Sanitation Guidance for Beef Grinders

1. Good sanitation prevents the introduction of new bacterial hazards to controlled ingredients.

The objective of a beef grinder is to maintain the clean condition of the carcass, primal, subprimal, or coarse ground beef starting material.

a) The grinder should develop sanitation standard operating procedures (SOPs) that address, at a minimum, the cleaning of food contact surfaces, equipment, utensils, implements, and the processing areas. The SOPs should indicate the frequency with which these items will be cleaned and how the grinder will verify their cleanliness.

b) Systematic sanitizing of belts and implements is recommended, as it will break the chain of any contamination that slips through. Thus, rather than the contaminant being spread throughout the lot, it will be stopped or at least diminished.

c) Employees are in continuous contact with the product. Therefore, sanitation training and education, as well as supervision, are crucial. Keeping the processing areas clean and in good repair and keeping employee areas clean and in good repair set a personal tone for the operation. These are management choices, but can indirectly affect the product.

d) Desirable practices to instill in employees are:
   1) Removing outer clothing when leaving the processing area.
   2) Practicing personal hygiene, such as proper handwashing after using the toilet or before entering the processing area.

2. Sanitation procedures should prevent cross-contamination from equipment, personnel, traffic, air flow, tables, and floors to product.

3. Additional resources:


**FRESH GROUND BEEF PRODUCTION LOG/TRACKING LIST**

<table>
<thead>
<tr>
<th>Time of Grind</th>
<th>Lot/ Batch Number (lot = same source material)</th>
<th>Exact Name/ Type of Product Produced</th>
<th>Package Size of Product Produced</th>
<th>Amount (in pounds) of Product Produced</th>
<th>Production Code of Product Produced</th>
<th>Manufacturer Name of Source Material Used for Product Produced</th>
<th>Supplier Lot Numbers, Product Code and/or Pack Date of Source Material Used</th>
<th>Establishment Information from label of Source Product Used (Est. #, ph #, contact info)</th>
<th>Establishment Information from label of Source Product Used (Est. #, ph #, contact info)</th>
<th>Grinder Cleaned and Sanitized? If Y, Date and Time</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

Signature of Store Management Reviewer ___________________________ Date ________________
**NEW WAVE STORE**  
123 Main Street  
Anytown, USA, Zip Code

**FRESH GROUND BEEF PRODUCTION LOG/TRACKING LIST**

Employee name: John Williams  
Today's Date: 12/14/11

<table>
<thead>
<tr>
<th>Time of Grind</th>
<th>Lot/ Batch Number (lot = same source material)</th>
<th>Exact Name/ Type of Product Produced</th>
<th>Package Size of Product Produced</th>
<th>Amount (in pounds) of Product Produced</th>
<th>Production Code of Product Produced</th>
<th>Manufacturer Name of Source Material Used for Product Produced</th>
<th>Supplier Lot Numbers, Product Code and/or Pack Date of Source Material Used</th>
<th>Establishment Information from label of Source Product Used (Est. #, ph #, contact info)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0700-1000 AM</td>
<td>Lot 001</td>
<td>91/9 New Wave Ground Chuck</td>
<td>Catch-weight retail trays</td>
<td>1,250 lbs total of 91/9 Ground Chuck</td>
<td>121511-01 NWGB; Sell-by 12/20/11</td>
<td>Boneless Chuck, twenty-one 60 lb boxes from USA Beef Company</td>
<td>BB120311USA Packed on 12/03/11; BB120411USA Packed on 12/04/11</td>
<td>Est. 00321 M, (202)-123-4567, 898 Dodge St, Omaha, NE, 68104</td>
<td>Cleaned and sanitized grinder after Lot 001</td>
</tr>
<tr>
<td>1030-1130 AM</td>
<td>Lot 002  From store-generated bench trim</td>
<td>70/30 New Wave Ground Beef</td>
<td>2 lb. Trays</td>
<td>50/2 lb. trays</td>
<td>121511-03 NWGB; sell-by date 12/20/11</td>
<td>USA Company</td>
<td>BB120511USA Packed on 12/05/11 BB120711USA Packed on 12/07/11;</td>
<td>Est. 00321 M, (402)-123-4567, 898 Dodge St, Omaha, NE, 68104</td>
<td>Used trim from two different production lots from USA</td>
</tr>
<tr>
<td>same</td>
<td>same</td>
<td>same</td>
<td>same</td>
<td>same</td>
<td>National Brand Beef</td>
<td>NBB120111, Packed on 12/01/11</td>
<td>Est. 15555 M, (903) 999-5454, 220 Locust St, Denton, TX 76201</td>
<td>Used trim from only one production lot of NBB product</td>
<td></td>
</tr>
</tbody>
</table>
**Appendix II: Grinding Log**

**How to Use the Grinding Log**

1. **Grinding Time & Date**
   Record the time and date when in-store grinding was initiated for the batch.

2. **Ingredient Source and Supplier**
   - **Internal**
     In this column simply place a check mark if the trim was generated in-store during fabrication of cuts or if rework from the display case was used to create ground meats. If trim or ground meats was purchased from external suppliers, leave blank.
   - **Supplier**
     If coarse ground meats or trim is purchased from an external supplier, record the name of the supplier in the space indicated.

3. **Species**
   Record the species ground using the first letter of its name. Use P for pork and B for Beef.

4. **Ingredient Production Date**
   - **Rework**
     If rework is utilized, record the original “packaged on date” of the product which was reworked.

5. **Fresh or Frozen Storage**
   Record if ingredients were stored Fresh with an F or with a Z if ingredients were Frozen.

6. **Date Acceptable**
   If ingredients were frozen and packaged to prevent freezer burn, they may be used 12 months after the production date. Place a check mark if criteria is met.

Observe store guidelines for fresh coarse ground meat and trim – ingredients stored at 0°C may be used longer than those stored at 4°C.

7. **Quality Check**
   When opening ingredients verify that no off-odour is present and that visually ingredients appear satisfactory for ground meat production. Place a check mark if criteria is met.

---

**Ground Meat Production Log**

<table>
<thead>
<tr>
<th>1 Grind. Time</th>
<th>2 Ingredient Source</th>
<th>3 Species</th>
<th>4 Production Date</th>
<th>5 Fresh or Frozen</th>
<th>6 Date Acceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year: 2005</td>
<td>Internal</td>
<td>P</td>
<td>July 8</td>
<td>F</td>
<td>✓</td>
</tr>
<tr>
<td>Month: July</td>
<td></td>
<td>B</td>
<td>July 11</td>
<td>Z</td>
<td>✓</td>
</tr>
</tbody>
</table>

8. **Grinder Sanitation Check**
   Each day the grinder is used, before the start of production perform the day. Remember that the grinder should also be completely cleaned between species. If the grind increases in shelf life and product safety may also be gained by cleaning the grinder during the day.

**Grinder Sanitation Check (Please Check and Initial):**

✓ Mon. MK. ✓ Tues.
8. Ingredient Quantity
Place a check mark to indicate if kilograms or pounds are used as the unit of measurement. Place the value in kilograms or pounds under the correct column for the ingredient type utilized.

9. Lean %
Record the lean % of each ingredient or use the selected abbreviation.

10. Meat Temperature
Record the temperature of the ingredients before grinding using a probe thermometer which is periodically checked for accuracy. Ground meat and trim should always be kept at 4°C or lower. Optimal shelf-life will be achieved at temperatures closer to 0°C. It is especially important for food safety reasons that ground meat and trim be kept under 5°C as at this temperature if any dangerous E. coli bacteria are present they will not grow. Remember that meat temperature will rise due to friction from grinding.

11. Clip Check
When removing clips from chubs ensure they are all properly disposed of and then place a check mark.

12. Additional Information
This space can be used to record any information that the retailer wishes to capture (such as temperature of product exiting the grinder).

