

# Tips on layer bone and egg shell quality



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To ensure that a laying hen is productive, it is essential to establish and maintain a strong and healthy skeleton.



Therefore, a flock of high performance laying hens with problems in their skeletal structure usually shows a decrease in production, poor egg shell quality, and presentation of crooked keels or fractures.

With this article, **Zucami's** technical team intends to present **TIPS** to help our customers **understand the relationship between the layer's bone structure and the egg shell quality of the eggs they produce.**



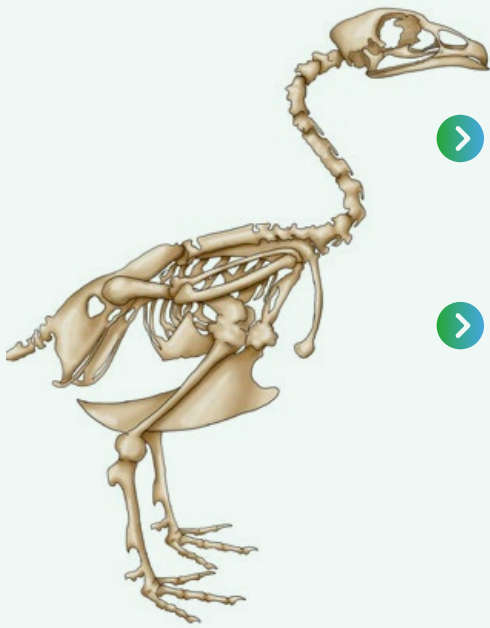


## The layer's skeleton

A problem that affects all egg producers in the world with high performance laying hens is the presence of fragile, thin and soft bones.



Understanding skeletal biology and the impact of diet on the skeleton is critical. There are three different types of bones:



- **Cortical Bone:** hard outer surface of round bones, such as the femur, or humerus and flat bones, such as the skull or pelvis.
- **Trabecular or cancellous bone:** less dense than cortical bone and helps maintain the inner structure of cortical bone.
- **Medullary bone:** specialized tissue that acts as a calcium reservoir for the demand of eggshell formation. Medullary bone easily creates and reabsorbs calcium making it ideal as the first source for mobilizing calcium when more calcium is required.

Bone growth and resorption are controlled and regulated by a few cells and many different hormones. In healthy well fed birds, the cells and hormones work together to maintain the bone structure and blood calcium levels necessary for optimal egg production.



## Eggshell mineralization

The mineralization of hen eggshell is the most accelerated calcification process known in nature.

The eggshell is developed in the uterus or **eggshell gland** by deposition of calcium carbonate. Shell formation takes around 20 hours.



- **Calcification takes place in the uterus** when the egg is immersed in uterine fluid, where calcium and bicarbonates are found in such high concentrations (hypersaturated medium) that calcium precipitates...
- The **disruption of the calcification process** occurs during the 2-4 hours prior to the expulsion of the egg.

Whitehead reported that the hen's bone begins to weaken from the time 200 eggs are produced, which corresponds to 50-52 weeks of life.

# 3

## Layer growth rate

### > 6-12 weeks

The highest rate of skeletal growth occurs between 6 and 12 weeks of age. During this time period, layer pullets gain an average of 90 to 110 grams of body weight per week.

By 12 weeks of age, 95% of the skeleton has developed and once the bone growth plates close near sexual maturity, the bone can no longer grow.

### > From 13 weeks onwards

At 13 weeks of age, birds have reached approximately 95% of their adult size, but only 75% of their mature weight.

In the next 6 weeks, muscle, medullary bone and reproductive tract will represent most of the weight gain.

### > 32 weeks

Laying birds will continue to add muscle and bone mass and gain in weight until approximately 32 weeks, when they reach their full mature body weight.



**A batch of birds that experience high levels of stress during periods of fast growth, is more likely to have poor uniformity which can affect peak production.**

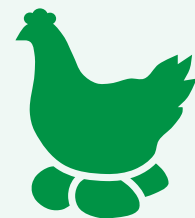
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## Bone production and quality

When the hen starts laying, its skeleton should already be complete lengthwise and widthwise. The skeleton of the hen is influenced by the level of egg production, the formulation of the diet in relation to consumption, and the state of a disease.



A well-developed layer generally does not experience skeletal problems until after peak production, even with slightly to moderately deficient diets.



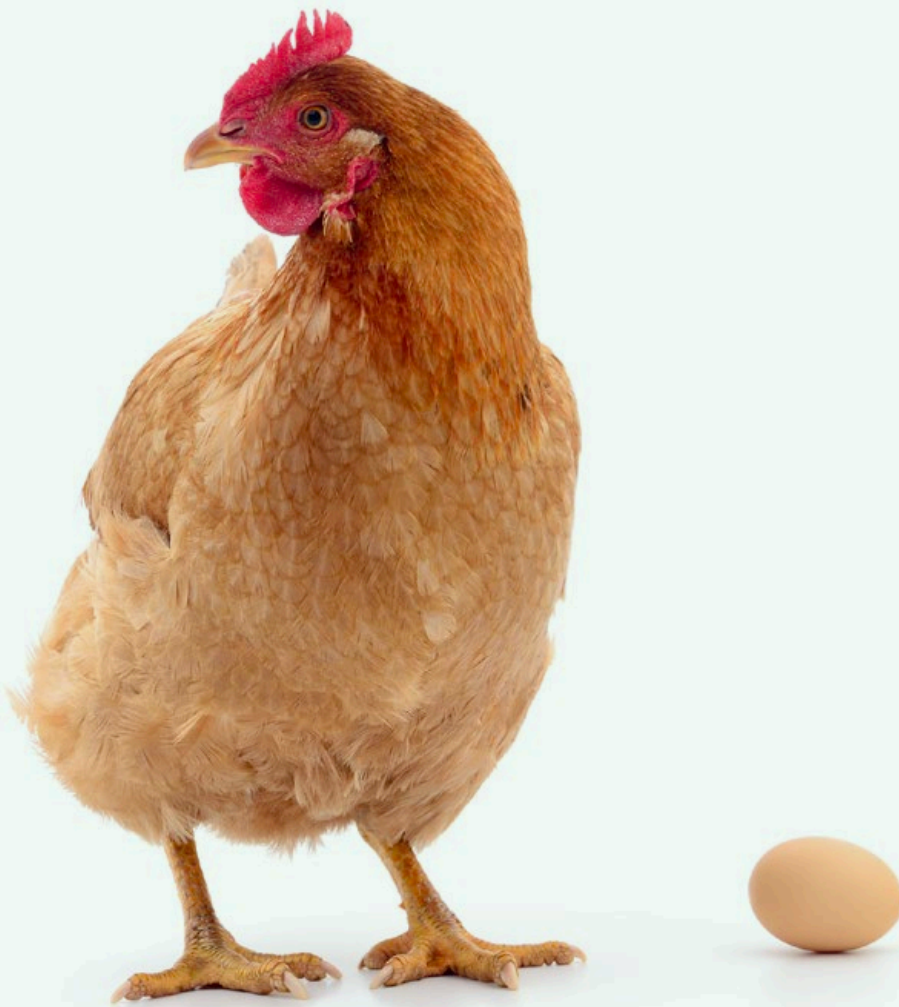
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## Nutritional deficiencies and diseases

In general, **nutritional deficiencies are often the first cause of a decrease in the integrity of the hen's skeleton leading to egg shell quality problems.**



- In addition, diseases related to the digestive or respiratory system can also lead to alterations in eggshell quality.





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