HACCP Plan – Heat Treated, Shelf Stable

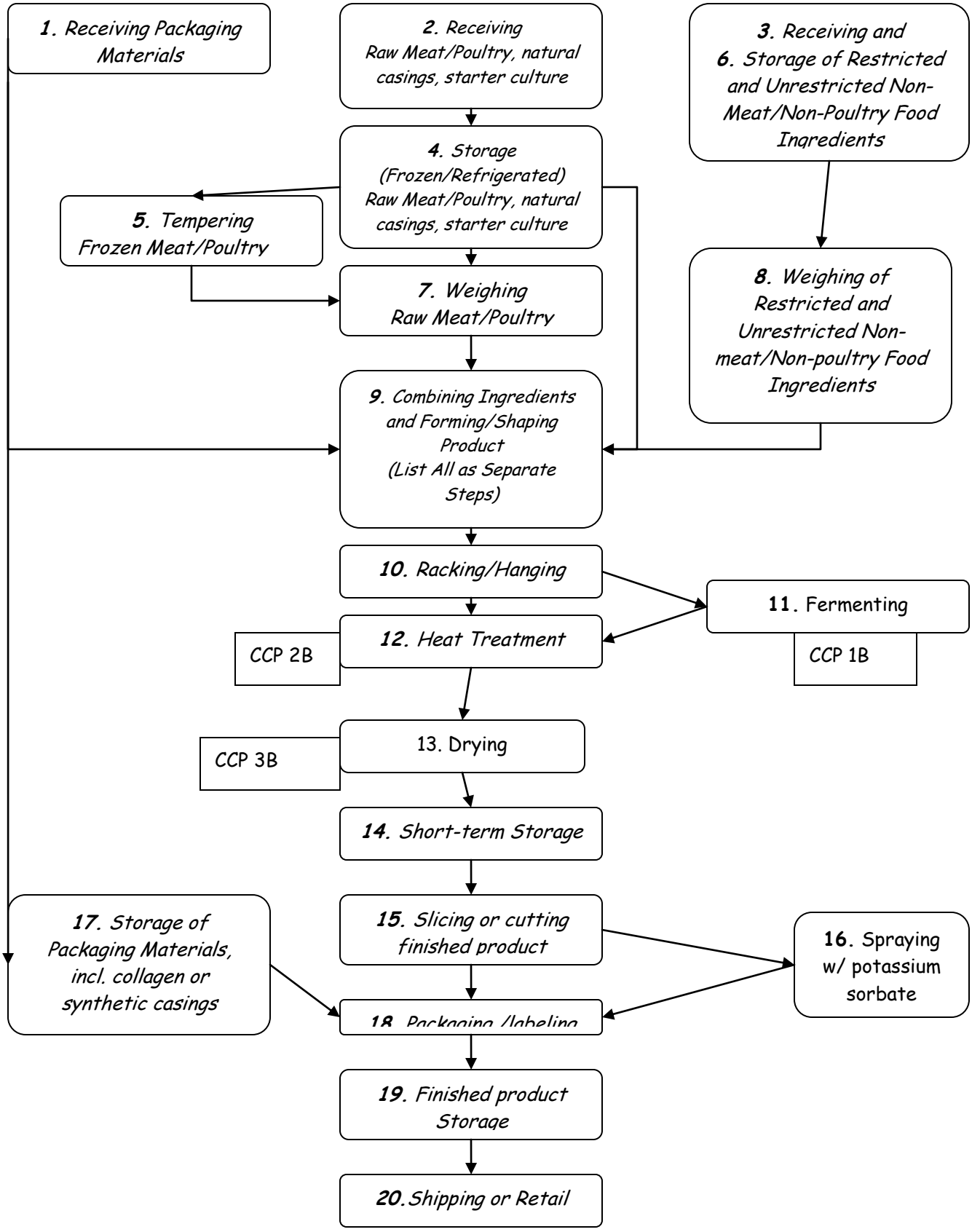
Product Description

COMMON NAME:	beef jerky, dried beef strips, kippered beef; jerky; dried strips or kippered products made from non-beef meats; snack sticks, shelf-stable summer sausage
HOW IS IT TO BE USED?	Ready-to-eat
TYPE OF PACKAGE?	Vacuum-packaging, air-packaged with oxygen scavenger in sealed plastic bags, bulk-packaging in plastic bags
LENGTH OF SHELF LIFE, AT WHAT TEMPERARTURE?	1 year at room temperature (in oxygen-free or anaerobic packaging), to be determined by processor for products packaged in air
WHERE WILL IT BE SOLD?	Sold at retail and wholesale
LABELING INSTRUCTIONS:	Standard label with ingredient statement and “refrigerate after opening” statement
IS SPECIAL DISTRIBUTION CONTROL NEEDED?	Lot code based on production date applied along with appropriate product label.

Directions for Use of the Process Flow Diagram

1. Examine the model Process Flow Diagram and determine which steps you actually use in your process. Cross out, white out, or delete all steps that are NOT part of your process. Re-number steps as necessary.
2. List all of your steps that can be considered parts of the step currently labeled as step 9 (combining ingredients and shaping/forming product). Such steps may include grinding, chopping, mixing, marinating, adding starter culture, stuffing, and forming. These steps should be numbered as sub-steps of the step currently labeled as 9, e.g., 9a, 9b, 9c.
3. Add any processing steps not already shown and make sure that each new step is assigned a number.

Process Flow Diagram
Process Category: Heat Treated, Shelf Stable
Products: Snack Sticks, Summer Sausage, Jerky



Directions for Use of the Hazard Analysis Form

1. Make sure that every step shown on the Process Flow Diagram is entered in the Hazard Analysis Form. Make sure that each step has the same name and number in both the Process Flow Diagram and the Hazard Analysis Form.
2. Check the three categories of hazard (Biological, Chemical, Physical) shown for each step.
    a. If you think a listed hazard is not reasonably likely to occur, leave it in column 2 (Food Safety Hazard) and enter "No" in column 3 (Reasonably likely to occur?). Then provide a reason in column 4.
    b. If you think there are no relevant hazards for a particular category, delete the listed hazard and write "none" in column 2, write "No" in column 3, provide a reason in column 4, and cross out any information in columns 5 – 6.
    c. If you think that a relevant hazard should be added at a step, describe the hazard in column 2 (Food Safety Hazard). Then determine whether the hazard is reasonably likely to occur and put the answer in column 3. Then provide, in column 4, a reason for deciding whether or not the hazard is reasonably likely to occur.
        i. For example, following an SSOP, SOP, or approved formulation may make a hazard unlikely to occur, or a supplier may provide a letter of guarantee stating that the hazard should not be present.
        ii. On the other hand, a history of outbreaks or contamination related to a hazard would mean that the hazard IS reasonably likely to occur.

    Columns 5 and 6 can be left blank if a hazard is NOT reasonably likely to occur.

    IF the hazard IS reasonably likely to occur: fill in columns 5 and 6.
        i. In column 5, list measures that could be applied to prevent, eliminate, or reduce the hazard to an acceptable level. NOTE: at least one of these measures must be either a Critical Control Point (CCP) at the present step or a CCP at a later step.
        ii. Finally, if the hazard is controlled by a CCP at the present step, enter the CCP number in the 6th column. The accepted

numbering system is to number the CCP's in order, followed by either B, C, or P to indicate what type of hazard is being controlled. For example, if the 2nd CCP in a process controlled a physical hazard, it would be entered as CCP -2P.

d. I f you agree that a listed hazard is relevant, no changes are necessary.