13. Staff Initial
The individual who is performing the grinding process should initial indicating information recorded is accurate.

14. Grinder Sanitation Check
Each day the grinder is used, before the start of production, perform an inspection to ensure that grinder is visually clean and dry. If satisfactory record your initials by the day. Remember that the grinder should also be completely cleaned between species. If the grinder is used in warm conditions where air temperature is significantly greater than 4°C substantial increases in shelf-life and product safety may also be gained by cleaning the grinder during the day.

Records Storage
Grinding logs should be filed and kept on the premises for a period of at least one month.

Items Requiring Corrective Action
If during the course of filling out the grinding log you find that ingredients are not satisfactory for use, place the suspect ingredients in a location where they will not be used and inform your supervisor or take action according to your store policy. Record the details on the back of the grinding log so you may refer to it at a later time.

---

<table>
<thead>
<tr>
<th>Location: Store Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality Check</th>
<th>Ingredient Quantity</th>
<th>Lean %</th>
<th>Meat Temp.</th>
<th>Clip Check</th>
<th>Additional Information</th>
<th>Staff Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kilograms</td>
<td></td>
<td></td>
<td></td>
<td>Post grinding temp.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pounds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ = Good</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>56</td>
<td>M</td>
<td>0</td>
<td>✓</td>
<td>1°C</td>
<td>MK</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>75%</td>
<td>2</td>
<td>✓</td>
<td>3°C</td>
<td>TL</td>
</tr>
</tbody>
</table>

An inspection to ensure that grinder is visually clean and dry. If satisfactory record your initials by the day. Remember that the grinder should also be completely cleaned between species. If the grinder is used in warm conditions where air temperature is significantly greater than 4°C, substantial increases in shelf-life and product safety may also be gained by cleaning the grinder during the day.

---

TL  □ Wed. _____ □ Thurs. _____ □ Fri. _____ □ Sat. _____ □ Sun. _____
## Ground Meat Production Log

### Retail Location:

<table>
<thead>
<tr>
<th>Grinding Time and Date</th>
<th>Ingredient Source</th>
<th>Species</th>
<th>Ingredient Production Date</th>
<th>Fresh or Frozen Storage</th>
<th>Date Acceptable</th>
<th>Quality Check</th>
<th>Ingredient Quantity</th>
<th>Lean %</th>
<th>Meat Temp.</th>
<th>Clip Check</th>
<th>Additional Information</th>
<th>Staff Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>9am 11</td>
<td></td>
<td>B</td>
<td>July 8</td>
<td>Z</td>
<td>✓</td>
<td>✓</td>
<td>56</td>
<td>M 75%</td>
<td>0</td>
<td>✓</td>
<td>MK</td>
<td></td>
</tr>
</tbody>
</table>

**Grinder Sanitation Check**

Each day the grinder is used, before the start of production perform an inspection to ensure that grinder is visually clean and dry. If satisfactory record your initials by the day. Remember that the grinder should also be completely cleaned between species. If the grinder is used in warm conditions where air temperature is significantly greater than 4°C, substantial increases in shelf-life and product safety may also be gained by cleaning the grinder during the day.

**Grinder Sanitation Check (Please Check and Initial):**

- □ Mon.____
- □ Tues.____
- □ Wed.____
- □ Thurs.____
- □ Fri.____
- □ Sat.____
- □ Sun.____
Research Note

Multistate Outbreak of Multidrug-Resistant Salmonella Newport Infections Associated with Ground Beef, October to December 2007

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ABSTRACT

In late October 2007, an outbreak of multidrug-resistant Salmonella Newport infections affected 42 case patients in California, Arizona, Idaho, and Nevada. A case-control study implicated ground beef from one chain store. Despite detailed ground beef purchase histories—including shopper card information for several case patients—traceback efforts by both the U.S. Department of Agriculture, Food Safety and Inspection Service and the California Department of Public Health were unable to identify the source of contamination. Case patients consumed multiple types of ground beef products purchased at numerous chain store A retail locations. These stores had received beef products for grinding from multiple beef slaughter–processing establishments. Detailed retail grinding logs and grinding policies that prevent cross-contamination between batches of ground beef products are crucial in the identification of contaminated beef products associated with foodborne illness.

In late October 2007, the California Department of Public Health (CDPH) noted an increase in Salmonella Newport isolates resistant to chloramphenicol, a marker for multidrug resistance. Historically in California, clusters of multidrug-resistant (MDR) Salmonella infections have predominantly occurred among the Hispanic population and have often been associated with consumption of raw milk and/or raw milk products (2). Previous outbreaks of MDR Salmonella Newport in the United States have been associated with consumption of ground beef (11). Among the six initial cases of this outbreak, all were non-Hispanic, and the isolates shared an extremely rare pulsed-field gel electrophoresis (PFGE) pattern; this PFGE pattern accounted for only 0.2% of all Salmonella Newport isolates posted to the national PulseNet database at that time. In all, 42 MDR Salmonella Newport isolates with indistinguishable PFGE patterns by two enzymes were identified in California, Arizona, Nevada, and Idaho, from October to December 2007. A case-control study was conducted by the CDPH, the Arizona Department of Health Services, the California Emerging Infections Program, and the Centers for Disease Control and Prevention. This report summarizes the results of the epidemiologic investigation that linked these MDR Salmonella Newport infections to consumption of contaminated ground beef purchased from several grocery stores of the same chain (chain store A).

MATERIALS AND METHODS

Epidemiologic investigation. A case was defined as a culture-confirmed MDR Salmonella Newport infection in a U.S. resident, with symptom onset on or after 1 October 2007 and an isolate matching the outbreak PFGE patterns (XbaI JJPX01.0422–BlnI JJPX01.0422). The CDPH Microbial Diseases Laboratory conducted a national PulseNet search to identify isolates with the outbreak patterns.

Hypothesis-generating questionnaires were administered by phone to case patients in California and Arizona during the first 2 weeks of November. Foods consumed by more than 50% of the case patients were included on the case-control study questionnaire. Case-control study interviews were conducted during the last week of November and the first week of December. Controls were defined as persons without self-reported diarrhea in the 2 weeks prior to interview and were matched to cases by age (younger than 18 years, 18 to 64 years, and 65 years and older) and neighborhood, using reverse address lookup, with the case patient’s address as the anchor. Case patients provided information about foods consumed during the 7 days prior to the onset of illness. Controls provided information about foods consumed during the month of October to match exposure period to that of the case patients. Case patients and controls were asked about

* Author for correspondence. Tel: 916-764-4487; Fax: 916-323-1658; E-mail: Jen.JenSchneider@gmail.com.
consumption of ground beef, chicken, tomatoes, milk, cheese, eggs, bananas, and raw onions. Case patients were asked to provide grocery store shopper card information if available. Odds ratios and 95% confidence intervals were calculated with SAS 9.1 software (SAS Institute, Cary, NC). A two-tailed $P$ value $<0.05$ was considered statistically significant.

**Environmental investigation.** Product isolates collected during the U.S. Department of Agriculture, Food Safety and Inspection Service (FSIS) Pathogen Reduction–Hazard Analysis and Critical Control Point *Salmonella* Verification Testing Program are subject to PFGE and antimicrobial resistance testing at the U.S. Department of Agriculture, Agricultural Research Service (6). Each *Salmonella* isolate is cut by a primary enzyme (*Xba*I) and, on request, by a secondary enzyme (*Bln*I). The PFGE patterns are uploaded to the VetNet database maintained by the Agricultural Research Service. A VetNet pattern search was conducted by the FSIS to match the unique PFGE *Xba*I pattern of the outbreak strain to isolates collected from meat and poultry establishments during FSIS *Salmonella* testing.

