The ABC’s of Poultry

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General outline

• Poultry
• Poultry production
• Meat quality
• Creating wins
Poultry

USDA Definition

“Poultry means domesticated birds (chickens, turkeys, ducks, geese, Guineas, ratites, or squabs, also termed young pigeons from one to about thirty days of age), whether live or dead”
WANTED

To help us locate the whereabouts of Tom the Turkey
DEAD or ALIVE (roasting preferred)

Sometimes goes by the alias of MOT and SAMOHT
(That's Tom + Thomas spelled backwards)

He was last seen doing the turkey trot and suspiciously acting like he had lost his head.

He is accused of the following crimes:
Dressing in his birthday suit, Whipping the Tadders, Stuffing himself while stalking Kernal Corn, Losing his giblets, and putting Buns in Henny Penny's oven!

If you come to find him, please contact local authorities at ____________

His trial will be held Thanksgiving Day,

At _______ pm
Come feast or famine.

Please bring: ____________________________
Poultry

- Any kind of domesticated bird captive raised for its utility
- Kept by humans for food, utility products, or as pets
- Does not include wild birds hunted for sport or food (game)
- Wild fowl – Chicken, turkey, quail, squab, Guinea fowl, pheasant, and peafowl
- Waterfowl – Ducks, geese, and mute swan
- Chicken and turkey dominate US industrial production

<p>| Per capita consumption of poultry and livestock estimated 2014, in lbs |
|---------------------------------|---------------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|</p>
<table>
<thead>
<tr>
<th>BEEF</th>
<th>PORK</th>
<th>TOTAL RED MEAT</th>
<th>BROILERS</th>
<th>OTHER  CHICKEN</th>
<th>TOTAL CHICKEN</th>
<th>TURKEY</th>
<th>TOTAL POULTRY</th>
<th>TOTAL RED MEAT AND POULTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>53.8</td>
<td>45.9</td>
<td>100.9</td>
<td>82.7</td>
<td>0.8</td>
<td>83.5</td>
<td>15.6</td>
<td>99.1</td>
<td>200.6</td>
</tr>
</tbody>
</table>
Chickens

Male - rooster or cock
Female – hen
<1 yr male - cockerel
<1 yr female – pullet
Young - chick or peep
Castrated rooster – capon

- Raised primarily for meat and eggs
- Descended from Asian red jungle fowl
- Medium sized birds characterized by fleshy red combs and wattles on their heads
- Laying hens, broilers, roasters
Turkey

Male - tom or gobbler
Female - hen
Young male - jake
Young female - jenny
Young - poult

• Raised primarily for meat
• Descended from wild turkeys in the Americas
• Large spreading fan shaped tails and distinctive fleshy snood that hangs from the top of the beak
• “Turkey fowl”
Ducks

Male - drake
Female - duck
Young – duckling

- Raised primarily for meat, eggs, feathers (down)
- Descended from Mallard or Muscovy
- Medium sized aquatic birds with broad bills eyes on the side of the head, fairly long necks, short legs that are set far back on the body, and webbed feet
- Fois gras
- Funniest animal
Geese

Male - gander
Female - goose
Young – gosling

- Raised primarily for meat and feathers
- Large, thick necks upright posture, large bodies, broad rear ends
- Foie gras
Guinea fowl

Male - Guinea cock
Female - Guinea hen
Young male - Guinea cockerel
Young female - Guinea pullet
Young - keet

- Raised primarily for meat and feathers
- Native to sub-Saharan Africa
- Medium sized gray or speckled bird with a small naked colorful head
Ratites

Male – cock
Female – hen
Young – chick

- Raised primarily for meat, eggs, feather, hide, oil (emu)
- Large flightless birds with no keel sterna, underdeveloped flight muscles, almost absent wishbone, regressed tail and flight feathers, and no preen glands

Ostrich - African
Emu – Australian
Cassowary - New Guinea
Rhea - South America
Kiwi- New Zealand
Peafowl

Male - peacock
Female - peahen
Young – peachick

- Raise primarily for feathers
- Asiatic and African origin
- Male's extravagant eye-spotted tail feathers
Others

