

Dr. Brian Nummer PhD

FOOD-SAFETY.GURU







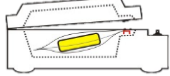




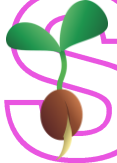
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Food Safety For Small Processors, Retail, And Foodservice

How can I help you today? Click a menu item above or search here



 **SPECIAL**    
  **PROCESSES**    

HAZARDS AND CONTROLS

Cured, Fermented, & Dried Meats

Food Code

6. DISCUSSION OF THE CODE AS A HACCP MODEL AND THE INTENTION TO INCORPORATE OTHER MODELS

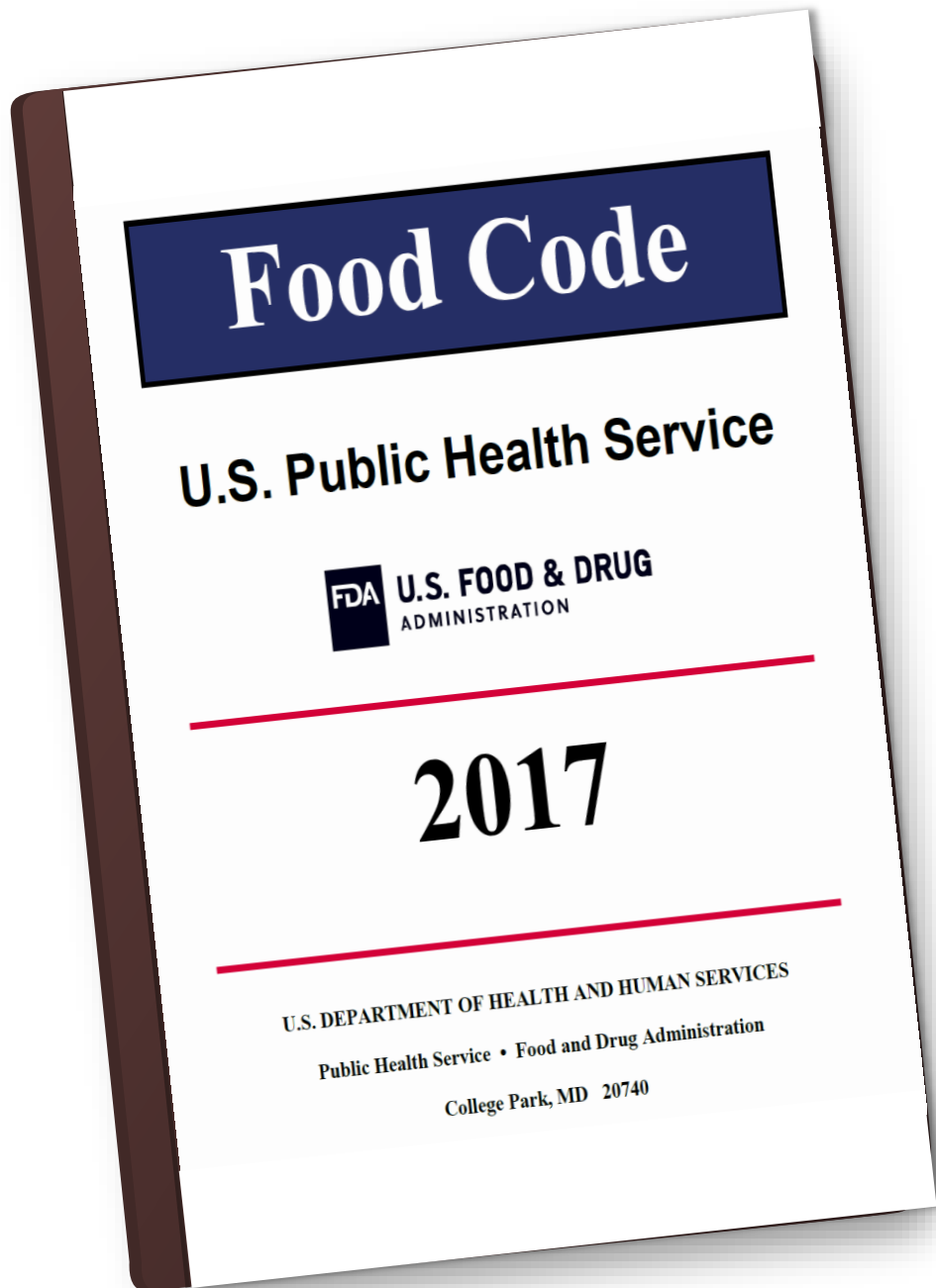
It is important to note that preapproval of HACCP plans for food establishments operating pursuant to a variance is provided for under the Food Code, but such a plan preapproval is not a part of another HACCP regulatory model, the Fish and Fishery Products regulation 21 CFR 123, effective December 18, 1997. FDA published the Fish and Fisheries Hazards and Controls Guidance Fourth Edition April 2011. Additionally, there are differences between the two models in the required content of the HACCP plan. For example, the HACCP plans requested by the Food Code must include flow

HACCP plans are key to the use of performance standards as measures of regulatory compliance. Performance standards issued by the Food Safety and Inspection Service are applicable to a broad range of meat, poultry, and egg products. Federal performance standards are acceptable, equivalent alternatives to the command-and-control provisions that now provide specific times and temperatures for processing various products. Federal performance standards may be used to determine the safety of a product or process under the Food Code if authorized under a variance granted in accord with the Code's variance provisions, and demonstrated by adherence to a validated HACCP plan, consistent with the Code's HACCP provisions.

PREFACE

conformance with such regulation or guideline. In so doing, the need for preapproved plans under the more intensive regimen of the Food Code will be significantly reduced.

HACCP plans are key to the use of performance standards as measures of regulatory compliance. Performance standards issued by the Food Safety and Inspection Service are applicable to a broad range of meat, poultry, and egg products. Federal performance standards are acceptable, equivalent alternatives to the command-and-control provisions that now provide specific times and temperatures for processing various products. Federal performance standards may be used to determine the safety of a product or process under the Food Code if authorized under a variance granted in accord with the Code's variance provisions, and demonstrated by adherence to a validated HACCP plan, consistent with the Code's HACCP provisions.