Grocery shopper card purchase information was sought from case patients. Using shopper card information, the FSIS and the CDPH conducted traceback investigations of case patients’ ground beef purchases at multiple retail locations. Investigators met with store meat managers to review in-store grinding procedures and policies. Investigators reviewed grinding logs, and invoices for the day’s ground beef purchased by case patients had been fabricated to identify specific beef suppliers of interest. Investigators conducted traceforward investigations at FSIS-regulated establishments where ground beef–positive *Salmonella* Newport isolates that exhibited the outbreak PFGE *Xba*I pattern were recovered in 2007.

**RESULTS**

**Epidemiologic investigation.** The CDPH Microbial Diseases Laboratory noted an increase in chloramphenicol-resistant *Salmonella* Newport isolates in late October 2007. A PulseNet search conducted on 31 October 2007 identified 10 isolates with the same pattern in the United States during the previous 60 days. In all, 42 isolates with a two-enzyme (*Xba*I and *Bln*I) PFGE match were identified between October 2007 and January 2008. Isolates from three California case patients were confirmed by the National Antimicrobial Resistance Monitoring System and met the System’s definition of MDR (1).

The 42 case patients were from California (22), Arizona (16), Nevada (3), and Idaho (1). Onset dates ranged from 4 October to 10 December 2007 (Fig. 1). The median age of case patients was 41 years (range, $<1$ to 94 years); 56% of the case patients were female. The majority (82%) of patients was non-Hispanic white. Twenty-five (74%) of 34 patients had bloody diarrhea. Seventeen (46%) of 37 patients were hospitalized; there were no deaths.

Fifteen case patients in California and Arizona completed the hypothesis-generating questionnaire. Twenty-one case patients and 36 controls were enrolled from the four states in the case-control study. In univariate analysis, no single food item was significantly associated with illness. There was a border-line-significant association with purchasing ground beef from chain store A (42% [8 of 19] of cases versus 18% [6 of 33] of controls, $P$ value = 0.06) (Table 1). Case patients were more likely to have shopped for groceries at chain store A in the week prior to the onset of illness, as compared with controls during the month of October (81% of cases compared with 67% of controls, $P$ value = 0.25), although the association was not statistically significant. Among case patients and controls who had shopped at chain store A, no single food item was associated with illness. However, among persons who consumed ground beef at home during the week prior to the onset of illness or in the month of October for controls, 80% of the case patients purchased their ground beef from chain store A compared with 26% of controls (odds ratio = 11.3, 95% confidence interval = 1.9 to 69.1, $P$ value = 0.005). The investigation did not identify a link between any of the illnesses and ground beef purchased at other store chains. At

![FIGURE 1. Symptom onset date of MDR Salmonella Newport outbreak cases, October to December 2007, United States (n = 39).*](image-url)
the time of the case-control study, none of the patients contacted for this investigation had leftover ground beef available for testing.

**Traceback and traceforward investigations.** FSIS investigators followed up on shopper card information collected from 11 case patients and visited nine Arizona, two California, and one Nevada chain store A locations. Based on the shopper card information, case patients had purchased multiple and various types (percent lean) of ground beef products prior to illness onset, but had not purchased ground beef patties. Seven establishments were identified that directly supplied beef products to chain store A locations in California, Arizona, and Nevada (Fig. 2). Four of the establishments (I, J, K, and L) provided primal cuts of beef to stores in all three states. Bench trim from the primal cuts was ground into 80\% (80/20) lean ground beef at individual chain store A locations. Three establishments (B, C, and E) supplied ground beef products to chain store A locations. Establishment B, a grinding plant, supplied coarse ground beef for regrinding to stores in California, Arizona, and Nevada. Establishment C, a slaughter–processing establishment, supplied coarse ground beef to chain store A locations. Establishment E, a grinding plant, supplied preformed ground beef patties to chain store A locations in Arizona. Establishment A, a slaughter–processing plant, and establishment D, a processing plant, supplied both establishments B and E with boneless beef products for grinding. Establishment B also received boneless beef products from foreign establishment G (Fig. 2).

Chain store A locations did not regularly clean the grinder between batches of various blends of ground beef; it is likely that individual ground beef products were commingled with the subsequent batch of ground beef products. Additionally, the chain store locations did not record the sources of the bench trim on daily grinding logs, and information on the source of coarse ground beef was recorded incompletely or inaccurately at some stores. This made it difficult for the investigators to collect establishment and lot numbers for specific ground beef products purchased by case patients.

In September 2007 one *Salmonella* Newport ground beef isolate, indistinguishable (by *Xba*I) from the outbreak strain, was recovered during FSIS sampling at establishment E. Establishment E supplied ground beef patties to store chain A locations in Arizona and, as previously stated, no case patients reported consuming that type of ground beef. Establishment F, a small processing plant, was the source of a second 2007 FSIS ground beef isolate indistinguishable by two enzymes (*Xba*I and *Bln*I) from the outbreak strain.

<table>
<thead>
<tr>
<th>Exposure</th>
<th>No. (%) of cases</th>
<th>No. (%) of controls</th>
<th>Odds ratio</th>
<th>95% confidence interval</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground beef at home</td>
<td>12 (57)</td>
<td>28 (78)</td>
<td>0.38</td>
<td>0.1–1.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Ground beef in restaurant</td>
<td>6 (40)</td>
<td>19 (56)</td>
<td>0.53</td>
<td>0.2–1.8</td>
<td>0.3</td>
</tr>
<tr>
<td>Ever cook ground beef</td>
<td>15 (79)</td>
<td>29 (81)</td>
<td>0.9</td>
<td>0.2–3.6</td>
<td>0.9</td>
</tr>
<tr>
<td>Chicken at home</td>
<td>12 (71)</td>
<td>31 (86)</td>
<td>0.39</td>
<td>0.1–1.6</td>
<td>0.18</td>
</tr>
<tr>
<td>Chicken at restaurant</td>
<td>12 (63)</td>
<td>22 (63)</td>
<td>10</td>
<td>0.3–3.2</td>
<td>1</td>
</tr>
<tr>
<td>Raw onion</td>
<td>7 (37)</td>
<td>22 (61)</td>
<td>0.37</td>
<td>0.1–1.2</td>
<td>0.09</td>
</tr>
<tr>
<td>Grocery shop at chain store A</td>
<td>17 (81)</td>
<td>24 (67)</td>
<td>2.1</td>
<td>0.6–7.7</td>
<td>0.25</td>
</tr>
<tr>
<td>Ground beef from chain store A</td>
<td>8 (42)</td>
<td>6 (18)</td>
<td>3.3</td>
<td>0.9–12</td>
<td>0.06</td>
</tr>
</tbody>
</table>

**FIGURE 2.** Beef product suppliers for chain store A supermarkets.
Establishment F could neither be linked to store chain A nor to establishments A, D, I, J, K, or L. Both establishments E and F did have a common foreign supplier of boneless beef, establishment H.

The FSIS issued a public health alert (7) on 20 December 2007, after an exhaustive FSIS investigation could not identify specific production lots that would be subject to a recall. The public health alert advised consumers not to consume ground beef that was ground and sold by chain store A locations between 19 September and 5 November 2007. The original alert was expanded on 15 February 2008 to include ground beef sold between 19 September and 25 November 2007, based on an additional case patient with illness onset of 10 December 2007, who reported a ground beef purchase at store chain A on 23 November 2007.

On 30 January 2008, a public health laboratory isolated

Salmonella Newport from leftover frozen ground beef retrieved from a California case patient’s freezer. The patient bought the ground beef from a chain store A location on 4 October 2007. On 8 February 2008, the CDPH confirmed that the isolate was MDR Salmonella Newport and matched the outbreak strain, with two enzymes by PFGE. The subsequent recovery of the outbreak strain from frozen ground beef confirmed the epidemiologic implication of ground beef from chain store A. Subsequent traceback activities by the FSIS confirmed that this product had been the first product ground at the chain store A location on 4 October 2007, and that establishment B was the sole source of that ground beef product.

