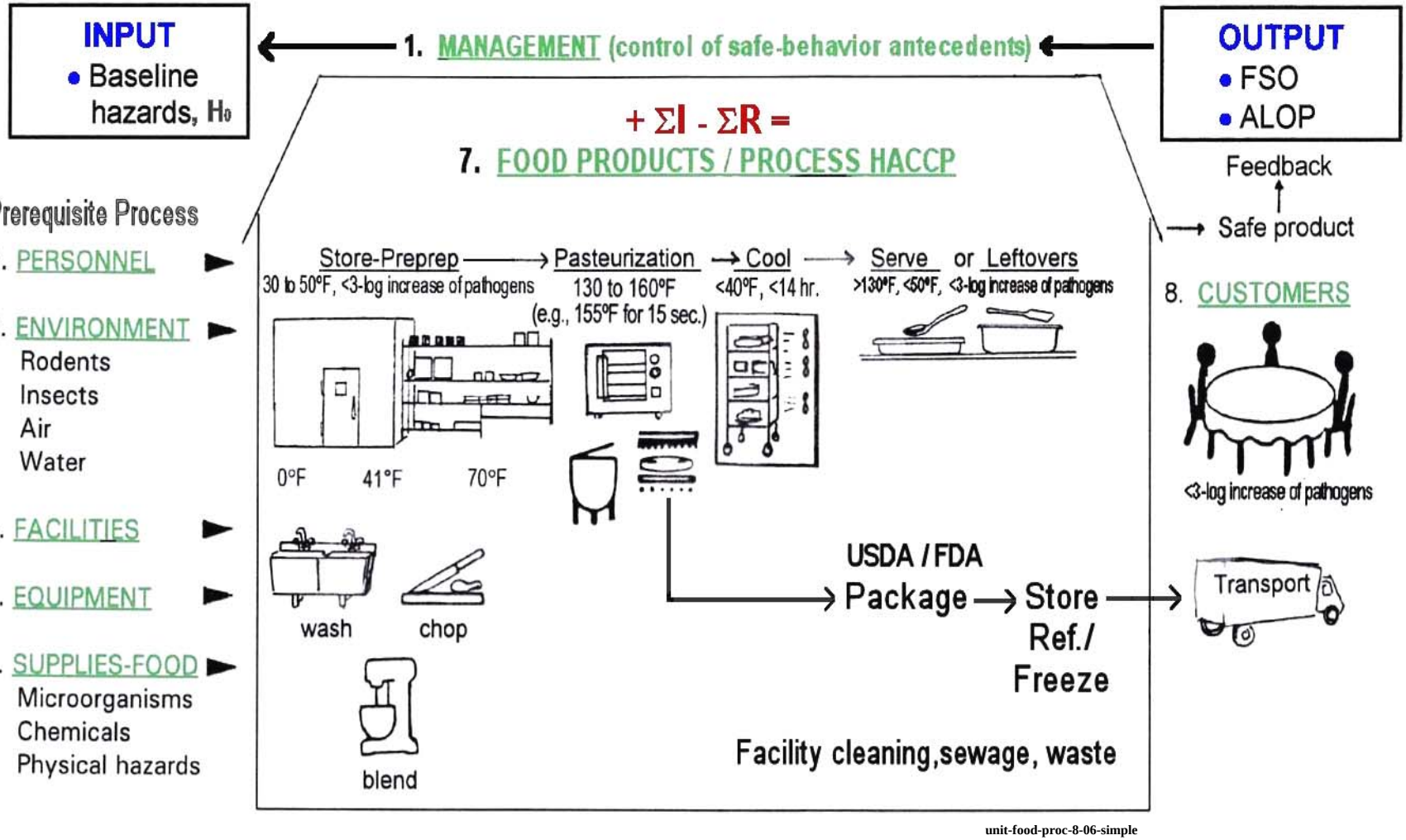
ACTIVE MANAGER CONTROL

- Government rules the same as for the licensed kitchen.
- Manager keeps records of CCP such as ill employees and food storage temperatures. Inspector checks records but not employee demonstration of control.

MANAGER HACCP PROCESS CONTROL AND INNOVATION

- Manager determines hazards and risks, and sets controls and critical limits (CL) based on science. Managers / cooks can innovate any process that they can validate as meeting a Food Safety Objective (FSO). Government approves the Food Safety Management Plan and food HACCP plans.

