

# Charcuterie

Original French: pork butcher shop or  
a branch of cooking devoted to prepared meat products

American expansion: meat deli &  
adding quality, authenticity and big flavor to the menu



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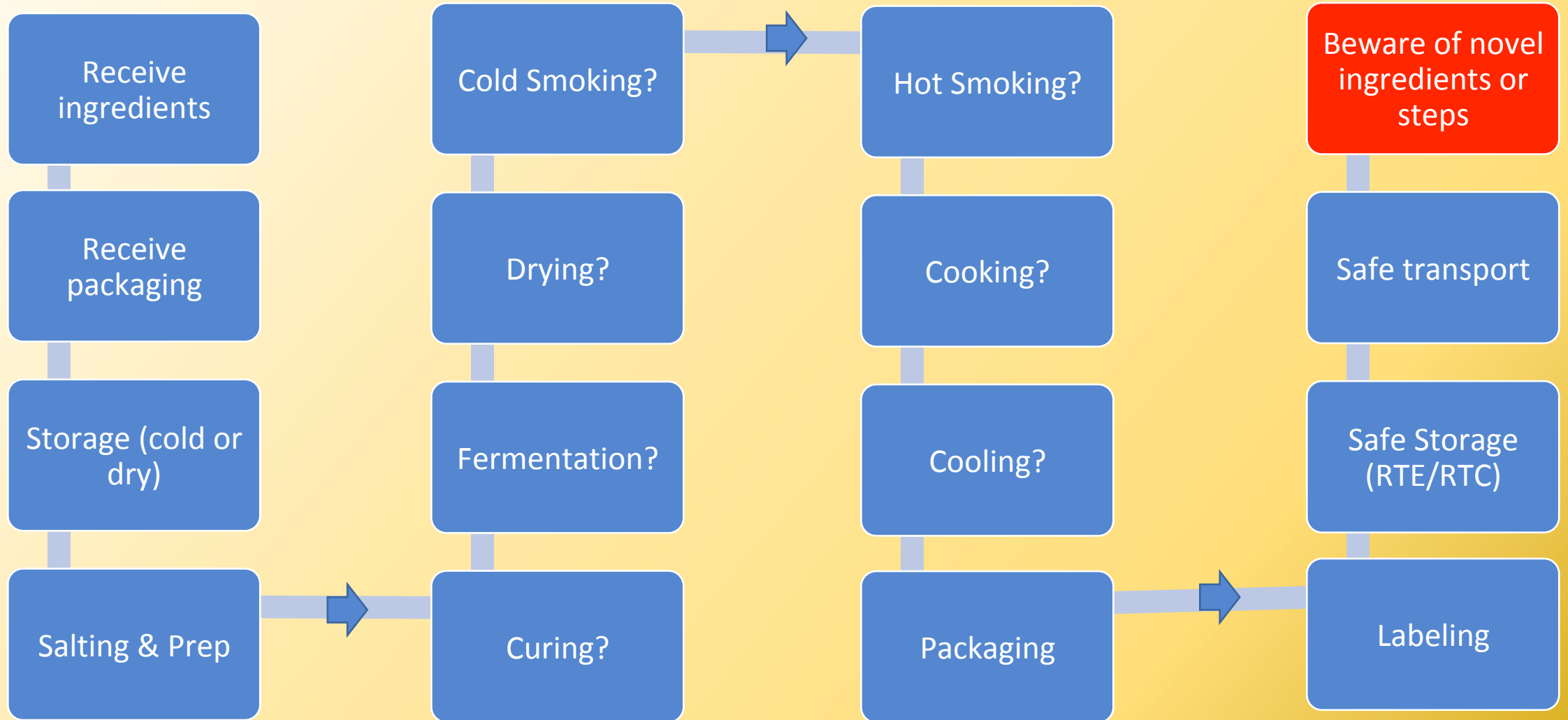
# Why?


- This is food with a thousand year history
  - Recipes are ethnic and international (new tastes and experiences)
  - Charcuterie is value-added
  - The protein diet and ingredient simplicity
  - Allows the chef to “flex” their creativity
- 
- Biggest drawback for chefs is the food safety side (HACCP, regulations, applications, etc).

# Charcuterie is a very broad category

- Whole muscle – raw (dry aging)
- Ground raw (ready to cook sausages)
- Whole muscle dry (e.g., prosciutto di Parma, jamon serrano, bresaola)
- Whole muscle dried or smoked (e.g., speck, Virginia ham)
- Whole muscle cooked – unsmoked (e.g., prosciutto-cotto, roast beef, capicola)
- Whole muscle cooked – smoked (e.g., pastrami)
- Ground fermented – unsmoked (e.g., hard salami, soppressata, nduja)
- Ground fermented – smoked (e.g., pepperoni)
- Ground cooked – unsmoked (e.g., salami-cotto, bologna, mortadella)
- Ground cooked – smoked (e.g., wurst, andouille)

# Process Approach



The  is to food safety is to use the process approach. Start with an ingredient list and the flow chart.



fresh



cooked



smoked



cured, ferm. dried

## Not Shelf stable

1. Raw intact	2. Raw ground	3. Products with secondary inhibitors	4. Heat treated, but not fully cooked	5. Fully cooked	6. Not heat treated (cured, ferm., dried)
Meat cuts (steak from loins)  <b>DRY AGE</b>	Pork Breakfast Sausage Italian sausage Uncooked pates	Salt cured meats & fat (Lardo)  Cure salts added	Bacon Pancetta	Hot dogs Polish sausage Ham, Pates Rendered fats	Smoked meats Salami Jerky

## Shelf stable

Not heat treated (cured, ferm., dried)	Heat treated (cured, ferm., dried)	Canned
Salami Jerky	Salami Jerky	Canned meats (follows 21 CFR 113 or 114)

### READY-TO-EAT VS READY-TO-COOK

How USDA FSIS might look at these meat products

1



# Dry aging beef

Raw intact

Concerns: storage temp > 41F,  
storage time > 30 days

is said to enhance flavor and tenderness. Dry aging meat is essentially aging meat without protection in a refrigerator. Cuts are stored apart from each other to permit air flow to dry them in 1-6 weeks. Mold growth is not a concern. Not clear if this is a special process.