### DISCUSSION

Ground beef has been identified previously as the source for MDR Salmonella Newport and Salmonella Typhimurium infections (4, 10). It is important to identify strategies to control MDR Salmonella from farm through processing. The judicious use of antibiotics in animal agriculture is important to decrease the emergence of resistant pathogens.

An outbreak of MDR Salmonella Newport occurred among residents of California, Arizona, Nevada, and Idaho in late 2007. The epidemiologic and laboratory evidence supported that this outbreak was due to consumption of ground beef purchased at chain store A. Because of chain store A’s beef grinding policies, it is likely that individual ground beef products were routinely commingled with the next batch of ground beef, although incomplete grinding logs at some store locations hindered conclusive findings on this point.

Patients infected with MDR Salmonella have a greater risk of hospitalization and death compared with patients infected with drug-susceptible Salmonella (5, 9). During this 2007 outbreak, almost half (46%) of all patients were hospitalized. State and national level surveillance systems for MDR Salmonella Newport need to be maintained to enhance detection of outbreaks. Once an outbreak is detected, epidemiologic studies and prompt collection of product (food) samples from case patients are the key to the identification of the source of the infections. Initiation of traceback activities early in an investigation enhances the identification of the source of the outbreak. Supermarket loyalty cards have proved an invaluable resource, providing detailed case patient purchase information. This information, combined with detailed and accurate retail recordkeeping, is crucial to the successful determination of the source of the contamination and the removal of potentially contaminated products from commerce (8). Changes to retail supermarkets’ ground beef policies and recordkeeping could aid investigations. When grinding beef in-store, retail supermarkets should consider separating batches of beef from different sources to prevent commingled product, which may result in the spread of contamination by pathogens, such as MDR Salmonella Newport or E. coli O157:H7. Retailers should maintain detailed records of grinding activities and logs (Fig. 3) that include documenting cleanup between grinds. Detailed grinding logs are essential for the successful traceback of contaminated beef when implicated in outbreaks and to allow focused, detailed, and prompt recalls to prevent additional infections (3).

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### REFERENCES


Research Note

Recordkeeping Practices of Beef Grinding Activities at Retail Establishments

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ABSTRACT

Ground beef has been implicated as a transmission vehicle in foodborne outbreaks of infection with pathogens such as Escherichia coli O157:H7 and Salmonella. During outbreak investigations, traceback of contaminated beef to the producing facility is often unsuccessful because of inadequate recordkeeping at retail establishments that grind beef products. We conducted a survey in three states participating in the Environmental Health Specialists Network to describe beef grinding and recordkeeping practices at retail establishments. In each establishment that maintained grinding logs, three randomly selected records were reviewed to determine whether important data elements for traceback investigations were recorded. One hundred twenty-five stores were surveyed, of which 60 (49%) kept grinding logs, including 54 (74%) of 73 chain stores and 6 (12%) of 51 independent stores. One hundred seventy-six grinding records from 61 stores were reviewed. Seventy-three percent of the records included the establishment code of the source beef, 72% included the grind date and time, and 59% included the lot number of the source beef. Seventy-five percent of records noted whether trimmings were included in grinds, and 57% documented cleanup activities. Only 39 (22%) records had all of these variables completed. Of stores that did not keep grinding logs, 40% were unaware of their purpose. To facilitate effective and efficient traceback investigations by regulatory agencies, retail establishments should maintain records more detailed and complete of all grinding activities.

Consumption of beef, particularly ground beef, is a risk factor for infection with several foodborne pathogens, including Escherichia coli O157:H7 and Salmonella (8, 10). Foodborne disease outbreaks with ground beef as a vehicle of infection are relatively common; in 2006, outbreaks caused by ground beef accounted for approximately 10% of outbreaks with a known food vehicle (3). Contaminated ground beef ground at grocery stores or other retail establishments has been implicated in a number of outbreaks (8). In some of these outbreaks, investigators found that although the retail establishment where the beef was ground or purchased could be identified, determining the source of the implicated beef supplied to the retail establishment was difficult or impossible. To identify the source of the contaminated product (traceback investigation), investigators must be able to determine what products were incorporated into each batch of ground beef, on what day, and whence these products originated. Additionally, records of beef grinding activities (grinding logs) can help investigators to identify other potentially contaminated batches of meat that might have originated at the same establishment, and other establishments that might have been affected by contaminated product (traceforward investigation). Difficulties in these investigations have been attributed to poor retail recordkeeping practices or to inadequate or incomplete grinding logs.

While establishments are required by both the Federal Meat Inspection Act (21 United States Code [U.S.C.] 642) and the Poultry Products Inspection Act [21 U.S.C. 460(b)] to keep records that will disclose fully and correctly all transactions involved in their business subject to the acts (including keeping bills of sales, invoices, bills of lading, and receiving and shipping papers), there are currently no U.S. Department of Agriculture (USDA) or state requirements to generate or maintain grinding logs. Because many USDA Food Safety and Inspection Service (FSIS) traceback activities have been impeded by lack of information, the FSIS and public health officials continue to encourage businesses to maintain production records such as grinding

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TABLE 1. Summary of store characteristics and grinding activities in EHS-Net sites, by store type, 2008

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>All (n = 125)</th>
<th>Chain (n = 74)</th>
<th>Independent (n = 51)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median no. (range) of grinds per week</td>
<td>7 (2–140)</td>
<td>10 (3–140)</td>
<td>7 (2–42)</td>
</tr>
<tr>
<td>Median no. (range) of kilograms per grind</td>
<td>18 (1–363)</td>
<td>23 (2–182)</td>
<td>14 (1–363)</td>
</tr>
<tr>
<td>Stores using trimmings for grinds (%)</td>
<td>78</td>
<td>91</td>
<td>61</td>
</tr>
<tr>
<td>Among stores using trimmings in grinds, those grinding separately (%)</td>
<td>78</td>
<td>90</td>
<td>52</td>
</tr>
<tr>
<td>Stores maintaining grinding logs (%)</td>
<td>49</td>
<td>74</td>
<td>12</td>
</tr>
</tbody>
</table>

logs that provide important information about how, when, and where product was prepared, shipped, received, stored, and handled.

The Environmental Health Specialists Network (EHS-Net) is a network of environmental health specialists and epidemiologists in nine states (7). The network conducts special studies to evaluate food preparation and handling practices in restaurants and retail establishments. After a multistate outbreak of multidrug-resistant Salmonella Newport infections attributed to store-ground beef (2, 6), we initiated a study in EHS-Net sites to evaluate the prevalence of grinding logs in retail establishments. The primary objectives of this study were to describe how often retail establishments keep grinding logs and to determine the completeness of these grinding logs.

MATERIALS AND METHODS

Three EHS-Net sites (California, Minnesota, and Tennessee) participated in this survey. Each site surveyed a convenience sample of retail establishments that ground beef in their respective jurisdictions; the establishments were selected based on the site’s schedule for routine facility inspections and a priori knowledge about whether each establishment ground beef in the facility. The survey was administered as part of routine facility inspections. The survey contained questions on the type and size of the store, the number of times beef was ground each week and the number of kilograms contained in each grind, and whether grinding logs were kept in the store. Each store that kept grinding logs was asked the reasons logs were kept (e.g., corporate requirement), for how long logs were kept, and where the logs were kept (e.g., in store, at corporate headquarters). Additionally, we asked if the establishment included trimmings (i.e., beef remnants typically produced during the cuttings of steaks and other cuts that are routinely incorporated into ground beef products) in beef grinds.

