Poultry slaughter processing technology – Part 1

Fig. 1

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Poultry industry

- the global market for poultry continuous to grow and
- chicken consumption is growing faster than other meat
- reason is the relatively low costs of production poultry than beef/pork
- the rapid growth rate of poultry,
- the high nutritional value of the meat
- good source of protein,
- low content of fat, with unsaturated fatty acids
- changing consumer preferences:
- on health (low in fat),
- social (convenient, fast food) grounds
- the introduction of many new processed products

Fig. 2

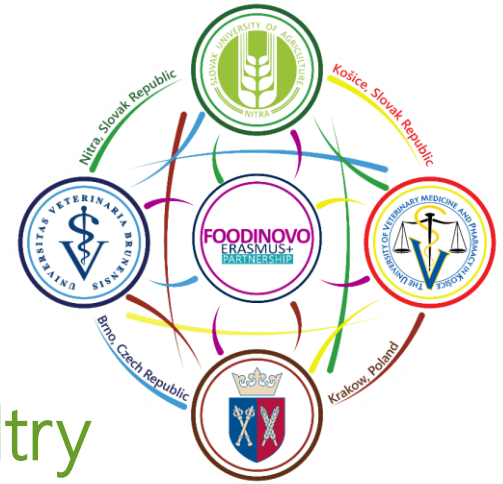
Poultry processing

- takes place in slaughterhouse
- by means of automated lines,
  with the respect to the technological requirements.

- on the basis of poultry type,
  suitable the poultry processing equipment is used.

Fig. 3

Poultry slaughterhouse



- An establishment used for slaughtering and dressing poultry and the meat of which is intended for human consumption

- the slaughtering circuit is divided into:
- the receiving/holding live birds and
- slaughtering sections which includes 3 plant circuits.

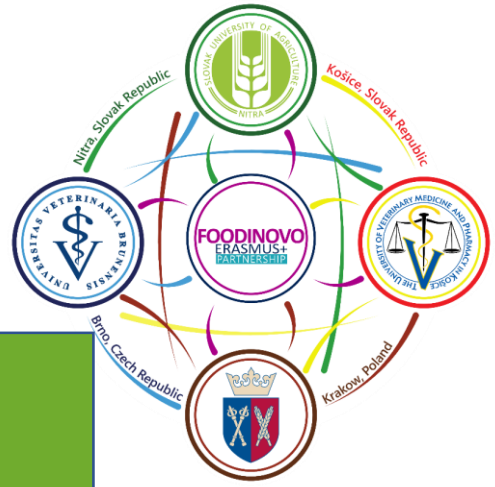
Receiving section of slaughtering

- It is zone for unloading broilers from cages
- on a conveyor belts and
- hanging poultry in shackles on a conveyor

- the empty crates given a thorough wash
- before being restacked either
- manually or automatically
- transport vehicles are wash before being loaded

Fig. 4

Slaughtering section



1. Stunning, Bleeding, Scalding, Plucking, Decapitation and removal of shanks

2. Evisceration, Cleaning and spray washing, Processing of giblets

3. Chilling, Cutting, Grading, Batching, Dressing, Wrapping and Labeling

Stunning

- is necessary to induce a lack of consciousness and sensibility
- of poultry before, or at same time as the birds are killed

Methods of stunning poultry:

- Electrical waterbath stunning method
- Controlled atmosphere stunning
-

Fig. 5

Electrical waterbath stunning method

- EWSM - the most commonly used and preferred method for poultry
- each piece of poultry receives the required minimum current
- the electrodes in the waterbath stunning equipment shall extend the full length of the waterbath
- necessary good contact between the limbs and the shackles of the line
- depth of water bath is according to the type of poultry the poultry
- heads should be completely immersed in the waterbath
- prevention overflow of water at the entrance of waterbath
- electrical waterbath shall be fitted with a device which displays
- and records the details of the electrical parameters

- the empty crates given a thorough wash before being restacked either manually or automatically,
- clean crates are stored separately from full c
- transport vehicles are wash before being loaded with clean crates for another run.