**Dry aging charcuterie** is also possible in **dry age bags**. However, the OTR is < 10,000 requiring a simple “ROP” HACCP plan.

*Store ROP ≤ 41°F for ≤ 30 days (3-502.12) or ≤ 34°F for > 30 days (3-502.11)*

The recommended dry age temp. is 34° to 38°F





# Sausage

Raw ground

Concerns: Confusion with RTE.

There are likely hundreds of ground meat sausage recipes. The main key to the “raw ground” group is the meat is not cooked and not cured ( $\text{NO}_2$  or  $\text{NO}_3$ ).

*The easy factor in controlling the food safety of ground sausage and meats is thorough cooking before consumption.*

*Foodservice: Cook to 155 or 165 (poultry)*

*Grocery: Apply recommended cooking label or instructions.*

**Food code:** not considered a “special process”. While not a food code requirement, a grinding log may be used.

3



# Lardo

**Products w/ Secondary Inhibitors**

**Concerns:** Europeans store at room temp.

...all the fat of bacon without the meat. Lardo is salt cured usually without nitrites or nitrates.

The salt percentage does not make this charcuterie item any safer than raw meat.

*Some operators may wish to store this at room temperature, but there is no science supporting room temperature safety.*

Generally meant to be sliced very thin and consumed without cooking. *Food Code: raw or undercooked menu notification.*

Corned beef and pastrami are also salt cured charcuterie

3



...Boudin sausage, refrigerator bacon (uncooked), terrines, pates, galantines (forcemeat), confit and similar.

Cured with nitrites or nitrates. Only concern is that USDA FSIS limits cure salts.

**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
<sup>1</sup> USDA Nitrite ppm critical limit-1	≤ 200	≤ 156	≤ 625	≤ 120	≤ 200

<sup>1</sup>The nitrite critical limit comes from USDA 9 CFR 424. The cure No.1. mix in ounces by weight is only valid for cure mixes of 6.25% nitrite and 93.75% salt. <sup>2</sup>The target level is a suggested Cure Mix No. 1 usage based on the fact that culinary curing requirements are less rigorous than curing for preservation. Should an operator need to use more curing salt, then a variance would be required.

# “Culinary curing”

Products w/ Secondary Inhibitors

Concerns: Europeans store at room temp.

Too little added not a concern if always refrigerated, but USDA has said it prefers the correct amount be added.

**Food Code:** Technically a “special process”. Could be achieved by a simple formulation SOP.

4



## Bacon or pancetta

Heat treated, but not fully cooked

**Concerns:** Smoking 42-130F only if properly cured

Bacon and pancetta are examples of heat treated (smoked) meats that are not fully cooked. They are intended to be cooked by the consumer or before consumption.

This group is definitely a “special process”.

*The keys to food safety are proper curing, safe smoking times and temperatures, and cold holding.*

5



## Meat & Sausage

Fully cooked

Concerns: Cook-Chill-Cold Hold,  
come up time, refrigeration still req'd

Some meat products are **fully cooked** as part of their culinary process. The term “fully” means to lethality.

*If these meats are fully cooked, properly cooled and properly cold held; they are ready-to-eat.*

*USDA FSIS would not permit a come up time 10-43C longer than 6h. Danger is *S. aureus* toxin.*

**Food code:** not considered a “special process” unless packaged in reduced oxygen packaging.



# Salumi

**Cured, fermented, and dried**

**Concerns:** Cook-Chill-Cold Hold, come up time, refrigeration still req'd

**Salumi** is Italian for prepared pork often implied as cured, fermented, and dried. The term encompasses other meats as well.

***Cured*** means adding nitrite or nitrate to prevent the outgrowth of *Clostridium botulinum* and *C. perfringens*.

***Fermented*** means using a microbial culture to reduce the pH of the meat from approx. 6.2 to 5 or less.

***Dried*** means to reduce the water activity to  $\leq 0.85$  or  $\leq 0.91$  (when SA is controlled).

*All three processes are not required to be in this USDA grouping.*

**Food code:** considered a “special process”.

- **Italian-type**

- Salami
- Genoa salami
- Coppa
- Soppressata
- Toscana
- Pancetta
- Prosciutto
- Pepperoni
- Bresaola
- **S. European type**
- Saucisson
- Fuet
- Chorizo
- Soujoul (Turkish)



- **Germanic type**

- Summer sausage
- Thuringer
- Hard salami
- Cervelat
- Landjager
- Lebanon bologna
- Baquette salami
- Westphalia salami
- Teewurst
- Schlackwurst
- +300-400 more of various recipes

# HA + CCP

7 STEPS (Principles)

01  
HAZARDS ANALYSIS



02  
IDENTIFY CONTROLS



+

03  
CRITICAL LIMITS



04  
MONITORING



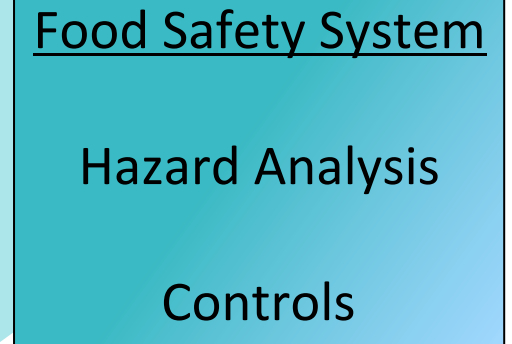
05  
CORRECTIVE ACTIONS



06  
VERIFICATIONS



07  
RECORDS



Hazard Analysis

Critical Control Points

Remember the “process approach” what are hazards at each step, then what controls are needed for those hazards?



