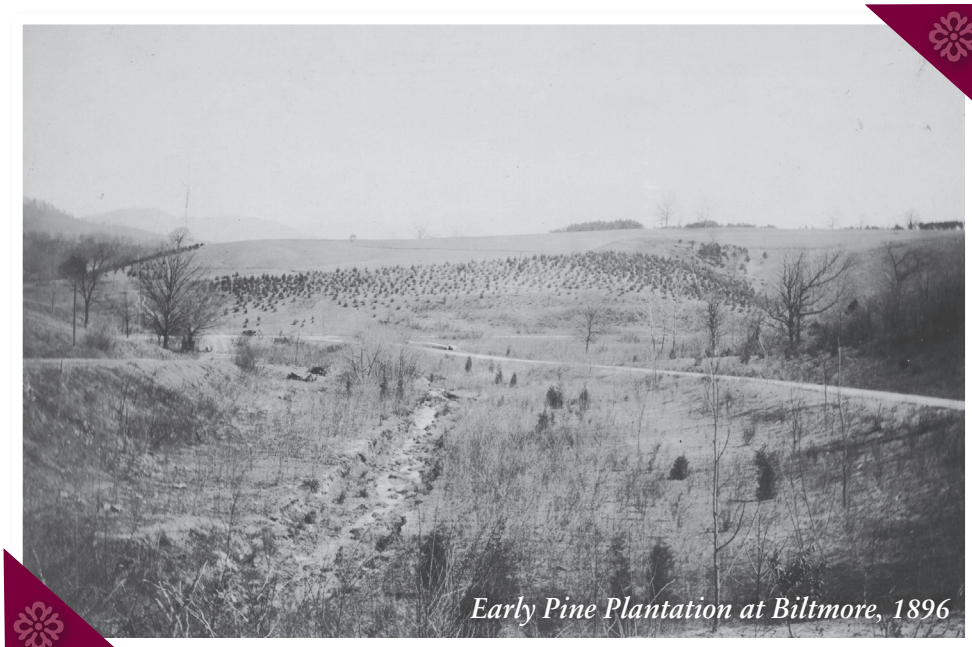
BILTMORE®

The Start of Sustainable Farming at Biltmore

Before George Vanderbilt ever began building Biltmore House, he started buying hundreds of acres of land. Eventually, his private estate grew to be thousands of acres—more than 125,000 acres to be exact!



Early Pine Plantation at Biltmore, 1896

Much of this land had already been farmed by other people in the area. In those days, very few people were familiar with the idea of sustainable farming. Instead, a farmer might grow corn on the same field year after year. Eventually, the soil would run out of all of the nutrients that corn needs to grow. Farmers would plant corn again on that same field and find that the results weren't the same as they had been before. Crops would become poorer with each passing year.

Instead of spending time or energy to enrich the soil, the farmer would usually just decide to try to grow corn in a different part of his land the next year. And, when the entire farm stopped producing crops, the farmer often moved. In order to create more land for his crops, the farmer would cut down all of the trees to make a new field, and clear the field of stumps. This pattern continued for many, many years. By the time Mr. Vanderbilt started to buy land to build Biltmore, much of the land was in bad shape.

The land had been over-farmed and depleted of nutrients. Much of the forest had been cut down as a source of wood or cleared to create more farmland.

It took many years for estate workers to improve the land and create the forests and farming operations that Mr. Vanderbilt envisioned for his estate. They spent years enriching the soil, planting trees, and trying to prevent erosion.

Guess how many trees were planted at Biltmore?

- ◯ More than 1 million
- ◯ More than 3 million
- ◯ More than 5 million

Guess what natural product was used on the estate to enrich the soil?

