HACCP Plan – Beef Slaughter

Product Description

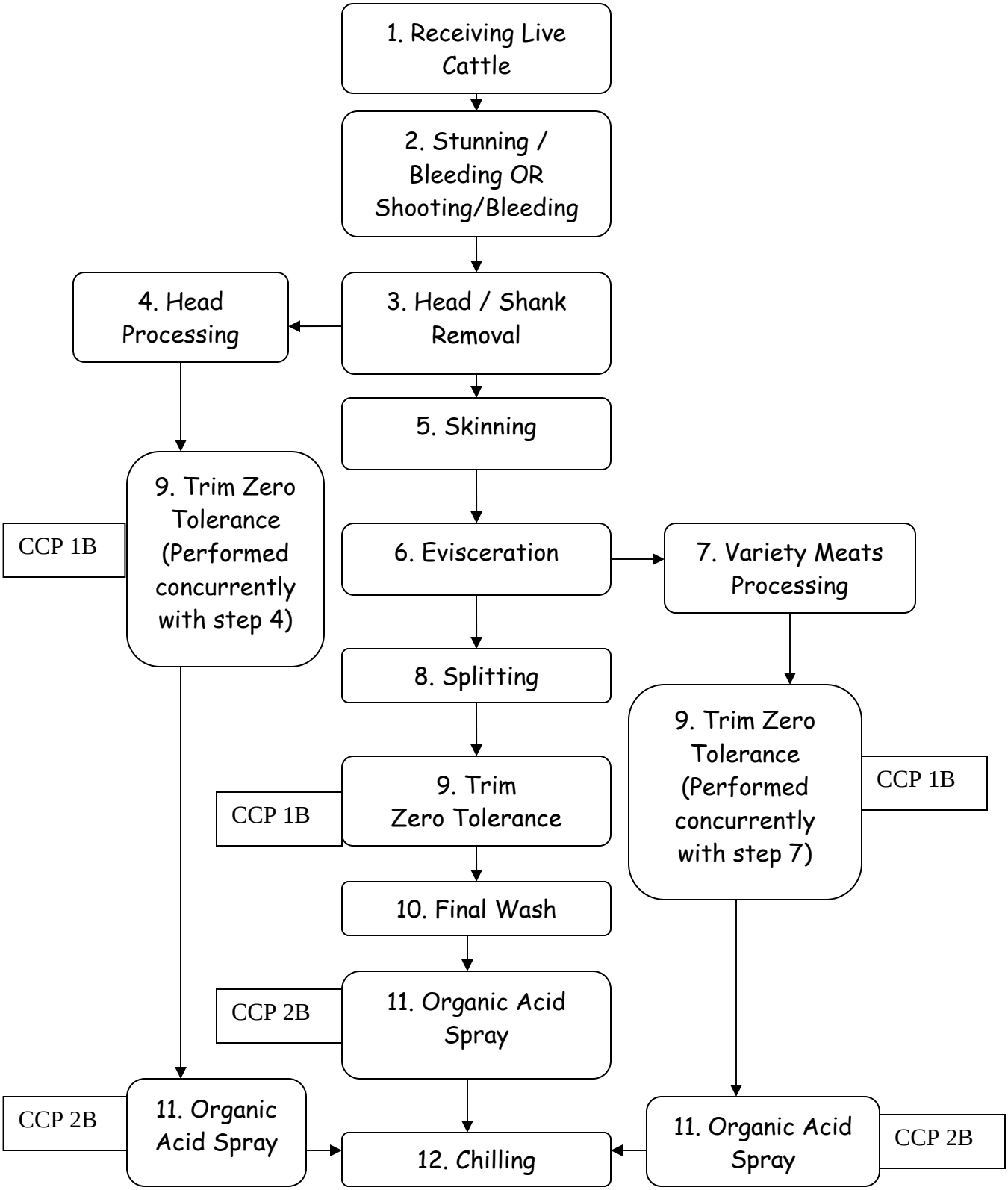
COMMON NAME:	beef carcass halves or quarters; whole heads; head and cheek meat; variety meats (heart, liver, tongue)
HOW IS IT TO BE USED?	Further processing or sold wholesale
TYPE OF PACKAGE?	No packaging is used for carcass halves and quarters; butcher paper, freezer wrap, or cryovac bag for head and cheek meat; butcher paper or freezer wrap for heart, liver, and tongue
LENGTH OF SHELF LIFE, AT WHAT TEMPERATURE?	Carcass halves and quarters: 14 days under refrigeration ($\leq$ 41°F) Head and cheek meat: 7 days under refrigeration, 6 months frozen Heart, liver, tongue: 7 days under refrigeration
WHERE WILL IT BE SOLD?	Further processed in our plant, sold retail and sold wholesale
LABELING INSTRUCTIONS:	Carcass halves have ID tag and state inspection legend; carcass quarters have state inspection legend. Head and cheek meat are labeled with appropriate product label including safe handling instructions. Heart, liver, tongue (if not subdivided) have state inspection legend; if subdivided, these products would have an appropriate product label including safe handling instructions.
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. Cross out, white out, or delete all steps that are NOT part of your process. Re-number steps as necessary.
2. Add any processing steps not already shown and make sure that each new step is assigned a number.
3. Note that if the "mechanical; gunshot" method is used for slaughter, then the tongue is the only portion of the head considered edible and under this HACCP plan.