3-502.11
Special Processes

8-201.13
When a HACCP plan is required

8-201.14
Contents of a HACCP Plan

(B) Curing FOOD; ^{Pf}

(C) Using FOOD ADDITIVES or adding components such as vinegar: ^{Pf}

(1) As a method of FOOD preservation rather than as a method of flavor enhancement, ^{Pf} or

(2) To render a FOOD so that it is not TIME/TEMPERATURE CONTROL OF SAFETY FOOD; ^{Pf}

Methods

(H) Sprouting seeds or beans. ^{Pf}

HACCP Preliminaries



5 Steps to get started

01

Create an “educated” HACCP team. Document General Information.

02

Describe the *Special Process* food product (category) and consumer

03

List ingredients, packaging, and “special” equipment

04

Create/verify a flow diagram

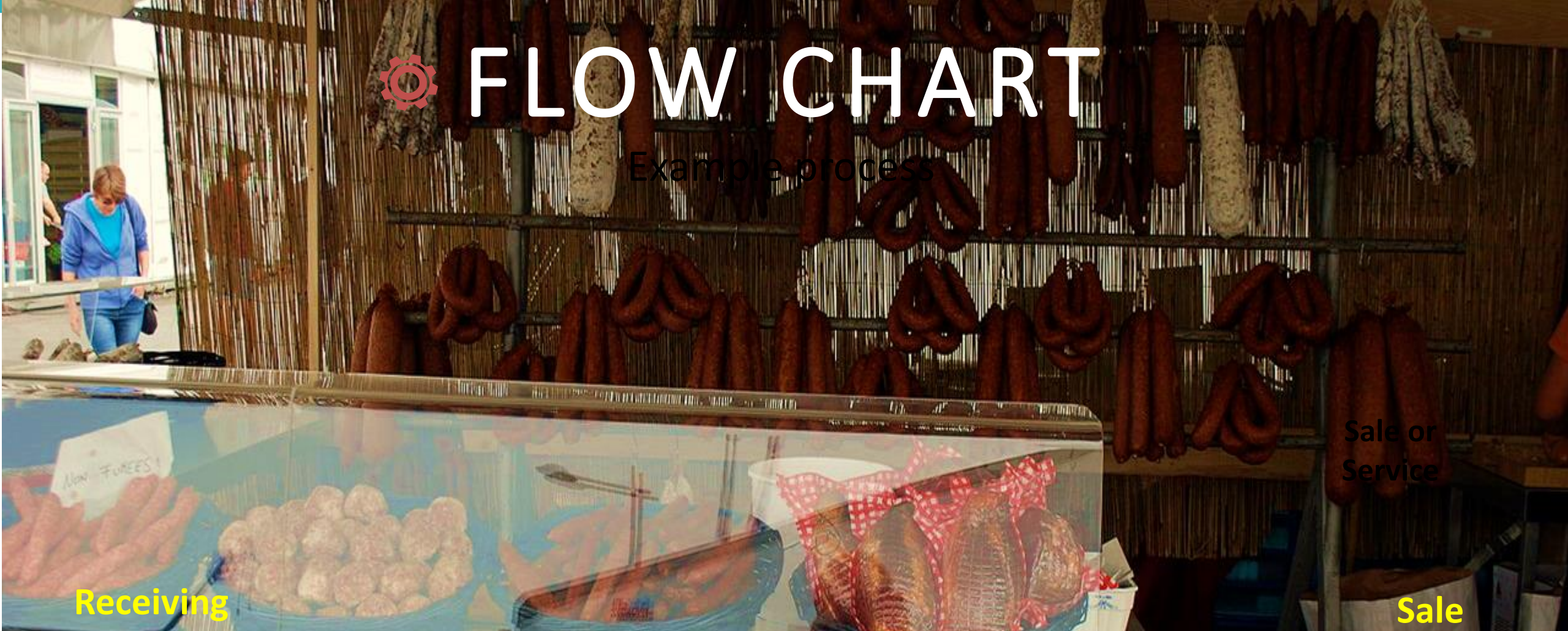
05

Consult Regulatory Agency



FLOW CHART

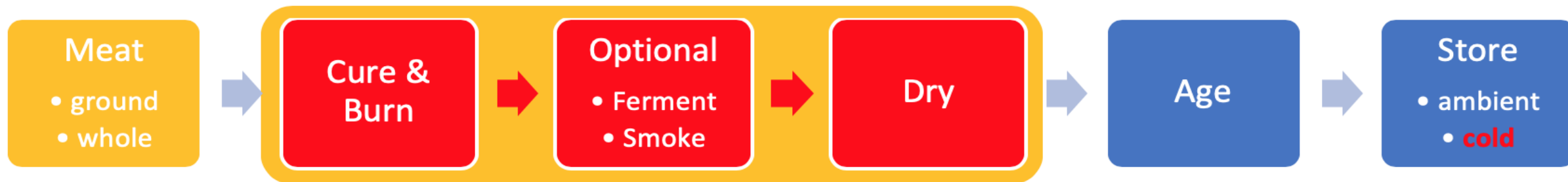
Example process



Receiving

Sale or Service

Sale



HA + CCP

7 STEPS (Principles)



Hazard Analysis



+



Critical Control Points

Time doesn't permit covering this part of HACCP

Annex 4, Table 1a – 1c. Selected Biological Hazards Found at Retail, Associated Foods, and Control Measures

Annex 4, Table 1a. Selected Bacterial Hazards Found at Retail, Associated Foods, and Control Measures