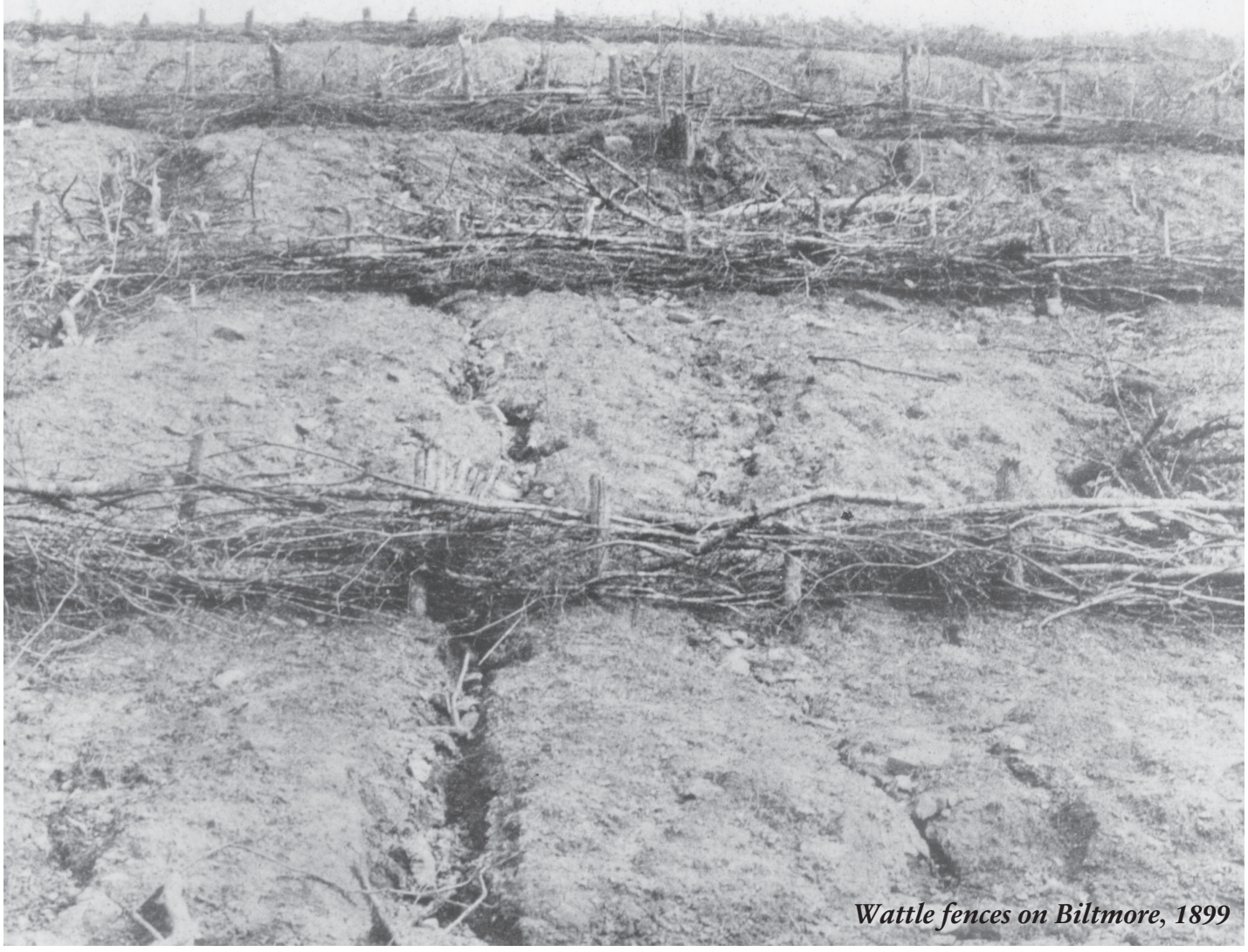
Hint: Cows produced it at Biltmore's dairy, but it wasn't milk!

ANSWERS: *More than 5 million* and *Manure!*

Understanding Erosion

The root systems of trees and grass are a crucial part of our environment. Roots bring food and water to the plants, but they are also important to keep the soil in place. When too many trees are cut down on a piece of land and the stumps are removed, the root systems that once held the trees up and the soil in place are no longer there. Without tree and plant roots to hold the dirt in place, soil washes away when it rains. This is called erosion.

When George Vanderbilt bought the land to create Biltmore, many of the barren fields had been eroded. To prevent the hillsides from eroding away, estate workers built wattle fences out of inter-woven branches, which helped to hold the soil in place. This "ground-breaking" idea helped to make healthy fields and forests at Biltmore.