HAZARD ANALYSIS – HEAT TREATED, SHELF STABLE – Snack Sticks, Summer Sausage, Jerky

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur?	4. Basis of decision for whether reasonably likely to occur	5. If Yes in Column 3, What Measures Could be Applied to Prevent, Eliminate, or Reduce the Hazard to an Acceptable Level?	6. Critical Control Point
1. Receiving Packaging Materials	Biological – Contamination with meat, other biological material	No	SOP for receiving makes hazard unlikely to occur.		
	Chemical – Non-food grade materials	No	Letter of guarantee for packaging materials makes hazard unlikely to occur.		
	Physical - None	No	SOP for receiving makes hazard unlikely to occur.		
2. Receiving Raw Meat/Poultry, natural casings, starter cultures	Biological - Presence of pathogens: Salmonella, Listeria monocytogenes, Staph. aureus, Clostridium botulinum, Clostridium perfringens; if beef E. coli 0157:H7; if poultry, Campylobacter	Yes (Pathogens) No (Prions)	Raw meat/poultry, natural casings are known sources of pathogens Letter of guarantee received from all	Pathogens will be controlled at subsequent steps through heat treatment and drying (jerky & snack sticks) or fermentation/ acidification and heating (summer sausage, snack stick).	

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur?	4. Basis of decision for whether reasonably likely to occur	5. If Yes in Column 3, What Measures Could be Applied to Prevent, Eliminate, or Reduce the Hazard to an Acceptable Level?	6. Critical Control Point
	Presence of BSE-causing prions in beef casings		suppliers of natural beef casings to certify that casings are not obtained from SRMs.		
	Chemical – None	No	SOP for receiving makes hazard unlikely to occur.		
	Physical – None	No	SOP for receiving makes hazard unlikely to occur.		
3. Receiving and 6. Storage– Restricted and Unrestricted Non-meat\Non-poultry Food Ingredients	Biological – None	No	SOP for receiving and storage makes hazard unlikely to occur.		
	Chemical – Ingredients containing undesirable substances	No	Letters of guarantee are received from all suppliers of food additives. SOP for storage makes contamination unlikely.		
	Physical – None	No	SOP for receiving makes hazard		

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur?	4. Basis of decision for whether reasonably likely to occur	5. If Yes in Column 3, What Measures Could be Applied to Prevent, Eliminate, or Reduce the Hazard to an Acceptable Level?	6. Critical Control Point
			unlikely to occur.		
4. Storage (Cold – Frozen/Refrigerated) – Raw Meat/Poultry, natural casings, starter culture	Biological: Presence or growth of pathogens (see list above)	Yes (Presence) No (growth)	Raw meat/poultry, natural casings are known sources of pathogens. Pathogens are not likely to grow if the product is maintained according to the SOP for storage.	Pathogens will be controlled at subsequent steps through heat treatment and drying (jerky & snack sticks) or fermentation/ acidification and heating (summer sausage, snack stick).	
	Chemical – None	No	SOP for storage makes hazard unlikely to occur.		
	Physical – None	No	SOP for receiving makes hazard unlikely to occur.		
5. Tempering Frozen Meat/Poultry	Biological – Presence or growth of pathogens (see list above)	Yes (presence) No (growth)	Raw meat/poultry are known sources of pathogens. Tempering done according to SOP, therefore pathogen growth is unlikely.	Pathogens will be controlled at subsequent steps through heat treatment and drying (jerky & snack sticks) or fermentation/acidification and heating (summer sausage, snack stick).	
	Chemical – None	No	SSOP makes hazard unlikely to occur.		

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	Physical - None	No	SSOP makes hazard unlikely to occur.		
7. Weighing Raw Meat/Poultry	Biological – Presence or growth of pathogens (see list above)	Yes (presence) No (growth)	Raw meat/poultry are known sources of pathogens. Weighing done quickly enough to prevent growth. SSOP makes contamination via equipment and workers unlikely to occur.	Pathogens will be controlled at subsequent steps through heat treatment and drying (jerky & snack sticks) or fermentation/acidification and heating (summer sausage, snack stick).	
	Chemical – None	No	SSOP makes hazard unlikely to occur.		
	Physical – None	No	SSOP makes hazard unlikely to occur.		
8.Weighing Restricted and Unrestricted Non-meat/Non-poultry Food Ingredients	Biological – None	No	SSOP (operational) makes hazard unlikely to occur.		
	Chemical – Excessive Level of Nitrite	No	Approved product formulation will be followed to prevent addition of too much nitrite. Use of pre-blended cure mixes added to		

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur?	4. Basis of decision for whether reasonably likely to occur	5. If Yes in Column 3, What Measures Could be Applied to Prevent, Eliminate, or Reduce the Hazard to an Acceptable Level?	6. Critical Control Point
			standardized amounts of meat makes hazard unlikely to occur.		
	Physical - None	No	SSOP makes hazard unlikely to occur.		
9. Combining Ingredients, and Forming/Shaping Product (Includes one or more of the following; grinding, mixing, adding starter culture, marinating, stuffing, forming, and slicing)	Biological – Presence or growth of pathogens (see list above)	Yes (presence) No (growth)	Raw meat/poultry, natural casings are known sources of pathogens. Processing steps are done quickly enough to prevent growth. SSOP makes contamination via equipment and workers unlikely to occur.	Pathogens will be controlled at subsequent steps through heat treatment and drying (jerky & snack sticks) or fermentation/acidification and heating (summer sausage, snack stick). Spore-forming pathogens will not be able to grow on finished product (products are shelf-stable).	
	Chemical – Allergens; cleaning/sanitizing chemical residues	No	Application of correct label prevents inadvertent consumption of allergens by consumer. Operational SSOP prevents cross		

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			contamination of allergenic agents. Pre-op SSOP makes presence of chemical residues unlikely to occur.		
	Physical – Foreign materials	No	Visual observation for foreign materials during processing, inspection of equipment during cleaning make hazard unlikely.		
17. Storage of packaging materials, incl. collagen or synthetic casings	Biological – contamination from meat products	No	SOP for receiving and storage makes hazard unlikely		
	Chemical – None	No	SOP for receiving and storage makes hazard unlikely		
	Physical - None	No	SOP for receiving and storage makes hazard unlikely		
10. Racking/Hanging	Biological – Presence or growth of pathogens (see list above)	Yes (Presence) No (Growth)	Raw meat/poultry, natural casings are a known source of pathogens. Process	Pathogens will be controlled at a subsequent step through heat treatment and drying (jerky & snack sticks) and/or	

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur?	4. Basis of decision for whether reasonably likely to occur	5. If Yes in Column 3, What Measures Could be Applied to Prevent, Eliminate, or Reduce the Hazard to an Acceptable Level?	6. Critical Control Point
			is done rapidly enough to prevent growth, and product is returned to cooler if not promptly fermented or heat-processed. SSOP makes contamination via equipment & workers unlikely to occur.	fermentation or acidification and heating (summer sausage, snack stick).	
	Chemical – None	No	SOP for storage makes hazard unlikely to occur.		
	Physical - None	No	SOP for storage makes hazard unlikely to occur.		
11. Fermenting (Used for pH reduction of Snack Sticks, Summer Sausage, Landjaeger)	Biological – Presence or growth of pathogens (see list in step 2)	Yes (S. aureus) No (other pathogens)	Potential growth of Staphylococcus aureus and toxigenesis if fermentation process is inadequate. Growth of other non-sporeforming	Fermentation within the degree-hour limit will achieve the pH needed to inhibit S. aureus. Spore-forming pathogens will not be able to grow on finished product (products are shelf-stable). In some cases, decrease in pH to less than 5.3 is required for shelf-stability.	1 B