In each establishment that kept grinding logs, three records of individual grinds from the previous month were randomly selected and reviewed to determine whether data elements needed for traceback and traceforward investigations were completed. These data elements included the date and time the grind was performed, the type of product produced, the lot and establishment code of the source beef, whether cleanup was performed between grinds, and whether beef trimmings were included in the grind. Descriptive data analysis was performed with SAS, version 9.2, software (SAS Institute Inc., Cary, NC).

RESULTS

Of the 125 stores surveyed, 43 were in California, 33 in Minnesota, and 49 in Tennessee. Seventy-four (59%) stores were classified as chain stores, and 51 (41%) stores were classified as independent. Among the 70 chain stores for which ownership information was available, 58 were corporately owned or operated, and 12 were franchisee owned. Most of the stores (91 [73%]) were grocery stores, 14 (11%) were ethnic or international stores, 10 (8%) were butchers or meat markets, and 10 (8%) were another type of establishment.

Overall, the surveyed stores ground beef a median of seven times per week and ground a median of 18 kg per grind, but this differed between chain and independent stores (Table 1). Chain stores also ground more beef in each grind. Three-quarters of stores reported that they used beef trimmings in grinds, and this practice was more common in chain stores (91%) than it was in independent stores (61%). Among the 98 stores using trimmings in grinds, chain stores were also more likely than were independent stores to report grinding trimmings in batches separate from other beef grinds (90 versus 52%).

Overall, 61 (49%) stores kept grinding logs, including 55 (74%) chain stores, but only 6 (12%) independent stores. Among the stores that kept grinding logs, a number of reasons were cited for keeping them, including a corporate or franchise requirement (64%), for store records (23%), for state requirements (16%), for USDA requirements (11%), or another reason (21%). Most stores (39%) kept logs for 6 months to 1 year, 36% of stores kept logs for more than 1 year, 21% for 1 to 6 months, and 3% for less than 1 month.

Stores that did not keep logs were asked why not. The most common reason stated was that they did not know what logs were (35%). Other common reasons stated included because they were not required (21%), that they were supposed to keep them but did not (6%), and that they were too busy or it was too much paperwork to keep logs (5%).

We reviewed 179 grinding log records in the 61 stores that kept grinding logs. Overall, 22% of records included information for all of the data elements that are needed for a traceback or traceforward investigation. The remaining records were either only partially completed or the grinding logs did not record all of the necessary data elements; we did not distinguish between the two. Most records (164 [92%]) indicated the type of product (e.g., 90% lean) produced during that grind, whether trimmings were included in the grind (135 [75%]), the grind date and time (131 [73%]), the establishment code of the source beef (129 [72%]), and the production date of the source beef (120 [67%]). About half of records included the lot number of the source beef (106 [59%]) and whether cleanup was
performed after that grind or on that day (104 [58%]). Fewer records (69 [39%]) contained the “use-by” date of the source beef.

DISCUSSION

Accurate recordkeeping by retail establishments that grind beef is essential for complete and effective investigations during foodborne outbreaks associated with ground beef. In a survey of retail establishments in three states, we found that only half of stores kept grinding logs to document their beef grinding activities, and that grinding logs were more common in chain than they were in independent establishments. Among stores that kept logs, only a quarter maintained complete records needed to conduct a traceback investigation.

The FSIS relies heavily on records maintained by retailers to aid in traceback and traceforward investigations of products associated with illness and other food safety incidents, to determine quickly and effectively the source product, and to ensure that appropriate controls are implemented, because contaminated product can be widely distributed among retailers. With effective traceback and traceforward, contaminated products can be removed from the market in a fashion timelier and more complete, helping to prevent further cases of illness. When traceback and traceforward investigations cannot be completed because of incomplete information, illnesses could continue to occur (4), and recurrent outbreaks associated with the same source might occur (1, 4).

Our findings from this survey are consistent with those reported from recent investigations of outbreaks associated with beef products ground at retail establishments. In 2007 and 2008, the FSIS conducted 16 such investigations involving retail operations (9). Nine (56%) establishments kept grinding logs that contained sufficient information for traceback and traceforward activities; five of these nine investigations resulted in recall actions.

Meat grinding is an important source of cross-contamination in retail establishments (5). In the current study, just over half of the stores we surveyed documented cleanup after grinding beef in their grinding logs. We did not document or review the procedures used by each store for cleanup between grinds, and could not assess whether cleaning activities were sufficient to prevent cross contamination; similarly, we did not assess cleanup procedures in stores that did not keep grinding logs. If cleaning is not documented properly, it might be impossible for investigators to determine the source of a contaminated lot of beef.

Most stores that kept grinding logs cited keeping them to meet a corporate–franchise, state, or USDA requirement, although neither the USDA nor any of the states included in this study had regulations that required retail establishments to keep grinding logs. While it is heartening that many corporate chains and franchises do require their stores to keep records of grinding activities, only half of the establishments we surveyed even maintained records, and in particular, independent stores kept records of grinding activities less frequently. More work is needed to ensure that retail establishments maintain grinding logs that contain sufficient information for traceback and traceforward investigations.

This study had several limitations. First, we surveyed a limited number of stores, and stores were selected based on convenience rather than a sample more systematic or random. We included more than one store from some chains in the analysis, possibly biasing our findings to reflect the practices of selected corporations or company policies. While our findings were similar across all three participating sites, it is possible that the findings are not representative of other states or of other jurisdictions in the states included in this study. Last, although evidence from outbreak investigations supports the utility of grinding logs, the study was not designed to evaluate any establishment’s safety benefits because of keeping grinding logs.

While proper recordkeeping will aid in more efficient and effective traceback and traceforward investigations, and might help to reduce the scope and duration of outbreaks, grinding logs are only one part of a range of activities that are essential to limit foodborne infections. Other interventions are needed to reduce the prevalence of pathogens such as *E. coli* O157 on beef products (5), and consumers should continue to be vigilant about preparation of ground beef products and prevention of cross-contamination in the home.

REFERENCES

Best Practices
For Retailer Operations
Producing
Raw Ground Beef

Developed By:
Beef Industry Food Safety Council
National Cattlemen’s Beef Association

Edited by:
Kerri B. Harris
International HACCP Alliance
College Station, Texas

Developed August 2004
Revised April 2005
Best Practices for Retail Operations Producing
Raw Ground Beef

**Introduction:**

Producers of raw ground, including ground beef, products recognize that these products have an inherent food safety risk due to the nature of the process and the lack of a sufficient “kill” step for biological hazards in the process. Therefore, it is extremely important that retail operations producing raw ground beef implement Best Practices to produce the safest products possible by increasing total process control throughout the process. This document focuses on retail operations that are grinding beef in the store, not the handling of ground product that is purchased in the final packaged form. For detailed information on developing a total food safety program the Food Marketing Institute (FMI) has developed a document entitled, “A Total Food Safety Management Guide: A Model Program for Category: Raw, Sold Ready to Cook Product: Ground Beef.”

This document provides guidelines for grinding and can be used by retail operations to develop store specific programs. The guidelines are designed to provide a recommended set of practices and procedures that retail operations may want to adopt in their entirety or part to ensure optimal quality and food safety. It also addresses the issues of designing an effective lotting system and reprocessing ground products. These recommendations focus solely on the production of raw ground beef.

It should be noted that the following items are not fully addressed in this document, but they should be covered by existing retail operating procedures and/or other store-specific processing programs.

- Personnel — disease control, hygiene, clothing, training, etc.
- Retail Facility — construction and design, product flow, drainage, etc.
- Sanitary operations — general maintenance, cleaning and sanitizing, pest control, etc.
- Sanitary facilities and controls — water supply, plumbing, sewage disposal, rubbish and offal disposal, etc.
- Freezer and coolers — monitored and maintained to ensure temperature control, recording devices, alarms, etc.
- Equipment maintenance and calibration — adequate frequency for thermometers, recording devices, compressed air equipment, etc.