HAZARD	ASSOCIATED FOODS	CONTROL MEASURES
<i>Bacillus cereus</i> (intoxication caused by heat stable, preformed emetic toxin and infection by heat labile, diarrheal toxin)	Meat, poultry, starchy foods (rice, potatoes), puddings, soups, cooked vegetables	Cooking, cooling, cold holding, hot holding
<i>Campylobacter jejuni</i>	Poultry, raw milk	Cooking, handwashing, prevention of cross-contamination
<i>Clostridium botulinum</i>	Vacuum-packed foods, reduced oxygen packaged foods, under-processed canned foods, garlic-in-oil mixtures, time/temperature abused baked potatoes/sautéed onions	Thermal processing (time + pressure), cooling, cold holding, hot holding, acidification and drying, etc.
<i>Clostridium perfringens</i>	Cooked meat and poultry, Cooked meat and poultry products including casseroles, gravies	Cooling, cold holding, reheating, hot holding
<i>E. coli</i> O157:H7 (other shiga toxin-producing <i>E. coli</i>)	Raw ground beef, raw seed sprouts, raw milk, unpasteurized juice, foods contaminated by infected food workers via fecal-oral route	Cooking, no bare hand contact with RTE foods, employee health policy, handwashing, prevention of cross-contamination, pasteurization or treatment of juice
<i>Listeria monocytogenes</i>	Raw meat and poultry, fresh soft cheese, paté, smoked seafood, deli meats, deli salads	Cooking, date marking, cold holding, handwashing, prevention of cross-contamination
<i>Salmonella spp.</i>	Meat and poultry, seafood, eggs, raw seed sprouts, raw vegetables, raw milk, unpasteurized juice	Cooking, use of pasteurized eggs, employee health policy, no bare hand contact with RTE foods, handwashing, pasteurization or treatment of juice
<i>Shigella spp.</i>	Raw vegetables and herbs, other foods contaminated by infected workers via fecal-oral route	Cooking, no bare hand contact with RTE foods, employee health policy, handwashing
<i>Staphylococcus aureus</i> (preformed heat stable toxin)	RTE TCS foods touched by bare hands after cooking and further time/temperature abused	Cooling, cold holding, hot holding, no bare hand contact with RTE food, handwashing
<i>Vibrio spp.</i>	Seafood, shellfish	Cooking, approved source, prevention of cross-contamination, cold holding