Process Flow Diagram

Process Category: Slaughter
Product: Beef



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 the 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, and cross out any information in columns 4 – 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.
        iii. 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.

iv. Finally, if the hazard is controlled by a CCP at the present step, enter the CCP number in column 6. 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 – BEEF SLAUGHTER – Carcass halves and quarters, head meat, heart, liver, tongue

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur	4. Basis of 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 live cattle	Biological – Pathogens (Salmonella, Escherichia coli O157:H7) carried on hide and in intestinal tract., Prions (if animal has BSE).	Yes (Pathogens) No (Prions)	Cattle are a known source of Salmonella. Elder et al data (supplied by FSIS) states that E. coli O157:H7 is reasonably likely to occur in beef cattle. Non-ambulatory animals are not accepted for slaughter, per 9 CFR 309.3(e).	Trim Zero Tolerance and Organic Acid Spray steps (CCP's later in the process) control pathogens.	
	Chemical – Drug residues	No	Low risk according to USDA Residue Monitoring Program		
	Physical – Buckshot, needles, bullets	No	No reported incidences at this		

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur	4. Basis of 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
			facility (must be supported with evidence); visual observation for foreign materials during processing, inspection of equipment during cleaning make hazard unlikely.		
2. Stunning/Bleeding OR Shooting/Bleeding	Biological- Pathogens (see list in step 1) introduced into animal's circulatory system by the sticking knife	Yes (Pathogens)	Sticking knife will be heat-sanitized prior to sticking. Visible contamination in neck area will be avoided or trimmed off before cutting through the hide. However, pathogen transfer may still occur.	Trim Zero Tolerance and Organic Acid Spray steps (CCP's later in the process) control pathogens.	
	Chemical – None	No			
	Physical – Bullet	No	If frangible (easily		

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur	4. Basis of 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
	fragments		broken) bullets are used, the head will be discarded. Otherwise, only tongue will be deemed edible.		
3. Head/Shank Removal	Biological –Prions associated with SRM's	No	Animal age determined by dentition or producer certificate. SOP for removal of SRM's and Operational SSOP (for sanitation of equipment following use on cattle 30 months of age or older) make hazard unlikely to occur.		
	Biological- Pathogens (see list above)	Yes	Hide opening and removal of shank and head may introduce	Trim Zero Tolerance and Organic Acid Spray steps (CCP's later in the process) control pathogens.	

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur	4. Basis of 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 onto the carcass.		
	Chemical – None	No			
	Physical – None	No			
4. Head processing	Biological: Presence or growth of pathogens (see list above)	Yes (Presence) No (Growth)	Raw meat is a known source of pathogens. Head skinning and removal are done rapidly enough to prevent pathogen growth.	Trim Zero Tolerance and Organic Acid Spray steps (CCP's later in the process) control pathogens.	
	Biological: presence of prions in SRM's	No	SOP for SRM removal makes hazard unlikely		
	Chemical – None	No			
	Physical – None	No			
5. Skinning	Biological – Presence or growth of pathogens (see list above)	Yes (Presence) No (Growth)	Cattle hide is a known source of pathogens. Skinned carcass is moved rapidly enough to next step to prevent	Trim Zero Tolerance and Organic Acid Spray steps (CCP's later in the process) control pathogens.	