• Squab - young of domestic pigeons (squeaker)
• Quail
• Mute swan
• Pheasant
Bird phobias

Birds = Ornithophobia

Turkeys = Meleagrisphobia

Being watched by ducks (geese, swans) = Anatidaephobia
Common themes in good commercial practices for poultry

• Employee training for bird handling
• Zero tolerance policies around animal abuse
• Temperature and environmental management
• Food and water
• Proper application and monitoring of stun and kill steps
• On farm euthanasia
• Bird health
• People
National Chicken Council

- The national, non-profit trade association representing the U.S. chicken industry, based in Washington, D.C.

- A full-service trade association that promotes and protects the interests of the chicken industry and is the industry’s voice before Congress and federal agencies.

- NCC member companies include chicken producer/processors, poultry distributors, and allied industry firms

- Governance, public affairs, government relations, consumer education, industry promotion, and public communications

- http://www.nationalchickencouncil.org/
National Turkey Federation

- The non-profit national trade association based in Washington, D.C.
- Represents the turkey industry and its allies and affiliates
- Advocates for all segments of the turkey industry, providing services and conducting activities which increase demand for its members' products
- NTF represents its members before the U.S. Congress and the various regulatory agencies
- EatTurkey.com
NTF guidelines

Animal Care Best Management Practices for the Production of Turkeys

Slaughter Guidelines

Production Guidelines
Euthanasia Guidelines is a companion document for the Animal Care Guidelines for the Production of Turkeys

• Specifics
  – Why euthanasia is necessary
  – When euthanasia is appropriate
  – Methods of euthanasia
  – Training and documentation
  – Referenced to literature

• Differentiates between manual and mechanically assisted BFT
The goal of live production is for a farmer to produce a high quality bird using efficiently performed specific tasks in a healthy and economically viable manner.
US turkey is highly vertically integrated
Genetics

Generation 1

Pedigree flocks (pure lines) crossed to produce generation 2

Generation 2

Cross to produce generation 3

Generation 3

Male lines are selected for such meat traits, rate of growth, and feed efficiency

Female lines are selected for fertility, hatchability, and eggs

The selected male-line males are crossed with the selected female-line females

Market

Eggs are hatched and the chicks/poults are sold for the production of market birds
Eggs and chicks/poults

- Eggs are produced by breeding stock
- Chicks/poults distributed to growers who raise market birds
- Eggs must be of good quality and ensure hatching of healthy vigorous birds
- Egg incubation
  - Large forced air incubation system create a highly uniform environment
  - Sanitation keeps the environment free of disease causing microorganisms
- Chicks/poults are hatched, graded, typically sorted by sex, and shipped to farms
Production practices

• Farms
  – Food and nutrients
  – Clean water
  – Shelter from the elements
  – Protection from predators
  – Proper medical care

http://www.animalhandling.org/ht/d/sp/i/80622/pid/80622

AMI
AMERICAN MEAT INSTITUTE

Glass Walls...
Turkey production

http://www.animalhandling.org/ht/d/sp/i/80622/pid/80622
Managing young poultry

• Provide a clean and comfortable environment with proper feed, water, and air requirements

• Heaters and spacing

• Poult services
  – Birds should be vaccinated and given health care according to a prescribed schedule
  – Fulguration and toenail conditioning
  – Operators and equipment must be carefully trained and closely supervised
Managing older poultry

- Feed, water, and air requirements
- Environmental moisture (dust)
- Floor space (density)
- Most poultry houses are built to prevent sudden changes in house temperature
  - Live bird body temperature is 106.5
  - Looses heat to its environment except in extreme hot weather
  - Excess house moisture bad in cold temps
- Management of the ventilation system provides fresh air and aids in removing excess moisture and heat via fans, misters, and soft sides

There’s a App for that
Table 1.1. Types of Commercially Available Poultry and Their Average RTC<sup>a</sup> Weight.