RTE = ready-to-eat

TCS = time/temperature control for safety food

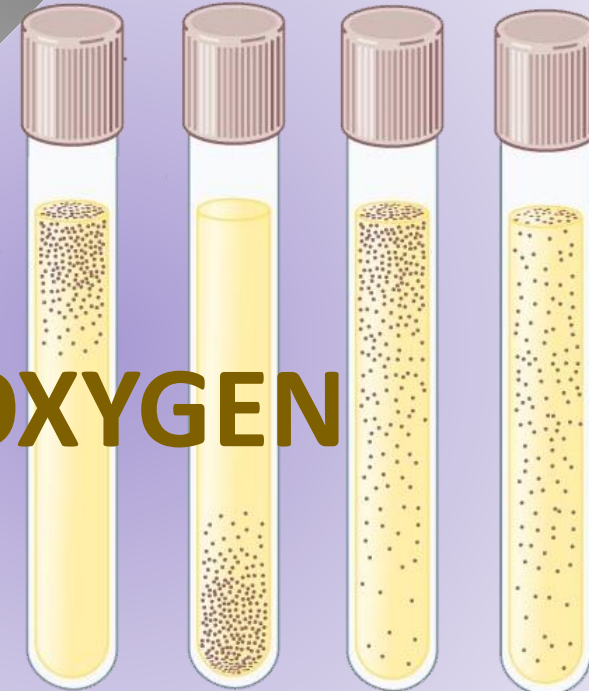
Sporeformers

intoxication & toxico-infection
toxins need cells

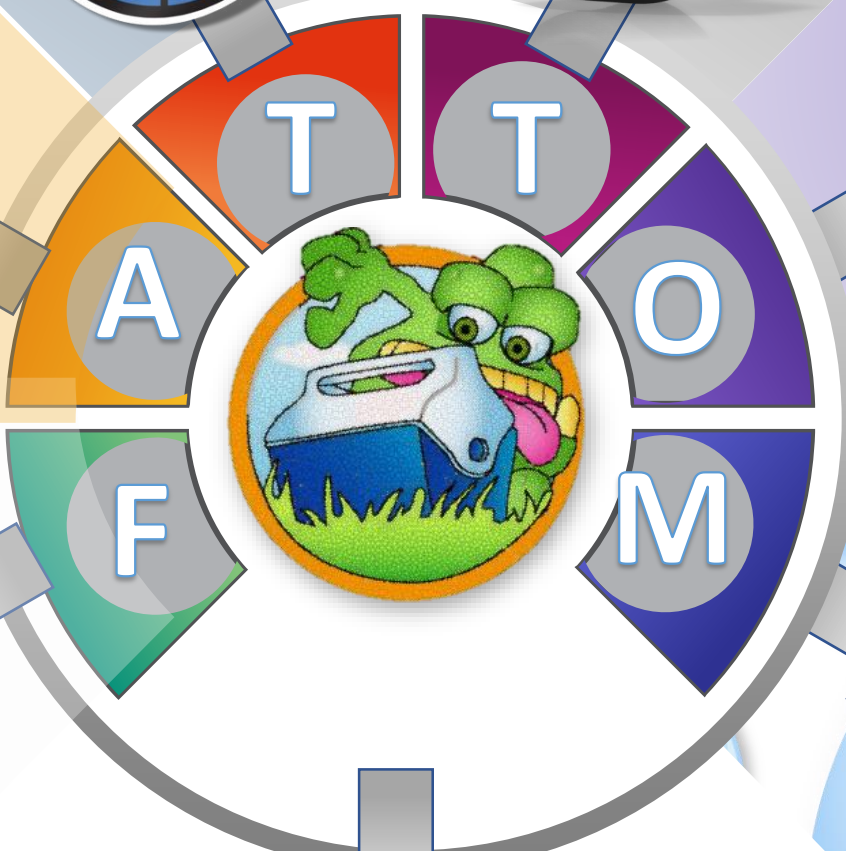
Vegetative toxin formers

Vegetative

no toxin, no spores, acid resistant?
E. coli O157

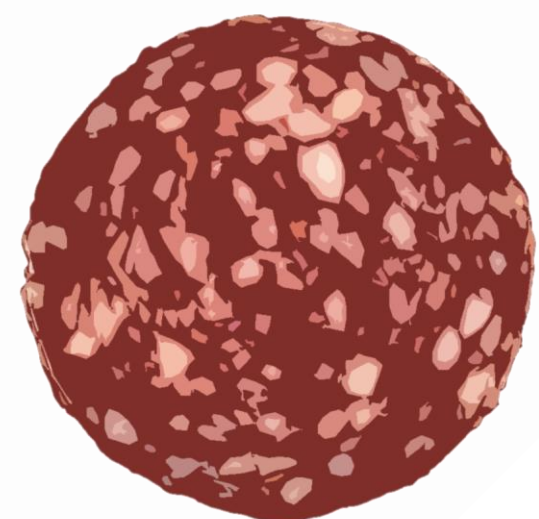


OXYGEN



Bacterial inhibitors

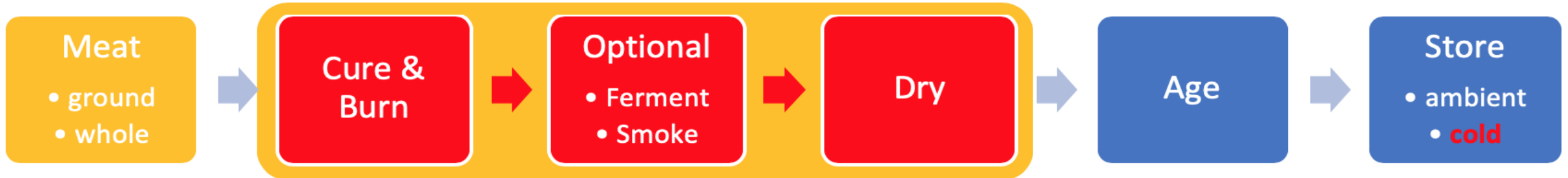
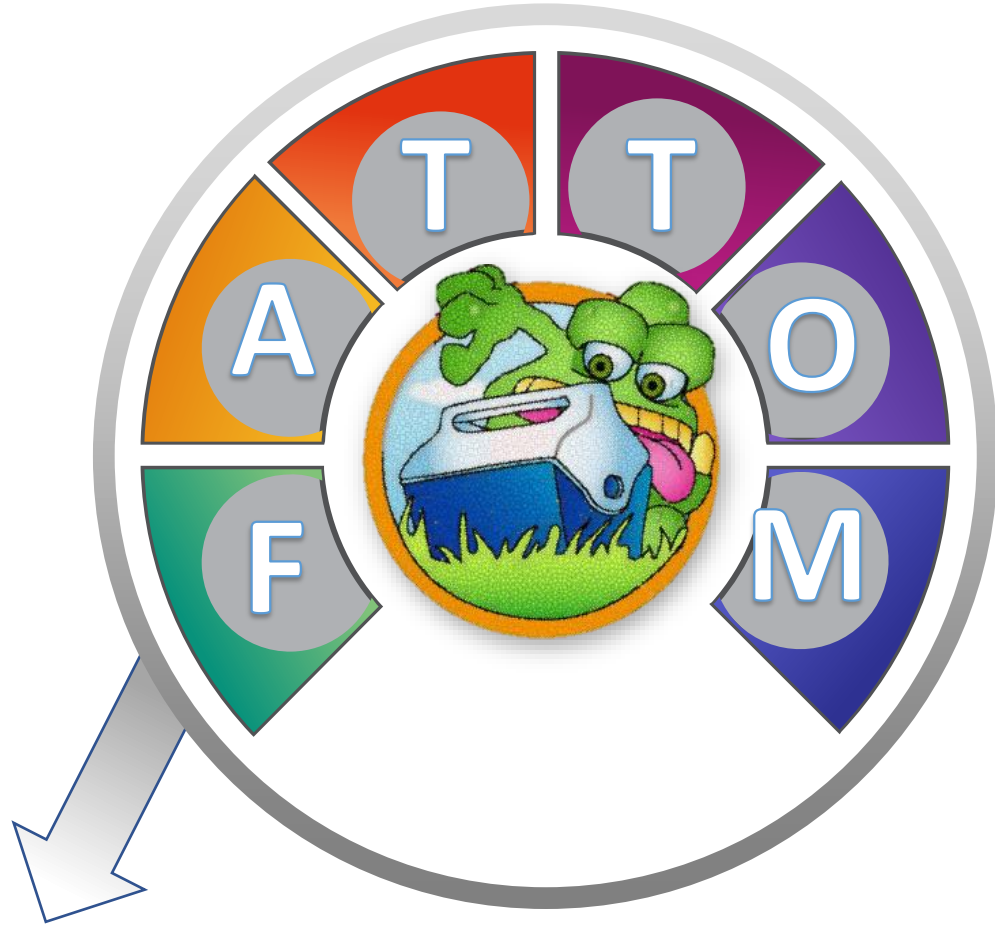
FOOD



MOISTURE



Competitive cultures



Bresaola
Loma
Basturma
Coppa
Ham
Pancetta
Pastrami

Intact Meat
RTC and RTE

Summer sausage
Salami
Pepperoni
Cervelat
Mettwurst
Thuringer
Many, many more

SAUSAGE RTE

USDA CURE LIMITS

Guidance for culinary usage of cure mix No. 1 in meat or poultry

Cure Mix No. 1. 6.25% nitrite in 93.75% NaCl

for 100 lbs meat or poultry

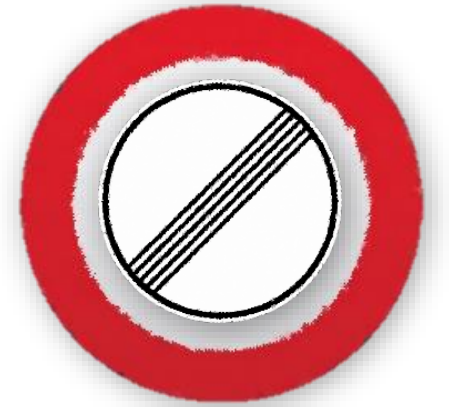
	Immersion (+12 gal water)	Comminuted	Dry Rub	Bacon Immersion (+12 gal water)	Bacon Dry Rub
¹ USDA Nitrite ppm critical limit-1	≤ 200	≤ 156	≤ 625	≤ 120	≤ 200

¹The nitrite critical limit comes from USDA 9 CFR 424. The USDA recommends adding this exact amount, no more and no less (personal communication). Most commercial cure mixes specify in ounces how much to add to meat.