**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

**H A C C P**

**Annex 4, Table 1b. Selected Parasitic Hazards Found at Retail, Associated Foods, and Control Measures**

HAZARD	ASSOCIATED FOODS	CONTROL MEASURES
<i>Anisakis simplex</i>	Various fish (cod, haddock, fluke, pacific salmon, herring, flounder, monkfish)	Cooking, freezing
<i>Taenia spp.</i>	Beef and pork	Cooking
<i>Trichinella spiralis</i>	Pork, bear, and seal meat	Cooking

RTE = ready-to-eat

TCS = time/temperature control for safety food

**Annex 4, Table 1c. Selected Viral Hazards Found at Retail, Associated Foods, and Control Measures**

HAZARD	ASSOCIATED FOODS	CONTROL MEASURES
Hepatitis A and E	Shellfish, any food contaminated by infected worker via fecal-oral route	Approved source, no bare hand contact with RTE food, minimizing bare hand contact with foods not RTE, employee health policy, handwashing
Other Viruses (Rotavirus, Norovirus, Reovirus)	Any food contaminated by infected worker via fecal-oral route	No bare hand contact with RTE food, minimizing bare hand contact with foods not RTE, employee health policy, handwashing

RTE = ready-to-eat

TCS = time/temperature control for safety food

Safe source (USDA inspected)



Food code hygiene



# Charcuterie Process Approach

Ingredient safety

Salting

Curing (NO<sub>2</sub>)

Fermentation (pH)

Drying (Aw)

Cold smoking

Hot Smoking  
(Cooking)

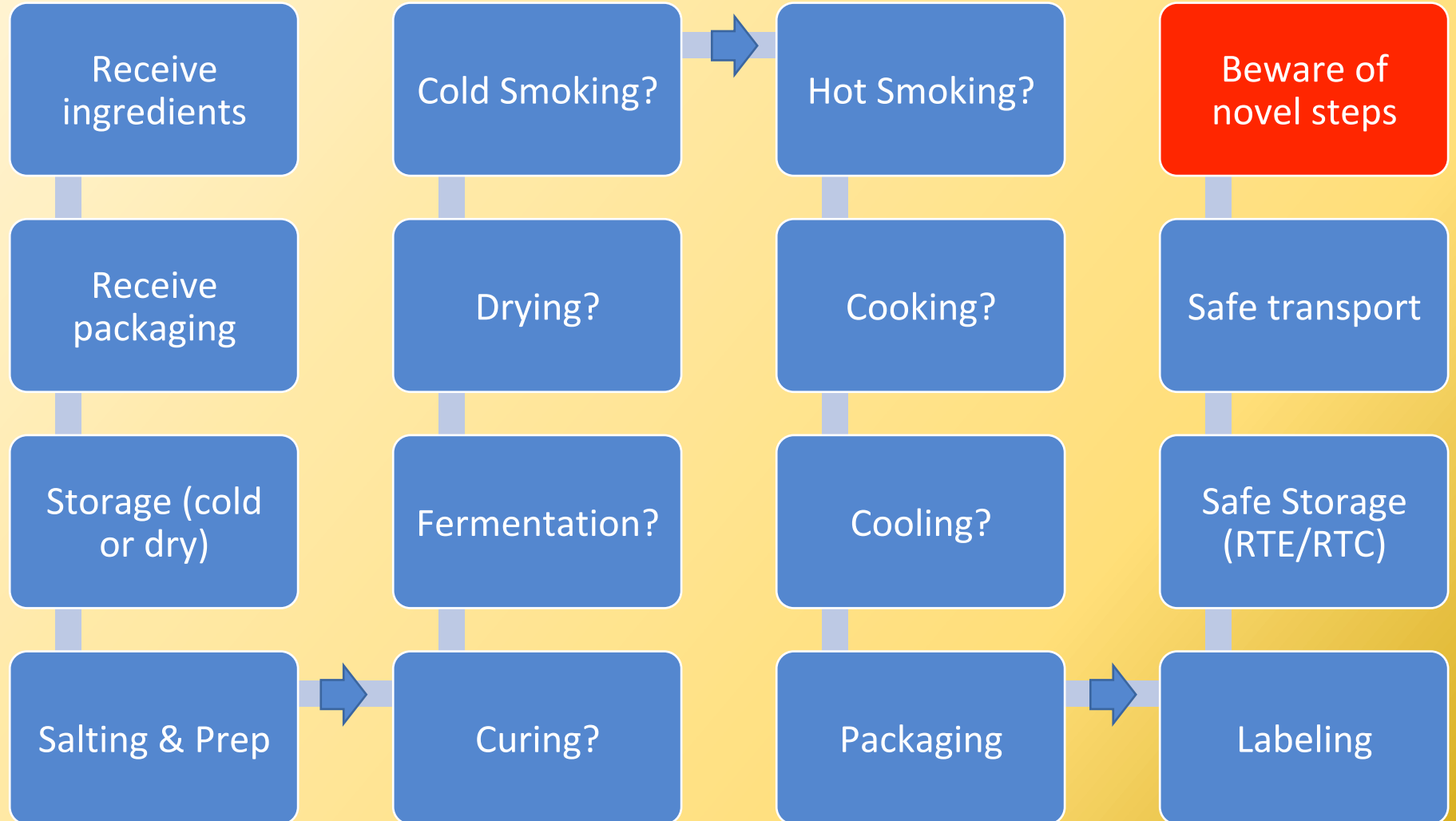
Cooking

Cooling (USDA calls it  
"stabilization")