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur?	4. Basis of decision for whether reasonably likely to occur	5. If Yes in Column 3, What Measures Could be Applied to Prevent, Eliminate, or Reduce the Hazard to an Acceptable Level?	6. Critical Control Point
			pathogens may occur, but hazard is controlled by subsequent heat-processing.		
	Chemical – None	No	SSOP makes hazard unlikely to occur.		
	Physical - None	No	SSOP makes hazard unlikely to occur.		
12. Heat Treatment (Cooking Step)	Biological – Pre-process contaminating pathogens: Listeria monocytogenes Salmonella, Staphylococcus aureus, E. coli 0157:H7 , Clostridium botulinum, Clostridium perfringens	Yes	Potential survival and growth of pre-processing contaminating pathogens and toxin production by S. aureus due to inadequate process time/temperature/% relative humidity.	Heat treatment using appropriate time/temperature/humidity to produce lethality/pasteurization.	2 B

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur?	4. Basis of decision for whether reasonably likely to occur	5. If Yes in Column 3, What Measures Could be Applied to Prevent, Eliminate, or Reduce the Hazard to an Acceptable Level?	6. Critical Control Point
	Chemical – None	No	SSOP makes hazard unlikely to occur.		
	Physical - None	No	SSOP makes hazard unlikely to occur.		
13. Drying	Biological - Post-process contaminating pathogens: Listeria monocytogenes, Staphylococcus aureus, toxin-producing molds	Yes (bacteria) No	Spore-forming pathogens may survive. Post-process contamination may occur. SOP for oxygen-free	Product will be dried to an extent that prevents growth of sporeforming bacterial pathogens. For some shelf-stable products, reduced pH and reduced water activity combine to prevent growth of bacterial pathogens.	3B

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		(molds)	packaging and/or discarding of moldy product makes hazard unlikely.		
	Chemical – None	No	SSOP makes hazard unlikely.		
	Physical - None	No	SSOP makes hazard unlikely.		
14. Short-term storage	Biological – Growth of Listeria monocytogenes, Staphylococcus aureus, toxin-producing molds	No	Short duration of step and reduced water activity make growth unlikely to occur. Spore-forming pathogens will not grow because products are shelf-stable.		
	Chemical – None	No	SSOP makes hazard unlikely.		
	Physical - None	No	SSOP makes hazard unlikely.		
15. Slicing or cutting finished product	Biological – Contamination with pathogens via workers or equipment.	No	SSOP controls hygienic condition of equipment and practices of		

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur?	4. Basis of decision for whether reasonably likely to occur	5. If Yes in Column 3, What Measures Could be Applied to Prevent, Eliminate, or Reduce the Hazard to an Acceptable Level?	6. Critical Control Point
			employees handling products in post-lethality environment.		
	Growth of Listeria monocytogenes, Staphylococcus aureus.	No	Short duration of step makes growth unlikely. Drying prevents pathogen growth. Listeria control program is in effect.		
	Growth of toxin-producing molds	No	Short duration of step makes growth unlikely. SOP for oxygen-free packaging and/or discarding of moldy product makes mold growth unlikely.		
	Chemical – None	No	SSOP makes hazard unlikely.		
	Physical - None	No	SSOP makes hazard unlikely.		
16. Spraying w/	Biological – None	No	Potassium sorbate is		

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur?	4. Basis of decision for whether reasonably likely to occur	5. If Yes in Column 3, What Measures Could be Applied to Prevent, Eliminate, or Reduce the Hazard to an Acceptable Level?	6. Critical Control Point
potassium sorbate			an approved antimicrobial agent.		
	Chemical – excessive potassium sorbate	No	Applying potassium sorbate according to approved formulation makes hazard unlikely to occur		
	Physical - None	No	SSOP makes hazard unlikely.		
18. Packaging/Labeling	Biological - Growth of Listeria monocytogenes, Staphylococcus aureus	No	Product is shelf-stable and does not permit growth of bacterial pathogens. Listeria control program.		
	Growth of toxin-producing molds	No	SOP for oxygen-free packaging and/or discarding of moldy product makes hazard unlikely.		
	Chemical – None	No	SSOP makes hazard unlikely.		
	Physical - None	No	SSOP makes hazard		

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur?	4. Basis of decision for whether reasonably likely to occur	5. If Yes in Column 3, What Measures Could be Applied to Prevent, Eliminate, or Reduce the Hazard to an Acceptable Level?	6. Critical Control Point
			unlikely.		
19. Finished Product Storage	Biological – None	No	Product is shelf-stable.		
	Chemical – None	No	Product is handled according to SOP for Finished Product Storage.		
	Physical - None	No	Product is handled according to SOP for Finished Product Storage.		
20. Shipping or Retail	Biological – None	No	Product is shelf-stable.		
	Chemical – None	No	Product is handled according to SOP for Finished Product Storage.		
	Physical - None	No	Product is handled according to SOP for Finished Product Storage.		

Directions for Using the HACCP Plan Form

1. Examine your Hazard Analysis form to determine which steps are CCP's and what type of hazard (Biological, Chemical, or Physical) each CCP controls.
2. Check to see whether each CCP is already listed on the HACCP Plan Form. If a CCP is not already listed, enter the CCP number and step in the column labeled "CCP # and Location".
3. For CCP's already listed on the model form, examine the Critical Limits listed. In the HACCP Plan Form for some HACCP categories there will be several options for Critical Limits. If this is the case, choose the Critical Limits that will work best in your plant and cross out, white out, or delete the other Critical Limits and the Monitoring Procedures that go with them. It may be helpful to check the "Monitoring Procedures and Frequency" column during your decision-making. For CCP's already on the model form, supporting scientific documentation is already included in your manual.
4. If you are adding a new CCP, you will need to determine the scientifically valid Critical Limits to be used with the CCP. You must also obtain scientific information supporting your choice of Critical Limits. Consult your inspector or university extension specialists for help.
5. Examine the "Monitoring Procedures and Frequency" column for each CCP. If you wish to change the procedure and/or the frequency, check with your inspector or a university extension specialist for help. If a change is OK, you will need to write down your reasoning for making the change and include this reasoning in your HACCP manual.
6. Examine the "HACCP Records" column. If you are using different forms for record-keeping in this HACCP Plan, please put the correct form title(s) in the "HACCP Records" column.
7. The verification activities listed in the "Verification Procedures and Frequency" column are required by the regulation. However, you may choose to do additional activities; for example, for verification, beef jerky samples may be sent to the lab each quarter for water activity testing. Moisture:Protein Ratio (MPR) testing would not be necessary to meet HACCP requirements for jerky. However, MPR testing and/or water activity testing may be needed to meet HACCP requirements for other shelf-stable products. If you do any additional verification activities, enter them in the "Verification Procedures and Frequency" column. If you choose to use a frequency for the required verification activities that is different than the frequency shown, you must provide written justification for the different frequency. Consult your inspector or university extension specialists for help.
8. We suggest that you make no changes in the "Corrective Actions" column. Be sure to have a form for documenting corrective actions that you take. A corrective action form is included in this model.

