

**Conference for Food Protection
2010 Issue Form**

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Council Recommendation:	Accepted as Submitted _____	Accepted as Amended _____	No Action _____
Delegate Action:	Accepted _____	Rejected _____	

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Title:

Guidelines for Producing or Cooking Mechanically Tenderized Beef for Retail

Issue you would like the Conference to consider:

The Blade Tenderization Committee submits up-dated "Guidelines for Producing or Cooking Mechanically Tenderized Beef for Retail and Food Service Establishments".

Public Health Significance:

The submitted guidelines are intended to control contamination by *Escherichia coli* (*E. coli*) O157:H7 and other pathogenic Shiga-toxin producing *E. coli* [STEC] *E. coli* and *Salmonella* species during the production, handling, or preparation of mechanically tenderized or injected beef at food service establishments and retail food stores. Since control procedures for *E. coli* O157:H7, and other pathogenic *E. coli* also control *Salmonella* and other microbiological pathogens, these recommended guidelines will refer specifically to the control of *E. coli* O157:H7 but will be inclusive of these additional foodborne pathogens. *E. coli* O157:H7 is a significant public health concern in raw ground beef and the meat industry has implemented a variety of procedures to control this hazard. However, several recent *E. coli* O157:H7 outbreaks and resulting recalls linked to non-intact tenderized beef have raised concern about the safety of these products. The relatively recent recalls and outbreaks of non-intact tenderized beef products have also caused great interest in: 1) determining the potential risk these products pose to public health; and 2) the development of food safety preventive measures to control such risks during the production and preparation of non-intact beef products.

Recommended Solution: The Conference recommends...:

approval of the new revised guidance document titled "Guidelines for Producing or Cooking Mechanically Tenderized Beef for Retail and Food Service Establishments" and that it be made available to interested stakeholders on CFP's web site .
Additionally, the Conference recommends that a letter be sent to the FDA requesting that this guidance document be made available as an addendum to the Food Code.

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Attachments:

- "Guidelines for Producing or Cooking Mechanically Tenderized Beef..."

It is the policy of the Conference for Food Protection to not accept Issues that would endorse a brand name or a commercial proprietary process.

1 **Guidelines for Producing or Cooking Mechanically Tenderized Beef for Retail and**
2 **Food Service Establishments**

3 **The following guidelines are intended to control contamination by**
4***Escherichia coli* (*E. coli*) O157:H7 and other pathogenic Shiga-toxin producing *E.***
5***coli* [STEC] *E. coli* and *Salmonella* species during the production, handling, or**
6**preparation of mechanically tenderized or injected beef at food service**
7**establishments and retail food stores. Since control procedures for *E. coli* O157:H7,**
8**and other pathogenic *E. coli* also control *Salmonella* and other microbiological**
9**pathogens, these recommended guidelines will refer specifically to the control of *E.***
10***coli* O157:H7 but will be inclusive of these additional foodborne pathogens.**

11 *E. coli* O157:H7 is a significant public health concern in raw ground beef and the
12meat industry has implemented a variety of procedures to control this hazard. However,
13several recent *E. coli* O157:H7 outbreaks and resulting recalls linked to non-intact
14tenderized beef have raised concern about the safety of these products. The relatively
15recent recalls and outbreaks of non-intact tenderized beef products have also caused great
16interest in: 1) determining the potential risk these products pose to public health; and 2)
17the development of food safety preventive measures to control such risks during the
18production and preparation of non-intact beef products.

19 These guidelines have been developed for limiting contamination by *E. coli*
20O157:H7 during the production, handling, or preparation of mechanically tenderized beef
21(e.g., blade-tenderized beef, pinned beef) and in the production and preparation of
22injected mechanically tenderized beef. Tenderization is the process of treating whole
23muscle tissue by either a mechanical or chemical method to soften the beef tissues,
24primarily to enhance product quality. Mechanical tenderization uses blades, needles, or

25pounding devices (e.g., blade-tenderized beef, pinned beef) to soften the beef tissue.
26Other forms of tenderization use chemicals or enzymes and a mechanical processing step
27(e.g. scoring of the muscle and tumbling, needle tenderization).

28 Blade tenderized and other mechanically tenderized beef is a significant portion
29of the beef supplied to and used by the restaurant and food service industry. In 1975, it
30was estimated that over 90% of hotel, restaurant, and institutional (HRI) operations
31utilized blade tenderization (10) and in a 2003 survey conducted on behalf of the National
32Cattlemen’s Beef Association, 94% of manufactures indicated they used mechanical
33tenderization to improve product quality (13).