THE UNIT AS A FOOD PROCESS SYSTEM



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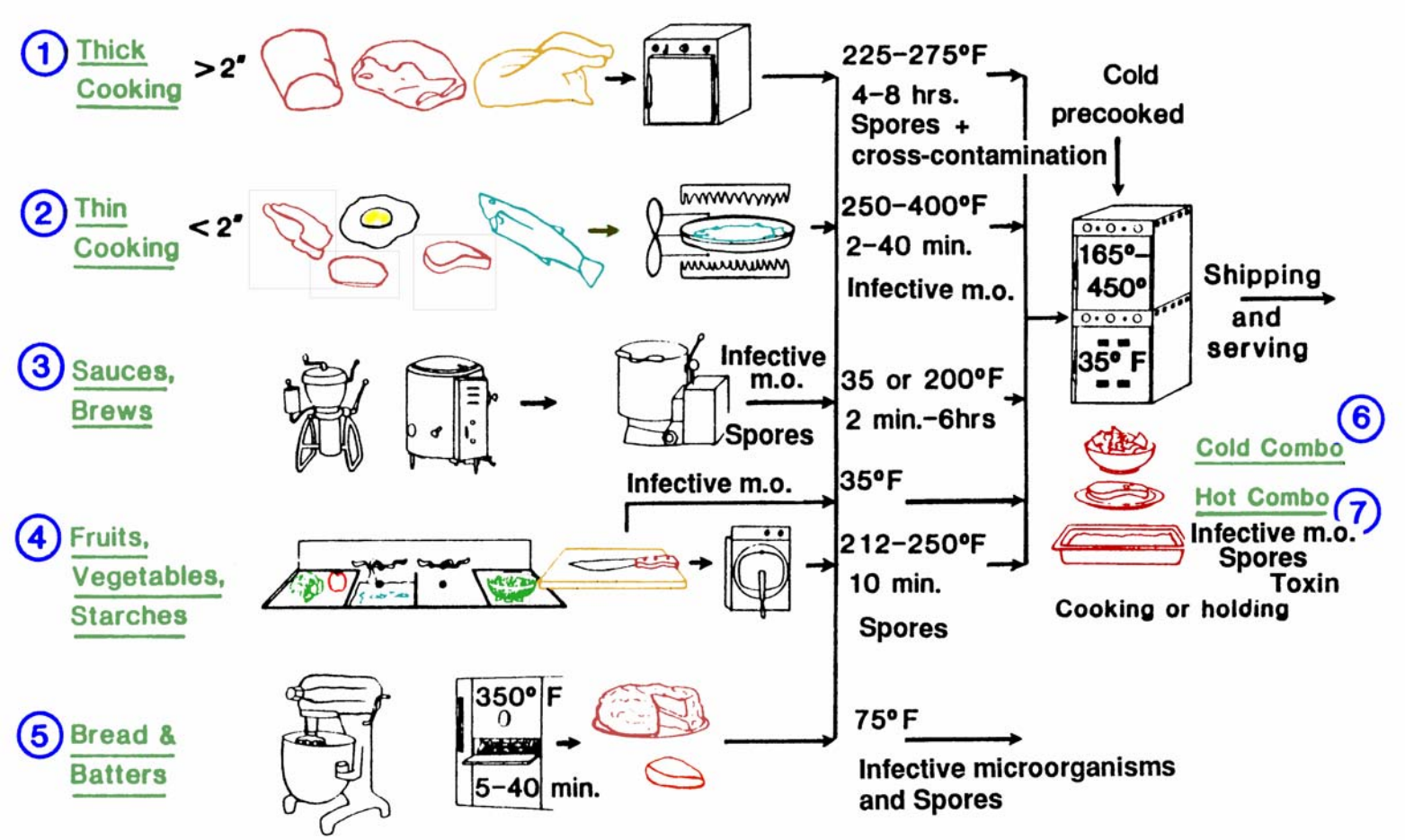
THE SEVEN COOK-THEN-PACKAGE / SERVE RECIPE PROCESSES

Design for control of infective microorganisms and toxin-producing microorganisms



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USDA-SPECIFIED CHILLED FOOD PROCESSES

COOK-IN-PACKAGE

1. **Assemble – Sear – Package – Cook – Chill**
   - Sous vide Rolls and roasts, Canned crab, ham Pates, sausage in casing — PRE-PREP→VACUUM PACKAGE→PASTEURIZE→CHILL
   - Casseroles (Meat, pasta, vegetable, sauce combination) — PRE-PREP→PACKAGE OR PAN AND COVER→PASTEURIZE→CHILL

COOK-THEN-PACKAGE

2. **Assemble – Cook – Package above 160°F (71.1°C) – Chill**
   - Stews, Sauces Soups — PRE-PREP→PASTEURIZE AND PACKAGE HOT→CHILL
3. **Cook – Chill – Assemble – Package**
   - Roast or fried chicken Uncured sausages, patties — PRE-PREP→PASTEURIZE→CHILL→PACKAGE
   - Uncured luncheon meat Diced meat — PRE-PREP→PASTEURIZE→CHILL→SLICE/DICE→ PACKAGE
   - Meat and pasta dinner Sandwiches and pizza — PRE-PREP→PASTEURIZE→CHILL→ASSEMBLE→PACKAGE
   - Meat pies, quiches — PRE-PREP→FILL IN DOUGH→PASTEURIZE→CHILL→PACKAGE
   - Uncured meat, Loafs / tureen — PRE-PREP→ADD RAW INGREDIENTS→PASTEURIZE→CHILL TO GEL→PACKAGE
4. **Assemble with Cooked and Raw Ingredients – Package [chill, pasteurize (heat), or serve cold]**
   - Cold salad Sandwiches, Pizza — PRE-PREP/→CHILL→ASSEMBLE→OPTIONAL→PACKAGE DISINFECT/ PASTEURIZE COOK/CHILL

* **Note:** Food that is frozen after processing can have 20,000 to 50,000 microorganisms per gram.

