VTEC – “A shared responsibility”

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FSAI
Why are VTEC Important?

The USDA dispatched a "SWAT team" plant in Columbus, Nebraska Sunday plant Thursday.
The implementation of Food Safety Management Systems in Beef and Lamb Slaughter Plants based on HACCP Principles
Scientific Committee Report 2nd edition

2nd Edition 2010

Still “A shared responsibility”

Primary Producers; Processors; retailers; consumers; AND Regulators

http://www.fsaie.ie/resources_publications.html
Whole Chain Approach

1. Introduction to VTEC & it’s Controls

2. Farm Environment

3. Animal Slaughter & Raw Meats

4. Food Processing, Distribution, Retail & Catering

5. Members of the Public & Vulnerable Groups

6. Public Health Management

7. Recommendations for the Control of VTEC throughout the Food Chain
Clean Livestock Policy - FSA

“Clean”

“Dry”

Clean Livestock – Categorisation of Cattle Cleanliness

The pictures in this leaflet are taken from the ‘Clean Beef Cattle for Slaughter’ guidance booklet and are examples of animals assessed on the farm as being in category 2 (acceptable for slaughter) and 3 (unacceptable for slaughter).

Category 2 – Slightly Dirty
Cattle in this category will be accepted for slaughter without any special treatment.

Category 3 – Dirty
Animals in category 3 and above are unable to proceed for normal slaughter.
But ... Life’s not always perfect
Food Law?
The Law – Regulators / Legislators

**Farmer Responsibility** - Reg 852

*as far as possible* to ensure the cleanliness of animals going to slaughter and (...),

**Slaughterhouse Requirements** - Reg 853 (COMM Guidance)

Food business operators operating slaughterhouses in which domestic ungulates are slaughtered must ensure compliance with the following requirements - 4. **Animals must be clean.**

**CA Requirements** - Reg 854

The official veterinarian is to verify compliance with the food business operator's duty under Regulation (EC) No 853/2004 to ensure that animals that have such hide, skin or fleece conditions that there is an **unacceptable risk of contamination** of the meat during slaughter are not slaughtered for human consumption unless they are cleaned beforehand.
Section 3 Animal Slaughter & Raw Meats

3.7.2 Slaughter & Dressing

**Suitability for Hygienic Dressing**
Clean & DRY *(Clean Livestock Policy)*

Hide Removal – prevent contamination

Evisceration – nicking Rumen -> Leakage

Clean **Carcase** Policy

Carcase defect scoring System = Objective Score
- FBO
- OVs
- Audits
2. In addition to the general requirements of Article 4(5) concerning audits of HACCP-based principles, the official veterinarian is to check that the operators' procedures guarantee, to the extent possible, that meat:

(a) (...)
(b) does not bear faecal or other contamination;

Meat is to be declared unfit for human consumption if it:
(s) shows soiling, faecal or other contamination;
Zero Tolerance ≠ Zero Presence
### AQIS Carcase Defect

(Rec. # 5)

#### Classification of Carcase Defects

<table>
<thead>
<tr>
<th>Defect</th>
<th>Minor</th>
<th>Major</th>
<th>Conc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feces, Milk, Ingezza, Urine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brains, Blood Clots</td>
<td>2 - 5 cm (GD)</td>
<td>&gt; 5 cm (GD)</td>
<td>2 cm (H)</td>
</tr>
<tr>
<td>Seed</td>
<td>5 - 10</td>
<td>11 - 20</td>
<td>&gt; 20</td>
</tr>
<tr>
<td>R有名, etc.</td>
<td>W 5 cm diam</td>
<td>1 - 2 cm diam</td>
<td>&gt; 2 cm diam</td>
</tr>
<tr>
<td>Hair &amp; Wood Streaks</td>
<td>5 - 10 strands</td>
<td>11 - 20 strands</td>
<td>&gt; 20 strands</td>
</tr>
<tr>
<td>Hair &amp; Wood Clusters, &amp; Hair, wool, coarse</td>
<td>2 clusters</td>
<td>&gt; 3 clusters</td>
<td>&gt; 3 clusters</td>
</tr>
<tr>
<td>Foreign Objects</td>
<td>1 incidence</td>
<td>2 incidence</td>
<td>&gt; 5 incidence</td>
</tr>
<tr>
<td>Pathology</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Appendix 11 Carcase Defect Recording Sheet

- Date
- Inspector
- Defect Categories
  - Wool
  - Seed
  - Foreign Objects

#### Defect Scores

<table>
<thead>
<tr>
<th>Common</th>
<th>Minor</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Defect Rating</td>
<td>Acceptable</td>
<td>Marginal</td>
</tr>
</tbody>
</table>

#### Wool Fallout

- Wool
  - Wool (20)
  - Wool (10)
  - Wool (5)
  - Wool (1)

#### Seed

- Seed
  - Seed (2)
  - Seed (1)

#### Foreign Objects

- Foreign Objects
  - Foreign Objects (5)
  - Foreign Objects (10)
  - Foreign Objects (15)

#### General Notes

1. Removed elder damage are evidence of milk contamination.
2. For a defect to be rated as a zero tolerance defect it must be visible to the eye in tissues, ingesta, urine or milk.
3. Hair attached to hair: seen bundles can only be scored in wool.
4. Wool segments, including cotton, are seen to have distinct, clearly defined silver tips.
5. Ovine animals deposited on the slaughter floor should be removed from the area, the oblique search in the boning room is accepted as a limit.