CURING

Clostridium botulinum
Clostridium perfringens



Residual nitrite

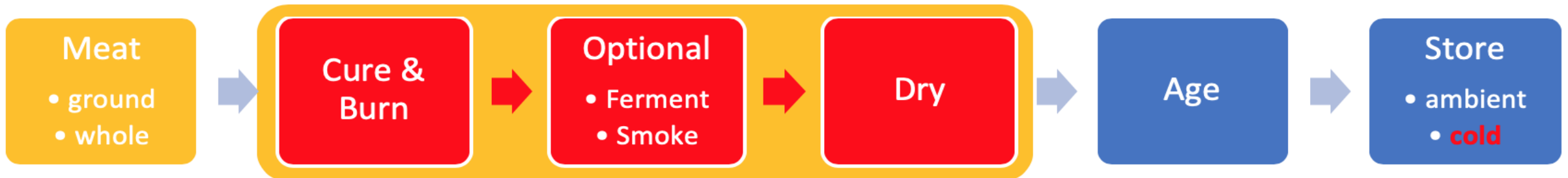
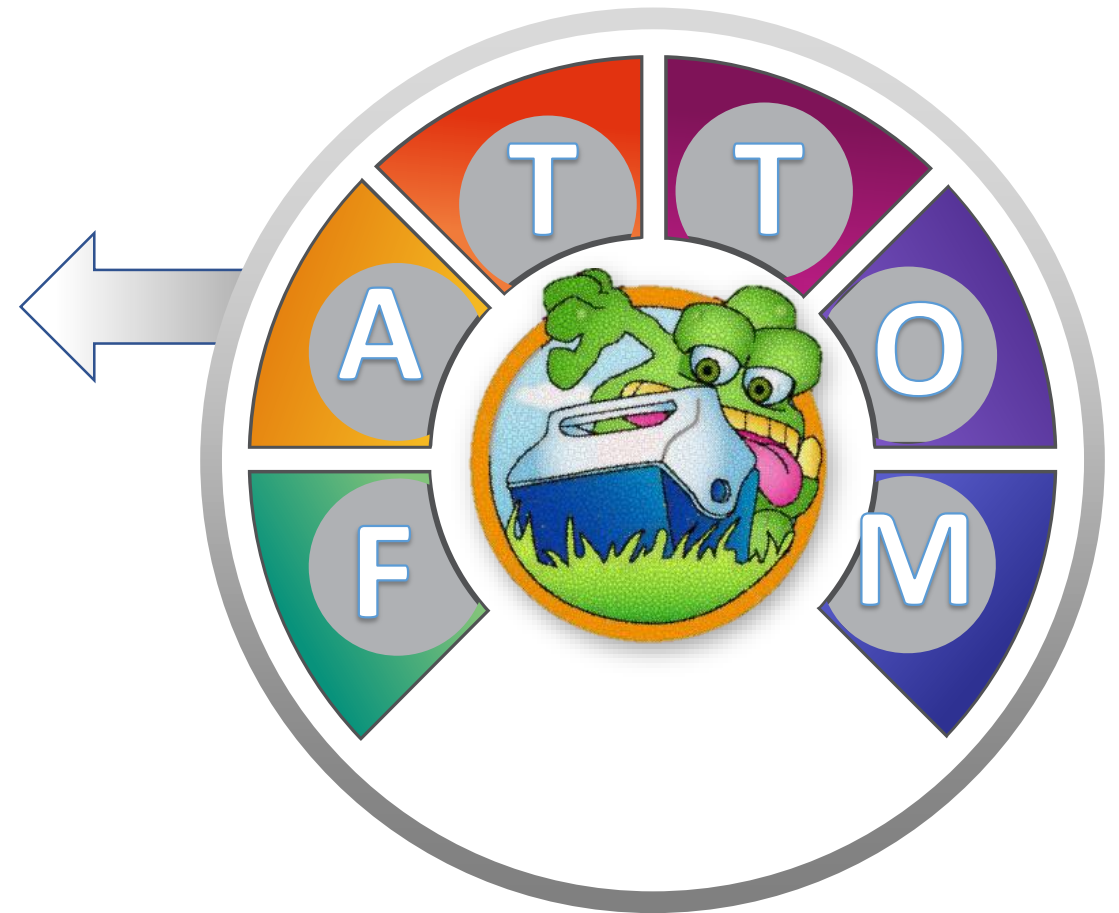
Growth	< 3.9	3.9 - 4.2	4.2 - 4.6	4.6 - 5	5 - 5.4	> 5.4
< 0.88	J Food Prot. Vol 73, No.1. page 144.					
0.88 – 0.90					SA	SA
> 0.90 – 0.92				SA	SA	SA, LM
> 0.92 – 0.94			LM, SAL	BC, SA, CB , LM, SAL	BC, SA, CB , LM, SAL	BC, SA, CB , LM, SAL
> 0.94-0.96			LM, SAL, EC, SA	SA, CB , LM, SAL, EC, BC	SA, CB , LM, SAL, EC, BC	SA, CB , LM, SAL, EC, VP, BC,
> 0.96		SAL	LM, EC, SAL, SA	SA, CB , LM, SAL, EC, VP, BC,	SA, CB , LM, SAL, EC, VP, BC,	SA, CB , LM, SAL, EC, VP, BC, CB

DEGREE HOURS

During fermentation of sausages, it is necessary to limit the time during which the sausage is exposed to temperatures exceeding 60°F (15.6°C), until a pH ≤ 5.3 is reached.