HACCP PLAN
PROCESS CATEGORY: Heat treated, shelf stable
Product example: Snack Sticks, Summer Sausage, Jerky

CCP# and Location	Critical Limits	Monitoring Procedures and Frequency	HACCP Records	Verification Procedures and Frequency	Corrective Actions
1B Fermenting (Snack Sticks, Summer Sausage produced w/ a fermentation step)	pH ≤ 5.3 – achieved within one of the following time limits (based on a constant chamber temperature). Constant Chamber Temp (°F) Max Hrs 75 80 80 60 85 48 90 33 95 28 100 25 105 20 110 18 In addition, pH must be reduced to either a) 5.1-5.2 if product water activity will be 0.92 – 0.95, or b) no more than 5.0 if MPR is 3.1 or lower. If product MPR is 1.9 or lower, or if product water activity is 0.91 or lower, no pH standard must be met beside reaching	Sausage maker or designee will take a product sample for pH measurement from each lot at the completion of the fermentation cycle. Before removal from fermentation, determine compliance with the critical limit time related to the specified fermentation chamber temperature. The pH is measured using SOP for Calibration of pH Meter and Product pH Measurement. The number of product pieces tested for pH will be determined based on lot size, product history, recent changes in formulation, previously observed variation, etc.	Fermentation Log Corrective Action Log Thermometer Calibration Log pH Meter Calibration Log	Establishment owner or designee will review the Fermentation Log, Corrective Action Log, Thermometer Calibration Log, and pH Meter Calibration Log once per week. Establishment owner or designee will calibrate all thermometers to a known standard monthly. Thermometers will be calibrated to ± 2° F or taken out of operation as stated in the SOP. Calibration actions are recorded in the Thermometer Calibration Log. Establishment owner or designee will check the pH meter used for monitoring, to verify accuracy before	If a deviation from a critical limit occurs, the establishment owner or designee is responsible for corrective action protocol as stated in 9 CFR, 417.3 1. The cause of the deviation will be identified and eliminated. 2. The CCP will be under control after the corrective action is taken. 3. Measures to prevent recurrence will be established. 4. No product that is injurious to health or

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PROCESS CATEGORY: Heat treated, shelf stable
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CCP# and Location	Critical Limits	Monitoring Procedures and Frequency	HACCP Records	Verification Procedures and Frequency	Corrective Actions
	5.3 or lower within the specified time.			each batch of product is produced. The SOP for calibration will be used and calibration will be accurate to ± 0.1. Calibration activities will be recorded in the pH Meter Calibration Log. Establishment owner or designee will observe monitoring of temperature and pH at least once per month.	otherwise adulterated as a result of the deviation will be permitted to enter commerce.
2 B Heat Treatment (summer sausage, snack sticks with fermentn./ Acidificn. step)	Snack Sticks to be cooked to an internal temperature of at least 150°F for at least 72 seconds, or another pre-determined Appendix A temperature/time combination. Summer sausages to be cooked to a pre-determined Appendix A temperature/time combination. Note that less severe temperature/time combinations have been	Smokehouse operator or designee will take the internal temperature at appropriate times using a calibrated internal probe or thermometer and/or review smokehouse chart for each lot at completion of cooking cycle and before removal of product from smokehouse. The number of product pieces	Smokehouse/ Product Temperature Log Thermometer Calibration Log Corrective Action Log	Establishment owner or designee will review Smokehouse/Product Temperature Log, Corrective Action Log, and Thermometer Calibration Log once per week. Once per week the establishment owner or designee will observe the monitoring of process time	If a deviation from a critical limit occurs, the establishment owner or designee is responsible for corrective action protocol as stated in 9 CFR, 417.3 1. The cause of the deviation will be

HACCP PLAN
PROCESS CATEGORY: Heat treated, shelf stable
Product example: Snack Sticks, Summer Sausage, Jerky

CCP# and Location	Critical Limits	Monitoring Procedures and Frequency	HACCP Records	Verification Procedures and Frequency	Corrective Actions
	validated for products with low pH. For more info contact Steve Ingham (608-265-4801 or scingham@wisc.edu)	monitored for temperature will be determined based on lot size, product history, recent changes in formulation, previously observed variation, etc.		and temperature. Thermometer calibration will be done in accordance with the SOP for Calibration of Thermometer.	identified and eliminated. 2. The CCP will be under control after the corrective action is taken. 3. Measures to prevent recurrence are established. 4. No product that is injurious to health or otherwise adulterated as a result of the deviation will be permitted to enter commerce.
2 B Heat Treatment (Jerky except Poultry)	Application of one of the processing schedules below: 1. Set oven dry-bulb temperature to reach 170°F within 30 minutes, and then	Oven temperature will be monitored using calibrated smokehouse dry-bulb and wet-bulb thermometers.	Smokehouse/ Product Temperature and Yield Log	Smokehouse operator or designee will verify that the wet bulb wick is clean and the wet-bulb water well contains the appropriate	If a deviation from a critical limit occurs, the establishment owner or designee

HACCP PLAN
PROCESS CATEGORY: Heat treated, shelf stable
Product example: Snack Sticks, Summer Sausage, Jerky

CCP# and Location	Critical Limits	Monitoring Procedures and Frequency	HACCP Records	Verification Procedures and Frequency	Corrective Actions
	apply one of the following wet-bulb temperature spikes. a. 125°F for 60 min. b. 130°F for 60 min. c. 135°F for 30 min. d. 140°F for 10 min. Then dry to required dryness at a dry-bulb temperature of at least 170 °F. 2. Process product at a chamber **wet-bulb** temperature and time combination at least equivalent to a pre-determined Appendix A combination. An Appendix A combination may be used with a dry-bulb temperature provided at least 90% Relative Humidity is maintained throughout the process. 3. Increase dry-bulb temperature to reach at least 170°F within 90 minutes, and		Corrective Action Log Thermometer Calibration Log Smokehouse/ Product Temperature and Yield Log Corrective Action Log Thermometer Calibration Log	amount of water prior to startup. Once per week, the establishment owner or designee will review the Smokehouse/Product Temperature Log, Corrective Action Log, Thermometer Calibration Log. Once per month the establishment owner or designee will observe the smokehouse operator or designee perform the monitoring activity. Smokehouse operator or designee will verify that the wet bulb wick is clean and the wet-bulb water well contains the appropriate amount of water prior to startup.	is responsible for corrective action protocol as stated in 9 CFR, 417.3 1. The cause of the deviation will be identified and eliminated. 2. The CCP will be under control after the corrective action is taken. 3. Measures to prevent recurrence are established. 4. No product that is injurious to health or otherwise adulterated as a result of the deviation will be permitted to enter

HACCP PLAN
PROCESS CATEGORY: Heat treated, shelf stable
Product example: Snack Sticks, Summer Sausage, Jerky