A training document (Attachment 1) developed by Costco is included in this document as an example, but it is recommended that each store develop store-specific information. Many of the items listed above are also addressed in 21 CFR Part 110 – Current Good Manufacturing Practices in Manufacturing, Packing, or Holding Human Food (Attachment 2) – which was developed by the Food and Drug Administration and can be used as a resource if more information on any of these areas is needed.
**LOTTING**

All retail grinding operations should have a lotting mechanism for coding and recording finished ground products to allow for tracing the product back through the system for tracing the product forward through the chain to determine when it was sold and how much was sold vs. disposed of at the store. Some retail operations may develop computerized bar codes or tracking systems that are very elaborate and detailed, and others may have simple handwritten documentation and box/package codes. Lotting is usually driven by some time factor (i.e., hour, shift, day, etc.) or by raw materials (i.e., sirloin, chuck, etc.) and is given a specific identification code. Creating smaller lots or utilizing a sub-lotting system for tracking information may help demonstrate/document process control and could possibly help minimize the economic impact of a recall from product that is ground in the store.

Regardless of the mechanism each store should have a record keeping system, and the following items may be considered for each identified lot/sub-lot:

- Raw material source(s) by vendor, including vendor lot identification, time used
- Data collected during process (product and/or storage temperatures, microbial data, etc.)
- Metal detector records, if used
- Equipment evaluation records (i.e., grinder checks)
- Bone collection records, if applicable
- Date placed in the case/date removed from the case and disposed of at the store, if applicable

If any abnormal condition(s) (odor, off color, etc.) are found during the grinding process then it is recommended that the product be segregated, that the grinder and all other equipment be cleaned and sanitized prior to reinitiating grinding process, and that a new lot/sub-lot is started when product begins. It is best if information can be documented to show what the problem was, the product(s) that were involved, how the product was handled, and that the equipment was cleaned and sanitized appropriately.

While retail operations may grind small or limited amounts of beef in the store, it is still important that retailers fully understand the importance of product identification and lotting. The concept of lotting systems in ground beef productions is a complex and detailed issue. The existing USDA definition for a lot, when there is a positive result for *E. coli* O157:H7, is “from full sanitation to full sanitation.” In most federally established commercial grinding operations this definition may impact a full day’s production of ground beef. However, proper documentation and controls (including product testing) may allow finished products to be sub-lotted under this definition to minimize the amount of affected products.

A retail operation may also consider sub-lotting under the context of the definition described above. If so, then the following types of documentation are useful:
• Batching records — These records should identify the types of raw materials used by its tracking codes; the amount used in each batch of formulated product, the time it was used and the grinder that it was ground in, if there is more than one grinder.

• Packaged product tracking systems — The finished products should be coded with the actual times they are packaged and placed in the retail case.

• Microbiological testing and tracking — If a retail store is sampling and testing finished formulated raw materials from each batch for potential microbial adulterants, then it should include the batch number samples, the time of the sample and a protocol tracking form for submission to the laboratory used for analysis. It is extremely important that a retail store clearly identifies what lots/sub-lots are represented by the sample being tested.

• Finished Product “Test and Hold” Programs — If a retail store is testing finished ground product for potential microbial adulterants, then it should place all of the product on hold until the laboratory testing is completed and the results are available.

Utilizing the guidelines provided above will allow retailers to better identify and document the amount of suspect or affected product. For example, if one composite sample for formulated products tested positive for E. coli O157:H7 during a day’s production where all other composites tested negative, then the information discussed above may provide added assurance that sufficient controls were in place to minimize the amount of product affected and the impact of a recall.

Sub-lotting can also be used for other potential contamination such as a physical contaminant. Sub-lotting for physical contamination will require the following:

Batching records — These records should identify the types of raw materials used by its tracking codes, the amount used in each batch of formulated product, grinder head, the time the batch was formulated, the cleaning and inspections by authorized representatives.

In-process Control Records — These records should identify the types of control checks performed on metal detectors and other control instruments, the time checks were performed and the line and/or product code information.

**REPROCESSED PRODUCT**

Retail store grinding operations must address the use of reprocessed product and should not reintroduce product from one’s day’s production to the next. For the purpose of the best practices, a lot was defined as the finished product and a batch was defined as material that is in-process. The following categories are recommended to help distinguish between the types of raw materials being reintroduced and the points of entry into the grinding operation.
1. Distressed/Returned product — Retailers should dispose of all product that is returned by a customer or has been distressed at the store-level.

2. Out-of-date product — Out dated products should be discarded and should not be introduced into ground product. Use of products that are nearing the expiration date (i.e., round) will need to be properly identified and may impact the shelf-life of the ground product.

The recommendations provided above should help a retailer make decisions relating to the reprocessing of products. Each store will need to carefully consider the options and determine which one works best within their process based on amount of production, opportunities for further processing, etc. Each retailer is encouraged to develop written procedures for how it will handle and document these issues. Retailers should note that any time product is being reprocessed food safety considerations must come first.

**BEST PRACTICES**

The following guidelines for developing best practices for retail store that are grinding beef are recommended for voluntary consideration and use in developing store-specific procedures. These are not designed to control specific food safety hazards, but are intended to provide useful information to help stores produce safe and wholesome products. For detailed information on developing a total food safety program the Food Marketing Institute has developed a document entitled, “A Total Food Safety Management Guide: A Model Program for Category: Raw, Sold Ready to Cook Product: Ground Beef.”

**Raw Material Source:**
Retail stores should encourage/support further actions at all sectors of the industry (from animal production to consumer) to reduce microbial contamination and foodborne illness. This is especially important for ground beef and the control of *E. coli* O157:H7. The responsibility for safe food depends upon all sectors working together to produce the safest food possible for consumers. Stores that produce ground beef are responsible for outlining the requirements for raw material suppliers and for establishing a procedure to verifying that all of the requirements are implemented and working as designed. From a retail store’s perspective, there are three basic points that could be considered in selecting suppliers for raw materials for ground product(s).

A. Process Interventions and/or Controls for Food Safety
   1. HACCP
      Ensure that the supplier has a HACCP program that meets all regulatory requirements and has been validated to control the food safety hazards identified as reasonably likely to occur. Retail operations may want to verify that these programs are in place and implemented appropriately.
   2. For Beef, the following items are specific to *E. coli* O157:H7
a. Suppliers of beef should have validated process interventions and/or validated Critical Control Points (CCPs) in place to prevent, eliminate or reduce E. coli O157:H7 to a non-detectable level. Validation may include scientific literature and/or store specific validation using indicator organisms, and it should be specific to the process(es) being applied at the store. This can be incorporated into the retail store’s purchase specifications or other store programs to ensure that all raw materials are produced using validated CCPs or process interventions. If a retailer is requiring testing for E. coli O157:H7, the specifications and testing protocol could be included in the purchase specifications. This is true for both domestic and imported suppliers of raw beef to be used in ground product(s).

B. Foreign Material Contamination:
Retail stores should track unacceptable inclusions, indigenous and foreign materials, found in raw materials to help identify trends in suppliers. These findings should be shared with the supplier to help them improve their process, and may be a factor in supplier selection for future orders. This should be included in specifications to the supplier outlining items that are not acceptable in the raw materials.

C. Testing / Prescreening Requirements:
1. Sampling and testing for E. coli O157:H7 (by supplier or retail store)
   There should be a written protocol for sample collection, lab analysis and proficiency testing, as well as the procedures for reporting the results. It is very important that the supplier and the customer fully understand what the sample represents (i.e., a single combo, a composite of 5 combos, an entire trailer load, etc.), and the steps to be taken in the event of a positive. Communication is extremely important for reporting the test results if the product is being transported to the customer while the test is pending to ensure that all positive product is handled according to the store’s written protocol.