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur	4. Basis of 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
			pathogen growth during this step.		
	Chemical – None	No			
	Physical - None	No			
6. Evisceration	Biological – Presence or growth of pathogens (see list above)	Yes (Presence) No (Growth)	The intestinal tract of cattle is a known source of pathogens. Eviscerated carcass is moved rapidly enough to next step to prevent pathogen growth during this step.	Trim Zero Tolerance and Organic Acid Spray steps (CCP's later in the process) control pathogens.	
	Presence of prions in SRM (distal ileum)	No	SOP for removal of distal ileum		
	Chemical – None	No			
	Physical – None	No			
7. Variety Meats Processing	Biological - Presence or growth of pathogens (see list above)	Yes (Presence) No (Growth)	Beef is a known source of pathogens. Heart, liver, tongue may be contaminated via tools, employees,	Trim Zero Tolerance and Organic Acid Spray steps (CCP's later in the process) control pathogens.	

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur	4. Basis of 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
			cattle hide and gastrointestinal tract, although Operational SSOP reduces this risk. Variety meats are moved rapidly enough to next step to prevent pathogen growth during this step.		
	Chemical –None	No			
	Physical – None	No			
8. Splitting	Biological – Presence or growth of pathogens (see list above)	Yes (Presence) No (Growth)	Pathogens are known to be present on beef carcasses; splitting saw may transfer pathogens from carcass to carcass or from location to location on one carcass.	Trim Zero Tolerance and Organic Acid Spray steps (CCP's later in the process) control pathogens.	

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur	4. Basis of 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
	Prions associated with spinal cord and vertebral column	No (Prions)	Carcass halves are moved rapidly enough to next step to prevent pathogen growth during this step. SOP for Minimizing BSE Risks Associated with SRM's requires removal of spinal cord and vertebral column (animals 30 months of age or older) and thereby makes hazard unlikely. Operational SSOP (for sanitation of equipment following use on cattle 30 months of		

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur	4. Basis of 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
			age or older) make hazard unlikely to occur.		
	Chemical –None	No			
	Physical – Metal or bone fragments	No	No history of problem (must provide evidence). Visual observation for foreign materials during processing, inspection of equipment during cleaning make hazard unlikely.		
9. Trim Zero Tolerance (may be done concurrently with step 4 or step 7 for head meat and variety meats, respectively)	Biological – Presence or growth of pathogens (see list above)	Yes (Presence) No (Growth)	Pathogens are known to be present on beef carcasses, and are also reasonably likely to be present on head meat and variety meats. Removal of visible contamination is	All visible fecal material, milk, ingesta is trimmed off carcass halves and quarters, head meat, and variety meats.	1B

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur	4. Basis of 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
			required by 9 CFR 310.18(a). Carcass halves, head meat, and variety meats are moved rapidly enough to next step to prevent pathogen growth during this step.		
	Chemical – None	No			
	Physical – None	No			
10. Final Wash	Biological – Presence or growth of pathogens (see list above)	Yes (Presence) No (Growth)	Pathogens are known to be present on beef carcasses, and are also reasonably likely to be present on head meat and variety meats. Prior step (Trim Zero Tolerance) reduced likelihood of hazard occurring. Carcass	Organic Acid Spray step (CCP later in the process) controls pathogens.	

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur	4. Basis of 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
			halves, head meat, and variety meats are moved rapidly enough to next step to prevent pathogen growth during this step.		
	Chemical – None	No			
	Physical - None.	No			
11. Organic Acid Spray	Biological –Presence or growth of pathogens (see list above)	Yes (Presence) No (Growth)	Pathogens are known to be present on beef carcasses, and are also reasonably likely to be present on head meat and variety meats. Trimming step reduced likelihood of hazard occurring. Organic acid spray reduces likelihood of	Organic acid spray treatments are well known to reduce pathogen numbers. Organic acid prepared and applied according to the Organic Acid Spray SOP is likely to reduce pathogen numbers to nondetectable level.	2B