Packaging

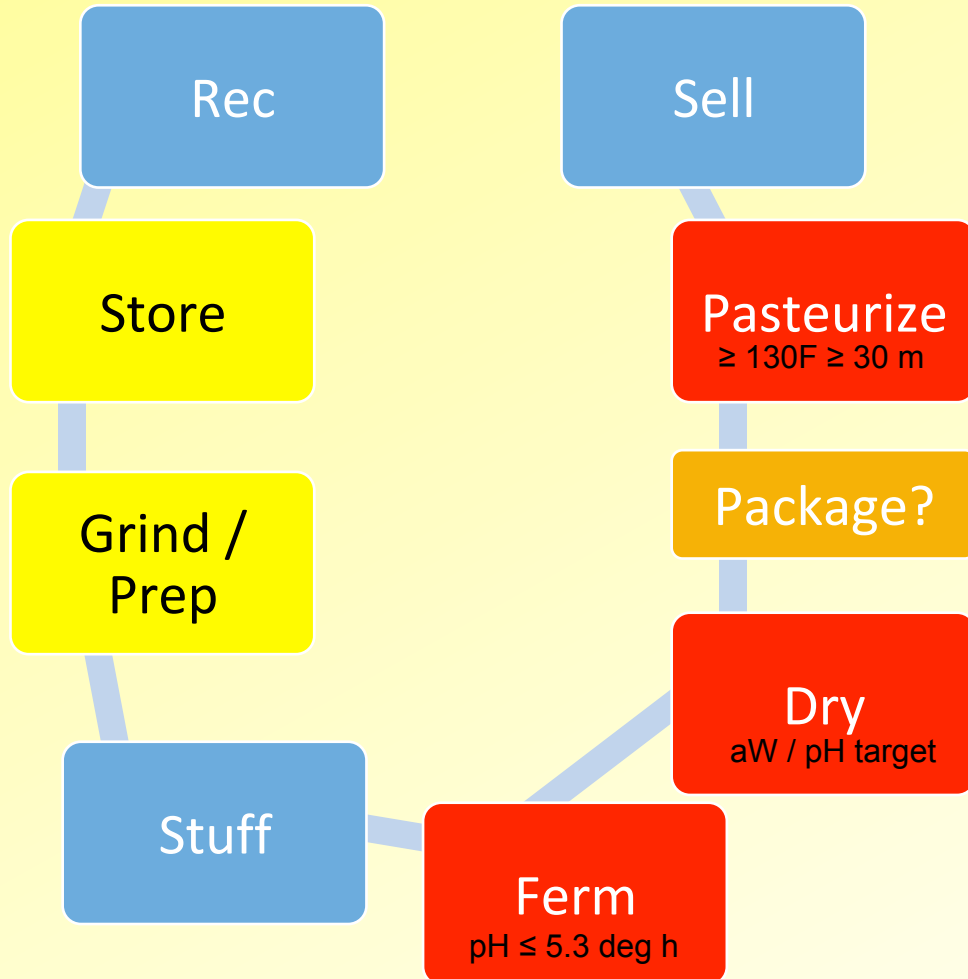
Labeling

RTE vs RTC



# Salami

*Cured, fermented, dried*



## Ingredients:

Pork, beef, other meats, spices, casings; cure mix (nitrites)

## Process:

The ingredients are all received cold and stored cold (refrigerated). Note trichinae concerns for pork and correct nitrite usage concerns.

Preparation involves grinding and blending. Each variety will have a preferred grind coarseness. Metzger's typically add ice during grinding to keep the meat cool. After grinding spices, etc are mixed in. Should have meat out  $\leq 2$  h until inoculated. Generally, a purchased lactic acid bacterial starter is added to provide the fermentation.

Stuffing sausage into casings follows the grinding and mixing steps.

Ferment. The meat is fermented at approx. 110F (varies) to pH 5.3 to inhibit *S. aureus* (toxin), then to its target product level usually  $\leq$  pH 5. Degree hours are used here.

Optionally, some sausages are smoke flavored.

Dry. After fermentation, the cured, fermented sausage is aged until it dries to the desired finished water activity. Many will develop a white mold on the casing (not a concern).

Packaging. Note that the USDA permits (and encourages) vacuum packaging of dry and semi dry fermented sausages, especially those sliced.

# Ingredients

## Ingredient safety

Salting

Curing (NO<sub>2</sub>)

Fermentation (pH)

Drying (Aw)

## Ingredient GMPs

- Food grade, 9 CFR limited ingredients

## Ingredient mandates

- 9 CFR 318.10 –Prescribed treatment of pork and products containing pork to destroy trichinae (USDA bugged pork is acceptable).

## Food Code

- Safe source - Must use USDA or state inspected meats



# Salt *(as a partial preservative)*

Ingredient safety

Salting



Curing (NO<sub>2</sub>)

Fermentation (pH)

Drying (Aw)

Salt does little to prevent the growth of food pathogens. It will minimize some spoilage and slow coliform spoilage (fecal origin).


Adding salt will very likely drop the Aw to  $\leq 0.97$  preventing the growth of psychrotrophic *C. botulinum*.

Salt would need to be at 10% to be effective to inhibit some other pathogens.

