Eggshell Quality Problems in Layer Flocks

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The purpose of any layer flock is to produce one of America's favorite protein sources: eggs.

Eggs are a unique food in the fact that they go from farm to the consumer's table largely unaltered. Therefore, any egg with visible imperfections of the eggshell needs to be sorted out and cannot be sold as is. Producers keep a close eye on the appearance of their eggs. While many deformities might look scary and immediately raise the concern of a serious issue like diseases, they very often have benign or easy to fix causes.

The main factors that affect eggs are most often nutrition, maturity of the bird, management factors like lighting, and stress. Infectious diseases are a rarer cause of eggshell deformities.

This article will help you to identify the kind of deformity, the cause, and offer problem solving strategies.

Benign Deformities

While eggs tend to look all the same in the grocery store, there is quite a large natural variety of egg sizes and shapes that are still very normal. Eggs can naturally vary in size from very small (peewee) to very large (jumbo). Peewee eggs sometimes come without a yolk, this is called a fairy egg. Jumbo eggs can contain two yolks, called a double-yolker. Young pullets that just started laying will produce these eggs more frequently, due to their reproductive tract still getting into the rhythm of egg production. Wind, or Fairy Eggs, are eggs which have a very thin or no eggshell, and are also commonly seen with young hens. Older hens, which are about to reach the end of their production commonly produce pale or soft-shelled eggs. Eggs with cracks or body-check marks are more frequently produced by older hens.

Nutritional Deficits

The main component of a chicken's eggshell is calcium. The majority of the 2g of calcium in each shell is coming directly from the feed. An unbalanced diet can lead quickly to shell deformities. Calcium is the nutrient most often considered when shell quality issues occur, although deficiencies of vitamin D_3 and phosphorus can also result in weaker shells. The three nutrients of calcium, vitamin D_3, and phosphorus stand in close relation in a bird's metabolism. Vitamin D_3 is needed to absorb calcium, and phosphorus and calcium need to be balanced during excretion.

Excess calcium will lead to bumpy and rough shells due to extra calcium deposits. White or brown speckled eggs are another presentation of too much calcium in the diet. Another indicator for excess calcium intake is wet bedding and soiled feathers in the vent area, as the extra calcium puts stress on the kidneys and makes the birds drink more to flush it out. This leads to more fluid in the droppings.

Low levels of calcium will lead to the birds laying soft-shelled or shell-less eggs. Unfortunately, these two deformities are not only seen with low calcium levels but could also indicate other nutritional imbalances like a lack of phosphorus, trace mineral, and/or vitamins.

When reading your feed tag, it is important to not only pay attention to the total amounts of minerals, but to also pay attention to the type of mineral source being used. Some sources are much more available to the bird's metabolism than others. This means that a high inclusion factor of a low available mineral source actually supplies less usable mineral for the bird than an equal or even lower amount of better bioavailable mineral source. A good example of trace minerals that have a high bioavailability are the chelated trace minerals Crystal Creek® uses in its poultry feed. Polysaccharide chelated zinc for example has up to 90% bioavailability, while the commonly used zinc oxide has only values around 20-30%. Therefore, the same inclusion in the diet will lead to 3 – 4.5 times the available zinc in the Crystal Creek® diet.

Management and Stress

Eggshell deformities that are commonly seen with stress are often related to the structure of the shell. Slab-sided, body-checked, broken, misshaped, or white banded eggs are typical examples. Often the stress causes one egg to slow down in the oviduct and the following egg "catching up" with the slowed down one. When the two eggs get in contact in the duct both shells are compromised.

Many management factors and outside stressors can cause a disruption to the sensitive process of eggshell production. The effects on the egg are less uniform as ones described above, therefore it sometimes can be hard to determine the cause behind a deformity caused by stress. What makes this even harder is that stress effects can mimic any deformity usually caused by a different factor.

Common stressors for birds are overcrowding, predators in or around the bird's enclosure, changes in the flock like sudden introduction of new birds or changes in their light regime, and/or feeding. Like most livestock, chickens like consistency above anything else and any change should be carefully timed and if possible, introduced gradually.

Disease

Unfortunately, some eggshell deformities are a sign of a serious infectious disease in a flock. Viral diseases like New Castle Disease, Infectious Bronchitis, and Egg-Drop Syndrome '76 would be the most important to note here.

New Castle Disease has a significant impact on the poultry industry due to its high contagiousness and mortality rate. Early signs of an infection can be soft shelled or shell-less eggs, often followed by respiratory signs and a complete stop of laying activity.

Infectious Bronchitis is a disease caused by a coronavirus that comes in 3 different forms: a respiratory, reproductive and kidney form. There is a drop in egg-production with all forms, paired with deformities like shell-less and corrugated eggs.

Egg Drop Syndrome '76 is a viral disease than can cause extreme loss in commercial egg production. When the virus infects a flock, the first sign of disease is the production of pale-shelled eggs, quickly followed by thin-shelled, soft-shelled, or shell-less eggs. The thin-shelled and shell-less eggs are fragile, and the birds tend to eat them; these eggs also may be trampled into litter and may be overlooked unless a careful examination is made. Other than the effects on the eggs the disease does not cause a clinical illness.

Figure 1 gives a summarized overview of the clinical symptoms of the three diseases mentioned in this article. When symptoms like the above occur, it is important to let a vet take samples and determine if and what viral disease has infected the flock as they cannot be distinguished by symptoms alone.

Eggshell deformities come in many shapes and forms, and it is very hard to diagnose from the appearance of the shell alone what the cause of it is. As a rule of thumb, it is advisable to inspect your eggs daily and take note of any deformities. When the same deformity is seen suddenly, with a high frequency and quantity, further steps like consulting with our team of experienced nutritionists at Crystal Creek® should be considered. You can call the Crystal Creek® office at 888-376-6777 or reach out via email to info@crystalcreeknatural.com.

References available upon request.

Figure 1 **CLINICAL SYMPTOMS OF THREE POULTRY DISEASES**

	Egg Production	Rough Egg Shell	Shell-less Eggs	Mortality	Respiratory Signs	Neurological Signs
New Castle Disease	↓	↑	↑	↑	↑	↑
Infectious Bronchitis	↓	↑	↑	↑	↑	
Egg-Drop Syndrome			↑			