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THE GLOBAL FOOD HAZARDS

CHEMICAL

Poisonous Substances
Toxic plant material
Intentional additives
Chemicals created by the process
Agricultural chemicals
Antibiotic and other drug residues
Unintentional additives
Sabotage / terrorism
Equipment leaching
Packaging leaching
Industrial pollutants
Heavy metals
Radioactive isotopes

Adverse Food Reactions (food sensitivity)
Food allergens
Food intolerances
Metabolic disorder
Pharmacological reactions
Idiosyncratic reactions
Anaphylactoid reactions

PHYSICAL

Hard Foreign Objects
Glass
Wood
Stones
Metal
Packaging materials
Bones
Building materials
Personal effects

Functional Hazards
Particle size deviation
Packaging defects
Sabotage

Choking / Food Asphyxiation Hazards
Pieces of food

Thermal Hazards
Food so hot that it burns tissue

BIOLOGICAL

Microorganisms and their Toxins
Bacteria: vegetative cells and spores
Molds (mycotoxins, e.g., aflatoxin)
Yeasts (*Candida albicans)*
Viruses and rickettsia
Parasites

Fish and shellfish as sources of toxic compounds

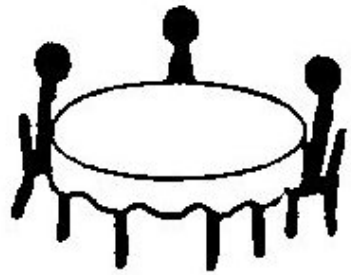
Pests, animals (birds, insects and rodents) as carriers of pathogens

Filth from insects, rodents, and any other unwanted animal parts or excreta

FOOD PRODUCT PROCESS HACCP

H_0 + ΣI - ΣR + ΣI = FSO with ALOP

Input Hazards		Processes		
• Ill employee / feces on fingers	10^6	Hand wash (*Shigella*)	10^{-6}	10^0
• Environment, facilities, equipment, pest control, food contact surface cleaning	10^3	Food contact surface clean and sanitize (*Salmonella*)	10^{-3}	10^0
• Supplies: food that the farmer grew / processor made safe, physical hazards, chemical control, prevent cross-contamination	10^3	Food wash / pasteurization Sterilization	10^{-5} 10^{-9}	10
		↑ CM / PS		↑ PO



FSO	Food Safety Objective – Safe level of hazard
ALOP	Appropriate Level Of Protection – Acceptable ill / 100,000
PO	Performance Objective – Level of a hazard at end of step
CM	Control measure – Any action taken to reduce / control hazard
PS	Performance Standard – hazard reduction in a step

H_0	Hazard input
ΣI	Hazard increase
ΣR	Hazard reduction

FOOD HAZARDS (H_0) AND FOOD SAFETY OBJECTIVES (FSO)

Hazards	Raw Product Contamination (H_0)	Process Performance Criteria (ΣR)	Food Safety Objective (FSO)
MICROBIOLOGICAL			
INFECTIVE			
Vegetative pathogens - infection			
Salmonella spp.	10^3 cfu/g	10^{-5} cfu/g - reduce	10^{-2} cfu/g or 1cfu per 100 g
Shigella spp.	10^3 cfu/g	10^{-5} cfu/g - reduce	10^{-2} cfu/g or 1cfu per 100 g
Escherichia coli O157:H7	10^3 cfu/g	10^{-5} cfu/g - reduce	10^{-2} cfu/g or 1cfu per 100 g
Parasites			
Cryptosporidium parvum	1 cyst	prevent / reduce	undetectable
Toxoplasma gondii	1 cyst	prevent / reduce	undetectable
Trichinella spiralis	1-500 larvae	prevent / reduce	undetectable
Viruses			
Hepatitis A	>10 virus / g	prevent / reduce	undetectable
Norovirus	>100 virus / g	prevent / reduce	undetectable
TOXIN PRODUCING			
Staphylococcus aureus (exotoxin)	10^3 cfu/g	$<10^3$ cfu/g increase	$<10^6$ cfu/g (toxin dose: <1 microgram)
Clostridium botulinum (exotoxin)	10^0 spores / g	$<10^3$ cfu/g increase	$<10^3$ cfu/g (toxin dose: ≤2 nanograms)
Bacillus cereus (exotoxin, enterotoxin)	10^2 spores / g	$<10^3$ cfu/g increase	$<10^5$ cfu/g (toxin dose: unknown)
Clostridium perfringens (enterotoxin)	10^2 spores / g	$<10^3$ cfu/g increase	$<10^5$ cfu/g (toxin dose: unknown)
CHEMICAL			
Sulfites	Unk	none added	<10 ppm
Nitrates	Unk	<500 ppm added	<500 ppm
Nitrites	Unk	<200 ppm added	<200 ppm
Monosodium glutamate	Unk	≤0.5 g / serving	<3.0 g / meal
Aflatoxins (from mold)	<20 ppb	no increase	<20 ppb
Histamine (from fish, cheese)	<20 ppm	no increase	<20 ppm
PHYSICAL			
Hard foreign objects (broken tooth)	>1/16 inch diameter	prevent / remove	undetectable
Choking	>1/4 inch diameter	prevent / remove	undetectable

* cfu = colony forming units

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FOOD GROUPS HACCP PROCESS ANALYSIS