Wattle fences on Biltmore, 1899

Biltmore's Poultry Yards:

An Egg-cellent Example of Sustainable Farming

George Vanderbilt established Biltmore's first agricultural operations to produce meat, poultry, cream, butter, and fruits and vegetables for use in Biltmore House. Excess products were sold in local markets. His goal was for each of his farms to become self-supporting. Mr. Vanderbilt was proud of Biltmore's farms and took his guests to tour them, just like you are doing today. When Edith Vanderbilt's sister came to visit in March of 1905, she wrote about it in a letter: "driving … along the soft dirt roads, red with the native clay" with farms "scattered about at distances of two or three miles from the house, the poultry farm in one direction, the pig farm in another, the dairy farm in another."[1]

The first chickens were kept in two poultry sheds "for Fattening & Laying Hens."[2] But by 1896, the operation had grown and needed more space. Mr. Vanderbilt hired an architect to design a new complex of buildings high on "Chicken Hill," the hill above Antler Hill Barn. These weren't just simple hen houses. Each space was designed to have a specific purpose. The architect put a lot of thought into what would be needed to have a productive farm and to raise a large number of birds. The complex was called the "Poultry Yards."[3]

Turkeys at Biltmore's Poultry Yard more than 100 years ago.

Poultry

Poultry is a general word that means any kind of bird that is raised to provide meat or eggs. Chickens, turkeys, ducks, and geese are all different kinds of poultry. All were raised at Biltmore.

[1]Pauline Merrill to Mrs. T. S. Viele, March, 1905.
[2]George Weston to Charles McNamee, December 7, 1895.
[3]Biltmore Estate Archives Drawings Collection.

Brooder House

Mr. Vanderbilt's Poultry Yards, 1906

As you can see in this historic photograph, adult chickens lived in the houses along the hill. Each house measured 12 x 24 feet and was divided into two, like a duplex apartment. Every group of chickens had their own fenced yard. The long building with the row of windows on the right is one of the "runs" of the Brooder House. Neither the little houses nor the run still exists today, but you will pass the Brooder House on your way to the Solar Fields.

At the heart of the Poultry Yards was the Brooder House—a place where young birds were raised until they were strong enough and old enough to live on their own with no additional heat. It included an incubator room—a warm and safe place to keep eggs that were going to hatch as well as newly-hatched chicks—kind of like a nursery in a hospital. There were originally two large "runs" attached to the main building, a long shed for feeding, pens for breeding, and an office for the workers who helped to raise the chickens. No detail was overlooked. There was even a different house for ducks and a hospital—a separate space where sick birds could be kept separate from the rest of the flock.

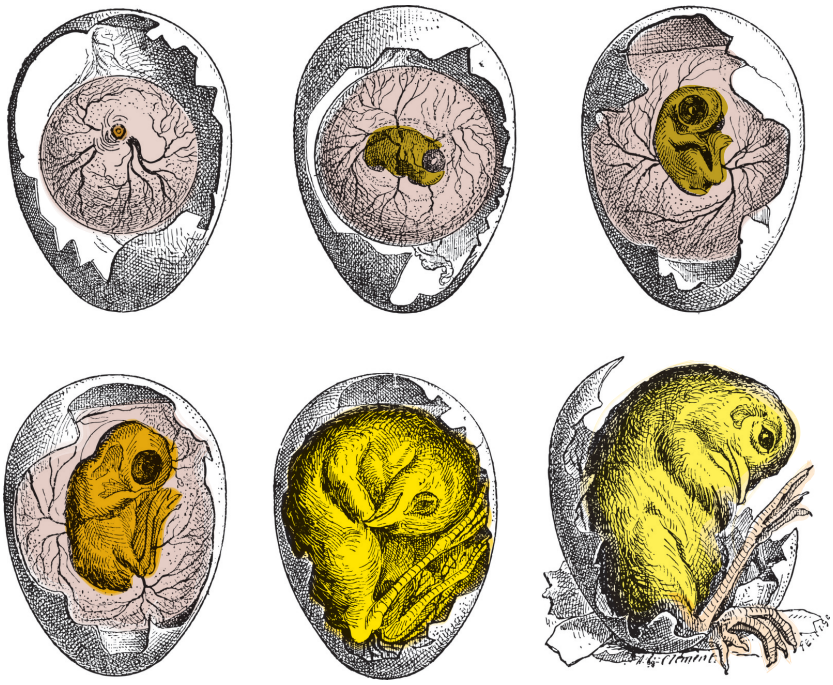
Get a special peek at Biltmore's Brooder House during the Homeschool Festival. This space isn't open to the public because baby chicks are busy hatching! Shhh! Please do not disturb.