CCP# and Location	Critical Limits	Monitoring Procedures and Frequency	HACCP Records	Verification Procedures and Frequency	Corrective Actions
2B Heat Treatment (poultry jerky)	then dry to required dryness at a dry-bulb temperature of at least 170°F. 4. Increase dry-bulb temperature in smokehouse in 1-hour intervals to 120°F, 130°F, 140°F, and 170°F, then dry to required dryness at dry-bulb temperature of at least 170°F. Wet-bulb temperature in chamber must reach at least 155°F (cured products) or 160°F (uncured products.	Oven temperature will be monitored using calibrated smokehouse wet-bulb thermometers.		Once per week, the establishment owner or designee will review the Smokehouse/Product Temperature Log, Corrective Action Log, Thermometer Calibration Log. Once per month the establishment owner or designee will observe the smokehouse operator or designee perform the monitoring activity.	commerce. If a deviation from a critical limit occurs, the establishment owner or designee is responsible for corrective action protocol as stated in 9 CFR, 417.3 1. The cause of the deviation will be identified and eliminated. 2. The CCP will be under control after the corrective action is taken. 3. Measures to prevent recurrence

HACCP PLAN PROCESS CATEGORY: Heat treated, shelf stable Product example: Snack Sticks, Summer Sausage, Jerky					
CCP# and Location	**Critical Limits**	**Monitoring Procedures and Frequency**	**HACCP Records**	**Verification Procedures and Frequency**	**Corrective Actions**
					are established. 4.No product that is injurious to health or otherwise adulterated as a result of the deviation will be permitted to enter commerce.
3B Drying	Yield pre-determined to result in either: jerky with MPR of 0.75 or lower and water activity of not higher than 0.85 (air storage) or 0.88 (oxygen-free packaging), OR non-jerky product with a) MPR of 1.9 or lower , or b) water activity of 0.92-0.95 and pH of 5.1 – 5.2, or c) water activity of 0.91 or lower.	Smokehouse operator or designee will determine product yield (see SOP for relating product yield to water activity and Moisture:Protein Ratio) for every lot.	Smokehouse/ Product Temperature and Yield Log Corrective Action Log Thermometer Calibration Log Results of yield and/or water activity testing. May be part of Smokehouse/Product Temperature and	Once per week, the establishment owner or designee will review the Smokehouse/Product Temperature and Yield Log, Corrective Action Log,. Once per month the establishment owner or designee will observe the smokehouse operator or designee perform the monitoring activity. Twice per year (once during warm weather, once during cold weather), water	If a deviation from a critical limit occurs, the establishment owner or designee is responsible for corrective action protocol as stated in 9 CFR, 417.3 1. The cause of the deviation will be identified and eliminated. 2. The CCP will be under control after the corrective

HACCP PLAN PROCESS CATEGORY: Heat treated, shelf stable Product example: Snack Sticks, Summer Sausage, Jerky					
CCP# and Location	**Critical Limits**	**Monitoring Procedures and Frequency**	**HACCP Records**	**Verification Procedures and Frequency**	**Corrective Actions**
			Yield Log	activity and MPR will be tested to ensure that product meets shelf-stability standards (see SOP for Relating Product Yield to Water Activity and Moisture:Protein Ratio)>	action is taken. 3. Measures to prevent recurrence are established. 4.No product that is injurious to health or otherwise adulterated as a result of the deviation will be permitted to enter commerce.

Sign and date at initial acceptance, modification, or annual reassessment.

Signed _____ Date _____

Signed _____ Date _____

Signed _____ Date _____

Signed _____ Date _____

Smokehouse/Product Temperature Log for Red-Meat Jerky made using processing option 1.										
Product ID/Lot	Start Wt. (6 pieces)	Start Time	Dry-Bulb temp. at 30 min.	**Wet-bulb temp. spike:** Length and Lowest Temp.	Drying Stage: **Length and Lowest Temp.**	Devn. from CL? (Y= Yes → take corrective action, N = No)	Monitoring of CCP Initials/Date	End wt. (same 6 pieces)	Yield	Pre-shipment Review Signature/Date

Verification Activities (for up to three weeks) associated with these batches. Indicate Type of activity: DO = Direct Observation of CCP monitoring (monthly), CAL = thermometer calibration, or RR = Records Review (weekly).

Type of activity: _____ Type of activity: _____ Type of activity: _____

Result (✓ or -): _____ Result (✓ or -): _____ Result (✓ or -): _____

NOTE: ✓ = in accordance with the HACCP plan. – = not in accordance w/ HACCP plan; take corrective action.

Date/Time: _____ Date/Time: _____ Date/Time: _____

Initials: _____ Initials: _____ Initials: _____

Smokehouse/Product Temperature Log for Red-Meat Jerky made using processing option 2.									
Product ID/Lot	Start wt. (6 pieces)	Start Time	Appendix A (wet-bulb temperature) Start & End Times	Lowest Temperature	Deviation from CL? (Y = yes, → take corrective action N = no)	Monitoring of CCP Initials/Date	End wt. (same 6 pieces)	Yield	Pre-shipment Review Signature/Date
						/			
						/			
						/			
						/			
						/			
						/			
						/			
						/			
						/			
						/			

Verification Activities (for up to three weeks) associated with these batches. Indicate Type of activity: DO = Direct Observation of CCP monitoring (monthly), CAL = thermometer calibration, or RR = Records Review (weekly).

Type of activity: _____ Type of activity: _____ Type of activity: _____
Result (✓ = acceptable): _____ Result (✓ = acceptable): _____ Result (✓ = acceptable): _____
NOTE: ✓ = in accordance with the HACCP plan. – = not in accordance w/ HACCP plan; take corrective action.
Date/Time: _____ Date/Time: _____ Date/Time: _____
Initials: _____ Initials: _____ Initials: _____

Smokehouse/Product Temperature Log for Red-Meat Jerky made using processing option 3.								
Product ID/Lot	Start weight (6 pieces)	Start time	Temperature at 90 minutes	End time	Lowest temp-erature from 90 minutes	Deviation from CL? (Y = yes→ take corrective action, N = no)	Monitoring of CCP Initials/Date	Pre-shipment Review Signature/Date

Verification Activities (for up to three weeks) associated with these batches. Indicate Type of activity: DO = Direct observation of CCP monitoring (monthly), CAL = thermometer calibration, or RR = Records review (weekly).

Type of activity: _____ Type of activity: _____ Type of activity: _____

Result (✓ = acceptable): _____ Result (✓ = acceptable): _____ Result (✓ = acceptable): _____

NOTE: ✓ = in accordance with the HACCP plan. – = not in accordance w/ HACCP plan; take corrective action.

Date/Time: _____ Date/Time: _____ Date/Time: _____

Initials: _____ Initials: _____ Initials: _____

Smokehouse/Product Temperature Log for Red-Meat Jerky made using processing option 4.							
Prod. ID/ Lot	Start Wt. (6 pieces)	Time and Dry-Bulb Temp at start of each of 4 "steps" and at end of 4th "step" TIME/ TEMP TIME/ TEMP TIME/ TEMP TIME/ TEMP	Devn. from CL? (Y = yes→ take corrective action, N = no)	Monitoring of CCP Initials/ Date	End wt. (same 6 pieces)	Yield	Pre-shipment Review Signature/Date
		/ / / /		/			
		/ / / /		/			
		/ / / /		/			
		/ / / /		/			
		/ / / /		/			
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		/ / / /		/			

Verification Activities (for up to three weeks) associated with these batches. Indicate Type of activity: DO = Direct Observation of CCP monitoring (monthly), CAL = thermometer calibration, or RR = Records Review (weekly).

