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Lecture 7: Poultry Slaughter and Inspection

Legislation provides for the humane slaughter and humane pre-slaughter treatment of poultry. It requires that:-

‘no turkey, domestic fowl, guinea fowl, duck or goose shall be slaughtered unless it is slaughtered instantaneously by means of decapitation or isolation of the neck or some other method approved by the Ministers, or it is, by stunning effected by means of an instrument of a kind approved by them and in proper repair, instantaneously rendered insensible to pain until death supervenes.’ The Jewish and Muslim methods, i.e. ritual, are exempt in the legislation.

Typical processes

The majority of birds are killed and dressed at poultry packing stations. The following is a typical process.

Unloading bay

The transport vehicles reverse into the bay, which is under cover. The birds, which are carried in either fixed or loose plastic crates, are unloaded and individually hung upside down by the feet on shackles suspended from a continuously moving line. The centers of the shackles are approximately 15 cm apart. Such a line can have a throughput of up to 8,000 birds per hour or 135 birds per minute. Ante-mortem inspection is carried out in this area. Crates are provided for birds rejected by the inspector. These are dealt with Separately.

Slaughter room

The birds enter the slaughter room through a small narrow opening and are stunned instantaneously. Before stunning a quietening time is allowed, i.e. the time between hanging and stunning, of not more than 6 minutes for turkeys and not more than 3 minutes for domestic fowls.

Various types of electrical stunners are used. The birds are stunned either by their heads coming into contact with a 500 volt electrified metal slope or wires or, more commonly, the birds' heads pass through a 150 volt electrically charged water bath.



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Recent research by various workers has shown that it is more humane to kill the birds in the stunner than just to stun them. Bleeding is not affected in any way.

Bleeding

About 30 seconds after passing through the stunners the birds are bled automatically or by an operator severing the jugular veins and carotid arteries at the base of the skull. The birds now pass along a bleeding tunnel for at least 2 minutes for turkeys and at least 90 seconds for domestic fowls.

This is to allow the birds to bleed before entering the scalding process. It is estimated that 50% of the blood is removed during this time.

Scalding

The birds, still suspended from the line, pass through the scald tank in which there is continuously changing water at 50–80°C, usually 53°C (soft scald) or 63°C (hard scald). The time in the scald should be no more than 2 minutes. This ensures that the skin will be untorn and unblemished. Higher times and temperatures result in torn and discoloured skins. The scalding loosens the feathers for the defeathering process. Sometimes detergents are added to the scald water. This helps penetration of the water to the feather follicles.

Defeathering

The birds pass into the DE feathering machines, which consist of revolving drums with rubber beaters or discs. The birds are continually flailed or scraped by these, while being sprayed with warm water. This process takes approximately 1 minute. Any feathers still remaining attached are removed by hand. Ducks are often further defeathered by a hot wax process which removes the finer feathers and down.

The first post-mortem inspection takes place in this area. Rejected birds are removed from the line. After plucking, the birds are washed by overhead sprays.

Neck slitting and foot removal

A vertical incision is made in the skin on the dorsal surface of the neck to assist in the removal of the crop, oesophagus and trachea at a later stage.



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The feet are removed automatically by a cutter on the line or by manually operated secateurs. The birds drop onto a conveyor that transfers them through a narrow opening from the 'dirty' section of the slaughterhouse into the 'clean' section.

Evisceration line

The birds are rehung by the hocks on the shackles of the evisceration line. The line is continuous from this transfer point right through to the washing and cooling tanks. The evisceration line runs above a water trough or a mechanical conveyor, which carries away waste materials. Various operations are carried out on this line:

(1) **Venting.** This is done by using a venting gun or scissors. In either method the vent is cut round so that it can be removed with the intestines from the carcass. Great care is needed in this important operation if faecal contamination of the carcass, edible offal and operators' hands is to be avoided.

(2) **Drawing.** All of the viscera are drawn out of the body cavity, leaving them hanging from the carcass ready for inspection. The drawing is done either by hand or by operators using eviscerating forks or by automatic eviscerating machines. At this point the inspectors examine the viscera, the body cavity and the carcass generally. Good lighting, directed into the body cavity, is essential.

(3) **Removal of offal.** The edible offal or giblets, i.e. the heart, liver and gizzard, are removed for further cleaning and washing. The intestines, proventriculus and lungs are discarded into the water trough or mechanical conveyor. On some lines a suction tube is then introduced into the body cavity to remove any contamination or portions of lungs remaining.