The farmer responsible for raising the chickens was called the Chicken Tender. He and his family lived in their own house near the Brooder House. James J. Lenton from Ottawa was hired as the Chicken Tender or poultryman in August 1895 and made $50 a month including housing.

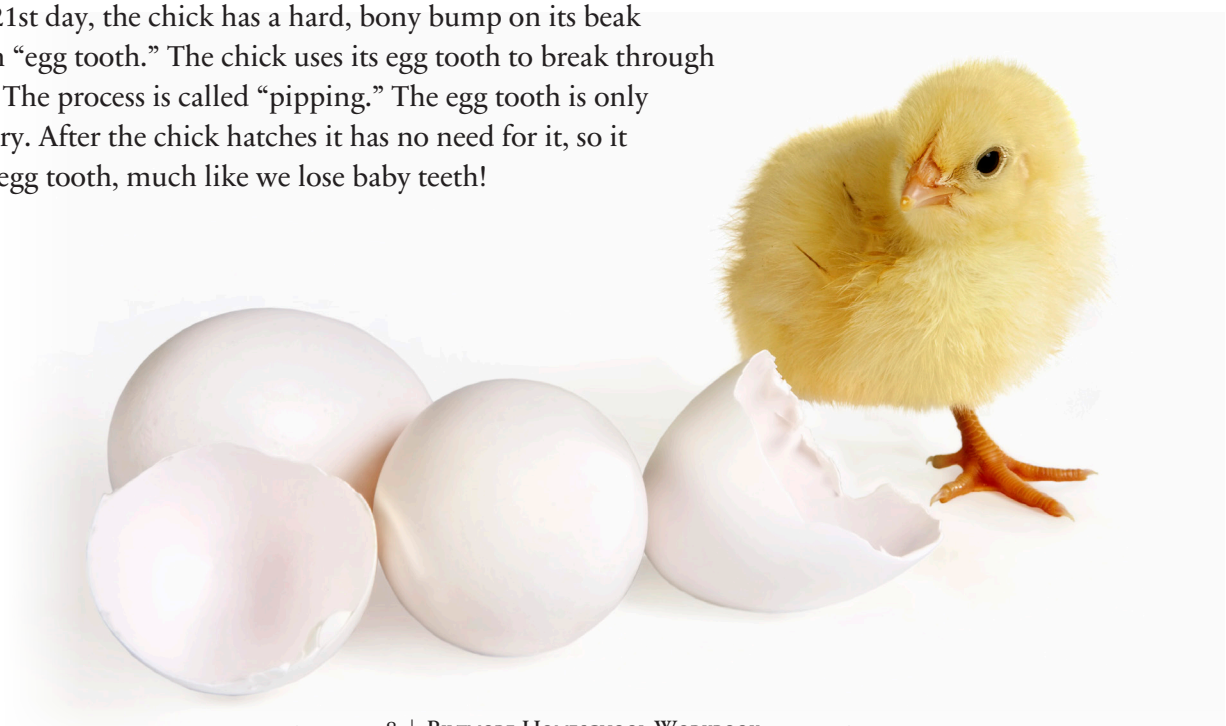
Despite its early success, the Poultry Farm proved to be more expensive than first anticipated. The operation eventually closed down, but the buildings continued to be used for other purposes. Some were altered, like the Brooder House, which no longer has its two long runs. Others, like the Chicken Tender's House, have been lost to fire. Nevertheless, Biltmore's poultry operation is growing once again and we hope that it will soon be a self-sustaining part of the farm. It's an exciting time to see the chickens returning to Chicken Hill!

Stages of Chick Development

Baby birds develop differently from humans and other mammals. Mammals have a gestation period (9 months for humans) when the baby is receiving all its nutrients directly from its mother. Birds do not gestate; instead, they have an incubation period. The egg that the baby develops in contains everything the chick will need while it develops. The incubation period for a chicken is 21 days. The chart to the right illustrates the stages of development the chick is going through inside the egg.



On the 21st day, the chick has a hard, bony bump on its beak called an "egg tooth." The chick uses its egg tooth to break through its shell. The process is called "pipping." The egg tooth is only temporary. After the chick hatches it has no need for it, so it loses its egg tooth, much like we lose baby teeth!