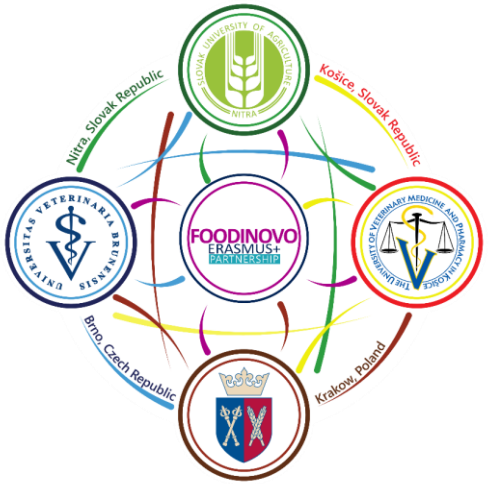
Requirements EWSM in different birds

Frequency (Hz)	Chickens	Turkeys	Ducks and Geese	Quails
< 200	100 mA	250 mA	130 mA	45 mA
200 to 400	150 mA	400 mA	Not permitted	
400 to 1 500	200 mA	400 mA	Not permitted	

- Birds shall be exposed to those current for et least 4 s.

Fig. 6

Controlled atmosphere stunning



- is humane way of stunning,
- an improvement from an animal welfare perspective,
- birds can be stunned without prior shackling,
- CO_2 or inert gases (Ar, N) or mixtures of these gases
- Poultry must be exposed for a gas sufficient period of time to ensure
- that her state of unconsciousness persists until her death.
- containers in which poultry are exposed to CO_2 are such that
- to prevent injury to poultry are equipped with equipment
- assuring the CO_2 concentration at the point of maximum exposure
- data on the display on the inside of the chamber are recorded

- the empty crates given a thorough wash be[illegible] restacked either manually or automatically
- clean crates are stored separately from full cra[illegible]

Controlled atmosphere stunning

- Advantages:

- improvement from an animal welfare perspective,
- birds can be stunned without prior shackling,
- better quality of poultry meat is ensured.
- blood spots and bone fractures hardly ever occur ,
- CO_2 - does not leave residues in the meat.

- Disadvantages:
- higher economic costs,
- increased demands on staff safety.

Fig. 7

- the empty crates given a thorough wash before being restacked either manually or automatically.
- clean crates are stored separately from full c
- transport vehicles are wash before being loaded with clean crates for another run.

Bleeding of poultry

- must be quickly as soon as possible after stunning,

- External cut – an external opening of the carotid vein and artery of the birds between the head and 1. cervical vertebra
- Internal cut – an internal opening of the carotid vein and artery
- The total bleeding last 2-3 min. Birds are dead after 1-2 min.
- Blood is stored and transported in *collecting tanks*.

Fig. 8

Scalding of poultry

- is the process of treating carcasses with hot water or steam
- loosen the feather from the follicle to aid their removal without damaging the skin.
- required time and temperature of the heat treatment are primarily determined by the need for efficient removal of the feathers

Methods of scalding:

- hot water scalding in water bath or shower bath
- steam scalding

Hot water scalding

- Types of hot water scalding are as follows:

- semi – scalding: 51-54 °C for 45-90s
- soft or low scalding: 50-60 °C for 30-70s
- hard or high scalding: 70-80 °C for 10-20s

- If too much heat is using, ruptures of the skin would occur,
- or the whole bird becomes reddish.

Fig. 9

Steam scalding

- used only for waterfowl
- it is more effective because higher temperature is used
- duck scalding – 85-90°C 90-130s
- geese 92-100 °C for 90-130s
- Before and after scalding, waterfowl must be dried
- means of a warm air stream at 70 °C for 90-120s.
- Waterfowl treated in this manner has fewer
- micro – organisms on skin surface.

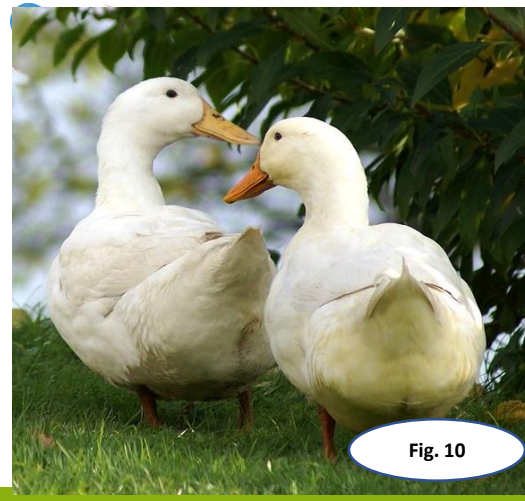


Fig. 10

Plucking of poultry

- must take place as fast as possible after scalding (up to 15-20 min)
- cooling of the birds would make the feather removal difficult.
- dry method (by hand): is only preferred in ostrich
- wet method – poultry plucking machine
- Carcasses are carried by conveyor line while hanging by the feet,
- through rubber – fingered picker which pull of the feathers from the skin.
- Rubber fingers are mounted on:
- the cylinder: cylindrical pickers or on the disk: disk pickers
- The problem: cross- contamination of the carcasses.
- The plucking machine are rather noisy, therefore scalding
- and plucking is performed in separate rooms.