Recommended to start with meat at pH ≤ 5.8

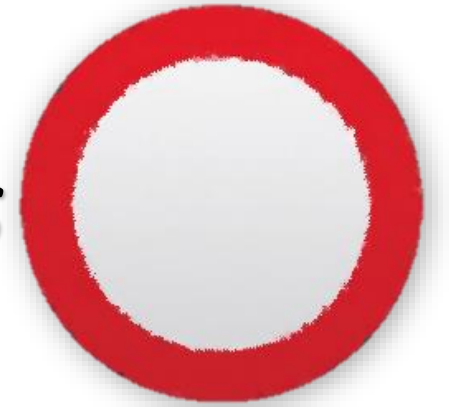
Time > 60F (h)	Maximum temp.
< 1200	< 90F
< 1000	90-100F
< 900	> 100F



DEGREE HOURS

pH \leq 5.3

Staphylococcus aureus



Degree Hours pH ≤ 5.3 *safe* (USDA performance std)

Growth	< 3.9	3.9 - 4.2	4.2 - 4.6	4.6 - 5	5 - 5.4	> 5.4
< 0.88						
0.88 – 0.90					SA ●	SA
> 0.90 – 0.92				SA	SA	SA, LM
> 0.92 – 0.94			LM, SAL	BC, SA, CB , LM, SAL	BC, SA, CB , LM, SAL	BC, SA, CB , LM, SAL
> 0.94-0.96			LM, SAL, EC, SA	SA, CB , LM, SAL, EC, BC	SA, CB , LM, SAL, EC, BC	SA, CB , LM, SAL, EC, VP, BC,
> 0.96		SAL	LM, EC, SAL, SA	SA, CB , LM, SAL, EC, VP, BC,	SA, CB , LM, SAL, EC, VP, BC,	SA, CB , LM, SAL, EC, VP, BC, CB

Degree Hours pH ≤ 5.3 *safe + vacuum packaged*

Growth	< 3.9	3.9 - 4.2	4.2 - 4.6	4.6 - 5	5 - 5.4	> 5.4
< 0.88						
0.88 – 0.90					SA cannot grow	SA
> 0.90 – 0.92				SA	SA	SA, LM
> 0.92 – 0.94			LM, SAL	BC, SA , CB , LM, SAL	BC, SA , CB , LM, SAL	BC, SA, CB , LM, SAL
> 0.94-0.96			LM, SAL, EC, SA	SA, CB , LM, SAL, EC, BC	SA , CB , LM, SAL, EC, BC	SA, CB , LM, SAL, EC, VP, BC,
> 0.96		SAL	LM, EC, SAL, SA	SA , CB , LM, SAL, EC, VP, BC,	SA , CB , LM, SAL, EC, VP, BC,	SA, CB , LM, SAL, EC, VP, BC, CB

FERMENTATION

ACIDIC

- pH ↓
- Organic acids ↑

NEUTRAL

- pH doesn't drop
- Bioprotective (antimicrobial)

MOLD

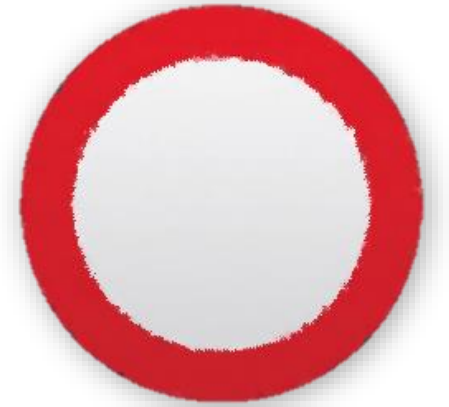
- flavor
- Surface protection



FERMENTATION

Competitive Culture (Bioprotective)

All vegetatives and Bc



FERMENTATION



ambient



refrigerate

Growth	< 3.9	3.9 - 4.2	4.2 - 4.6	4.6 - 5	5 - 5.4	> 5.4
< 0.88						
0.88 – 0.90					SA	SA
> 0.90 – 0.92				SA	SA	SA, LM
> 0.92 – 0.94			LM, SAL	BC, SA , CB , LM, SAL	BC, SA , CB , LM, SAL	BC, SA, CB , LM, SAL
> 0.94-0.96			LM, SAL, EC, SA	SA, CB , LM, SAL, EC, BC	SA , CB , LM, SAL, EC, BC	SA, CB , LM, SAL, EC, VP, BC, CB
> 0.96		SAL	LM, EC, SAL, SA	SA , CB , LM, SAL, EC, VP, BC,	SA , CB , LM, SAL, EC, VP, BC,	SA, CB , LM, SAL, EC, VP, BC, CB

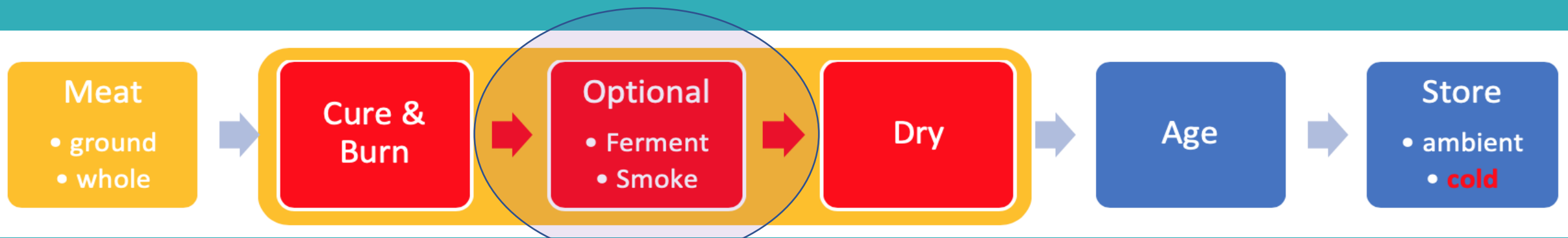
SMOKE

Cold

- flavor ↑

Hot

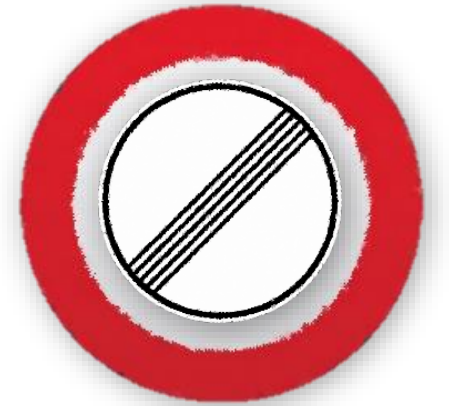
- flavor ↑
- Vegetative pathogens ↓



Hot smoked

@ Food code cooking temps

All vegetatives



HURDLES

BARRIERS

PATHOGENS vs SPOILAGE

HAZARDS

Growth possible

Very Slow Growth

No growth

DEATH

ELIMINATION

THE FOOD SAFETY CONTROL METER

HOT SMOKE & Packaged

 Shelf stable

Growth	< 3.9	3.9 - 4.2	4.2 - 4.6	4.6 - 5	5 - 5.4	> 5.4
< 0.88						
0.88 – 0.90						
> 0.90 – 0.92						
> 0.92 – 0.94				BC, SA , CB , LM, SXL	BC, SA , CB , LM, SXL	BC, SA , CB , LM, SXL
> 0.94-0.96				SA , CB , LM, SXL , EC, BC	SA , CB , LM, SXL , EC, BC	SA , CB , LM, SXL , EC, VE , BC, Op
> 0.96				SA , CB , LM, SXL , EC, VE , BC,	SA , CB , LM, SXL , EC, VE , BC,	SA , CB , LM, SXL , EC, VE , BC, Op