HACCP Process Groups (USDA HACCP, 9 CFR 417) Prerequisite / GMPs working		Control	Shelf life
I	**Not heat treated, not shelf stable (raw).** Not PHF / no RPG: sprouts; raw meat, fish; sushi, sashimi; poultry; eggs, raw fruits and vegetables	Grown safe, with H_0 that meets FSO. May require Temperature Control for Quality.	<14 days (bact. spoilage)
II	**Not heat treated, with inhibitors to make shelf stable.** Water activity: flour, corn meal, nuts, salt, sugar, sugar icing, honey, spices and herbs, oil, lard; salted, dried fish, fresh pasta Fermentation: pepperoni, salami; olives; dairy (cheese, yogurt, sour cream / milk / crème fraîche); bread; sauerkraut; kimchee; beer, wine Acidified: salad dressing; cole slaw; salsa; condiments	Grown safe, made safe by supplier, with H_0 that, with $+\Sigma I\text{-}\Sigma R$ (5-log *Salmonella*), meets FSO. Does not require TCS because of product aw, pH, or additives.	>2 years, 70ºF (chem. spoilage)
III	**Fully cooked, not shelf stable.** hot or cooled, refrigerated ready-to-eat food; meat, fish, poultry; fruits, vegetables, dairy, pastry filling, pudding	Pasteurized (5-log to 7-log *Salmonella*) so that $+\Sigma I\text{-}\Sigma R$ meets FSO. Requires TCS.	41 to 135ºF, ≤4 hours or Cold 41ºF, 14-90 days
IV	**Fully cooked, with inhibitors to make shelf stable.** marinara sauce; fruit pie fillings; cake icing, bread and pastry, dry cereals, dry pasta, smoked fish; packaged, low-pH fruits and vegetables	Pasteurized (5-log to 7-log *Salmonella*) so that $+\Sigma I\text{-}\Sigma R$ meets FSO. Does not require TCS because of product a_w, pH, or additives.	>5 years
V	**Commercially sterile, shelf stable.** "packaged" meat, fish, poultry, fruits, vegetables, dairy / UHT milk	Sterilized, *Clostridium botulinum* spores reduced 9 log to 12 log. Does not require TCS.	>5 years

HACCP PROCESS PERFORMANCE STANDARDS

- Physical hazard: <1/16 inch.
- Chemical hazard: At tolerable levels.
- Remove fecal pathogens from fingertips: 6D reduction.
- Wash food pathogens from hands: 3D reduction.
- Wash food pathogens from food contact surfaces: 5D reduction.
- Supplier safe with HACCP intervention process, or cook makes safe.
- Wash fruits and vegetables for a 2D reduction or blanch for a 5D reduction.
- Pasteurize meat, poultry, fish for a 5D reduction of *Salmonella.*
- Sterilize food for a 12D reduction of *Clostridium botulinum.*
- Cool 120 to 55ºF, 6 hours (to 40ºF, 14.4 hours); <1 log increase of *Clostridium perfringens.*
- Acidify: *Salmonella* control <4.1 pH
  C. botulinum control <4.6 pH
- A_w: <0.86 a_w *Staphylococcus aureus* control
  <0.92 a_w *Bacillus cereus* control
- Cold hold <40ºF, no spore outgrowth; no time limit. If held 40 to 130ºF, or given to consumer for take-out, <3 log increase.

MENU ITEMS GROUPED BY HAZARD AND CONTROL CATEGORIES

(Assumes that prerequisite programs are effective.)

Thick Food >2"	Thin Food <2"	Sauces, Soups	Fruits, Vegs., Starches	Hot Combo	Cold Combo	Breads, Pastries, Desserts	Miscellaneous
Served hot Prime rib Roast chicken Baked ham	Center pasteurize Hamburger Meatballs Sausage Surface pasteurize Steaks Chops Fillets	Hot ***pH >4.6*** Gravy White sauce Chicken soup ***pH <4.6/4.2*** Hollandaise sauce Bearnaise sauce	Cooked Products ***pH >4.6*** Potatoes Pasta Rice ***pH <4.6/4.2*** Applesauce Sweet and sour red cabbage	Cooked Products ***pH >4.6*** Beef stew Fettucini Alfredo ***pH <4.6/4.2*** Chili con carne BBQ beef	Cold Products ***pH >4.6*** Chicken sandwich Chicken salad ***pH <4.6/4.2*** Cole slaw Salsa Deviled eggs	 ***pH >4.6*** Eclairs Pumpkin pie Meat pies ***pH <4.6/4.2*** Cherry pie Apple pie Rhubarb crisp	Dairy Products ***pH >4.6*** Milk Cream Most cheese ***pH <4.6/4.2*** Yogurt Cheddar cheese
Served cold Sliced ham Sliced beef Sliced turkey	Eaten raw Fish Eggs Steak Tartar (beef) ***a_w<0.92*** Salted fish	Cold ***pH >4.6*** Vichyssoise Custards ***pH <4.6/4.2*** Mayonnaise Gazpacho ***a_w<0.92*** Honey Jam, jelly Maple syrup	Washed, not cooked ***pH >4.6*** Lettuce Cauliflower ***pH <4.6/4.2*** Apples Tomatoes Strawberries			 ***a_w<0.92*** Breads Muffins Pancakes	Beverages ***pH >4.6*** Coffee Tea ***pH <4.6/4.2*** Lemonade Cola Beer Wine