Poultry and eggs were on the Vanderbilts' menu almost daily. Mr. Vanderbilt liked to start his day with shirred eggs and bacon. For the second course at luncheon, eggs were served stuffed, creamed, or fried, as well as in the form of cutlets, omelets, timbales, and croquettes. Chickens were prepared broiled, roasted, fricasseed, fried, creamed, braised, and in casseroles, potpies, and mousse. Mr. Vanderbilt's very favorite dish was roast turkey. Other poultry dishes included roast and barbequed duck, braised quail and squab, and roast partridge and goose. Did the Vanderbilts eat leftovers? You bet they did! Any leftover poultry frequently found its way into the salad course served the following day.

Eggs are still a part of every morning at Biltmore.

Freshly-laid eggs are gathered at the Farmyard and delivered daily to The Inn on Biltmore Estate®. There, they are used to create omelets and other delicious recipes for the guests.

Egg Recipes from the American Egg Board

Find more, including one for shirred or baked eggs, at incredibleegg.org

Save your eggshells for the experiments on page 13.

Basic Omelet

2 eggs, 2 tablespoons water, ¼ teaspoon salt, dash of pepper, 1 tablespoon butter, fillings optional (cheese, bell peppers, onions, ham, etc.)

1. Mix the eggs, water, salt, and pepper with a fork.
2. Heat the butter in a pan or skillet until just hot enough to sizzle a drop of water.
3. Pour the egg mixture into the hot pan. The edges should set immediately.
4. With a spatula, draw the cooked edges toward the center.
5. Tip the pan to allow the uncooked portion to run out onto the hot pan.
6. While the top is still moist, put the filling onto one side of the omelet (optional).
7. Fold one side over the filling with the turner and turn the omelet out onto a plate. *You're ready to eat!*

Meringue Kisses

4 egg whites, room temperature; ½ teaspoon cream of tartar; 1¾ cups powdered sugar, sifted; 2 cups ground almonds

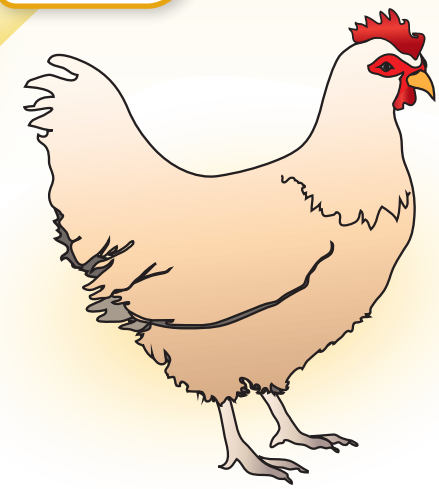
1. Heat oven to 225°F. Beat egg whites and cream of tartar in mixer bowl with whisk attachment on high speed until foamy. Beating constantly, add sugar, 2 tablespoons at a time, until whites are glossy and stand in stiff peaks.
2. Fold in almonds. Drop meringue by tablespoonfuls onto baking sheets lined with parchment paper or aluminum foil.
3. Bake in 225°F oven until firm, about 1 hour. Turn off oven. Let dry in oven, with door closed, until cool and crisp: at least one hour.

There are a lot of variations on meringues: you can try other nuts, cocoa powder, vanilla, orange peel, mint, or lemon extract…experiment and find out which meringue you like best!

Meringues won't get crisp on a really humid day—a dry day is best for making them.

your turn

Egg Facts and Trivia



The color of an eggshell depends on the breed of chicken that laid it. You can guess what color a hen will lay by looking at the color of her earlobe!

The color of the egg white changes as the egg ages: a fresh egg has a cloudy white but as time goes by, carbon dioxide escapes and the white becomes clearer.

The color of the egg yolk is determined by what the hen has been eating.

Eggs kept at room temperature will age in one day as much as refrigerated eggs age in a week!

You can tell how old an egg is by putting it in fresh water: a fresh egg will sink. A not-so-fresh egg will have the pointed end tipped down and the rounded end trying to rise. If your egg floats, don't eat it! This is because the air pocket inside the egg increases as the egg ages.

There is no difference in flavor, nutritional value, or cooking characteristics between white and brown eggs.

The average egg weighs about 2 ounces.