34 Regardless of why blade tenderization is utilized, mechanically tenderized beef is
35not required to be labeled by either the USDA’s Food Safety and Inspection Service or
36the Food and Drug Administration. While labeling may be seen as a value to inform a
37small proportion of consumers, labeling has never been documented as an effective way
38to appreciably affect consumer behavior broadly when it comes to cooking. All
39mechanically tenderized beef products, like all raw beef, must be labeled with “safe
40handling” instructions for consumers. Producers of beef injected with tenderizers or
41flavoring marinades are required to include the term “(solution or tenderizer) added (or
42injected)” on the principal display panel and to list the added ingredients on the
43ingredient statement of the label.

44 Scientific studies have shown a very low prevalence of *E. coli* O157:H7 on the
45surface of intact beef primals, ranging from 0.083 to 0.2% incidence (1). However,
46research has also demonstrated that when the product is mechanically tenderized, the
47blades or needles used in the mechanical process can transfer microorganisms from the

48surface of the beef to the interior (6, 7, 8, 10, 13). At high surface inoculation levels for
49*E. coli* O157:H7, after one-pass blade tenderization of beef only 3-4% of the initial
50inoculum was internalized into deeper parts/geometric center of the muscle (10, 13). In
51addition, in those studies that have quantified the surface inoculate (4 log CFU/g) versus
52those cells translocated after tenderization, very low levels of *E. coli* O157:H7 were
53transferred to the geometric center of the product; counts ranging from 0 to 0.83 CFU/g.
54This research indicates that adequate cooking temperatures targeted for the center of a
55product would effectively eliminate the levels of *E. coli* O157:H7 expected to be found in
56mechanically tenderized beef products. However, surface searing of a non-intact steak
57may not deliver enough lethality heat treatment to pathogens that may be present in the
58interior of the non-intact steak.

59 Guidelines for the production and handling of tenderized (mechanical or injected)
60meat at Federally Inspected meat processing facilities already exist. The meat processing
61guidelines are designed to prevent, eliminate or reduce contamination by *E. coli* O157:H7
62during the production, handling, and preparation of mechanically tenderized and injected
63beef. Recognizing that the guidelines for meat processors may not be applicable in retail
64and food service facilities, this document provides specific guidelines for the production
65and preparation of mechanically tenderized or injected beef that focus on measures to
66reduce the risk of contamination. A preventive control-based approach is reasonable
67given the expected low levels of contamination from *E. coli* O157:H7 in source materials
68and the current regulatory requirements on product labeling. Best practices should focus
69on controls that prevent the cross-contamination of source materials or product surfaces
70and minimize risks through application of an intervention prior to tenderization. In

71 addition, the use of some of these guidelines on the receipt and holding of blade
72 tenderized beef products from a manufacture assures the controls implemented in the
73 production of that product are maintained at the retail or food service establishment.

74 **Guidance for Retail Establishments That Only Repackage Beef For Sale**

75 Since mechanically tenderized beef is not required to be labeled differently from
76 intact beef, the retail establishment may not be able to distinguish mechanically
77 tenderized beef from intact beef cuts. Therefore, retail establishments should use a
78 preventive control approach in the repackaging process and set up purchase specifications
79 with their suppliers.

80 Purchase specifications should require a continuing letter of guarantee from the
81 supplier that:

- 82 1. Assures the beef product they purchase is inspected and passed according to the
83 Meat Inspection Act.
- 84 2. Includes a provision indicating that the product was produced following a food
85 safety preventive control program (e.g. HACCP) in which *E. coli* O157:H7 is
86 identified as a hazard likely to occur and that has a control step to eliminate the
87 hazard or reduce it to an acceptable level.

88 In addition to purchase requirements, the retail establishment should have in place
89 control measures to reduce the risk of cross-contamination with *E. coli* O157:H7 and the
90 proliferation of the organism in the packaging process. These controls include product
91 temperature control, sanitation, and product control.

92

93

- 94 1. Product Temperature Control – To limit proliferation of *E. coli* O157:
- 95 a. Verify temperature of refrigerated beef at delivery is 41°F or less [Food
- 96 Code 3- 202.11(A)]
- 97 b. Control cold holding temperature of product from delivery to sale by
- 98 refrigerating immediately at 41°F or less [Food Code 3-501.16(A)(2)]
- 99 Maintain frozen products prior to processing at a frozen state [Food Code
- 100 3-501.11]. Temper, thaw or slack frozen beef appropriately so product
- 101 does not exceed the minimum growth temperatures for *E. coli* O157:H7
- 102 (less than 44.6 °F). [Food Code 3-501.12]
- 103 c. Maintain temperature control in the processing and storage areas such that
- 104 the product being processed does not exceed the minimum growth
- 105 temperature for *E. coli* O157:H7 (less than 44.6 °F)
- 106 d. Rotate product on first in-first out (FIFO) or first expired first out (FEFO)
- 107 basis as a good retail practice.
- 108 e. Verify temperature of beef in retail case/display is 41°F or less [Food
- 109 Code 3- 202.11(A)].
- 110 2. Sanitation Program – A system for monitoring the completeness and effectiveness
- 111 of the sanitation procedures.
- 112 a. Should be a written document that is designed to ensure sanitary
- 113 conditions both before and during operations
- 114 b. Should describe procedures for employee hygiene or these procedures
- 115 should be described in a separate program [Food Code Chapter 2