# Curing Salts *(C. botulinum preservative)*

Ingredient safety

Salting

Curing (NO<sub>2</sub>) 

Fermentation (pH)

Drying (Aw)

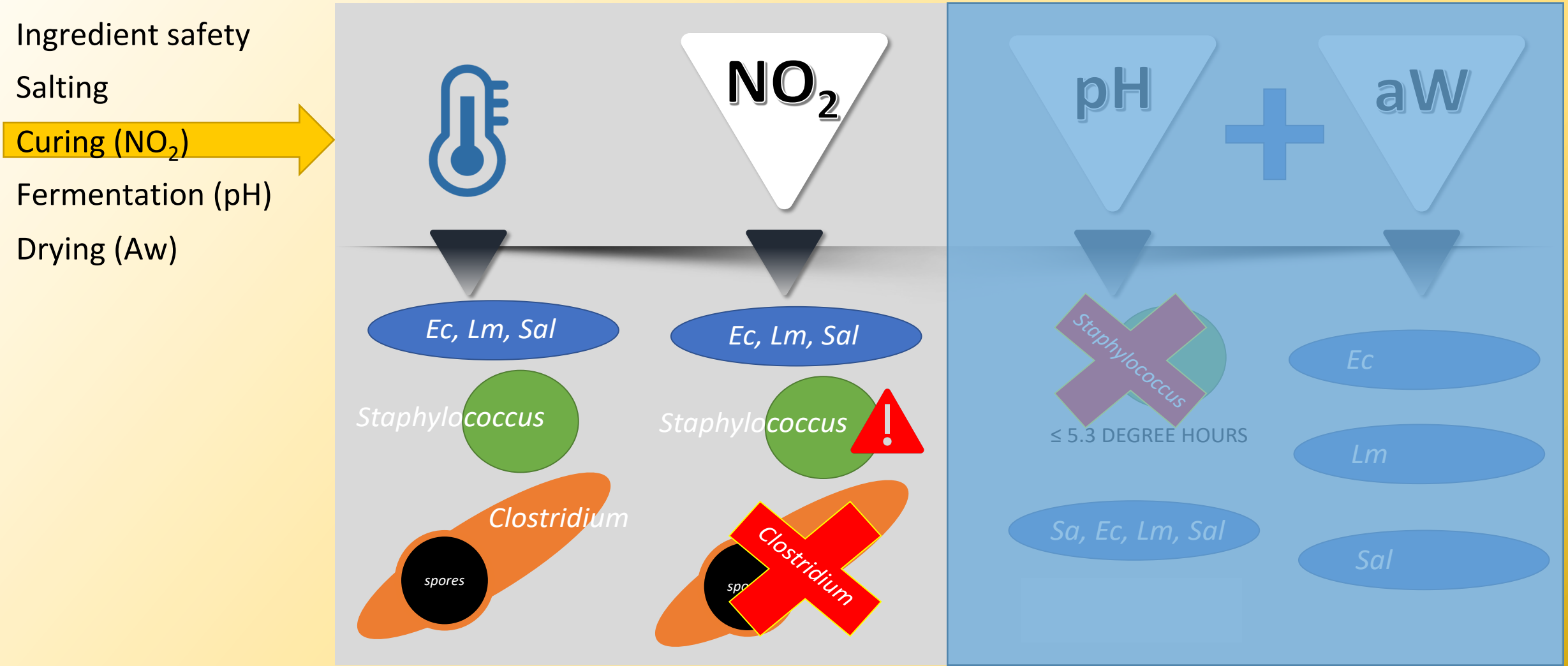
Curing using nitrite or nitrate salts prevents the outgrowth of *Clostridium botulinum*. Any meat that will spend more than a few hours between 41-130F must be protected from *C. botulinum* growth.

Veg-stable is a vegetable sourced nitrite or nitrate. The USDA does not recognize it as a curing salt; however it has the same function.

<b>Guidance for culinary usage of cure mix No. 1 in meat or poultry</b>					
<b>Cure Mix No. 1. 6.25% nitrite in 93.75% NaCl</b>					
<b>for 100 lbs meat or poultry</b>					
	<b>Immersion (+12 gal water)</b>	<b>Comminuted</b>	<b>Dry Rub</b>	<b>Bacon Immersion (+12 gal water)</b>	<b>Bacon Dry Rub</b>
<b><sup>1</sup>USDA Nitrite ppm critical limit-1</b>	<b>≤ 200</b>	<b>≤ 156</b>	<b>≤ 625</b>	<b>≤ 120</b>	<b>≤ 200</b>
<i><sup>1</sup>The nitrite critical limit comes from USDA 9 CFR 424. The cure No.1. mix in ounces by weight is only valid for cure mixes of 6.25% nitrite and 93.75% salt. <sup>2</sup>The target level is a suggested Cure Mix No. 1 usage based on the fact that culinary curing requirements are less rigorous than curing for preservation. Should an operator need to use more curing salt, then a variance would be required.</i>					

USDA FSIS recommends using this amount – no more and no less. Calculate by formulation

# Curing Salts (*C. botulinum* preservative)



USDA FSIS recommends using this amount – no more and no less. Calculate by formulation

# Fermentation (*acid preservation*)

Ingredient safety

Salting

Curing (NO<sub>2</sub>)

Fermentation (pH)

Drying (Aw)

Fermented sausages generally use a commercial active culture. Wild cultures are discouraged. Ultimately, any “active” fermentative culture is acceptable.