<table>
<thead>
<tr>
<th>Type</th>
<th>Age (Weeks)</th>
<th>Weight RTC (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chickens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broiler or fryer</td>
<td>6–8</td>
<td>1.2–1.7</td>
</tr>
<tr>
<td>Roaster</td>
<td>8</td>
<td>3.0</td>
</tr>
<tr>
<td>Rock Cornish game</td>
<td>3–4</td>
<td>0.6</td>
</tr>
<tr>
<td>Hen/stewing fowl</td>
<td>&gt;52</td>
<td>1.1</td>
</tr>
<tr>
<td>Cock or mature rooster</td>
<td>&gt;30</td>
<td>2.2</td>
</tr>
<tr>
<td>Turkeys</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broiler hen</td>
<td>10</td>
<td>4.2</td>
</tr>
<tr>
<td>Young hen</td>
<td>16</td>
<td>7.0</td>
</tr>
<tr>
<td>Young tom</td>
<td>17–18</td>
<td>12.5</td>
</tr>
<tr>
<td>Spent breeder</td>
<td>&gt;52</td>
<td>11.0</td>
</tr>
<tr>
<td>Ducks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broiler or Fryer</td>
<td>7</td>
<td>2.5</td>
</tr>
<tr>
<td>Geese</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mature</td>
<td>12–16</td>
<td>5</td>
</tr>
<tr>
<td>Guineas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mature</td>
<td>12</td>
<td>1.5</td>
</tr>
<tr>
<td>Pigeons</td>
<td>4–5</td>
<td>0.4</td>
</tr>
<tr>
<td>Quail</td>
<td>7</td>
<td>0.15</td>
</tr>
<tr>
<td>Ratite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ostrich</td>
<td>40–55</td>
<td>55</td>
</tr>
<tr>
<td>Rhea</td>
<td>44–48</td>
<td>62</td>
</tr>
</tbody>
</table>

<sup>a</sup>RTC = Ready-to-cook weight (i.e., body weight excluding feathers, blood, digestive tract, head and feet).
Feeds and feeding

- Feeds are specially formulated for body maintenance, production of eggs and/or meat, and fertility/hatchability
- Ensures adequate intake of energy, protein, minerals, and vitamins
- Energy is mostly supplied by cereal grains supplemented with fats
- Protein requirements vary according to age, purpose, and must provide sufficient nutritional value
- Minor components
  - Vitamins: ADEK, thiamin, riboflavin, pantothenic acid, niacin, vitamin B6, choline, biotin, folacin, vitamin B12
  - Minerals: Calcium, phosphorus, magnesium, manganese, iron, copper, zinc, iodine
Use of captive bolt for on-farm euthanasia of turkeys

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Abstract 138

In order to promote consistency of application, this instructional poster details the proper procedures that must be followed for humane euthanasia of large turkeys with a non-penetrating captive bolt stunner. It is imperative that some will become ill, debilitated, or injured. If unlikely to respond favorably to treatment or if treatment is not feasible, euthanasia is the best option. The use of mechanically applied methods of euthanasia are becoming as an improvement in practices used for on-farm culling for a variety of animal species. Traditionally, captive bolt devices were primarily used on large animals in processing plant settings due to logistical considerations and equipment limitations. Recent advances in captive bolt technologies have resulted in new designs that are sized for smaller animals, more suitable for on-farm use, and can be used for a variety of species. All euthanasia methods should be administered according to the AVMA guidelines for euthanasia of animals and should include a written action plan and worker safety training.

The use of captive bolt specifically for on-farm culling of large turkeys is becoming more common in the US as devices are being developed specifically for use with turkeys over 3 weeks of age. It is proving to be a more consistent and reliable means of rendering birds insensible compared to traditional on-farm manually applied methods of euthanasia.

**Step-by-Step Application of Captive Bolt**

1. Assemble device making sure it is functioning properly.
2. Engage bolt.
3. Load charge into chamber or engage propellant.
4. Approach bird slowly and with care.
5. Position a single foot, pad side up, at the rear of the bird and apply slight pressure to immobilize the bird.
6. Disengage safety.
7. Position captive bolt stunner.
   8. Engage bolt.
9. Immediately assess insensibility and safety.
10. If the bird is insensitive, reengage bolt.
   11. Stay with bird at a safe distance and continue checking birds status until involuntary wing flapping ceases. Confirm loss of breathing and heartbeat for confirmation of death.
12. Dispose of bird respectfully and according to local guidelines for euthanized animals.

