Egg Laying Hens
Understanding the purpose of egg laying hens
Why does the commercial poultry industry exist?

- Laying hens produce eggs for human consumption.
- In 2009, per capita egg consumption in the US was 248 eggs per year.
- What does that look like?
248 eggs

Equal to approximately 20.6 dozen
Trends in consumption

- Consumption was down during the mid-twentieth century as people moved from farms to cities.
- Health concerns also decreased consumption mid-century.
- In recent years, better health perceptions and the use of eggs in fast food breakfasts have increased consumption to present rates.
Where are eggs found?
Other egg containing foods...

- Jelly beans
- Crackers
- Cookies
- Pudding
- Pretzels
- Marshmallows
- Pie crust
- Cake
- Tartar sauce
- Frosting
- Some candies
- Most foods that have been battered and fried
Where in the country do our eggs come from?
These are the largest egg producing states and they house approximately 50% of the laying hens in the U.S.

In the U.S. approximately 3,136,500,000 dozen eggs were produced during 2008.

There are over 60 egg producing companies with more than 1 million laying hens, and 12 with more than 5 million.

In addition to producing eggs for the U.S., 21 million dozen eggs were exported, mainly to Asian countries but also to Europe, Canada, and Mexico.
Hen reproductive physiology and egg formation
• An egg takes **23-27** hours to form and then be laid.

• The shorter the time it takes the hen to form an egg, the more days in a row a hen will lay an egg.

• The number of days in a row that a hen lays an egg is referred to as **clutch size**.

• The term used for the parts of the hen where the egg is created is **oviduct**.
Parts of the oviduct

- Ovary
- Infundibulum (Funnel)
- Magnum
- Isthmus
- Uterus (Shell Gland)
Reproductive System of the Hen

- Cloaca
- Vent
- Vagina
- Uterus
- Isthmus
- Magnum
- Infundibulum
Ovary

- Hens only have one functional ovary (usually the left one).
- The ovary contains a series of **follicles** that mature as yolk material is added to them. Follicles look like little balloons on the ovary.
- Yolk material is manufactured in the liver.
- When one ruptures, ovulation occurs.
- The ovulated follicle then leaves the ovary and makes its way down the reproductive tract.
- If two follicles rupture at the same time, double yolked eggs can form.
Ovary

- Empty Follicle
- Immature Follicle
- Mature Yolk within Sac or Follicle
- Stigma or Suture Line
After **ovulation**, the follicle enters the infundibulum also known as the funnel.

- The infundibulum is controlled by **tactile** (touch) stimulation, so anytime something touches the inside of the funnel, an egg forms.

- This can lead to no yolk eggs or eggs formed around a piece of the oviduct that has broken off in some cases.

- If the hens were allowed to breed, this is also where conception would take place.
• This is where the thick egg white is formed.

• Egg white is also called **albumen**.
Isthmus

- The shell membranes form here.
- The membranes are the thin, opaque films closest to the egg shell when you break it open.
Uterus

- The egg spends most of its time in the uterus (approximately 20 of the 24 hours).

- The thin white (more liquid portion of the albumen) is pumped into the egg through the membranes.

- The shell forms. Most of the shell formation takes place at night.

- Even though the shell appears solid, there are actually thousands of tiny pores in the shell that allow the developing chick to breathe while inside.
The shell color is added.

A protective **cuticle** (wax like coating) is added.

The cuticle is like a natural sealant that prevents the egg from losing moisture too quickly.
Other parts of the reproductive tract

- **Vagina**: Acts as a transport from the uterus to the vent.

- **Cloaca**: (Vestibule) Common chamber through which the egg passes.