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SUPPLIER CONTROLS FOR SAFE INGREDIENTS

ingredient	CONTROL					STABILIZE		
	Grown safe	HFO Sort, Remove	Wash	Pasteurize Sterilize	Allergen (inform)	A_w	pH Acid / Ferment	Ref. / Freeze
Meat, fish, poultry								
Entrée								
Fruits, vegetables								
Dairy / eggs								
Bakery, grain								
Juice, beverages								
Fats / oils								
Sugar / sweets								
Condiments / dressings								
Gravy								
Spices / herbs / chemicals								
Alcoholic beverages								

COOK CONTROLS FOR SAFE INGREDIENTS

ingredient	B,C,P Hazard	CONTROL				STABILIZE		
		HFO Sort, Remove	Wash	Pasteurize Sterilize	Allergen (inform)	A_w	pH Acid / Ferment	Ref. / Freeze
Meat, fish, poultry								
Entrée								
Fruits, vegetables								
Dairy / eggs								
Bakery, grain								
Juice, beverages								
Fats / oils								
Sugar / sweets								
Condiments / dressings								
Gravy								
Spices / herbs / chemicals								
Alcoholic beverages								

FOOD PROCESS HACCP PLAN (CODEX / NACMCF)

Recipe Process Step	Chemical, Physical, Biological Hazards	Is this a CCP? (Yes / No)	Control-process criteria (Tolerable limits)	Monitoring procedures / Frequency / Person(s) responsible	Corrective actions / Person(s) responsible	Verification procedures / Person(s) responsible	HACCP records

HITM RETAIL PROCESS HACCP / RISK CONTROL PLAN

Process steps with controls Management, Prerequisite controls are effective	Hazard and Risk Analysis • B,C,P hazard identification Tolerable level / size • Risk assessment Severity (cost) Probable hazard levels / size Probable occurrence Acceptable risk ← next step Significant risk →	Control(s) • Critical limit of process control(s) to reduce / prevent / eliminate a significant risk to an ALOP • Validation and reference (FMEA) • Process criterion to achieve a C_{pk}>1 within expected process deviations	Monitoring / Self-check Who, how, when, what to measure process variation and keep inside the critical limit(s) Where is it recorded?	Corrective Action If deviation created a significant risk, what corrective action was taken?	Verification and Analysis for Process Improvement Who, how, when, what

THE RECIPE AS THE HACCP PLAN

Recipe Name: Chicken Cacciatore
Production style: Combination
Written by: O. P. S. Date: 10/95
SA/QA by: J. Bell Date: 12/95

Portion size (vol./wt.): 1/4 (6 oz.) chicken + 3 oz. sauce
Number of portions: 100
Final yield (AS):100
Final yield:

Preparation time: 2 hours
Prepared by: S. P.
Supervisor:

Gp. #	Ingred. #	Ingredients and Specifications	Edible Portion (EP) (weight or volume)		EP Weight %	As served (weight)
I	1	Onions, chopped (1/2" x 1")	3.0 lb	1,360.00 g	13.26	
	2	Mushrooms, cut (1/2 ", caps & stems)	3.0 lb	1,360.00 g	13.26	
	3	Peppers, green, cut (1/2" x 1")	2.0 lb	907.2 g	8.84	
	4	Garlic, chopped	6 Tbsp.	85.05 g	0.53	
	5	Tomatoes, canned, crushed (2 - #10 cans)	13.25 lb	6,010.00 g	58.58	
	6	Oil, vegetable	1/4 cup	54.00 g	0.53	
	7	Wine, Marsala or Madeira	2 cups	472.00 g	4.60	
	8	Oregano, crushed	2 tsp.	3.00 g	0.03	
	9	Salt	1 tsp.	5.50 g	0.05	
	10	Pepper	1 tsp.	2.10 g	0.02	
		Total	22.6 lb	10,258.85 g	100.00	22.0 lb
		Approx. gallons	2.5 gal.			
II	11	Chickens, whole (25 - 2¼ to 2½ lb.)	62 lb			40.0 lb

Preparation

1. Prepare sauce. Get chopped onions, mushrooms, green peppers and garlic (40°F) from refrigerator. Sauté the vegetables in vegetable oil for about 10 minutes. Add crushed tomatoes with juice, wine, and seasonings (72°F). Bring sauce to a simmering temperature (205°F, 10 min.).
   1a. Hold sauce in bain marie. (165°F, 20 min.)
2. Prepare chicken. Get chicken quarters (40°F) from meat and poultry refrigerated storage area. Remove rib bones. (45°F, 10 min.)
3. CCP Place quarters, one layer deep in shallow roasting pans. Brown chicken by baking it in a convection oven at 350°F for 30 min. (>165°F, >15 sec.)
4. Remove pans of chicken from oven. (165°F, 15 min.) Pour off excess liquid. Save for chicken stock.
   4a. CCP Cool liquid from 135 to <41°F, <6 hours, <2 inches deep or <1-gallon container.
5. Cover the chicken quarters with sauce, 155°F, <10 min. (Final temperature 150°F.)
6. Return the pans of chicken and sauce to convection oven at 300°F and continue baking until all parts of the chicken reach a temperature of 175°F (about 45 minutes).
7. Check temperature of chicken. If temperature is not 175°F, continue baking.
8. Cover chicken, 175°F, transfer to 150°F hot holding unit and serve within <2 hours.