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur	4. Basis of 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 remaining on carcass to an acceptable level and prevents pathogen growth during transfer of carcass to chiller.		
	Chemical – Excessive organic acid	No	SOP for preparing organic acid rinse solution makes hazard unlikely. Organic acid used is food-grade.		
	Physical - None	No			
12. Chilling	Biological – Presence or growth of pathogens (see list above)	No (Presence) No (Growth)	Pathogens adequately controlled at preceding CCP's. Storage of carcass under refrigerated (≤ 41°F) conditions, in accordance with		

1. Process Step	2. Food Safety Hazard	3. Reasonably likely to occur	4. Basis of 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
			SOP for final product storage, makes growth of pathogens (if present) unlikely.		
	Chemical – None	No			
	Physical - None	No			

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, carcass samples may be taken and sent to a laboratory for generic *E. coli* or *E. coli* O157:H7 testing. 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: Beef Slaughter

Product example: beef carcass halves or quarters; whole heads; head and cheek meat; variety meats (heart, liver, tongue)

CCP# and Location	Critical Limits	Monitoring Procedures and Frequency	HACCP Records	Verification Procedures and Frequency	Corrective Actions
1B – Trim Zero Tolerance	Zero visible fecal material, ingesta, or milk present	The carcass trimmer or designee will carefully perform a visual inspection of <u>each</u> carcass half or quarter, head, head or cheek meat, or variety meat. Formal record-keeping or monitoring can be done after a specified number of carcasses, carcass halves, whole heads, removed head and cheek meats, livers, hearts, or tongues rather than after every one.	Slaughter Log Corrective Action Log	Establishment owner or designee will review the Slaughter Log and Corrective Action Log once per week. Establishment owner or designee will observe monitoring of trim zero tolerance at least once per month.	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 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.

2B – Organic Acid Spray	Each carcass half or quarter, head, head or cheek meat, variety is sprayed thoroughly with an organic acid solution prepared according to the Organic Acid Spray SOP.	The carcass trimmer or designee will visually confirm that <u>each</u> carcass, carcass half, whole head, removed head and cheek meat, liver, heart, or tongue is thoroughly sprayed with an organic acid solution prepared according to the Organic Acid Spray SOP. Formal record-keeping of monitoring can be done after the first and last and a specified number (indicate here: _____) of carcasses, carcass halves, whole heads, removed head and cheek meats, livers, hearts, or tongues, rather than after every one.	Slaughter Log Organic Acid Spray SOP Log Corrective Action Log	Establishment owner or designee will review the Slaughter Log, Organic Acid Spray SOP Log, and Corrective Action Log once per week. Establishment owner or designee will observe monitoring of organic acid spraying at least once per month.	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 5. The cause of the deviation will be identified and eliminated. 6. The CCP will be under control after the corrective action is taken. 7. Measures to prevent recurrence are established. 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, and annual reassessment

Signature _____ Date _____ Signature _____ Date _____

Signature _____ Date _____ Signature _____ Date _____

Signature _____ Date _____ Signature _____ Date _____

Organic Acid Spray SOP Log					
Date	Type of Acid * and Concentration Acetic acid used at 2.5%, lactic acid used at 2.0 – 2.5, FreshBloom® used per manufacturer's directions.		Actual Amount of **Acid** Used in Preparation (indicate units, e.g. fluid ounces, gallons, ml, liters, weight ounces)	Actual Amount of **Water** Used in Preparation (indicate units, e.g. fluid ounces, gallons, ml, liters)	Time/Initials

* Ac = acetic acid (vinegar), L = lactic acid, FB = FreshBloom®

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 (Records Review) by and Date: _____

Plant Number:	Date:	**Slaughter Log**									
Owner Name, Tag ID No. & Species (if used for multiple species B = Beef, P = Pork, S = Sheep, G = Goat, Bis = Bison (* indicates 30 mo. or older beef, no asterisk indicates beef animal younger than 30 months))	Wt	Monitoring Contamination with feces, ingesta, milk? (yes/no, time, initials)			Monitoring **Acid Spray** Used for Carcass and/or head meat and/or variety meats? (yes/no, time, initials) OR **Dry-Aging** Used for Carcass only? (yes/no, duration, temp, initials) OR **Hot water** used for Carcass only? (yes/no, temperature, pressure-washer used?, initials			SRM's removed during slaughter? (✓)		SRM's (vertebral column) removed for further processing? (✓)	
		Carcass	Head meat	Variety meats	Carcass	Head meat	Variety meats	Yes	No	Yes	No
Acid Solution made per SOP: (initials) (date)					Pre-Use/Shipment Review: (Signature) (date)						
Verification, if done: List CCP #, action (OM = observe monitoring, RR = Records Review), Date, Time and Initials											