An egg substitute product is not the same as plain egg whites: most have thickeners, vitamins, and other things added to them, so check the label!

Egg whites have been used for facials. Egg yolks are used in shampoos and conditioners. And some of the egg's fatty acids are used in skin care products and cosmetics.

The grade of an egg, not its size, determines its quality. Eggs are evaluated on certain U.S. standards and are classified as AA, A, or B. Both exterior and interior conditions of the egg are taken into consideration.

It takes 24–26 hours for an egg to form—so a hen can lay roughly one egg per day!

A rooster is not required for a hen to lay an egg; the hen produces eggs by herself. However, in order to get a fertilized egg—one that can produce a chick—a rooster must be involved. A general guideline is to have one rooster for every 5–6 hens, but it can depend on the breed.

Birds, including chickens, have a unique feature: a fertile egg that is laid does not start developing until it is kept at the right incubating temperature. That's how a hen can lay one egg per day, wait until she has several, and then become "broody." Once she remains on the nest, all the eggs start to develop at the same time and eventually hatch on the same day!

your turn

Egg Experiments to Try at Home!

- Remember to wash your hands after handling raw eggs!
- Results are not always consistent, so scientists perform their experiments repeatedly.

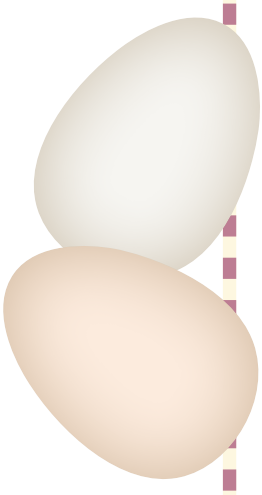
Eggsploration

1 egg; bowl; toothpick; magnifying glass (optional)

Begin by investigating and observing an egg. First, look closely at the shell. Use a magnifying glass if you have one. Now carefully crack the egg into a bowl. Examine the inside of the shell and touch it to see what it feels like. Notice that there is a membrane present. Now look at what is in the bowl: the yolk and the white. Notice the color of each and the consistency. Gently shake the bowl and see what happens. Use a toothpick to test the thickness of the different parts and the strength of the membrane around the yolk. When you are finished, cook the egg and enjoy eating it! (See the recipes included in this workbook or try one of your own.)

Egg Squeeze

1 egg; Ziploc bag optional



(If you are worried about making a mess, put the egg in a Ziploc bag first.) Hold a raw egg in the palm of your hand. Wrap your fingers (with no rings on) all the way around it and squeeze as hard as you can. Did it break?

Hold the egg between your thumb and forefinger and squeeze the top and bottom of the egg. What happened?

Lastly, hold the egg in one palm. With the forefinger of the other hand, press on one side only of the shell. What happened this time?

The egg's shape gives it tremendous strength. Its strongest points are at the top and bottom, similar to how an architectural arch can support immense weight. The round sides distribute pressure all over the shell, which is why squeezing it all the way around won't break it. Its weakness is uneven pressure, like when you pressed it only in one spot. This is why the egg can be sat on for 21 days by a hen without breaking, but the tiny beak of a new chick can break through the side. To really test the strength of the egg, try the next experiment.

Dome Strength

4 eggs, a stack of books of similar size, hand towel

Carefully crack the eggs on the pointed end, trying to keep the rounded end intact. Use the eggs for the recipes on page 12. Carefully try to even up the edges of the shell so that you end up with 4 half-shells that are roughly the same size. They don't have to be perfect!

Fold a hand towel in half and place on a level surface (this especially helps if your eggs are a bit uneven because it cushions the shells). Place the 4 egg shells on the towel in a square, chipped side down.

Now begin carefully stacking the books on top of the eggshells. If you want, you can estimate beforehand how many books you think the eggs can support. Add books slowly, one by one, until an egg cracks. This illustrates just how strong an eggshell—a natural architectural arch—really is!

Biltmore Farms raised many different breeds of poultry including Brahmas, Cochins, Cornish Game Hens, Leghorns, Minorcas, Plymouth Rocks, and Wyandottes. In addition to chickens, there were numerous other kinds of domesticated and wild fowl to be found on the estate, including Pekin ducks and drakes, Bronze turkey toms and hens, wild turkey, quail, squab, and pheasant. Mr. Vanderbilt's Poultry Yards produced enough eggs to supply a local inn and all the needs of Biltmore House. This is no small feat! This means Biltmore's hens were laying 8–15 dozen eggs a day.