DRY

Very Dry Whole muscle

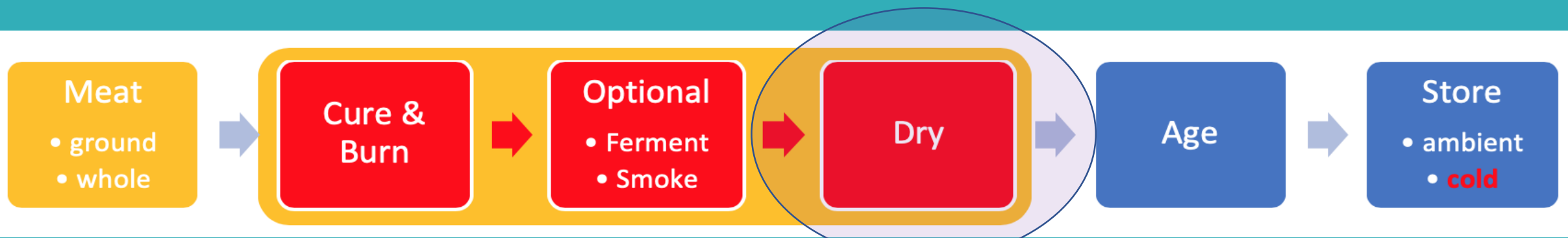
- usually ≤ 0.88 A_w

Dry Sausage

- 0.88-0.92 A_w
- 0.92-0.94 A_w

Semi Dry Sausage

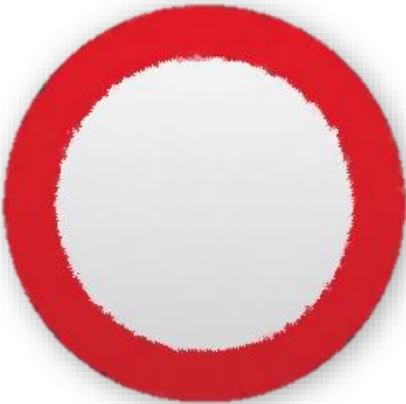
- 0.94 -0.96 A_w



DRY ($A_w \downarrow$)

not hot smoked

All vegetatives and Bc



THE FOOD SAFETY CONTROL METER

DRY ($A_w \downarrow$)

not hot smoked



ambient



refrigerate

Growth	< 3.9	3.9 - 4.2	4.2 - 4.6	4.6 - 5	5 - 5.4	> 5.4
< 0.88	whole	muscle	dried	meats	e.g. hams	e.g. loma
0.88 – 0.90					SA 5.3	SA
> 0.90 – 0.92	dry			SA	SA	SA, LM
> 0.92 – 0.94			LM, SAL	BC, SA , CB , LM, SAL	BC, SA , CB , LM, SAL	BC, SA, CB , LM, SAL
> 0.94-0.96	semi - dry		LM, SAL, EC, SA	SA, CB , LM, SAL, EC, BC 5.0	SA , CB , LM, SAL, EC, BC	SA, CB , LM, SAL, EC, VP, BC, CB
> 0.96		SAL	LM, EC, SAL, SA	SA , CB , LM, SAL, EC, VP, BC,	SA , CB , LM, SAL, EC, VP, BC,	SA, CB , LM, SAL, EC, VP, BC, CB