Beef Slaughter Intervention Treatments Suitable for Small and Very Small Establishments: an Update

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Introduction The beef slaughter process involves removing bacteria-free meat from between two highly contaminated surfaces, the hide and the gastrointestinal tract. No matter how carefully this process is done, there will inevitably be transfer of bacteria from these contaminated surfaces to the carcass.

Historically, the main weapon in reducing bacterial contamination of beef carcasses has been the use of effective sanitary dressing procedures during slaughter. There is no substitute for taking steps to prevent contamination in the first place. A list of current, industry-supported "best practices" is included at the end of this update.

However, no matter how carefully slaughter and dressing procedures are followed, bacteria will still contaminate the carcass. Some of these bacteria could be fecal pathogens such as *Escherichia coli* O157:H7. Because this pathogen is viewed as a hazard that is "reasonably likely to occur" on beef carcasses, the USDA requires beef slaughter operators to use one or more validated "intervention" treatments to remove and/or inactivate bacteria that may remain on the carcass after dressing. At least one of these interventions must be a CCP in the operator's beef slaughter HACCP plan. This means that beef slaughter HACCP plans must have at least two CCP's (the other one being the "zero tolerance" inspect & trim step). Large beef slaughter establishments commonly use interventions such as steam vacuuming, steam pasteurization, or automated organic acid carcass-washing. Small and very small plants have fewer options available to them. The options suitable for smaller establishments will be the focus of following sections.

What about beef head and cheek meat? What about edible offal (heart, liver, tongue)?
According to USDA, *E. coli* O157:H7 is considered a hazard reasonably likely to occur on all raw beef products. Therefore, beef heads, head and cheek meat, and edible offal must also undergo an intervention treatment. The intervention treatment can be the same one used for the carcass or it can be a different one. In the past, much less attention has been paid to intervention treatments for these items, so expect there to be new information and possibly different regulatory expectations in the future.

What is NOT considered a validated intervention step?
Carcass trimming and washing treatments using cold-to-warm water were commonly done in the industry long before the USDA mandated the adoption of an intervention treatment. Although warm water washing has been proven quite useful for removing bacterial contamination, it is NOT considered by USDA to be an intervention treatment.

What about hot-water sprays?The use of heated water has been evaluated and validated for use under some conditions as an intervention. However, there are many questions remaining about the importance of processors duplicating time, pressure, and volume conditions from the supporting scientific studies.

At present, we would consider the following two types of treatment **acceptable until further study is done**: water that is either 150ºF or hotter and applied with a typical "pistol grip" spray system, OR water that is at least 120ºF and applied with a pressure washer at a pressure of at least 1000 psi. PLEASE NOTE that new information may not show these treatments to be acceptable. This information to be gathered will consist of microbiological test results for samples obtained in-plant and pilot plant studies done using *E. coli* O157:H7. To get more information on in-plant sampling and pilot plant studies, please contact me.

What about dry-aging?
It is quite likely that dry-aging is an effective intervention treatment. Unfortunately, we have not obtained enough data on this process to submit a paper for possible publication in a peer-reviewed journal. Based on our laboratory studies to date, I can recommend dry-aging treatments in which the carcass cooler is maintained at 41ºF or colder, the and the aging time is at least 6 days. After future plant and lab studies, it is likely that we will be recommending a maximum allowable %Relative Humidity (%RH) that can occur during dry-aging. It is also possible that the 6-day minimum aging time may be shortened. Currently I would recommend that processors take steps to ensure good air movement in the carcass cooler and thereby keep %RH as low as possible. I don't consider dry-aging to be a practical intervention treatment for heads, head/cheek meat or edible offals.