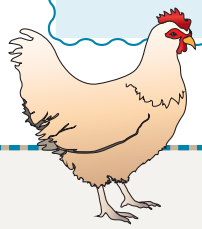
To put it into perspective:

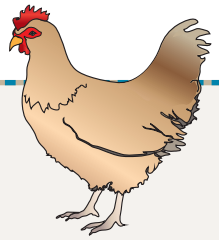
One list of eggs sent to Biltmore House tracks the transit of **115 dozen eggs in a month, or nearly 30 dozen a week!**

Figure out how many eggs per week the Vanderbilts, their guests, and servants ate:

30
x 12

= _____





Chicken Breeds at Biltmore

Look for these chicken breeds in the word search puzzle.
Hint: some of the words are backwards.

AMERAUCANA
ANDALUSIAN
BARRED ROCK
BRAHMA
COCHIN
D'UCCLE
FRIZZLE
HAMBURG
LEGHORN
MARAN
NAKED NECK
POLISH
RHODE ISLAND RED
SILKIE
SUSSEX
WELSUMMER
WYANDOTTE

X	E	K	R	D	A	S	P	W	G	X	E	Y	D	C
O	I	K	C	Z	F	O	Y	R	F	L	E	E	P	O
Y	K	P	P	E	L	A	U	A	C	D	R	H	B	C
Y	L	F	M	I	N	B	S	C	O	D	V	Y	L	H
H	I	W	S	D	M	D	U	U	N	I	U	A	A	I
B	S	H	O	A	W	D	E	A	S	Z	H	L	N	N
W	A	T	H	L	T	T	L	K	I	S	F	I	D	N
O	T	R	K	O	T	S	C	P	A	X	E	K	A	R
E	N	M	R	F	I	M	A	R	A	N	V	X	L	O
N	W	X	R	E	M	M	U	S	L	E	W	I	U	H
K	C	T	D	D	D	A	M	H	A	R	B	A	S	G
Q	I	O	A	M	E	R	A	U	C	A	N	A	I	E
H	H	G	W	E	M	R	O	D	Z	J	J	G	A	L
R	I	U	E	V	Y	Y	X	C	I	L	R	F	N	Z
F	R	I	Z	Z	L	E	W	J	K	I	F	V	V	E

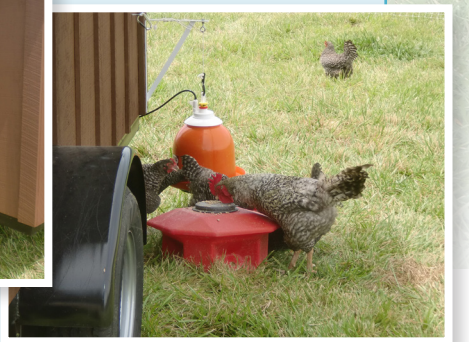
Be sure to visit the Farmyard to meet Biltmore's chickens in person!

Chicken Tractors

A chicken tractor is a movable coop that chickens live in. The tractor may be placed in a garden, field, or any location where chickens would be helpful to the soil. As the chickens are looking for insects and worms to eat, they dig up the soil with their sharp claws. Digging the soil helps to loosen it so the plant roots have an easier time spreading out, and also allows water and oxygen to get to the plants. This is called aeration.

The chicken manure helps fertilize crops and grass. When one section of garden or pasture has had enough aerating and fertilizing, the tractor can be attached to a truck or farm tractor and moved to another section. Usually the chicken tractor is moved every 6–10 days so the grass doesn't die from over-digging.

Our tractor has a self-sustaining watering system. When it rains, the rainwater is caught in gutters which attach to a plastic can. The can is hooked up to the chickens' watering trays.



Antler Hill Farm Chicken Tractor:

During the day, chickens roam around outside the tractor. At dusk, the chickens instinctively know that it is time to go inside and roost. Eggs are laid in the 12 nesting boxes all day long and also at night. The Farmyard staff collect the eggs twice a day—both morning and night.

Although the chickens eat grass, insects, grubs, and worms, they are also given chicken feed that is high in calcium which helps produce quality eggs.