2. Other microbiological Testing (Salmonella, APC, TPC, coliforms, etc.)
   As above, there should be a written protocol for sample collection, lab analysis and proficiency testing, as well as the procedures for reporting the results. It is important to establish how the results will be used before data are collected. Most of these microbiological tests are used for tracking supplier trends over time; however, each store must clearly define how they are going to use the information and the consequences of failing to meet the testing requirements.

3. In-store microbiological testing
   If a retail store elects to conduct its own testing of raw materials and/or finished product, then it should notify the supplier because the results may impact the supplier’s production and distribution of product.

Supplier Evaluations:
Raw material suppliers are critical to both food safety and quality aspects of producing ground products. Therefore, it is important that each new supplier is approved prior to using their products, and that there is a procedure for evaluating on-going suppliers. The following guidelines can be utilized to help design a system for evaluating suppliers.

A. New Supplier Approval:
   1. Each new supplier should provide written acknowledgement of the retailer’s purchase specifications and willingness to comply.
   2. Each supplier should meet the guidelines outlined in the purchase specifications for microbial testing and profiling. For new suppliers a retail grinder may want to establish an intensified sampling program to determine if the supplier can consistently meet the specifications.
   3. Each store should have a supplier audit conducted on a specified frequency to ensure compliance with the purchase specifications and other programs. The audits may be conducted by the retail grinder or by a third-party auditor. The audit requirements should be provided to the supplier as part of the purchase specifications.
   4. Retailers should conduct quality inspections of incoming materials to ensure that they are acceptable. For new suppliers a retailer may want to intensify the sampling frequency to ensure consistency in meeting the requirements.

B. Ongoing Suppliers:
   1. Retail grinding operations should periodically provide an update of the purchase specifications to each supplier and request an updated acknowledgement of receipt of the specifications and a willingness to comply.
   2. Data should be collected and tracked on the following items to identify supplier trends and help make purchasing decisions:
      a. Microbial profile data — may include, but not limited to: *Salmonella*, *E. coli* O157:H7, generic *E. coli*, Total Plate Count (TPC), Aerobic Plate Count (APC), and coliforms.
      b. Retailers may want to include periodic verification of results with a third party analysis.
      c. Foreign object contamination
      d. Defect(s) (unacceptable indigenous inclusions)
      e. Store Audits Results
      f. Age of Product at receipt
      g. Temperature of Product at receipt
      h. On-time Delivery
      i. Other store specific requirements

*Pre-Receipt of Raw Material(s) Verification:*
Based on all of the purchase requirements and store specifications, it is important that a system of checks and balances are put in place to verify that the supplier is conducting their program as planned. This verification process will help minimize problems and increase the integrity of the entire supplier purchasing program.

A. Negative Pre-Screen for *E. coli* O157:H7
The best practice is to have a negative *E. coli* O157:H7 test result from the laboratory or the supplier prior to opening the trailer or receiving the product. This should include all documents related to product identification, written notification of the test results, bill of lading, seal number on load, if applicable, and other identification and tracking information.

If the product must be removed from the trailer prior to receiving the written negative test result, the retailer should have written and documented procedures for off-loading, tagging and holding all of the product to ensure that it is not used prior to receiving the negative test result for *E. coli* O157:H7. This will require good tracking documentation procedures and sufficient training of all employees involved in both receiving and production to prevent the use of the product. The retail store should refuse receipt of any raw materials that test positive for *E. coli* O157:H7.

**B. Seal integrity (security)**

The optimal process is to seal the truck and have one delivery stop; however, this is not always possible. If the delivery will include multiple stops, then there should be a procedure for re-sealing the load and a tracking system for each seal placed on the truck. This process will help maintain product integrity and security.

**Receipt of Raw Material(s):**

**Receiving Meat**

Incoming raw meat materials should be evaluated to ensure that they meet the store-established purchase specifications. Trucks, containers and carriers of raw materials should be evaluated upon receipt to ensure that the conditions meet store requirements for transporting meat. All containers/cartons should be intact. All incoming meat should be coded/identified for store use and for the in-store tracking system. Retailer should verify that the received product is identified on invoice and the product identified on microbiological test results, if applicable.

Specific items to consider:
1. Designated employee(s) should verify that the raw material is from a store approved supplier. Each retailer should set supplier requirements and maintain a list of approved suppliers.

2. Designated employee(s) should evaluate and document on a product receiving log the condition of the trailer, shipping container(s), and carriers of raw materials upon arrival, and should document the time the inspection was conducted. Items for evaluation may include:
   - Retailers should ensure that chemicals or other compounds that may contaminate the raw materials are not being transported on the trailer.
     - Cleanliness of trailer — no foreign materials, dirt, free of debris, free of off odors
• Temperature of trailer — temperature of the trailer must be acceptable to maintain product temperature. Retailer may set a specific temperature for the product and/or the trailer as part of the purchasing specifications. If specific temperatures are set, then there should be a written procedure that defines the action(s) that will be taken if the temperature does not meet the specification.
• General trailer condition — void of cracks, insulation in good condition, trailer door is sealed properly, paper on floors for carcass carriers, etc.

3. If the truck condition is acceptable, the designated employee should verify that the incoming material matches the store purchase specifications and/or required documentation is provided with the load. The following items may be included:

• Species identity and/or origin
• Domestic vs. foreign supply source
• Boning date/ slaughter date
• No foreign objects
• Verification of intended use — verify product and box/combo identification matches the product ordered and the bill of lading, including the proper match for product and test results.
• Supplier microbiological testing results, if required. If the supplier is required to test for E. coli O157:H7, then the material should not be used until the test results are received. Raw materials should be refused if it test positive for E. coli O157:H7. If the supplier is testing for generic E. coli, coliforms, TPC or other microorganisms that can be used to establish supplier trend data, then the product does not have to be held until the results are received. However, if specific accept/reject levels are set for any specific microorganism then the product should not be accepted until test results are received.
• Packaging/pallet requirements — i.e., no metal fasteners or bands, pallets in good usable condition, slip sheets, covers on combos, plastic pallets, etc. It is important that package integrity is maintained and documented.
• Age of raw material — recommend fresh products be used within ≤5 days from fabrication; and frozen meat no more than 6 months from fabrication.

4. If the product meets the purchase specifications, then the designated employee should evaluate the actual condition of the raw materials. The following items are recommended for evaluation:

• Temperature of raw materials (i.e., frozen ≤10°F; fresh ≤41°F or less). Each retailer should have a separate procedure for taking the temperature of incoming product and calibrating thermometers. Recommend both core and surface temperatures of the product.
• Organoleptic evaluation of raw material for off odor, discoloration, improper appearance.
• Material must have supplier code information and proper lot/load identification on materials.
5. If incoming raw materials pass the receiving inspection, then all raw materials should be placed into inventory and receive any retailer specific tracking/coding information prior to entering the storage area or being used in the grinder.

**Use of Trimming Generated In-Store:**

Some retail stores may decide to not use trimmings generated in the retail store in the production of ground beef. However, if trimmings are going to be used in the production of ground beef, then the retailer should develop and implement a tracking system to properly identify the source of the trimmings. It is recommended that in-store trimmings be ground within 24 hours, and should be stored under $\leq 41^\circ F$.

**Non-meat Ingredients**

Retailers will also need to make sure that all non-meat items ingredients, such as seasonings/spices, etc. meet the store-established specifications. After the retailer accepts the non-meat ingredients, then these items should be stored, handled and used in a manner that will maintain the integrity of the items.