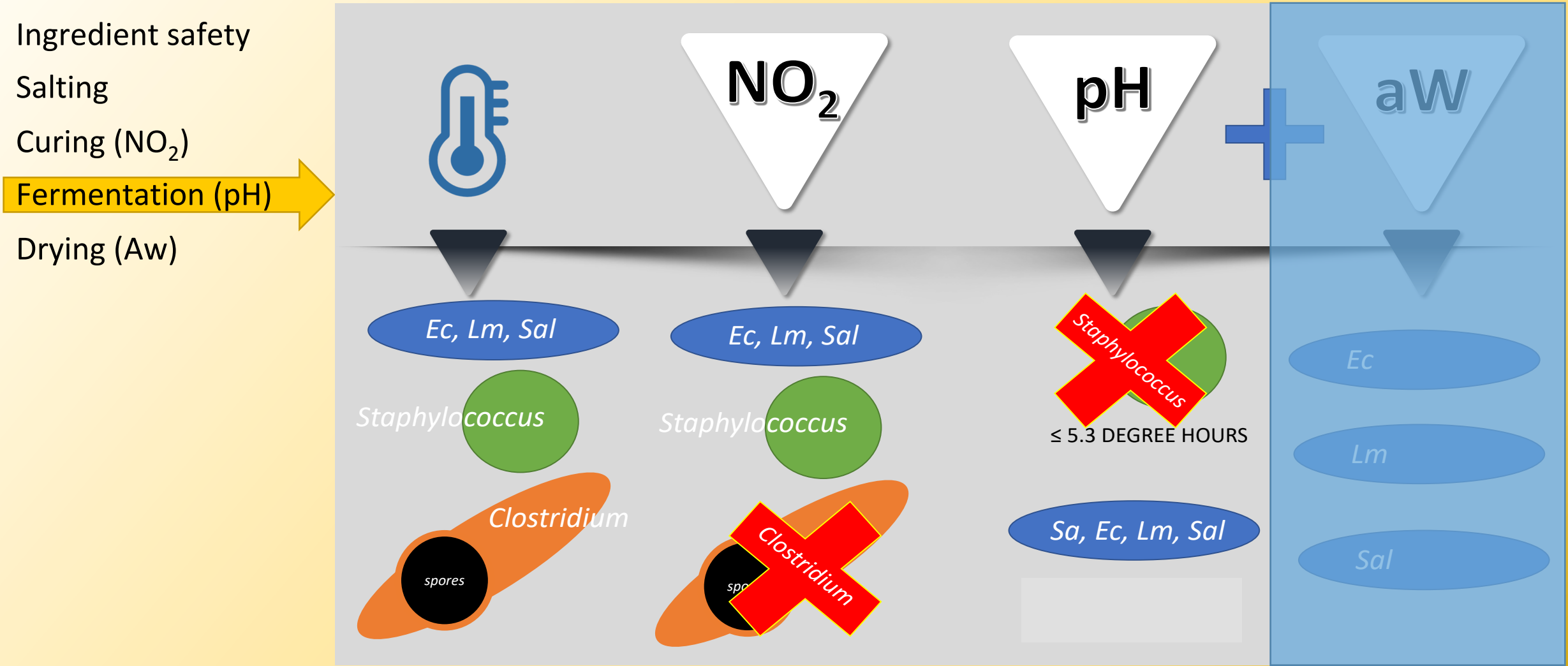
Since many of these types of sausages are expected to be held in the temperature danger zone (fermentation temperature), the next concern is *S. aureus* toxin. Toxin production and growth rate falls very low at pH 5.3. The USDA monitors this control as “degree hours”.

Time in F degree-hours above 60° F (16° C)	Maximum chamber temperature
less than 1200	less than 90° F (32° C)
< 1000	90-100° F (32-38° C)
< 900	greater than 100° F (38° C)

After degree hours the USDA FSIS requires fermented sausages to achieve a pH ≤ 5.