What other options ARE considered validated intervention treatments?
Many research studies have been done on beef slaughter intervention treatments. It is easy to get confused by all the ways in which intervention treatments are applied in research settings. In nearly all cases, small and very small processors cannot be expected to duplicate the exact conditions used in validation research. So, I will focus on the basic intervention processes that have been repeatedly shown to reduce numbers of bacteria, including *E. coli* O157:H7. I will also point out how these interventions could be applied to heads, head and cheek meat, and edible offal.

Lactic Acid Spray
Lactic acid is the acid normally found in fermented dairy foods like cheese and yogurt. It is the organic acid most commonly used as an intervention treatment in large establishments. As with any organic acid, it is more effective at killing bacteria at warm

or hot temperatures than at cold temperatures. I recommend applying a 2.0 – 2.5% solution (directions follow) of freshly prepared (same day) room-temperature lactic acid using a garden-type sprayer. A warmer solution (up to 130ºF) could be used, and may be more effective, but I do not recommend specifying a warm/hot temperature in your Organic Acid Spray SOP because it is very difficult to maintain a sprayer at a temperature warmer than room temperature. Each carcass half should be sprayed from the top to the bottom and then back to the top on the interior surface AND on the exterior surface. I recommend that whole heads, removed head and cheek meats, livers, hearts, or tongues should be sprayed with one application. To prepare the lactic acid solution:

- Lactic acid is usually available as an 88% solution. Add 3.25 ounces of that solution to 1.0 gallon of water to make a 2.1% solution. Adding 3.75 ounces to 1.0 gallon of water will make a 2.4% solution.
- I suggest following an SOP for preparing the solution. For the CCP of lactic acid-spraying, monitor that each carcass half, liver, etc. is adequately sprayed and document that spraying occurred.

Acetic Acid

Acetic acid is present in vinegar. Household vinegar is usually a 5% acetic acid solution. I recommend applying a 2.5% solution, so if the vinegar is 5% acetic acid (check the label) just mix vinegar 50:50 with water. As with lactic acid, I recommend making the acetic acid solution on the day it is to be used and holding it at room temperature. Use a garden-type sprayer with the same coverage as described above for lactic acid. Document the preparation of the acetic acid solution as an SOP and the application of the acetic acid as a CCP.

FreshBloom®

This product is available from Excalibur Seasonings and contains three different organic acids: citric acid, ascorbic acid, and erythorbic acid. The application rate is 8 ounces per gallon of water. Make the solution up on the day of use and hold at room temperature. Apply in the same manner as for lactic or acetic acid. The preparation of the solution would be done according to an SOP and the application of the solution would be a CCP.

NOTE: some processors have developed an intervention treatment in which head/cheek meat or edible offal is dipped in an organic acid. A dip treatment has an advantage and a disadvantage compared to a spray treatment. The advantage is that the dip treatment will generally expose the product to a larger volume of acid. The disadvantage is that the strength of the acid solution will decrease as residual protein from meat and edible offal remains in the solution. If the acid strength falls too much, the dip treatment will have limited effectiveness. I only have some limited data available, but as a starting point I would recommend that the acid solution be kept at a pH of 3.0 or lower. Remember that as the acid strength decreases, the pH increases. The pH of the solution can be measured precisely using a pH meter, or pH indicator paper can be used for a less precise measurement. In one trial this fall, we found that a lug-full of acetic acid solution could

be used to treat 5 or 6 livers (each dipped for 10 seconds) before the pH rose and it was necessary to make fresh solution.

Organic Acid Spray SOP

Currently there are three types of organic acid spray solutions available for use: acetic acid (vinegar), lactic acid, and FreshBloom® (a mix of citric acid, ascorbic acid and erythorbic acid). The type of acid used each slaughter day shall be recorded in the Organic Acid Spray SOP Log, along with the amounts of acid and tap water used to prepare the solution. The organic acid solution shall be prepared to yield the following concentrations:

Acetic Acid: 2.5% (vol/vol). Commercial vinegar is usually 5% acetic acid (label will be checked), so a 50:50 dilution in tap water will normally produce the 2.5% solution.

Lactic acid: 2 – 2.5% (vol/vol). Purchased lactic acid is usually 88% (label will be checked), so adding 3.25 fluid ounces of that solution to a gallon of water will result in a 2.1% solution, or adding 3.75 fluid ounces of that solution to a gallon of water will result in a 2.4% solution.