Type of activity: _____ Type of activity: _____ Type of activity: _____
Result (✓ = acceptable): _____ Result (✓ = acceptable): _____ Result (✓ = acceptable): _____
NOTE: ✓ = in accordance with the HACCP plan. – = not in accordance w/ HACCP plan; take corrective action.
Date/Time: _____ Date/Time: _____ Date/Time: _____
Initials: _____ Initials: _____ Initials: _____

Smokehouse/Product Temperature Log for Summer Sausage, Snack Sticks							
Product ID/Lot	Start Wt. (6 pieces)	Start of Appendix A process Time/ Product Temp.	End of Process Time / Product Temp.	Deviation from CL? (Y = yes→ take corrective action, N = no)	Monitoring of CCP Initials/Date	End wt. (same 6 pieces) Yield	Pre-shipment Review Signature/Date

Verification Activities (for up to three shifts) associated with these batches. Indicate Type of activity: DO = Direct observation of CCP monitoring (weekly), CAL = thermometer calibration, or RR = Records review (every shift).

Type of activity: _____ Type of activity: _____ Type of activity: _____

Result (✓ = acceptable): _____ Result (✓ = acceptable): _____ Result (✓ = acceptable): _____

NOTE: ✓ = in accordance with the HACCP plan. – = not in accordance w/ HACCP plan; take corrective action.

Date/Time: _____ Date/Time: _____ Date/Time: _____

Initials: _____ Initials: _____ Initials: _____

Fermentation Log

Critical Limit: pH ≤ 5.3 within the time limit listed (below)for the fermentation chamber temperature.

Date	Product ID	Chamber Temperature (°F)	Time In	Time Out	pH*§ #	Time Limit (hrs)	Deviation from CL? Yes→ take corrective action /No	Monitor Initials	Verification Activity[a]/Date/ Initial/Time	Comments/Results (✓ = in accordance with HACCP plan; – = not in accordance w/ HACCP plan; take corrective action.)

*Constant Chamber Temperature (°F)	75°F	80°F	85°F	90°F	95°F	100°F	105°F	110°F
Maximum Hours to pH ≤ 5.3	80	60	48	33	28	25	20	18

§For products with water activity of 0.92-0.95, pH must be 5.1 – 5.2; products with pH of 5.0 or lower are shelf-stable.

Instructions: Enter the appropriate chamber temperature under Chamber Temperature. If the chamber temperature lies between two values, select the next highest value. Enter the corresponding time limit in the Time Limit column. The time limit is the maximum time allowed for the pH to fall to 5.3 or lower. These values you entered will serve as the control values. Record requested information. **Do not remove the product from the fermentation stage until the product pH is equal to or less than 5.3**. Time and temperature may be recorded directly on the log, or taken from a chart recorder.

pH meter is checked against known standard at the beginning of each Lot. See SOP.

[a] DO = Direct Observation of CCP monitoring, CAL = pH meter calibration, RR = Records Review.

Corrective Action Log	
Product:	Lot ID:
Date / Time:	Responsible Person:
Deviation:	
Cause of Deviation:	
Cause of Deviation Eliminated By:	
CCP Under Control After Corrective Actions Taken:	
Preventative Measures:	
Product Disposition:	

Verification by (Records Review) and Date: _____

pH Meter Calibration Log

			pH meter actual reading*				
Date	Time	Meter ID	4.0 pH buffer	7.0 pH buffer	Accept / Unacceptable	Corrective Actions Taken	Initials

*If "✓" is entered, it indicates that reading was either 4.0 or 7.0, corresponding to the column heading value. Alternatively, enter the actual value, e.g. 4.0 or 7.0.

Thermometer Calibration Log

Date	Time	Test Therm. ID#	Reference Therm. Reading	Test Therm. Reading	Adjustments Required (yes/no)	Comments	Initials

Thermometers intended for measuring higher temperature items, such as cooked product, will be calibrated in hot water, while those used for taking lower temperatures will be calibrated in ice water. All thermometers will be calibrated within + or – 2 degrees F.

SOP for Calibration of pH meter and Product pH Measurement

Calibration of pH meter

Sausage maker or designee will calibrate the pH meter prior to use.

1. Use the procedures recommended by manufacturer of equipment (this will vary, but a general version is shown below).
2. For greatest accuracy, it is recommended that the instrument be calibrated before each use or hourly, whichever is longer. It is recommended to calibrate with two standard buffer solutions – usually pH 4 and pH 7.
3. Rinse the electrode with some pH 7 solution or clean water. Dip the bottom ($1\frac{1}{2}$") of the electrode into a beaker containing pH 7 solution.
4. Press the CALIBRATION key. The LCD will blink; the calibration can then be confirmed. Wait 30 seconds and press the confirmation key to confirm the first buffer.
5. If everything is satisfactory, the secondary LCD will blink "4" expecting the second buffer at pH 4. If the wrong solution is used or the electrode has been used or if the buffer is out of specification, the panel will blink to alert the user.
6. Rinse the electrode with clean water or some pH 4 solution. Dip the bottom ($1\frac{1}{2}$") of the electrode into a beaker containing pH 4 solution.
7. The LCD will stop blinking "4" when it has stabilized, and the calibration can then be confirmed. Wait 30 seconds and press the confirmation key to confirm the first buffer.
8. The buffer reference disappears from the secondary display and the meter is calibrated and ready to use.

pH Measurement Procedures

Sausage maker or designee will measure product pH.

The pH reading of any sample is directly affected by temperature. In order for the meter to measure the pH accurately, it must know/measure the temperature. Many pH meters compensate for sample temperature; use of some older units may require the operator to standardize sample temperature.

1. To prepare the meat product for testing, mix a product and distilled water in a 1:1 ratio to make a slurry. A kitchen-type blender can be used to make the slurry. A slurry is necessary to allow accurate reading of pH.
2. Place the pH electrode into the mixture so that the bottom ($1\frac{1}{2}$") of the electrode is submerged in the slurry to be tested, stir gently, and allow the electrode to adjust and stabilize.
3. If measurements are taken successively in different samples, it is recommended to rinse the electrode thoroughly first with deionized water or tap water, if deionized water is not available, and then with some of the next sample to condition the electrode before immersing it in the sample.

SOP for Calibration of Thermometer

Processor or designee will calibrate the thermometers prior to use by following the specifications of the manufacturer of the equipment (this will vary) or the following procedures.

Each thermometer will be assigned an ID number.

Thermometers intended for measuring higher temperature items, such as cooked product, will be calibrated in hot water, while those used for taking lower temperatures will be calibrated in ice water. All thermometers will be calibrated within + or – 2 degrees F.

Thermometers in use will be checked against a certified thermometer during calibration, if available. Otherwise, all thermometers will be calibrated either against each other, or against a thermometer that is used only during calibration. The latter methods would require at least three thermometers for accuracy. Dial thermometers will only be calibrated (and used!) on one end of the range of use, e.g. either the hot end or the cold end. This practice is followed to assure accuracy.