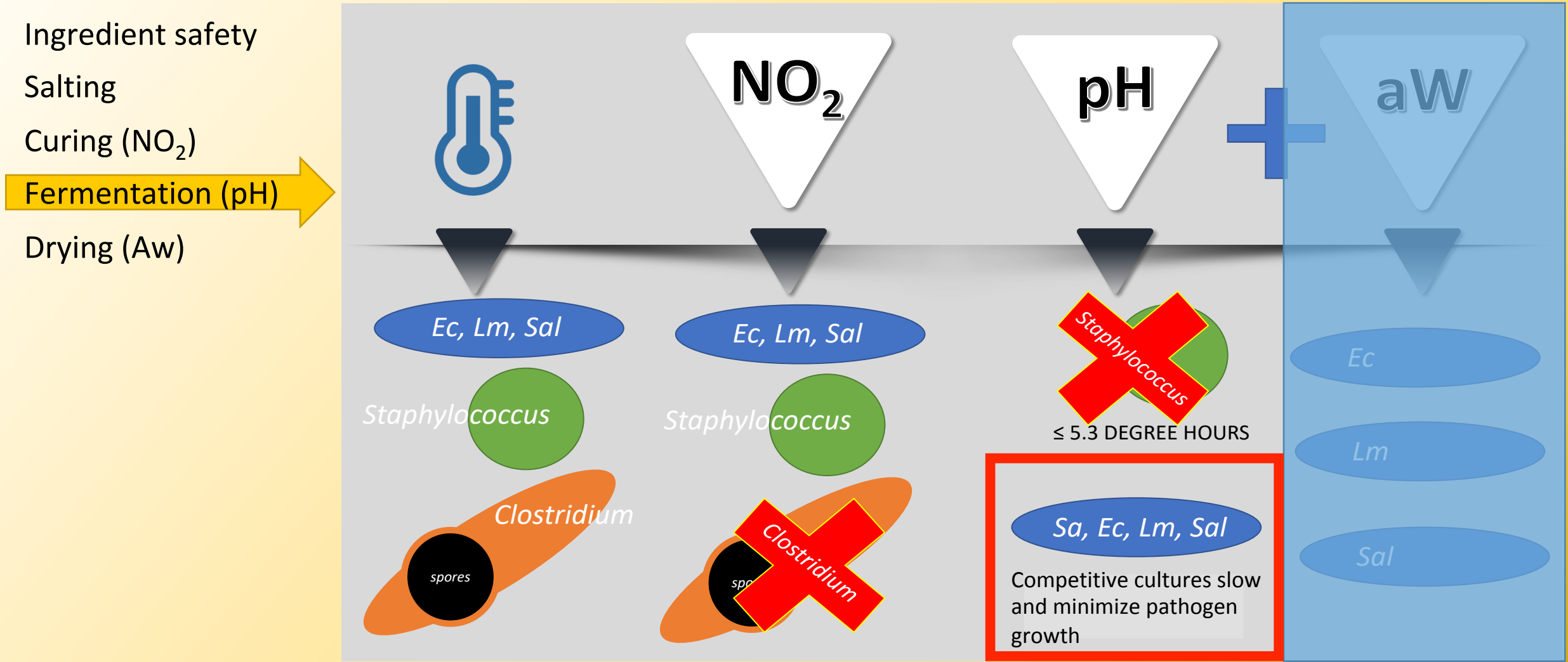


# Fermentation (*acid preservation*)



USDA FSIS recommends using this amount – no more and no less. Calculate by formulation

# Competitive Culture



# Drying (*Aw* reduction)

Ingredient safety

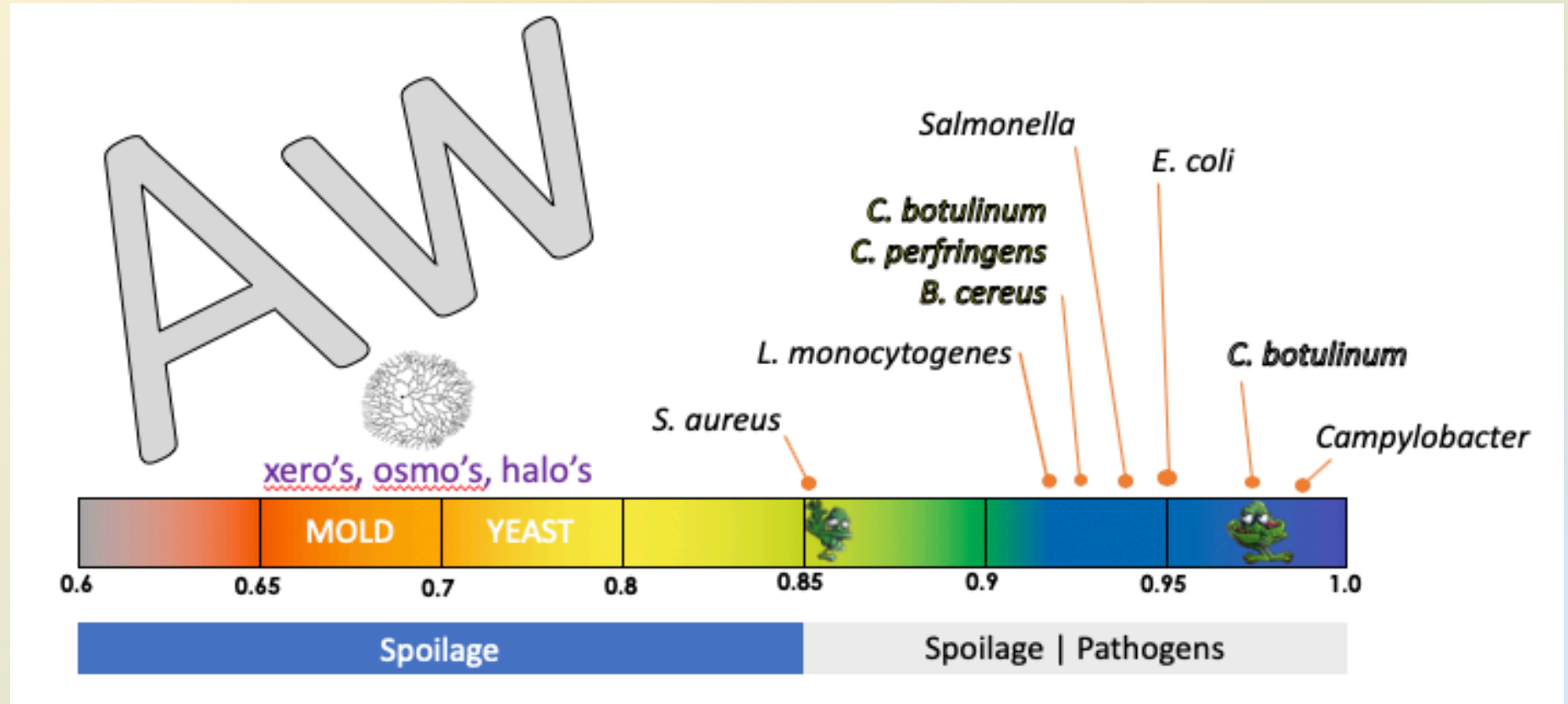
Salting

Curing (NO<sub>2</sub>)

Fermentation (pH)

Drying (*Aw*)

Fermented sausages are generally dried at room or warm temperatures. As more water evaporates, the water activity drops.



# Drying (*Aw* reduction)

Ingredient safety

Salting

Curing (NO<sub>2</sub>)

Fermentation (pH)

Drying (*Aw*)

**Shelf  
stable**

## Dry sausage

USDA: dried to MPR 1.9:1 = shelf stable  
Food Code:  $\leq 0.85$  aW

**Shelf stable or refrigerated?**

## *Semi-dry sausage*

USDA: pH  $\leq 4.5$  & aW  $\leq 0.91$  = shelf stable  
Food Code:  $\leq 0.85$  aW

# Aw minima for pathogen growth

<i>Clostridium botulinum</i> type E	0.97	<i>Clostridium perfringens</i>	0.94
<i>Shigella &amp; Yersinia</i>	<b>0.97</b>	<i>Bacillus cereus</i>	<b>0.93</b>
<i>Vibrio vulnificus</i>	0.96	<i>Clostridium botulinum</i> type A/ B	0.93
<i>Escherichia coli</i>	<b>0.95</b>	<i>Listeria monocytogenes</i>	<b>0.92</b>
<i>Salmonella</i>	<b>0.94</b>	<i>Staphylococcus aureus</i> (ROP)	0.90
<i>Vibrio parahaemolyticus</i>	0.94	<i>Staphylococcus aureus</i> (toxin)	0.88

