

Industry Approaches to Control *Salmonella* in Poultry in Farm to Fork Production



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Regulatory

- ▲ The EC directive no. 2073/2005 sets the process hygiene standard for salmonella, for broiler and turkey carcasses cooled at the abattoir. The purpose of this standard is to control the contamination of poultry carcasses with faeces from contaminated flocks, or resulting from cross-contamination at the abattoir.
- ▲ Since 1st December 2011, fresh poultry meat (*Gallus gallus*, laying hens, broilers and animals coming from breeding and slaughter turkey flocks) must meet the microbiological standard of *Salmonella Typhimurium* and *Salmonella Enteritidis* absent in 25 g.



Poultry-house / Poultry loading

- ◆ Pre-slaughter fasting

Purpose

- ◆ Minimizing of contamination with pathogenic bacteria present in crop and gastrointestinal tract during evisceration.



Shipping to the abattoir

- ◆ Characteristics of transportation means
 - construction allows cleaning and disinfection
 - high resistance to corrosion
- ◆ Transportation hygiene:
 - cleaning of cages and containers
 - cleaning of trucks (platforms, wheels)
 - separation of clean and dirty zones in the unloading area
 - examination of livestock transportation hygiene process
 - organoleptic and microbiological evaluation
- ◆ Facilitation of inspections
- ◆ Stress
- ◆ Ventilation

Electrical stunning by immersion

- ◆ Incorrect stunning parameters paired with incorrect construction of stunning equipment infect the poultry with contaminated water from the stunning device.

Cutting and bleeding

- ◆ Hygiene status of slaughter knives and other cutting equipment
- ◆ Bleeding time

Too short – scald water contamination with blood

Too long – removal of feathers at the first symptoms of rigor mortis, possibility of contamination through damaged skin

Scalding

- ◆ Scalding hygiene – availability during the cleaning process, presence of mineral and organic scale on heating elements
- ◆ Temperature: 52° C - 68° C
- ◆ Initial phase – increase in the number of microorganisms entering the water, coming from feathers, skin, cloaca, residues of faecal matter
- ◆ The number of microorganisms in the scalding water increases during the first production hours, reaches a determined high level after ca. 6 hours and remains at this level until the end of production day.

Scalding (cont.)

- ◆ Total viable count of aerobic microorganisms (TVC) – ca. 10^6 – constant level.
- ◆ The scalding process leads to the removal of skin epithelium together with microorganisms inhabiting the corneous layer of the skin.
- ◆ The exposed dermis provides a new surface to be inhabited by microorganisms; therefore contamination with new species of bacteria occurs

Removal of feathers – plucking

- ◆ It is performed mechanically, using rotating rubber fingers of mechanical plucking machines.
- ◆ The rubber parts („fingers”) rub the microorganisms present on the skin onto the entire surface of the carcass.
- ◆ Condition of plucking machine fingers – brittle, crumbling, cracking – how to clean them?
- ◆ Plucking machines are almost completely devoid of smooth surfaces.
- ◆ Finger replacement generates high costs at the abattoir.
- ◆ Selection of proper cleaning technology – cost reduction, process hygiene improvement.

Cutting off the claws

- ◆ Claws are a potential source of cross-contamination with Salmonella.
- ◆ Location of water showers during the entire poultry carcass production process.
- ◆ Introduction of claws into the evisceration area.

Evisceration

- ◆ It is the main source of poultry carcass contamination with intestinal bacteria, especially when damaging of intestines occurs.
- ◆ During the process an increase of microbiological contamination may occur – *Salmonella*, *Campylobacter*, *Clostridium Perfringens*.
- ◆ **Mechanical** – water sprayed at the correct angle and pressure guarantees the removal of soil from the „eviscerating spoon”.
- ◆ **Manual** – using a „bung cropper” – constant water flow and rinsing of the device influences process hygiene.

Cooling

- ◆ The purpose of cooling is to lower the temperature of the carcasses, which results in the inhibition of the development of microflora.
- ◆ Cooling should be performed quickly, in order to minimize carcass weight loss.
- ◆ The amount of absorbed water influences the microbiological quality of the meat (safety) and has a direct influence on its expiration date.
- ◆ It also influences post-slaughter efficiency – the more water is „squeezed” into the meat, the higher the profit.



Cooling (cont.)

- ◆ Absorbing too much water during the cooling process results in its loss during subsequent processes – tariff classification, portioning and packing.
- ◆ It is a part of so-called “post-slaughter loss”, which means a loss for the company.
- ◆ Such water leaks to the floor, conveyor belts, equipment, and to the hands of employees, resulting in cross-contamination and microorganism proliferation.
- ◆ Sanitary status of cooling premises is one of the key factors influencing the safety of poultry meat.

Critical factors of slaughter process hygiene

- ◆ Pre-slaughter fast period
- ◆ Shipment of birds in insufficiently cleaned transportation cages
- ◆ Electrical stunning by immersion in water
- ◆ Scalding in contaminated water
- ◆ Removal of feathers with contaminated plucking fingers
- ◆ Evisceration with contaminated elements of automatic eviscerating equipment
- ◆ Other contaminated post-slaughter processing equipment
- ◆ Carcass cooling process
- ◆ Multiple processes within one slaughter line
– rehangng of carcasses



Thank you for your attention !