Calibration with ice water:

1. Add crushed ice and water to a clean container to form a watery slush.
2. Place thermometer probe into slush for at least one minute, taking care to not let the probe contact the container.
3. If the thermometer does not read between 30 degrees and 34 degrees F., adjust to 32 degrees. Nonadjustable thermometers will be removed from use until they have been professionally serviced. Thermometers that have been adjusted for 3 consecutive months will be replaced.
4. Record the results, using actual values, on the thermometer calibration log, along with the date and initials of the person performing the calibration procedure.

Calibration with hot water:

1. Heat a clean container of water to a temperature in the range of cooked products. Running clean water through the coffee maker gives a water temperature of approximately 145 degrees F. Another option is to bring a clean container of water to a rolling boil.

2. Place the thermometer probe into the hot water, along with the certified thermometer and/or reference thermometer, or at least two other thermometers, for at least one minute, taking care not to let the probe contact the container.
3. If the test thermometer does not read within + or – 2 degrees of the reference thermometer, adjust accordingly. If three thermometers are used and one thermometer differs from the other two by more than 2°F, that thermometer shall be adjusted or removed from use. If all three thermometers differ from each other by more than 2°F, a reference thermometer must be used or each thermometer must be calibrated against vigorously boiling water (212°F). Nonadjustable thermometers will be removed from use until they have been professionally serviced. Thermometers that have been adjusted for 3 consecutive months will be replaced.
4. Record the results, using actual values, on the thermometer calibration log, along with the date and initials of the person performing the calibration procedure.

Thermometers that cannot be easily calibrated through direct immersion in either ice water or hot water can be calibrated by comparing readings with another calibrated thermometer. Thermometers that may be calibrated in this way include smokehouse probes and room temperature thermometers. When doing this, a recently calibrated thermometer will be used as the reference. Room temperature thermometers that are outside the + or – 2 degree F range will be replaced. Smokehouse probes that are outside the + or – 2 degree F. range will be professionally serviced. Results will be recorded, using actual values, on the thermometer calibration log, along with the date and initials of the person performing the calibration procedure.

Thermometers will be calibrated at a frequency dependent on production volumes, and use of monitoring CCP values or SOP values. Any thermometer that has been dropped or abused will be taken out of service until it has been recalibrated. Any "loose" thermometers, or thermometers that have been out of calibration for 3 consecutive months, shall be discarded.

SOP for Temperature Measurement Procedures

For snack stick and summer sausage products:

When performing the monitoring procedure for a CCP, a calibrated thermometer will be inserted in pieces of product in various areas of the smokehouse. For instance, when monitoring the final internal temperature of a batch of snack sticks, a temperature reading will be taken from a piece in the middle of the cart, as well as one from the top and one from the bottom. Depending on where the "cold spots" may be in a particular smokehouse, product temperatures may also be taken from the front and rear areas of the smokehouse. The HACCP plan may state that all monitored product temperatures will be recorded, or that just the lowest temperature of the specified number of pieces monitored will be recorded on the cooking log. The plan may also specify whether temperature should be measured at multiple times. If the smokehouse probe is the monitoring device, taking the final internal temperature of various pieces of product at various places in the smokehouse by using a separate thermometer could be used as the direct observation verification step in the HACCP plan for this process. The number of pieces tested for temperature will depend on the product cooked and the smokehouse in which it is cooked. Actual values will be documented on the official HACCP record, along with the monitor/verifier's initials, the date, and the time the procedure was performed.

NOTE: Be sure you know what part of your temperature-measuring device actually measures the temperature. For example, the temperature shown on a dial-and-stem thermometer is the average temperature for a short distance on either side of a dimple on the stem. It does not measure the temperature at the tip. The part of the device that actually measures temperature should be inserted to the cold point of the product being evaluated.

For jerky and related products:

Measuring product temperature of jerky is very difficult because of the thinness of the product. However, with care very thin thermocouples can be inserted into the center of a jerky strip. Humidity of the smokehouse and evaporative cooling of jerky have a dramatic effect on process lethality, though, so we recommend that instead of monitoring product temperature, the processor should monitor the temperature in the coldest part of the smokehouse using a dry-bulb thermometer AND a wet-bulb thermometer. The wet-bulb thermometer is simply a thermometer that is inside a "sock" or wick that hangs down into water. Thus, the temperature on this thermometer is reduced by the amount of cooling that occurs

as water migrates up the sock and evaporates. Alternatively, processors can monitor the smokehouse dry-bulb temperature and % Relative Humidity (using a hygrometer), and then use these values to calculate wet-bulb temperature. The HACCP plan will specify that time and temperature(s) will be monitored.

SOP for Oxygen-Free Packaging of Heat Treated, Shelf Stable Products

All products will either be vacuum-packaged or an oxygen-scavenger will be inserted in the package along with the product and the bag then sealed under air. The bag size will be appropriate for the number of oxygen-scavenger packets added (per the oxygen-scavenger packet manufacturer's instructions).

All product packaged under oxygen-free conditions will be examined after sealing to ensure that the seal is secure. Product in packages that have a non-functional seal (e.g. leaking vacuum packages) will be re-packaged.

SOP for Packaging of Heat Treated, Shelf Stable Products under Air

All products packaged under air will be examined weekly. Any product with visible mold growth will be discarded.

SOP for Receiving and Storage

Raw Meat/Poultry and Natural Casings

- We will only accept product from an approved source.
- All containers will be inspected for visible evidence of contamination or damage that may allow contamination. All contaminated or damaged product will be rejected.
- The product temperature will be checked for 2 boxes per load by placing a calibrated thermometer between two wrapped or bagged products or by inserting a cleaned and sanitized (and calibrated) thermometer into the product or between product pieces. Products that are not warmer than 50°F will be accepted. Products that are not warmer than 50°F will be accepted. Products that are between 50 and 75°F will either be rejected outright or evaluated. Evaluation may include organoleptic evaluation, review of time/temperature information obtained from the shipper, consulting a process authority, or accepting the product and performing a microbiological analysis. Product should be properly refrigerated/frozen if it is accepted pending the end of the evaluation. If the evaluation indicates that the product could be used to safely make cooked items, it can be accepted and used only in this way. No product with temperature over 75°F will be accepted. All temperatures and evaluations will be recorded on incoming invoices.
- All inovoices will be checked, initialed, and kept on file for review.
- Accepted products will be immediately placed on designated racks/shelves in the cooler or freezer.
- All coolers will be maintained to hold a temperature of 41°F or lower, with daily monitoring and documentation.
- All freezers will be maintained to hold a temperature of 0°F or lower, with daily monitoring and documentation.

Perishable Non-Meat Ingredients, including starter culture

- We will only accept product from an approved source.
- All containers will be inspected for visible evidence of contamination or damage that may allow contamination. All contaminated or damaged product will be rejected.
- The product temperature will be checked for 2 boxes per load by placing a calibrated thermometer between two wrapped or bagged products or by inserting a cleaned and sanitized (and calibrated) thermometer into the product or between product pieces. Products that must be frozen will be

accepted if there is no evidence of thawing. Products that are not warmer than 50°F will be accepted. Products that are between 50 and 75°F will either be rejected outright or evaluated. Evaluation may include organoleptic evaluation, review of time/temperature information obtained from the shipper, consulting a process authority, or accepting the product and performing a microbiological analysis. Product should be properly refrigerated/frozen if it is accepted pending the end of the evaluation. If the evaluation indicates that the product could be used to safely make cooked items, it can be accepted and used only in this way. No product with temperature over 75°F will be accepted. All temperatures and evaluations will be recorded on incoming invoices.