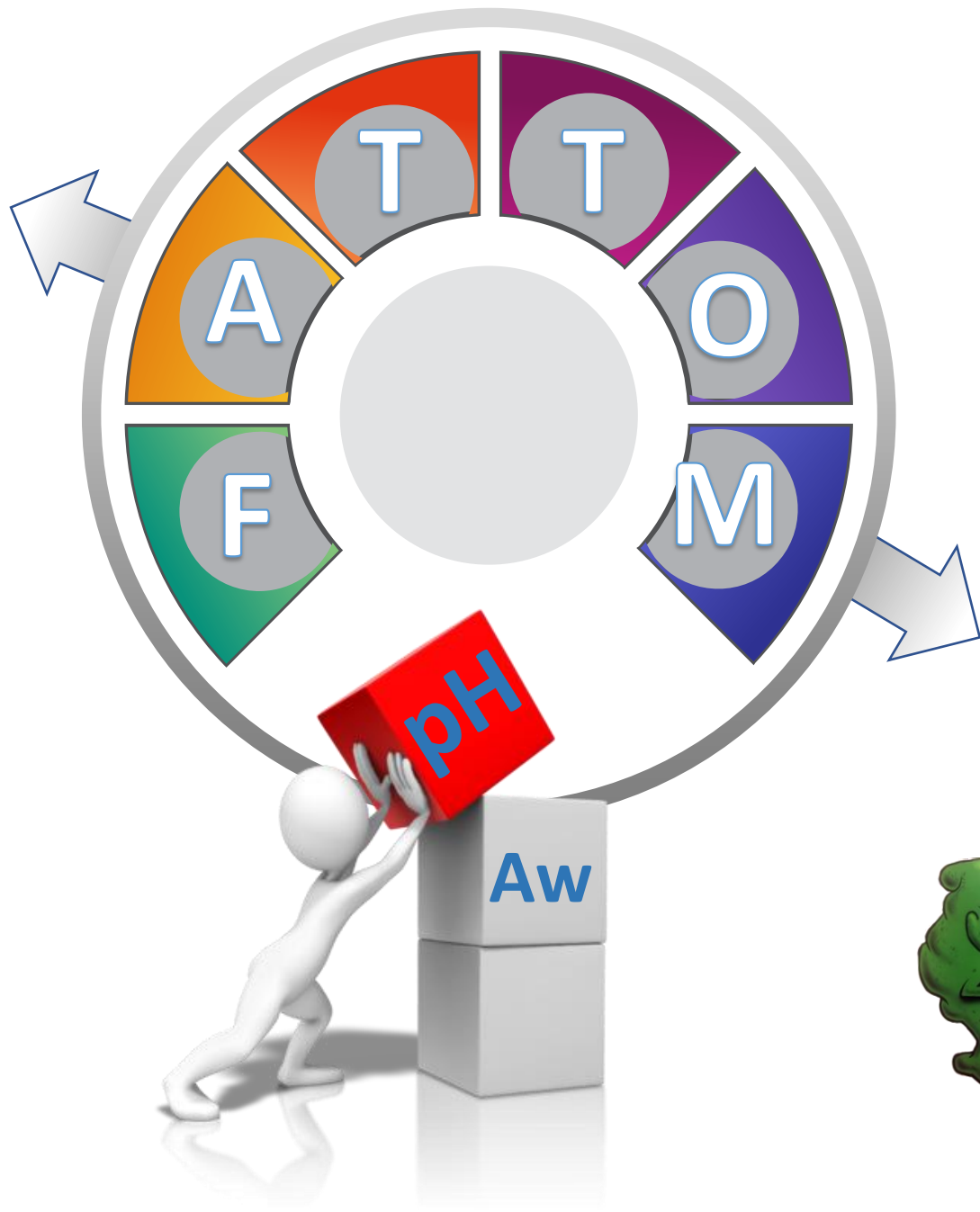


Table A. Interaction of pH and A_w for control of spores in FOOD heat-treated to destroy vegetative cells and subsequently PACKAGED

A_w values	pH: 4.6 or less	pH: > 4.6 - 5.6	pH: > 5.6
≤ 0.92	non-TCS FOOD*	non-TCS FOOD	non-TCS FOOD
> 0.92 - 0.95	non-TCS FOOD	non-TCS FOOD	PA**
> 0.95	non-TCS FOOD	PA	PA

* TCS FOOD means TIME/TEMPERATURE CONTROL FOR SAFETY FOOD

** PA means Product Assessment required

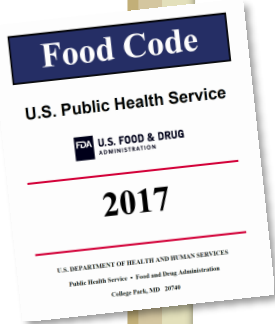
Table B. Interaction of pH and A_w for control of vegetative cells and spores in FOOD not heat-treated or heat-treated but not PACKAGED

A_w values	pH: < 4.2	pH: 4.2 - 4.6	pH: > 4.6 - 5.0	pH: > 5.0
< 0.88	non-TCS food*	Non-TCS food	non-TCS food	non-TCS food
0.88 - 0.90	non-TCS food	non-TCS food	non-TCS food	PA**
> 0.90 - 0.92	non-TCS food	non-TCS food	PA	PA
> 0.92	non-TCS food	PA	PA	PA

* TCS FOOD means TIME/TEMPERATURE CONTROL FOR SAFETY FOOD

** PA means Product Assessment required





8-201.14 Contents of a HACCP Plan.

For a food establishment that is required under § 8-201.13 to have a HACCP PLAN, the PERMIT applicant or PERMIT HOLDER shall submit to the REGULATORY AUTHORITY a properly prepared HACCP PLAN that includes:

(A) General information such as the name of the PERMIT applicant or PERMIT HOLDER, the FOOD ESTABLISHMENT address,

and contact information;

(B) A categorization of the types of TIME/TEMPERATURE CONTROL FOR SAFETY FOODS that are to be controlled under the HACCP PLAN;^{Pf}

(C) A flow diagram or chart for each specific FOOD or category type that identifies:

- (1) Each step in the process;^{Pf}
- (2) The HAZARDS and controls for each step in the flow diagram or chart;^{Pf}
- (3) The steps that are CRITICAL CONTROL POINTS;^{Pf}
- (4) The ingredients, materials, and equipment used in the preparation of that FOOD;^{Pf} and
- (5) Formulations or recipes that delineate methods and procedural control measures that address the FOOD safety concerns involved.^{Pf}

(D) A CRITICAL CONTROL POINTS summary for each specific FOOD or category type that clearly identifies:

- (1) Each CRITICAL CONTROL POINT,^{Pf}
- (2) The CRITICAL LIMITS for each CRITICAL CONTROL POINT,^{Pf}
- (3) The method and frequency for monitoring and controlling each CRITICAL CONTROL POINT by the designated FOOD EMPLOYEE or the PERSON IN CHARGE,^{Pf}

(4) The method and frequency for the PERSON IN CHARGE to routinely verify that the FOOD EMPLOYEE is following standard operating procedures and monitoring CRITICAL CONTROL POINTS,^{Pf}

(5) Action to be taken by the designated FOOD EMPLOYEE or PERSON IN CHARGE if the CRITICAL LIMITS for each CRITICAL CONTROL POINT are not met,^{Pf} and

(6) Records to be maintained by the PERSON IN CHARGE to demonstrate that the HACCP PLAN is properly operated and managed;^{Pf}

(E) Supporting documents such as:

- (1) FOOD EMPLOYEE and supervisory training plan that addresses the FOOD safety issues of concern;^{Pf}
- (2) Copies of blank records forms that are necessary to implement the HACCP PLAN;^{Pf}
- (3) Additional scientific data or other information, as required by the REGULATORY AUTHORITY, supporting the determination that FOOD safety is not compromised by the proposal.^{Pf}

(F) Any other information required by the REGULATORY AUTHORITY.

e.g. Validations

- Process authority letter
- Approvals from other jurisdictions (chains)
- Safe harbor performance standards (e.g. USDA FSIS)
- Letters of Guarantee (food grade status?)
- Equipment manuals?