116 Management and Personnel; FDA Employee Health and Personal Hygiene
117 Handbook]

118 c. Should include proper cleaning and sanitizing procedures that describe the
119 procedure for equipment breakdown to ensure effective and thorough
120 cleaning and sanitizing [Food Code Chapter 4, Parts 4-6 and 4-7].

121 d. Verify effectiveness of the sanitizing procedures

122 e. Prevent cross-contamination [Food Code Chapter 3, Part 3-3]

123 f. Make the sanitation program available to appropriate employees
124 responsible for managing or implementing these programs

125 g. Train all employees responsible for the sanitation procedures

126 3. Employee Health

127 a. A written employee health policy is recommended to be in place to
128 exclude ill food workers from the establishment. [Food Code Annex 3,
129 Part 2-2 Employee Health]

130 4. Product Traceability

131 a. Code the product and maintain sufficient documentation to allow trace
132 back for a time period to include any potential frozen storage that may
133 occur prior to consumption of the finished product.

134 5. Labeling

135 a. For beef products that are injected, identify any added marinade,
136 antimicrobial ingredient, flavoring or tenderizers in the ingredient
137 statement [Food Code 3-602.11]. Antimicrobial agents approved as

138 processing aides are exempted from labeling requirements (21 CFR §
139 101.100).

140 b. Provide required labeling for safe handling/cooking instructions [Food
141 Code 3-201.11(F)].

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143 **Guidance for Retail and Food Service Establishments That Tenderize or Inject Beef**

144 Retail and Food Service establishments that mechanically tenderize or inject meat
145 products should apply measures to reduce the risk of contamination with *E. coli* O157:H7
146 and other pathogens during the processing of the product and particularly in the
147 mechanical tenderization or injection step of the process. These preventive controls
148 include, but are not limited to, product temperature control, sanitation, and product
149 traceability, labeling, and interventions. It is recommended that retail and food service
150 operations develop a specific written plan, such as a risk-based or HACCP plan to define
151 their preventive controls. Only employees trained to implement these procedures in
152 accordance with the written plan should be permitted to tenderize or inject beef products.
153 Procedures for tenderizing and injecting meat should include:

154 1. Product and Solution Temperature Controls to limit proliferation of *E. coli* O157:

155 a. Verify temperature of beef at delivery is 41°F or less [Food Code 3-
156 202.11(A)]

157 b. Control cold holding temperature of product from delivery to sale by
158 refrigerating immediately at 41°F or less [Food Code 3-501.16(A)(2)].

159 Maintain frozen products prior to processing at a frozen state. Temper,
160 thaw or slack frozen beef appropriately so product does not exceed the

- 161 minimum growth temperatures for *E. coli* O157:H7 (less than 44.6 °F)
162 [Food Code 3-501.12]
- 163 c. Maintain temperature control in the processing and storage areas such that
164 the product being processed does not exceed the minimum growth
165 temperature for *E. coli* O157:H7 (less than 44.6 °F) [Food Code 3-501.12]
- 166 d. Maintain the time and temperature relationship on all re-used or re-
167 circulated injected fluids or marinade so that they do not allow the
168 outgrowth of *E. coli* O157:H7 [Food Code 3-501.16(A)(2)].
- 169 e. Rotate product on first in-first out (FIFO) or first expired first out (FEFO)
170 basis as a good retail practice.
- 171 f. Verify temperature of beef at in retail case/display is 41°F or less [Food
172 Code 3- 501.16(A)(2)]
- 173 2. Sanitation Program – A system for monitoring the completeness and effectiveness
174 of the sanitation procedures.
- 175 a. Should be a written document that is designed to ensure sanitary
176 conditions both before and during operations.
- 177 b. Should describe procedures for employee hygiene or these procedures
178 should be described in a separate program [Food Code Chapter 2
179 Management and Personnel; FDA Employee Health and Personal Hygiene
180 Handbook].
- 181 c. Should include specific procedures for proper cleaning and sanitizing that
182 include the procedures for equipment breakdown to ensure effective and

183 thorough cleaning and sanitizing [Food Code Chapter 4, Parts 4-6 and 4-
184 7].