- All inovoices will be checked, initialed, and kept on file for review.
- Accepted products will be immediately placed on designated racks/shelves in the cooler or freezer.
- Perishable non-meat items will be stored separately (different cooler, rack, or shelf) from raw meat/poultry and natural casings.
- All coolers will be maintained to hold a temperature of 41°F or lower, with daily monitoring and documentation.
- All freezers will be maintained to hold a temperature of 0°F or lower, with daily monitoring and documentation.

<u>Non-Perishable Non-Meat Ingredients</u>

- We will only accept product from an approved source.
- All containers will be inspected for visible evidence of contamination or damage that may allow contamination. All contaminated or damaged product will be rejected.
- Product containers will be marked with the date of receipt and stored on designated shelves/racks in the dry storage area. The "First In, First Out" principle will be followed in using ingredients.
- The acceptance of the product will be recorded on the incoming product invoice. All invoices will be checked, initialed, and kept on file for review.

<u>Packaging Materials, Cleaning Supplies, other non-ingredient items</u>

- We will only accept product from an approved source.
- All containers will be inspected for visible evidence of contamination or damage that may allow contamination. All contaminated or damaged product will be rejected.

- Product containers will be marked with the date of receipt and stored on designated shelves/racks in the packaging storage area or chemical storage area, as appropriate. The "First In, First Out" principle will be followed in using packaging materials, cleaning supplies, and other non-ingredient items..
- The acceptance of the product will be recorded on the incoming product invoice. All invoices will be checked, initialed, and kept on file for review.

SOP for Finished Product Storage

- Once meat/poultry items are packaged and labeled, they will be master-packed (if appropriate), and immediately moved into either dry storage (jerky and other shelf-stable products), refrigerated storage, or frozen storage.
- All coolers will be maintained to hold a temperature of 41°F or lower, with daily monitoring and documentation.
- All freezers will be maintained to hold a temperature of 0°F or lower, with daily monitoring and documentation.
- Finished raw products will be stored separately from finished Ready-To-Eat (RTE) products, either in separate coolers/freezers/rooms, or on physically separate racks/shelves.
- Finished RTE products will NEVER be stored below finished or unfinished raw products.
- No products (finished or unfinished) will be stored on the floor.

SOP for Relating Product Yield to Water Activity and Moisture:Protein Ratio

The following procedure will be followed FOR EACH FORMULATION OF PRODUCT.

Yield, water activity, and Moisture:Protein Ratio (MPR) will be determined for at least three lots. The sample size for each batch will be at least 6 pieces.

The data for calculating yield will be determined in-house by weighing the pieces at the start and end of processing. The yield will be calculated by dividing the finished weight by the starting weight, and then multiplying the resulting value by 100.

A testing laboratory will determine water activity, % moisture, and % protein on the same strips used for yield calculation. The MPR will be determined by dividing % moisture by % protein.

The results of each lot will be recorded.

To legally call a product jerky, it must have an MPR of 0.75 : 1 or lower. To ensure safety, the water activity must either be 0.85 or lower (product packaged under air), or 0.88 or lower (product packaged under oxygen-free conditions).

For other products, the MPR must be either 1.9 or lower, or 3.1 or lower with a pH of 5.0 or lower. The water activity must be either 0.92 – 0.95 if pH is 5.1 – 5.2, or no higher than 0.91.

The highest % yield for any lot that meets the applicable MPR and water activity limits will be noted. This value will be the targeted maximum % yield on future batches.

From this time on, the % yield for six pieces will be determined on each lot to ensure that drying is sufficient.

A sample of six pieces will be sent to a testing laboratory for water activity, % moisture, and % protein testing at least semi-annually, with one sampling during

warm weather and one sample during cold weather. The maximum % yield value will be decreased if the semi-annual sampling indicates that water activity and MPR standards were not met.

Yield, Water Activity, and Moisture:Protein Ratio (MPR) Log

Part 1. Initial Validation of Process

Lot/Formulation	Initial Weight	Final Weight	Yield (see #1)	% Moisture (from lab)	% Protein (from lab)	MPR (see #2)	Meets shelf-stable std.? (see #3) Y = Yes, N = No Initials/Date	Water activity (from lab)	Meets safety std.? (see #4) Y = Yes, N = No Initials/Date

#1 (Final weight divided by initial weight) x 100
#2 % Moisture divided by % Protein
#3 For jerky, must be 0.75 or lower. For other products must be either 1.9 or lower, or 3.1 or lower with a pH of 5.0 or lower.
#4 For jerky, must be either 0.88 or lower (if packaged under oxygen-free conditions) or 0.85 or lower (if unpackaged or packaged under air). For other products, must be either 0.92-0.95 if pH is 5.1 – 5.2, or no higher than 0.91.

Part 2. Maximum allowable yield for each formulation.

Formulation	Maximum allowable yield	Notes

Part 3. Semi-Annual Verification of Relationship between yield, MPR, and water activity.

Lot/Formulation	Initial Weight	Final Weight	Yield (see #1)	% Moisture (from lab)	% Protein (from lab)	MPR (see #2)	Meets shelf-stable std.? (see #3) Y = Yes, N = No Initials/Date	Water activity (from lab)	Meets safety std.? (see #4) Y = Yes, N = No Initials/Date

#1 (Final weight divided by initial weight) x 100
#2 % Moisture divided by % Protein
#3 For jerky, must be 0.75 or lower. For other products must be either 1.9 or lower, or 3.1 or lower with a pH of 5.0 or lower.
#4 For jerky, must be either 0.88 or lower (if packaged under oxygen-free conditions) or 0.85 or lower (if unpackaged or packaged under air). For other products, must be either 0.92-0.95 if pH is 5.1 – 5.2, or no higher than 0.91.

SOP for Tempering/Thawing of Frozen Materials

1. Place frozen product in a tempering room or cooler that is maintained at 50°F or colder and allow product to thaw or reach desired level of tempering. The following additional time guideline will be followed:
    - If the room temperature is greater than 41°F but not above 50°F, thawed product must be cooled to 41°F or colder within 8 hours of thawing.
2. Alternatively, frozen ground beef or whole chickens may tempered or thawed at a temperature greater than 50°F but not greater than normal room temperature (72°F) with the following restrictions:
    - Ground beef portions of at least 1 pound in size may be temnpered/thawed for up to 9 h.
    - Whole chickens of at least 3.7 pounds in size may be tempered/thawed for up to 9 h.
    - Thawed product must be cooled to 41°F or colder within 2 hours of thawing.

3. Tempering/thawing conditions warmer than 72°F must be evaluated to ensure that the pathogenic bacterial growth will not occur on the products.
4. The tempering/thawing product will be monitored on a scheduled basis to prevent product drip and loss of package integrity, and to ensure that product drip does not contaminate other products.
5. The product surface temperature will be monitored and documented on a scheduled basis to ensure that the guidelines listed above are met.
6. When possible, the outer layer of trim and/or pieces being thawed will be removed and refrigerated. This process will be repeated as often as necessary to ensure that the outer surface of the thawing mass is not held for an unsafe length of time at temperatures that could allow pathogen growth.
7. The lot code of frozen product that has been purchased from an outside vendor will be recorded on a batch sheet or production log (before tempering/thawing) for use in product tracking if the vendor institutes a recall.