- **Vent**: Outer opening of the hens reproductive and digestive tracts. Eggs and the urine/feces mixture eventually pass through the opening.
Q: How can you tell what color egg a hen will lay?
Look at its ear lobe!
- Blue ear lobes mean blue or blue green eggs.
- Red ear lobes mean brown eggs.
- White ear lobes mean white eggs.
Identify basic parts of an egg
Yolk

- The yellow part in the center of the egg.
- The actual color of the egg yolk varies based on what the hen who laid the egg is fed.
- Hens fed a diet high in corn or alfalfa tend to have a more dark yellow to orange colored yolk because those feeds are high in a fat soluble pigment called xanthophyll.
- Hens who are fed a diet of mostly wheat, which is low in xanthophyll, would have a very light yellow or even slightly grayish yolk.
The yolk is separated from the white by the vitelline membrane.

The yolk provides “food” that is essential for the developing chick embryo.
Germ

- The small white circle on the yolk.
- In a fertile egg, this is where the embryo starts to develop.
- In non-fertile eggs, this spot stays small and white.
Albumen

- Also called the egg white.

- There are two types of albumen:
  
  - Thick albumen: Located closest to the yolk. The less liquid, more dense portion of the white. In fresher eggs, the thick albumen is denser than in older eggs.

  - Thin albumen: The more liquid “runny” portion of the egg white.
Shell

- The hard, normally white (may also be brown or greenish blue) coating that provides the eggs solid structure and shape and protects the developing embryo.
- As mentioned before, the shell of an egg contains thousands of tiny pores.
Shell membranes

- Membranes that are located just inside the shell.
- Act as a barrier between the shell and the albumen.
Air cell

- The small open space at the large end of an egg.
- Formed by the separation of the two shell membranes.
- Provides the chick with an air supply during the final stage of development just before hatching.
- Older non-fertile eggs will have a larger air cell due to moisture loss.
Chalaza

- The small, white, rope-like structures at both ends of the yolk.
- These structures help keep the yolk centered within the egg.
- If the yolk were to come into contact with the shell during embryo development, the process would be aborted and the embryo would cease development.
Systems for raising laying hens
Floor house

- Hens are raised on the floor of a light and temperature controlled house.
- Usually equipped with an automated feeding and watering system, as well as a mechanical nest for egg gathering.
- Hens are free to roam and congregate where they please.
Floor House

These are actually broiler chicks not laying hens, but the house looks similar at this stage of life.
Nipple Watering System

Standard equipment in a floor house
Automated feeder
Also standard equipment. Several designs exist.
Cage house

- Hens are raised in cages.
- Sometimes there will be a single layer of cages per house.
- Normally several rows of cages stacked on top of one another (stacked deck house).
- Cages have roll outs (areas to catch eggs) and normally an automated egg gathering system.
- Normally have an automated feeding and watering system.
Cage House

Two layers of cages are visible, but four layers are present.
White Leghorns in a cage house

*Note the feeder (metal trough).*
Egg Roll Outs

Most are padded to prevent eggs from breaking.
Egg Belt

Used to carry eggs to processing. Note the padding on the near edge of the roll out.
Auger Feeder

*Used to bring feed to birds.*
The life cycle of a laying hen
Laying hens usually have a two year production cycle

- Hens arrive at a grow out facility at one day of age.

- Immature hens (pullets) usually stay in the grow out facility for approximately 18 weeks. It is critical that during this time pullets are not exposed to increasing day length.

- Once hens have reached proper body weight, they can be moved to the lay house. During this period hens should be exposed to an increasing day length.
Types of eggs you can buy at the grocery store
Brown Eggs

Just like regular white eggs, only brown.
Omega-3 Eggs

Eggs contain omega-3 fatty acid. Gives the eggs better health perception. Eggs are usually more expensive.
Reduced cholesterol or cholesterol free eggs

Viewed as a heart-healthier alternative to regular eggs.
Free-Range Eggs

Hens are required to be given some access to the outdoors. Usually eggs are much more expensive.
Hens are typically housed in floor houses with nest boxes. No access to outdoors. Eggs are usually more expensive.
Organic Eggs

Hens must be fed a completely organic diet from hatching. Since organic feed is expensive, eggs are more expensive.
Fertile Eggs

Laid by a hen who was given the opportunity to mate.
Be sure to keep fertile eggs refrigerated or the embryo could start to develop!

If that happens, what looks like a small black comma will form on the yolk’s surface.