(4) **Head removal.** Various techniques are used, but the heads are generally removed mechanically by traction of a head puller on the line. This also removes the crop, oesophagus and trachea. An inspector or a quality control officer then examines the carcass generally, especially the body cavity.



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(5) Neck removal. The necks are removed by cutting through the vertebrae between the shoulders using automatic or manual secateurs. The necks are classified as part of the edible offal or giblets.

(6) Line washing. Before going into the washing and cooling tanks the birds are spray washed to remove blood and extraneous matter.

(7) Polyphosphate injection. When polyphosphates are used they are injected under pressure by guns with two hollow perforated needles. The solution is injected into the breast and sometimes also into the leg muscles. Up to 5% of the body weight of this permitted additive solution may be injected.

Washing

The birds are dropped automatically from the evisceration line into long spin washer tanks, which contain mains water at a temperature of 10–16°C. The birds enter at a body temperature of 36°C, remain in the washer for about 10 minutes and leave the washer at about 25°C, a reduction of 11°C. The birds are propelled along the tanks by revolving paddles. The water through the tanks may be with or against (contra-flow) the direction of the birds. Chlorination is used at a level of 50 ppm free chlorine, which almost completely kills bacteria in the tanks.

Chilling

The birds are transferred from the washer unit by an elevator into the long immersion chiller tank. This works on the same principle as the washer unit. Flake ice is dropped into the water in the chiller tank from overhead flake-ice machines. Some chillers are fed with refrigerated water. The birds remain in the chiller tank for 30–40 minutes and leave at a temperature of 2–4°C.

Draining

After chilling, the birds are hung by the hocks on an overhead conveyor or draining line for 10 minutes to lose any surplus water not sealed in or absorbed by the skin or muscle during washing and chilling.

Freezing

After draining, the birds are packed into polythene bags and frozen to a temperature of -18°C.



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Fresh-chilled birds

Instead of freezing, some birds are sold for the fresh trade. They are chilled in air chillers or by CO₂ to a surface temperature of 0 to -1°C (super chilled). Their temperature must not exceed 48°C.

Inspection of poultry

Where the line system of killing and dressing of poultry is in operation the inspection is divided as follows:

- (1) Ante-mortem inspection.
- (2) Post-mortem inspection:
 - (a) whole carcass inspection
 - (b) evisceration inspection
 - (c) final carcass inspection.

NB At all inspection points the lighting must be good and well directed (540 lux).

Ante-mortem inspection

When this has been carried out as a flock inspection at the place of origin by an official veterinary officer and within 24 hours of arrival at the slaughterhouse, only a further general check is necessary. If not, each bird is inspected on the line in the unloading bay. Adequate lighting is essential and at least 2 metres of line is required for the inspector.

Crates should be provided for birds rejected by the inspector, and containers for birds dead on arrival.

Post-mortem inspection

(1) Whole carcass inspection:

is carried out immediately after defeathering and before any other operation. Badly bled or emaciated birds and birds with septic wounds, etc. are taken off the line before they can pass through into the 'clean' section of the slaughterhouse.

(2) Evisceration inspection:

One inspector should be able to inspect 1200 broiler fowl per hour provided the health level of the birds is good. If a batch of birds shows a high incidence of disease, the line should be slowed down



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accordingly. Twelve hundred broilers are equivalent to 600 hens or 900 ducks or 600 turkeys, which are more difficult to inspect. In hens the larger ova are the first things to be taken out of the body cavity. Whole eggs are expressed out through the cloaca. These must remain identifiable with the carcass. Care has to be taken so that they are not broken. In ducks the livers are friable so more care has to be taken in removing the viscera. The partly eviscerated birds are inspected still with the viscera attached. This includes the intestines, gizzard, liver, spleen, heart, lungs and the ovary in hens. There are various techniques of inspection, but within the very limited time available for inspection of each bird, the viscera, body cavity (including the forward air sacs), legs and carcass must be examined.

(3) Final carcass inspection:

This takes place after the viscera have been removed and the body cavity has been washed. This may be done by a quality control officer. At the inspection points on the line there must be lighting of a proper intensity (540 lux) and properly directed. There must also be warm-water hand sprays, wash hand basins and knife sterilizers at appropriate points. It is important that good hygiene is maintained throughout the slaughterhouse regarding floors, walls, ceilings, plant, operators and operators' clothes.

Good Luck