Hold / Serve

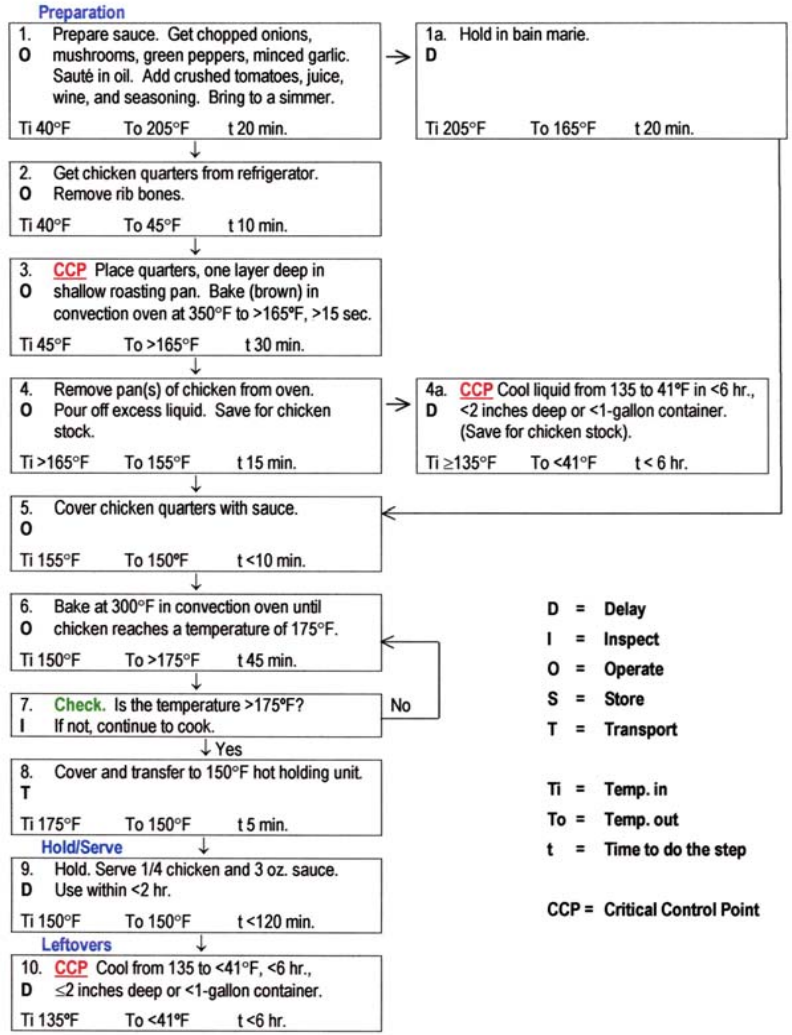
9. Hold / serve chicken >150°F, <2 hours. For each portion, use either 1/4 quarter white or dark meat. Chicken should be accompanied by 3 ounces of sauce (165°F) (about 3 tablespoons).

Leftovers

10. CCP Cool from 135 to <41°F in <6 hours, ≤2 inches deep or <1-gallon container.

Ingredients that could produce possible allergic reactions: Tomatoes, wine

Process step #	Start food ctr. temp., °F	Thickest food dimension (in.)	Container size HxWxL (in.)	Cover Yes/No	Temp. on/ around food	End food ctr. temp., °F	Process step time, hr./min.



QUALITY-ASSURED HACCP RECIPE PROCEDURES
(Prerequisite controls / SSOPs / GMPs are effective)

Gp. #	Ingred. #	Ingredients and Specifications	Lot #	EP Weight %	Edible Portion (wt.)	(vol.)	As Served (weight)	Nutr. #

Ingredients that could produce possible adverse reactions (allergic or intolerance): **Verification**

Pre-preparation

1. Get food for recipe, <1-log increase *L. monocytogenes*.
2. Thaw <70ºF, <1-log increase in *Salmonella*.
3. Do pre-prep. (No significant hazard.)

Preparation

4. **CCP**. Double wash all fruits and vegetables served raw to reduce vegetative pathogens 2 log or blanch, 5-log reduction of *Salmonella*..
5. **CCP**. Pasteurize / cook for 5-log *Salmonella* reduction (155ºF, 15 seconds).

Hold / Serve

6. Hot hold, transport, serve. <1-log increase *C. perfringens* (>125ºF, 90% Rh).

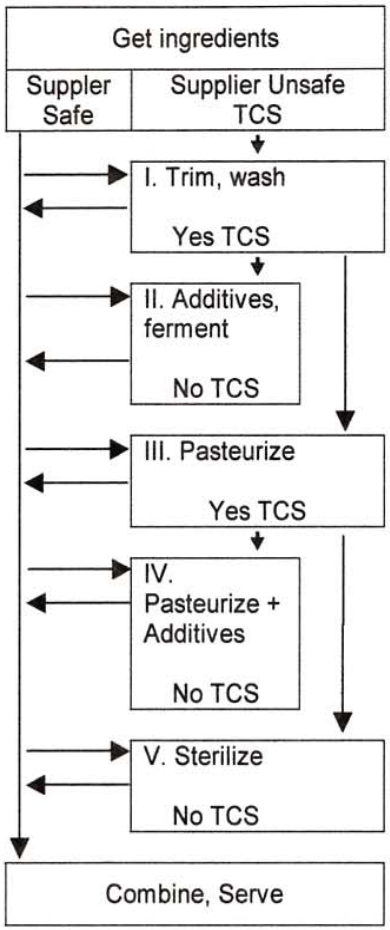
Leftovers

7. **CCP**. Cool to prevent >1-log increase of *C. perfringens* (120 to 55ºF, 6 hr. and continue until 40ºF, 14 hr.; <2 in. deep or 1- gal. pot, 6 in. diameter).
8. Cold hold, <3-log increase *B. cereus*. If making cold mixed salad, get all ingredients <50ºF before mixing to control *Staphylococcus aureus*.