FreshBloom® will be prepared at a rate of 8 ounces (weight) per gallon of water to result in a final concentration of 5.9% (wt/vol).

Regardless of the acid used, the following basic steps shall be followed.

a. Each carcass half shall be thoroughly rinsed with tap water (Final Wash step) before the organic acid spray is applied.

b. Each organic acid spray solution shall be prepared fresh on the day of use with tap water (cold or hot) and stored on the slaughter floor for that day's use only.

c. Each carcass half shall be sprayed thoroughly on the exterior (hide) surface from top to bottom and back to the top. Then the interior (gut) surface shall be sprayed from top to bottom and back to the top. Whole heads, removed head and cheek meats, livers, hearts, or tongues shall be sprayed in one application of the same organic acid spray used for carcass halves.

SOP for Minimizing BSE Risks Associated with Specified Risk Materials (SRMs)

This SOP is based on the requirements of 9CFR309.3 and 9CFR310.22 and outlines plant procedures that will reduce the risk of the BSE agent entering the human food chain.

Non-ambulatory disabled cattle will not be accepted for slaughter.

Owners of not-inspected carcasses for custom processing will be required to affirm that the live animal was ambulatory at the time of slaughter, and declare the animals to be either less than 30 months of age or 30 months and older before their carcass will be accepted for processing.

The age of all cattle slaughtered will be determined so that Specified Risk Materials (SRMs) can be identified for removal from the human food chain. The age of cattle will be determined according to procedures outlined in FSIS Notices 5-04 and 10 - 04 (verifiable documents and dentition). A daily record will be maintained to record the age of each bovine animal slaughtered, for the subsequent removal of any Specified Risk Materials in the manner described in this SOP. Any corrective actions taken will meet 9 CFR 417.3 (b) and will include a reassessment to determine if the newly identified SRM hazard and associated removal steps should be incorporated into the HACCP plan, sanitation SOP or other prerequisite program. Corrective actions will be recorded in the corrective action log.

Specified risk materials to be removed from the human food chain include:

- The tonsils and small intestine from <u>all</u> cattle.
- The brain, skull, eyes, trigeminal ganglia, spinal cord, vertebral column, (excluding the vertebrae of the tail, the transverse processes of the thoracic and lumbar vertebrae and the wings of the sacrum) and the dorsal root ganglia of cattle <u>30 months of age and older</u>.

Beef Slaughter Model

The carcass and head of cattle identified to be 30 months of age or older will be identified with a red colored weight tag affixed by dead lock. Any incidental contamination of the head by SRM material will be removed by knife trimming prior to washing of the head. The knife used for trimming SRM material will be cleaned of any SRM material before being used on edible product. After the removal of cheek meat (hot boned) and tongue, the skull, brain, trigeminal ganglia and tonsils will be placed in a labeled inedible container.

Palatine tonsils will be removed by knife trimming from cattle heads less than 30 months of age if the heads will be used for human food. Lingual tonsils will be removed by knife trimming from tongues saved for human food. The tonsils will be placed in a labeled inedible container.

After viscera inspection, the small intestine from all cattle, as part of the entire digestive tract, will be placed in a labeled inedible container.

After carcass splitting, cattle 30 months of age or older will have the spinal cord removed and placed in a labeled inedible container. Each half of the remaining vertebral column will be marked with green carcass ink to identify the vertebral column that will be removed during further processing.

During further processing of cattle 30 months of age or older the specified risk material portion of the vertebral column will be removed and placed in a labeled inedible container. The specified risk material portion of the vertebral column will be removed before individual steaks are cut. If a carcass 30 months of age or older leaves this establishment for further processing, documentation will transfer with the carcass to identify the presence of SRMs in the carcass.

Inspected bone-in beef that is received must come from a source that has a program to properly identify carcasses that contain SRMs and has documents for this purpose that are received with the carcass. Any SRMs in such identified carcasses will be removed during further processing and placed in marked inedible containers.

This establishment will routinely evaluate the effectiveness of the procedures addressed in this SOP and will revise the procedures whenever necessary to prevent specified risk materials from use as human food.

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.