Fig. 11

Decapitation and removal of shanks

- Decapitation is performed with the help of automatic rotary knife situated
- immediately after plucking
- Removal of shanks is the last operation in the first circuit of the slaughter area.
- Shanks can be removed by:
- knives, saws, manually operated shears or mechanized shares
- The automatic cut must be located as close to the heel joint as possible
- (1 cm below the joint)
- A cut, above or below – means lower quality, cause perforation
- of the plastic bag during packaging
- When legs are cut at the hock the birds are release from
- the shackles , fall down onto a conveyor belt,
- and must be re-hanging manually or with machine

Fig. 12

Evisceration

- remove organs from the cavity of bird
- by automatic evisceration equipment
- An evisceration line comprises of several machines, each performing a specific operation.
  Methods vary for different species of poultry and different plants.

- The carcasses:
- are hung by both hocks in a shackle
- with their back towards the centre of the machine:
- the position is called a two – point suspension

- Turkeys – *by both hocks as well as neck: three – point position*

Fig. 13

Evisceration

- machine comprising brackets or spoons, inserted in to the body of the poultry pulls the viscera (except of kidneys) out of the carcass.
- The viscera pack is moved into a pan of, a pan conveyor or
- rehanging to a separate viscera pack line.

- Cleaning of the carcasses with a drinking water,
- to clean *both external and internal surfaces*.
- The final carcass temperature after evisceration is of about 30 ºC
- must be reduced to no more than 4 ºC as soon as possible.

Fig. 14

Giblet processing

- The edible giblets: heart, neck, gizzard, liver, separated from the inedible
- by manual, semi – automatic or completely automated giblet processing,
- Liver: the gall bladder is removed from the liver.
- The gizzard: is cut open and emptied. The yellow horned membrane is removed.
- The heart: with or without the pericardial sac.
- The neck: with or without the skin.
- If the neck remains to the carcasses, it is not one of the giblets.
- A lung extractor unit can be used for the removal of the lungs and other parts of the viscera (kidneys).
- Giblets must be washed, chilled with cold water (max. 6 ° C) and moved to the

  Three independent packaging stations:

  1. Hearts and livers 2. Gizzards and 3. Necks
- and wrapped and labelled separately, or one – piece of each into a plastic bag
- then inserted into body cavity of the eviscerated chilled carcass and
- presented for sale as: Eviscerated poultry with giblets

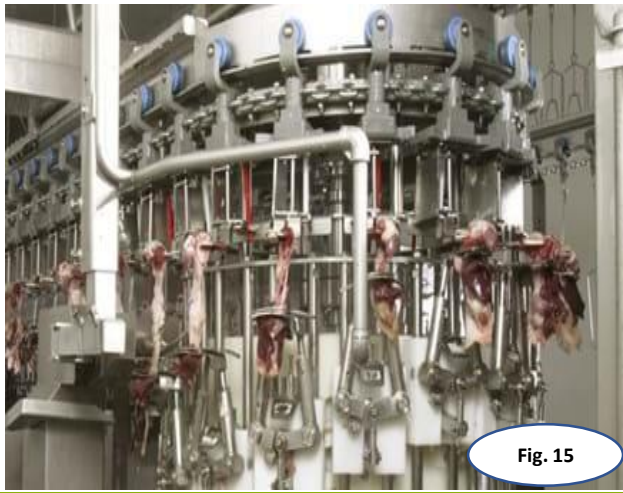


Fig. 15

Weighing and grading system

- Chilled birds can be hung manually on exit from a spin chiller or
- can be automatically transferred from an air chill conveyor.
- Birds are suspended by one leg from a plastic weighing shackle
- and are weighed on a special corner-wheel style weighstation.
- Depending upon the program entered into the control unit,
- birds are automatically unloaded by the release station.
- Grading systems
- are used to select birds for specific requirements depending
- upon required parameters of poultry meat.

Fig. 16

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