Process step #	Start food ctr. temp., ºF	Thickest food dimension (in.)	Container size HxWxL (in.)	Cover Yes/No	Temp. on / around food	End food ctr. temp., ºF	Process step time, hr./min.

FIVE USDA PROCESSES HACCP PLAN

Prerequisite controls are in place.

Process Steps	Hazards	Controls	Monitor	Corrective Action	Verification
					

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FOOD SAFETY PLAN AND HACCP MANUAL

Preface

Log of changes
Reassessment

Operations Description

System description
Organization
Environment (picture)
Facilities (plan)
Equipment (list)
Menu HACCP (processes)

Management

Food safety policy
Responsibility and accountability
HACCP team / QC
- Self-inspection
- Corrective action
- Training

Emergencies
Food security / sabotage

Prerequisite Processes

Personal hygiene

Employee illness reporting
Hand washing
- After toilet
- After touching raw food

Cleaning, maintenance, and pest control

Facilities, Environment
Equipment and warewashing

Supplies

Source of supply
- Ingredients
- Supplier safe vs. cook made safe

Receiving inspection
Storage: ambient, refrigerated, frozen
Control of physical, chemical, and biological contamination

Food Process HACCP

Pre-preparation

Physical hazards
Chemical hazards
Allergens
Thawing
Fruit and vegetable washing
Serving raw food

Preparation

Salad and hors d'oeuvres
Pasteurization / sterilization
Ingredients to extend shelf life
Hot holding
Cooling
Cold holding
Leftovers / reprocessing

Distributing / serving food

Communicating safe handling

OPERATION DESCRIPTION

Company / unit name Address	
License / establishment number	
Description (picture) of facility	
Person in charge	
HACCP team members and duties	Member name _____ _____ _____ Duties: Team _____ _____ _____ Operation _____ _____ _____
Hours of operations	
Type of operation	
Number of units / lbs. produced daily	
Population to which food is mainly served	General population
General processes for food preparation	
Products donated to charitable organizations (specify items)	

DAILY QA CHECKLIST AND RECORD

PREREQUISITE HACCP REQUIREMENTS	PERSON / ITEM : OBSERVATION	CORR. ACT #
1. **Personal Hygiene** (Person: Health, cleanliness, double hand washing when coming from toilet, single hand washing for raw food / RTE food control, gloves control)	1. _____ : _____ 2. _____ : _____ 3. _____ : _____	
2. **Environment / facilities** (Item: Cleaned, maintained, pests, trash, chemicals, water, plumbing controlled)	1. _____ : _____ 2. _____ : _____ 3. _____ : _____	
3. **Equipment** (Item: Cleanliness, temperature, maintenance, sanitizer concentration)	1. _____ : _____ 2. _____ : _____ 3. _____ : _____	
4. **Storage** (Food: temperature, use by)	1. _____ : _____ 2. _____ : _____ 3. _____ : _____	
FOOD HACCP PROCESSES	**FOOD : OBSERVATION**	**CORR ACT#**
1. **Physical hazards** (Food: hazard control)	1. _____ : _____ 2. _____ : _____	
2. **Allergen control**; do not add fresh to old; do not combine different leftovers (Food: allergen control)	1. _____ : _____ 2. _____ : _____	
3. **Double wash fruits and vegetables** Food: adequate physical wash)	1. _____ : _____ 2. _____ : _____	

MONTHLY PROCESS CHECKLIST AND RECORD

FOOD SAFETY PERFORMANCE REQUIREMENTS	OBSERVATION	CORR. ACT.
Management Programs		
1. Management, Person In Charge (PIC), HACCP team, trained and performing: a. Self-assessment using hazard and control checklist b. Cooks know hazards and perform controls and monitoring c. Team meeting to verify records that processes are in control and to take corrective action and improve d. HACCP plan validated; all food preparation procedures validated		
Prerequisite Programs		
2. Personal Hygiene a. Ill employee control (no work if vomiting, diarrhea; tell PIC if sick; restricted work if sneezing, coughing, runny nose; Call health department with hepatitis A, norovirus, *Salmonella*, *Escherichia coli* O157:H7, etc.) b. Employees clean (uniform; no body odor, short fingernails, etc.) c. Double hand washing when coming into food prep area, 6 log reduction; sink is convenient, equipped d. Single hand washing when in kitchen working with food, 3 log reduction e. Fingertip rinse bucket at work station, 3 log reduction f. Gloves are optional, except wounds and cuts on hands, arms washed, bandaged, covered		
3. Environment / Facilities a. Cleaned, maintained, pests controlled b. Water, plumbing, sewage, trash controlled (no cross connections; backflow preventers / air gaps installed; water safe source; approved sewer and waste management) c. Toxic items, chemicals controlled (separate storage; labeled)		

CLEANING PLAN AND REPORT

Equipment / area / surface (reference #)	Assigned to *	When done **	What to do, cleaning and sanitizing chemicals to use	Done by (initial / date)	Comments and corrective action
Receiving					
Storage					
Pre-prep					
Produce					
Meat, poultry fish					
Kitchen					
Packaging					
Trucks					

Verification _____ **Date** _____

* You may use a code such as: fp = food preparation person; st = sanitation technician; sp = service person; ap = administrative person.