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Some Good News

Irish survey of emerging VTECs

This is the first survey of its kind to assess the prevalence of emerging verocytotoxigenic Escherichia coli (VTECs) in Irish farms and abattoirs - O2, O63, O148, O149, O174, O26 and O113. On the farms, four of these emerging VTECs were detected and in the abattoirs one of the targeted emerging VTECs were found. Studies on their virulence, antibiotic resistance and adherence to human intestinal cells were also carried out which are important in assessing their risk to the public. Project code: F3958. Final update.

Infections by verocytotoxigenic Escherichia coli (VTEC) may result in bloody diarrhea and in some cases death. The elderly, children and immunocompromised are particularly vulnerable. Cattle are considered to be one of the main sources of E.coli O157:H7 and infections are often associated with eating undercooked hamburgers. E.coli O157:H7 is carried large quantities as well as isolated sporadically, and the incidence is increasing year on year.

However, other types of VTEC are emerging which may be of equal concern in the future, they are O2, O63, O148, O149, O174, O26 and O113. The main characteristic associated with VTEC is its ability to produce verotoxins, which are secreted in a bacterial exotoxin. The plasmid has the ability to move easily and incorporate in DNA into the bacterial DNA. Researchers at Teagasc Food Research Centre Athenry, and Galway College of Commerce have completed a study which investigated the incidence of these emerging VTECs. They also assessed their virulence, resistance to antibiotics and ability to infect consumers.

Methodology developed

The team developed a method for culturing non-O157 VTEC from soil, bovine feces, hide and carcasses samples. They also developed real-time PCR assays to isolate emerging non-O157 VTEC serogroups (O2, O63, O148, O149, O174 and O26). These methods will be used by industry, the food safety regulatory function and food safety research personnel to isolate and detect non-O157 VTEC serogroups (O2, O63, O148, O149, O174 and O26) from different samples. They will also be used by the Public Health Laboratory in Dublin and in other similar work.

The emerging VTEC survey

The research team visited 30 farms and nine abattoirs and collected samples of feed, soil, carcasses and hides for analysis.

- Farm

Soil and feed samples were collected six months after a year from both dairy and beef farms. Of the 1300 samples tested, 4% tested positive for emerging VTEC. Fluids were the most common source containing 31% of all emerging VTECs, followed by 15% in the soil.

As expected, VTEC was predominantly found in feed and soil samples during the warmer months (May – October) and at lower levels during the colder months of the year (November).

- Abattoirs

Three Irish beef abattoirs were sampled six times each and 25 hide and carcass (whole carcass) samples were analysed per visit. Therefore, 450 hide and carcass samples were analysed for VTEC during the course of the study. Forty VTEC isolates were cultured from hide and carcass samples, with the majority isolated from the hides (87.5%).

One of the seven targeted VTEC serogroups (O26) was cultured from hide and carcass samples. VTEC O2, O63, O148, O149 and O174 were not detected from any of the abattoir samples.

A broad range of different VTEC serotypes were detected in Irish abattoirs. The most predominant serogroup discovered was O128 (35%) followed by O113 (15%); O5, O168, O136, and O138 (7.5%); ONT, O26, O13, O150, O33 and O55 (2.5%).

Unlike the farm study there was no seasonal peak observed in the abattoirs.

The team also assessed the virulence potential of each isolate found in the farms and abattoirs. A minority were of potential risk to consumers.

For more information on food research contact RELAY.
T: 015-12011, F: 015-22099, Email: info@relay.teagasc.ie
**“HACCP-based Procedures”**

Table 4: Examples of Decision Making Process in Determining Critical Control Points at Selected Steps in Beef Slaughter