These devices are no longer just modernized nail guns. Instead, newer devices have non-penetrating bolts, are highly portable, sized specifically for birds, operator friendly, and feature low operation cost. The non-penetrating bolt stunner is the method currently required for turkeys.

The captive bolt device is a mechanically applied method in which a pneumatic or powder fired retractable blunt mallet, which when applied properly to the skull, causes post mortem brain damage and microscopic subdural hemorrhaging. It is applied perpendicular to frontal bone midway between eyes and ears where there is a natural depression in the skull (FIGURE 1). This is directly above the cerebral hemisphere and brainstem, which are the center of consciousness in the brain. Trauma to the brain must be severe enough to permanently induce loss of consciousness and subsequent death. Larger birds require more stun energy than smaller birds being rendered unconscious by use of captive bolt stunning. Adapters for small birds are available. The process needs to be reliable, consistent, irreversible, and save for both the birds and on-farm personnel. Effective maintenance of the captive bolt device should be performed by the operator often to ensure proper function and effectiveness. Advantages of captive bolt over other methods include improved consistency of application, increased effectiveness of primary application, no chemicals, and easy training and operation.

**Figure 1:** Proper placement of captive bolt on the turkey head. Red lines indicate target for stunner application.

**Figure 2:** Proper positioning of operator when applying captive bolt. Note the operator is applying gentle pressure with his foot on the rear leg to immobilize the bird.

**Figure 3:** Zone of clearance for involuntary wing flapping after application of captive bolt. The area should be clear of any obstructions.
Transporting turkeys

• Farm catch and loading
  – Birds are herded and loaded by a load-out crew directly from houses into truck mounted crates via conveyor belts
  – Auto-loading technologies
  – Avoid bruising and injury

• Transport
  – Truck design
  – Trucks of birds delivered from grow-out to the slaughter
  – Ventilation and cooling
Transporting turkeys

• Water withdraw
• Feed withdrawal
  – Too short results in too much feces
  – Too long results in weakening of the intestinal lining
• Receiving, holding, and unload
  – Flock scheduling
  – Adequate ventilation (large fan banks and misting)
  – Unloading technique and training
  – Recordkeeping and auditing
  – Avoid bruising and injury
  – Hang area needs low light conditions to minimize birds excitement
Farm and slaughter management

• Live animal handling events
  – Insemination, loading, unload, injection
  – Management and personnel training

• Farm practices
  – Zero tolerance for animal abuse
  – Food and water
  – Farmers should walk and clean barns

• Plant audits
  – Bruises
  – Stun efficiency
  – Broken wings
  – Damaged legs
  – Breast blisters
The principles of stunning

• Stunning is not required by USDA for poultry
• Induce unconsciousness
  – When an animal is unconscious, euthanasia can be administered
  – Fast induction
  – Avoid suffering or pain
  – No recovery during slaughter process
• Physical indicators
  • Corneal reflex
  • Spontaneous eye blinking
  • Rhythmic breathing
  • Righting reflex
• Religious slaughter typically has no stun
• Needs to be correctly performed, monitored, and audited regardless of method used (electrical, CAS, LAPS)
Evisceration

• **Bleeding**
  - Opening of the blood vessels of the neck to allow blood to drain from the carcass
  - As soon as possible after stun
  - Neck cut should open the carotid artery and vein
  - Do not sever the spine, trachea, or esophagus
  - Manual and automated methods
  - Back-up manual cutter
  - Cut quality is important
    • Can influence bleed out rate
    • Hemorrhaging and blood spots
    • Improper bleed out
Evisceration

- Scalding
  - Submerging bird carcass in warm water
  - Parameters vary (50-53°C for 60-180 sec)
  - Scalding should occur as soon as possible after bleeding
  - Facilitates feather removal
- Zero tolerance for sensibility when entering scalder
- Red birds
Evisceration