185 d. Should include specific procedures for the disassembly, cleaning and
186 sanitizing of the equipment used for the mechanical tenderization or
187 injection process. These procedures are outlined below:

188 i. Cleaning and sanitizing of equipment before operation and during
189 operation, especially reservoirs, and piping associated with
190 mechanical tenderizing/flavoring operations.

191 ii. Cleaning and sanitizing procedures for blades or needles that
192 include frequency of procedures, and methods and chemical
193 concentrations used.

194 e. Verify effectiveness of the sanitizing procedures

195 f. Prevent cross-contamination [Food Code Chapter 3, Part 3-3]

196 g. Make the sanitation program available to appropriate employees
197 responsible for managing or implementing these programs

198 h. Train all employees responsible for the sanitation procedures

199 3. Employee Health

200 a. A written employee health policy is recommended to be in place to
201 exclude ill food workers from the establishment [Food Code Annex 3, Part
202 2-2 Employee Health].

203 4. Product Control

204 a. Code the product and provide sufficient documentation to allow trace back
205 if necessary.

206 b. Develop purchase specifications for the suppliers to ensure that the beef to
207 be tenderized or injected has been tested negative for *E. coli* O157:H7
208 using N=60 sampling methodology.

209 c. Consider the use of approved antimicrobial agents as a surface treatment
210 prior to tenderization/injecting and/or an antimicrobial agent (e.g., lactic
211 acid) in the solution injected into the beef. A list of Safe and Suitable
212 Antimicrobial Agents Used in the Production of Meat and Poultry
213 Products is available from FSIS [FSIS Directive 7120.1;
214 [http://www.fsis.usda.gov/Regulations_&_Policies/7000_Series-](http://www.fsis.usda.gov/Regulations_&_Policies/7000_Series-Processed_Products/index.asp)
215 [Processed_Products/index.asp](http://www.fsis.usda.gov/Regulations_&_Policies/7000_Series-Processed_Products/index.asp)

216 5. Labeling

217 a. For beef products that are injected, identify any added marinade,
218 antimicrobial ingredient, flavoring or tenderizers in the ingredient
219 statement. Antimicrobial agents approved as processing aides are
220 exempted from labeling requirements (21 CFR § 101.100).

221 b. Provide required labeling for safe handling/cooking instructions.

222

223 **For Retail or Food Service Establishments That Cook or Thermally-Process** 224 **Mechanically Tenderized or Injected Beef Steaks**

225 Injected and other mechanically tenderized beef products are considered non-
226 intact products. Time and temperatures for cooking non-intact products differ from those
227 for cooking intact products [Food Code 3-401.11(A)(2), (C) and (D)]. Intact steaks may
228 have contamination on the cut surfaces, and therefore cooking both the top and bottom to

229a surface temperature of 63°C (145°F) or above can inactivate pathogens on the surface.
230However, mechanically tenderized or injected steaks could have contamination below the
231surface, where the needles, blades or pins penetrate and therefore need more rigorous
232cooking.

233 The final internal temperature that must be achieved for blade-tenderized steaks,
234comminuted beef and injected beef, which are all considered non-intact, is 155°F (68°C)
235for 15 seconds or other times and temperatures combinations listed in Section 3-
236401.11(A)(2) of the Food Code. When a retail or food service establishment knows that
237meat is non-intact, they should follow these cooking procedures. Those establishments
238that cook these products at a lower internal temperature, e.g., as requested by the
239consumer, must provide a consumer advisory with a disclosure and reminder [Food Code
2403-603.11]. However, this alternative may not be used by food establishments that serve
241highly susceptible populations, such as nursing homes, hospitals, schools or daycare
242facilities [Food Code 3-801.11(C)]. Additionally, the Food Code [3-401.11(D)(2)] does
243not allow under-cooked comminuted meat to be served off a children's menu. A whole-
244muscle, intact steak as identified by labeling or letter of guarantee may be served or
245offered for sale in a ready-to-eat form by cooking to a surface temperature of 145°F
246(63°C) or above and a cooked color change is achieved on all external surfaces[Food
247Code 3-401.11(C)(3)]. It is best to always use a calibrated thermometer to ensure that
248correct temperature is achieved during cooking.

249 This guidance on cooking of mechanically tenderized beef is applicable to beef
250with ingredients added to induce tenderization, such as injected beef [as defined in Food

251Code 1-201.10(B)]. The guidelines provided above for cooking of mechanically
252tenderized beef also apply to injected/tenderized beef.

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