<table>
<thead>
<tr>
<th>Process Step</th>
<th>Potential hazard introduced or enhanced at this step</th>
<th>Is the potential food safety hazard significant?</th>
<th>Justification for decision</th>
<th>What control measures can be applied to prevent the significant hazards?</th>
<th>Is this step a critical control point (CCP)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hide removal:</td>
<td>1. Fat lag; 2. Fat removal 3. Hair removal 4. Decontaminating foot drowning 5. Evisceration</td>
<td>Yes</td>
<td>Hide contamination is a known source of pathogens. Additionally, there is no scientific evidence to show that sanitary hides removal procedures control pathogens.</td>
<td>Work instruction in Standard Operating Procedure details; - Specific sanitary procedures for all tasks (eg. open air to open hair); - Sanitation practices for hands, equipment and protective clothing between processes and when contaminated (eg. using two hand technique); - procedures for identifying sources visually contaminated. All workers undertaking this process step are fully trained in all procedures in the Work instruction and experienced in its performance.</td>
<td>No [This step may be a CCP in some (HACCP Plan)]</td>
</tr>
<tr>
<td>Evisceration:</td>
<td>1. Wounded pig; 2. Bulb split; 3. Excludes unwound hanging; 4. Hair removal; 5. Gastrointestinal (GI) tract removal; 6. Pluck removal; 7. Liver removal</td>
<td>Yes</td>
<td>Contents of the gastrointestinal (GI) tract are potential source of animals pathogens; however, sanitary handling procedures should address contamination at this point.</td>
<td>Work instruction in Standard Operating Procedure details; - Specific sanitary procedures for all tasks (eg. open air to open hair); - Sanitation practices for hands, equipment and protective clothing between processes and when contaminated (eg. using two hand technique); - procedures for identifying sources visually contaminated. All workers undertaking this process step are fully trained in all procedures in the Work instruction and experienced in its performance.</td>
<td>No [This step may be a CCP in some (HACCP Plan)]</td>
</tr>
<tr>
<td>Chill</td>
<td>1. Undercuts; 2. Roll out; 3. Condensation; 4. Salmonella serotypes E coli</td>
<td>No or yes</td>
<td>Preventive maintenance and Training ECPs to prevent contamination. Control programs to eliminate contamination.</td>
<td>Proper chilling in an appropriate temperature period to reduce likelihood of pathogen growth.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

For illustrative purposes only.

Refrigeration (Rec. # 6)

Carcase Surface Temperature < 7°C within 12 hours

EU - Deep temp < +7°C before cutting

Rise at end of cycle

When the chiller air temperature is allowed to drift up to (say) 11.5°C, there will be a slight softening of the fat allowing for easier boning. The particular chilling profile (blue line) shown in Figure 4 still results in an RI near zero at aW 0.993. If the RI calculation could use an aW of around 0.985 (a more likely aW in many carcass chillers at this stage of the cycle), the temperature rise in Figure 4 could reach 15°C or higher over 25 h before an RI approaching 1.0 will be recorded.

Figure 4: Brisket surface temperature when air temperature is allowed to rise towards end of chilling cycle
Refrigeration

Risk assessment on E. coli O157:H7 in minced beef

A national quantitative risk assessment was conducted for E. coli O157:H7 in Irish beef. The study revealed that this pathogen occurs at a low prevalence (2.8%) but at highly variable concentrations (1-10,000cfu/g) in Irish minced beef. The predicted risk of illness was low (0.002-0.007). An estimated 21 cases of infection were expected in a population of 1 million people.

Between 2002 and 2005, 21 cases of E. coli O157:H7 infection were reported in the Republic of Ireland. These cases were confirmed and enterohemorrhagic E. coli (EHEC) strains were isolated from the infected individuals. However, these cases are likely to be an underestimate of the true incidence of disease. The estimated risk of infection from consuming E. coli O157:H7 contaminated minced beef is 0.003 per 100,000 population.

Mincing and coating the minced meat with salt, on ice or in brine, reduced E. coli O157:H7 levels. A series of small-scale trials were conducted to test the effectiveness of these processes. The results showed that mincing meat and coating it with salt, on ice or in brine, reduced E. coli O157:H7 levels by 1.5 log units.

Minced beef/burgers should be stored at 5°C or lower. Temperature abuse during storage can lead to the growth of E. coli O157:H7 and consequently an increase in the numbers of pathogens and risk of infection.
Domestic Fridge

Recommendations Specific to State/Public Bodies and Food Equipment Manufacturers

1. The public sale of raw milk intended for human consumption in the raw state, originating from cattle, sheep or goats, should be prohibited.

2. The delivery of focused public awareness programmes on food hygiene and safe food handling practices should be a priority. The programmes should focus on general food safety measures that are relevant to VTEC as well as other foodborne infections rather than emphasise any specific foodborne pathogenic microorganisms.

3. General food hygiene education in the school curriculum should be expanded to reach all students in the primary and secondary sectors.

4. Planning authorities should continue to pay particular attention to the location of septic tanks in relation to private wells in accordance with the guidance in the EPA Code of Practice on Wastewater Treatment and Disposal Systems Serving Single Houses.

5. When designing new fridges manufacturers of domestic fridges should be encouraged to install non-mercury thermometers which would enable members of the public to monitor the actual temperature at which their food is being stored.
Available Technology

Steam Carcase Pasteurisation

HPP