# Most charcuterie dried to $\leq 0.91$

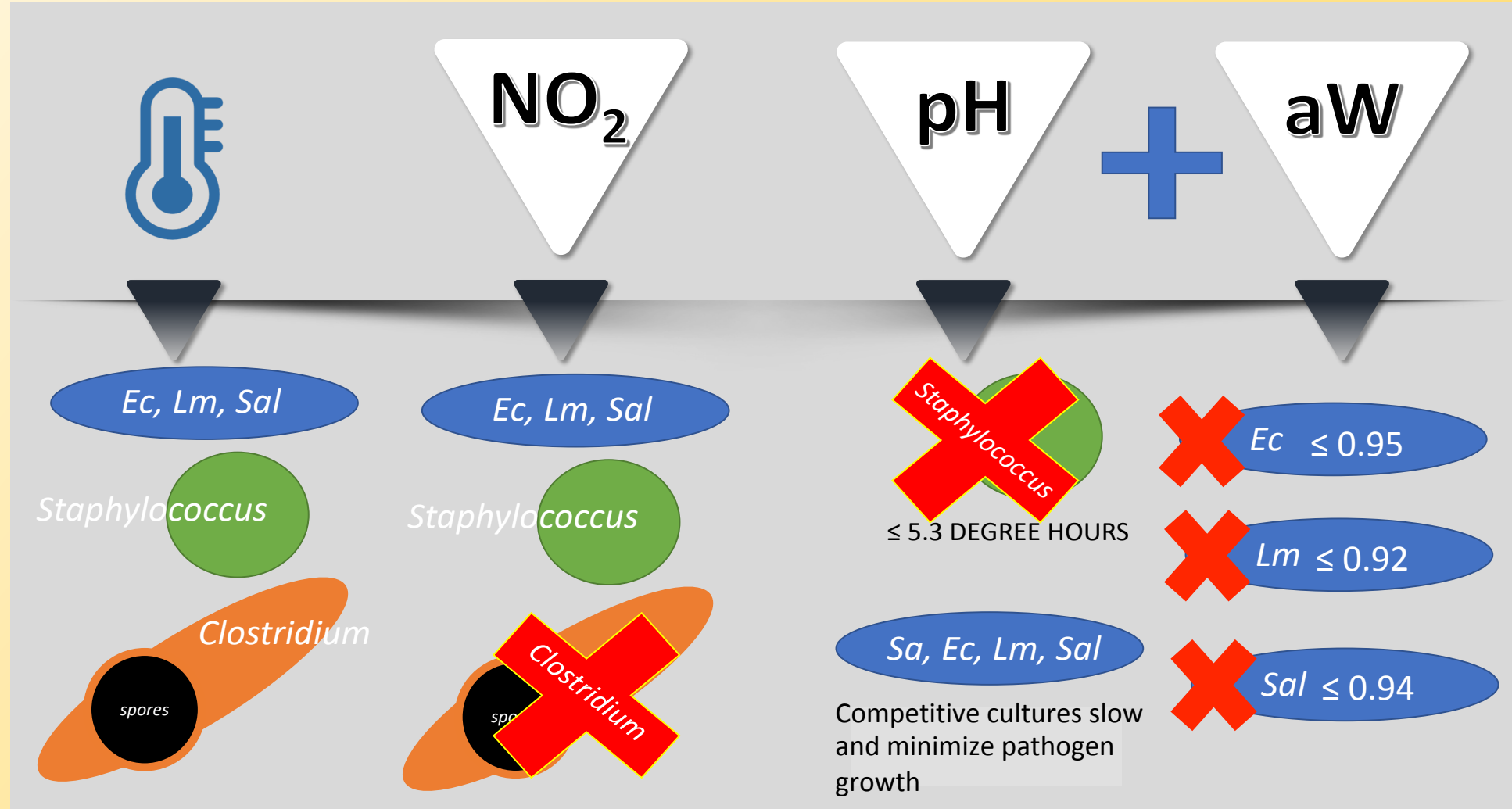
Ingredient safety

Salting

Curing ( $\text{NO}_2$ )

Fermentation (pH)

Drying ( $A_w$ )



# HAZARDS

Growth	pH < 3.9	3.9 - 4.2	4.2 - 4.6	4.6 - 5	5 - 5.4	> 5.4
Aw < 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, VP, BC	SA, CB, LM, SAL, EC, VP, BC	SA, CB, LM, SAL, EC, VP, BC, Cp
> 0.96		SAL	EC, SAL, SA	SA, CB, LM, SAL, EC, VP, BC,	SA, CB, LM, SAL, EC, VP, BC, Vv	SA, CB, LM, SAL, EC, VP, BC, Vv, Cp

# Pasteurization for added safety

° F	° C	6.5-log <sub>10</sub> Lethality
130	54.4	112 min
131	55.0	89 min
132	55.6	71 min
133	56.1	56 min
134	56.7	45 min
135	57.2	36 min
136	57.8	28 min
137	58.4	23 min

138	58.9	18 min
139	59.5	15 min
140	60.0	12 min
141	60.6	9 min
142	61.1	8 min
143	61.7	6 min
144	62.2	5 min
145	62.8	4 min
146	63.3	169 sec

HT ST | VP sausage | Sous vide pasteurize in water at 146F until internal temp is 145F

LT LT | VP sausage | Sous vide pasteurize in water at 131F until internal temp is 130F, then hold 2h