** Be as specific as possible. You may use a code such as: 3h = every 3 hours; a/u = after each use; a/o = at opening of the restaurant; a/c = at closing of the restaurant; a/r = as required during daily operations; wk = weekly.

PREVENTIVE MAINTENANCE PLAN AND REPORT

Equipment (reference #)	Assigned to	When done	What to do, what to use	Done by (initial / date)	Comments and corrective action
Refrigerators					
Ovens					
Fryers					
Ventilation					
Utility cleaning					
Hot water					
Floors / walls					

Verification _____ **Date** _____

SUPPLIER INGREDIENT SPECIFICATIONS

Ingredient name: **Product code:**

How is it to be used?

Type of package:

Special distribution control needs?

Shelf life at what temperature?

Ingredient description:

Safety of ingredient:

What is the supplier's intervention strategy?

Ingredient statement:

Allergens / chemical hazard:

MICROBIAL SPECIFICATIONS / HAZARDS		
Organism	**Mean**	**3 Std. Dev.**
APC		
Escherichia coli		
Listeria spp.		
Salmonella		
Yeast		
Mold		

PHYSICAL SPECIFICATIONS / HAZARDS		
Organism	**Mean**	**3 Std. Dev.**
Finished product weight		
Dimensions		
Texture		
Flavor / aroma		
Foreign material		
Color		
Shape		

Kosher specifications (if desired)**:**

Packaging

NUTRITION SPECIFICATIONS (CONSUMER)

Ingredient label:
Ingredient name:
UPC:
Production description:
Serving size:
Serving description:

Nutrition name	Value	% Daily value	Nutrition name	Value	% Daily value
Calories (Kcal)			Total carbohydrates (g)		%%
Calories from fat (Kcal)			Dietary fiber (g)		
Total fat (g)		%	Sugars (g)		
Saturated fat (g)		%	Protein (g)		
Trans fat (g)			Vitamin A (IU)		%
Cholesterol (mg)		%	Vitamin C (mg)		%
Sodium (mg)		%	Calcium (mg)		%
			Iron (mg)		%

Packaging:
Preparation instructions:
Allergens:

ASSEMBLE / PACKAGE PRODUCTION RECORD

Product _____ Date _____

Lot # / Prod.	Size / # Pkgs	Empl. Init.	Time Started	Time Finished / Temp				Cooling, 120-55ºF				Init.	Verify	Preship	Comments Below ✓
				Time	Temp	Temp	Temp	Time / Temp	Time / Temp	Time / Temp	Time / Temp				

Comments _____

_____

EMPLOYEE FOOD HACCP TRAINING CHECKLIST

Critical Control Points	Demonstrated Correct Performance	Evaluation Date _____
PREREQUISITES Personal hygiene If I have vomiting or diarrhea, I will tell the PIC. I will double wash my fingertips when coming from an "unknown location" such as the toilet. When handling raw meat / fish / poultry, I will decontaminate my hands and food contact surface before touching RTE food. I do not touch my skin when working with food. Immediately after glove use, I remove the gloves and wash my hands Receiving When receiving food / opening food, any food that is damaged or spoiled will be returned to the supplier / discarded. Refrigerate food 41ºF. Storage I store raw food on the bottom shelves in the refrigerator and RTE food above the raw food. I store chemicals completely separate from food. Equipment I assure that my equipment is clean before I use it. I assure that my equipment is working correctly and calibrated before I begin preparation.		

PROCESS QUALIFICATION

A qualified process is one that the cook can demonstrate in operation that all necessary procedures, training, documentation, measurement, controls, and checks and balances are in place to ensure that the process can produce uniform-quality, safe food, even under stress conditions.

- Until the performance of the process can be predicted, it is not in control. To predict, the key process variables must be known, be controlled, and be repeatable.
- Correction – When you find a problem, remove the ROOT CAUSE of the problem.
- A "better" process means:

  More stable: $C_{pk} > 1$; More predictable; Safer = $\frac{USL-X}{3\sigma}$

  Common and special causes known; Special causes being reduced
  Waste being reduced
  Faster production
  Better customer satisfaction

THE TEST OF AN EFFECTIVE HACCP-BASED FOOD SAFETY MANAGEMENT PROGRAM

Ask the person / manager / employee selling you the product.

1. What are you preparing and the process?
   - The person should think recipe and flow chart.
2. What are the hazards in this process?
3. The person should answer:
   - All prerequisite processes are controlled.
     - Personal hygiene.
     - Environment, pests, water.
     - Food contact surfaces are washed, rinsed, and sanitized.
     - Supplies come from qualified suppliers.
   - There are the following significant chemical physical, and biological hazards in the food. The critical limits are _____.
   - I perform the following controls. (My target values are _____.)
   - I monitor by _____ to assure that the process is in control, and I record it in the _____.

Operation Process step Description	B,C,P hazard identification / risk assessment	Hazard control; validation; reference	Monitoring / self-check; Who, How, When, recording	Corrective action (by HACCP team)	Verification (Improvement) Direct / record