**Storage of Raw Material(s):**

Raw materials should be used on a First-In/First Out (FIFO) basis or according to a store specified product rotation/inventory control schedule. Raw materials should be stored at temperatures that maintain proper product condition – temperature, integrity, etc. Frozen materials should be kept frozen, unless tempering or thawing is required prior to use. The packaging/pallet integrity must be maintained throughout the storage period to maintain the condition of the raw materials. Product identity in storage should allow for proper in-store tracking system.

Specific items to consider:
1. For shelf-life purposes place fresh raw materials into cold storage (i.e., $\leq 41^\circ F$ or less) and frozen product into freezers (i.e., $\leq 10^\circ F$ or less).

2. Develop retailer specific storage records or product identification, so product will be used on a FIFO basis or according to store product rotation/inventory control schedule.

3. Store raw materials to maintain package/pallet integrity. Boxed product should remained in closed box and combo bins should be covered during storage to prevent contamination.

4. Storage conditions should be maintained according to pre-requisite program requirements to ensure product integrity during storage.

5. Individual store security should address raw material and finished product storage areas.
**Raw Material Processing:**

**Tempering/Thawing of Frozen Materials**

If tempering or thawing is required prior to use, then it should be done in a time/temperature controlled manner that is adequately monitored and documented and verified. The product package integrity is important during this process. The product’s traceability should be maintained throughout the tempering/thawing process. It is advisable to have a written program that outlines specific guidelines or procedures.

Specific items to consider:
1. Place frozen product in a tempering room that is <41°F and allow product to reach desired level of tempering or thawed state; actual time will vary depending on amount of product and type of packaging. (If the room temperature is higher than 41°F then one must evaluate the time/temperature relationship to reduce the risk of potential microbial growth on the surface of the product.) You may want to consider air temperature and velocity to ensure proper thawing.
2. The product should be monitored on a scheduled basis to prevent degradation of the package integrity and minimize product drip.
3. The product temperature should be monitored on a scheduled basis to ensure that the desired end temperature is not exceeded.
4. All of the products should maintain the store-specific tracking/coding information to ensure proper traceability of product from receiving through to final end products.

**Grinding/Processing Records**

Grinders should be cleaned and sanitized between lots and should be documented on the grinding logs. The grinding logs should include weighing, mixing, blending, coarse and final grinds, forming, packaging, and labeling and other specific aspects of the process. Throughout all of these steps the temperature of the product should be maintained. Steps should be taken to prevent species cross-contamination and proper labeling to maintain end-product identity. Procedures for ensuring proper end-product characteristics (i.e., weights, size, shape, quantity, etc.) should be in place. The in-store tracking mechanism should allow for batch identification and time of batch production.

Specific items to consider for grinding:
1. Prior to initiating the grinding process, retailers should ensure that negative *E. coli O157:H7* results have been received, if the raw material was subjected to testing.
2. Formulation of the product should utilize a grinding logs to document product identification and includes raw materials used, specific weights and amounts, fat
percent, etc. The formulation documentation should address quality characteristics, product specifications, and traceability both forward and backward in the production system.

3. Temperature monitoring of the backroom and the product to ensure integrity. The room temperature should be controlled and the actual time of processing should maintain product integrity, including maintaining the temperature below 41°F during production. A target of ≤50°F for the room is most often used and records of actual room temperatures should be maintained.

4. Defect inspection and elimination systems should be used when possible for bones, metal, etc.

5. Appropriate identification and tracking for traceability purposes should be maintained for all reprocessed product.

6. Retail employees should complete an evaluation of the equipment (grinders – plates and blades, defect eliminators, metal detectors, etc.) on a scheduled basis and the time of each evaluation should be recorded. It is important that this is performed during the production of ground beef, and that this information is reviewed prior to placing the packaged product in the retail display case. This will help minimize the risks associated with equipment malfunctions that can impact the product.

Packaging/Labeling:
It is important that the finished product is properly packaged and labeled to protect the integrity of the product and to provide appropriate handling and cooking instructions to the consumer.

Specific items to consider:
1. Package material must be approved for use with food.
2. Package materials must be stored in a manner to prevent contamination and the material must protect the finished product.
3. The product identification/tracking mechanism should identify specific processing lines used to produce this finished product. This may help narrow the product impacted if there is a problem with a particular processing line that does not impact the other lines.
4. Packaging and labeling employees are responsible for properly labeling end-products with product identity and proper code dates for example: expiration date, sell-by-date, use-by-date, production date and time, using a dating system according to the regulations for opening dating.
5. Packaging and labeling employees are responsible for including all safe handling and storage information according to each product’s requirements, as well as specific cooking instructions. Safe handling labeling is required by USDA.

Storage of Finished Product and Products Displayed in Retail Case:
Finished products should be stored or placed in a retail case designated to maintain temperatures (≤41°F) over time to ensure product shelf-life and product safety. A FIFO or a store specified product rotation/inventory control schedule should be maintained for finished products. The package integrity should be maintained throughout the storage period to protect the condition of the finished product. Product identity in storage and during case display should allow for the in-store tracking system to be used for stock rotation and for recall and/or market withdrawal purposes.

Specific items to consider:
1. For shelf-life purposes place fresh product into cold storage and frozen product into freezers.
2. Utilize products in a specified time-period to maintain shelf-life requirements. Shelf-life of the product is dependent upon the type of product, type of package, temperature of storage, condition of incoming materials, etc. Therefore, each retailer should have specific guidelines for storing/displaying and utilizing finished products.
3. Storage/display conditions should be maintained according to pre-requisite program requirements to ensure product integrity during storage and display.

**SYSTEM CHALLENGES TO MEASURE EFFECTIVENESS:**

*Recall Program and Mock stock recovery drills:*
All retailers that grind beef should develop a recall program. The program should include mock recalls conducted on a periodic basis to ensure that the program works as planned. The recall program should include identification and tracking of raw materials, packaging, and finished products. The program must be able to cover all raw materials (meat, non-meat ingredients), packaging materials to the finished product. The program should identify all suppliers, customers, distributors and everyone involved in the process. The more details that are put in place prior to having a problem, the easier the recall or withdrawal will be if there is a problem. Retailers should have a tracking system to ensure that product that is pulled from the retail display case is documented (date pulled, amount, reason for pull, etc.).

*Store Security:*
Store security systems should address the security of the raw meat and the finished packaged product storage prior to being placed into the retail case. Access should be limited to designated employees only as part of the security program.

**SANITATION:**

Periodic sanitation practices must be followed to prevent the potential for product contamination. It is recommended that sanitation procedures should be a written schedule. Cleaning and sanitizing chemicals should be identified and stored separately from raw meat, grinding area and equipment, and finished products. It is recommended
that grinders and other equipment should be cleaned and sanitized between lots and documented on the grinder log.

**HACCP IN A GRINDING OPERATION:**

As we all know, HACCP is a process control system designed to prevent, eliminate or reduce to an acceptable level food safety hazards. The retailer should consider biological, physical, and chemical food safety hazards. This a raw process that has no scientific CCP for preventing, eliminating or reducing to an acceptable level microbial food safety hazards, such as *E. coli* O157:H7. Therefore, retailers that grind must focus on what can realistically be applied during the process to minimize the potential for growth of pathogens, if present on the raw material. These steps often involve time and temperature controls (i.e., raw material and finished product temperature during processing cold storage or other steps) to minimize the potential for growth.

All retailers that grind beef should be able to support the decisions that are made in the HACCP program and to use the documentation generated from the program to demonstrate product safety. For detailed information on developing a total food safety program the Food Marketing Institute has developed a document entitled, “A Total Food Safety Management Guide: A Model Program for Category: Raw, Sold Ready to Cook Product: Ground Beef.”