• Picking
• Opening of the body cavities to remove viscera and organs
• Inspection
  – Must present carcass in a clear way
  – Liver, gizzard, and heart
  – Wholesomeness
  – Free of disease
• Removing other parts
• Chilling the carcass
• Carcass disassembly
Breast

Tender
any strip of breast meat

Tenderloin
inner pectoral muscle that lies alongside the breastbone

Poultry half
full-length split down breast and back producing approximately equal left and right sides

Breast quarter
half a breast, a wing, and a portion of the back

Leg quarter
a thigh, a drumstick, and a portion of the back

Tail

Wing

3rd section—wing tip

2nd section—flat wing tip

1st section—wing drumette

Leg
thigh and drumstick

Drumstick

Thigh
also used to make turkey ham
Conversion of muscle to meat

- Postmortem changes occur after death that are driven by residual metabolism

- The circulatory system is no longer present to deliver oxygen or remove metabolic wastes from the muscle cells

- Glycogen is metabolized by the muscle into lactate (lactic acid)

- Lactate accumulates in the muscle cell, consequently, the tissue pH becomes more acidic

- Living muscle is about pH 7, post mortem muscle after death is about pH 5.5

Environmental or live handling stress can negatively influence this process and result in poor meat quality
The PSE quality defect

• Turkeys and other large birds
• **Pale, Soft, Exudative**
  – Pale in color
  – Forms soft gels
  – Decreased ability to hold water
• The results from poor control of postmortem metabolism, pH drop occurs before adequate chill
• PSE manifests as poor quality
  – Color variability
  – Decreased salt soluble protein extraction results in weak gelation
  – Decreased water binding by muscle tissue due to protein changes
• PSE meat is considered less functional due to the reduced ability to bind, hold water, and maintain texture
Animal Welfare Concerns

In response to the proposal, FSIS received a variety of comments on how the proposal could impact animal welfare. As the agency points out in the preamble, the proposal did not change the regulations requiring that birds be slaughtered consistent with good commercial practices. Moreover, since there is no increase in line speed in the final rule, there is no basis to assume the speed would result in changes in how the birds are handled. Finally, at establishments operating under NPIS, there will be off-line inspectors who can observe whether establishment employees are mishandling birds or that the animals died other than by slaughter.
Modernization of Poultry Slaughter Inspection (MPSI)

• **Modifications to existing regulatory requirements**
  - Elimination of the mandatory, specific time temperature requirements for product
  - Elimination of generic *E. coli* sampling
  - Elimination of the codified Salmonella Performance Standard
  - Option to use on-line reprocessing without a waiver
  - Off line reprocessing
  - Off line and/or on line reprocessing procedures must be incorporated in the HACCP plans, or sanitation SOP or other PP

• **New Requirements**
  - Procedures for controlling visible fecal contamination (9 CFR § 385.65 (f))
  - Procedures for controlling contamination throughout the slaughter and dressing process (9 CFR § 385.65 (g))
  - The establishment must incorporate these procedures into HACCP plan, or sanitation SOP, or other prerequisite program

• **New Poultry Inspection System (NPIS)**
  - Based on HACCP Inspection Model Project (HIMP)
  - In the final rule the agency kept all the previously approved inspection systems
Where does animal welfare impact the supply chain?

- The impact of animal welfare, positive or negative, impacts downstream members of the supply chain.
- Animal welfare plays a role in consumer purchase decisions.
- Messaging and behavior must converge to maintain the benefits of positive animal welfare statements or labeling.
A win in animal welfare occurs when all 3 come together
Industry feedback loop

Opportunities to have a unanimous voice as an industry
Achieving wins

• Linkage: What happens upstream with animal welfare often influences quality later in the process
• Find ways to make animal welfare drive profitability, these are often not cookie cutter changes
• Collaborations between welfare scientists and meat scientists (and other agricultural scientists)
• Leverage the total supply chain using an start-to-end view to enable innovative strategies
• There is a need for strategies that drive cost out of the supply chain and improve animal well being
• This path can result in paradigm shifts