

# Leg Health in Chickens

Raising healthy poultry is the focus of industry and backyard farmers. Leg health is paramount to the holistic health of the bird. In serious cases of leg illness, the health of the entire bird is compromised. Pain and discomfort from leg-related illness may compromise the overall health of the bird, which in turn, can lead to dehydration, starvation, and in severe cases, death.

In this fact sheet and in the associated series of infographics, we will examine a variety of illnesses which impact the leg health of poultry, including:

- ▶ Bacterial Chondronecrosis with Osteomyelitis (BCO)
- ▶ Bumblefoot
- ▶ Osteoporosis
- ▶ Tibial Dyschondroplasia (TD)
- ▶ Twisted Legs

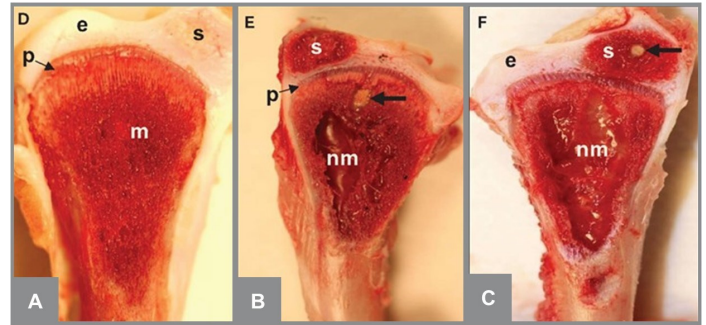
Some of the diseases discussed are infectious (BCO and Bumblefoot) while others are not (Osteoporosis, TD, and Twisted Legs), but these illnesses can be prevented. The keys to prevention of leg illness include proper nutrition, consistent monitoring, and proper breed/line consideration.

## What is BCO?

Bacterial Chondronecrosis with Osteomyelitis (BCO) is also called femoral or tibial head necrosis. BCO occurs when bacteria infect the head of the femur or tibia in poultry. BCO is mostly seen with high yielding broiler chickens.

### What Does BCO Look Like?

- ▶ BCO will look like other leg health issues. Birds may be walking abnormally or even exhibit an inability to walk (lameness).
- ▶ Leg issues from BCO may become noticeable after 14 days of age.



*Normal appearance of the tibial head (A). Bacterial infection has destroyed a portion of the growth plate (B, C). Thick arrows point to bacterial colonies. Source: Wideman and Prisby*

- ▶ In order to confirm the cause of lameness is BCO, a necropsy must be performed post-mortem.

### How Do You Prevent BCO in Your Flock?

- ▶ Keep all equipment for hatching chicks clean and disinfected.
- ▶ Vaccinate birds for any viral diseases common in your area. Sick birds may be more likely to develop BCO infections.
- ▶ Proper nutrition and adding probiotics can help prevent BCO.

### Why Does BCO Matter?

- ▶ Severe cases of BCO can prevent birds from accessing food and water because they cannot or will not walk.
- ▶ BCO is painful for the bird.
- ▶ BCO can be horizontally transmitted (from bird to bird). This happens when an infected bird exposes another to the bacteria. This may happen at the drinker, and on many other surfaces through out the house.

### Potential Technology to Diagnose BCO

Researchers have used infrared imaging technology as an on invasive test for BCO. Although the results are

promising, more research is needed before this method can be used on-farm. Link to study <http://dx.doi.org/10.3382/ps/pey538>

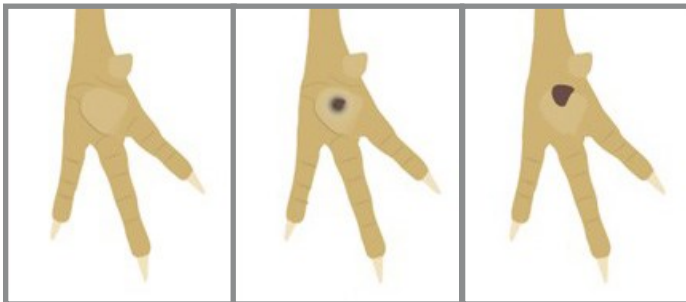
**There is no treatment for BCO. Monitoring and prevention are key. A good vaccination program and biosecurity practices may reduce incidences of BCO.**

## What is Bumblefoot?

Bumblefoot, also called pododermatitis, is a bacterial (typically *Staph. aureus*) infection of the foot pad. Infection develops after an injury to the footpad allows the bacteria to get inside the wound.

### What Does Bumblefoot Look Like On-farm?

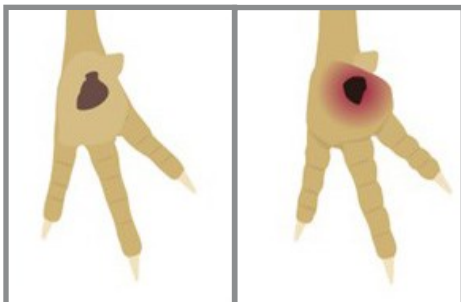
- ▶ Irritation of the footpad, ulcers as the disease progresses, and swelling will develop.
- ▶ The infected area may be warm to the touch.
- ▶ Redness around the scabbed area may be present.



**Grade I:** Redness on the surface, shiny appearance, or small lesions. No infection apparent.

**Grade II:** Lesion with infected tissue, no swelling.

**Grade III:** Infected lesion with swelling.



**Grade IV:** Plug of dead tissue, with infection of tissue in the foot, mild lameness.

**Grade V:** Swelling around the plug of dead tissue, with severe lameness.

Source: PoultryDVM

## How Do You Prevent Bumblefoot in Your Flock?

- ▶ Feeding a well-balanced diet, especially in vitamin A.
- ▶ Provide a clean housing environment. Keep litter dry.
- ▶ Minimize surfaces that may injure birds' feet.

## How Do You Treat Bumblefoot?

There are a variety of treatments for bumblefoot, including:

- ▶ Foot soaks with epsom salts or chlorhexidine solutions
- ▶ Bandaging with a dressing to facilitate healing
- ▶ Antibiotics
- ▶ Surgery performed by a veterinarian

## Why Does Bumblefoot Matter?

- ▶ Severe cases of Bumblefoot can prevent birds from accessing food and water because they cannot or will not walk.
- ▶ Bumblefoot is painful for the bird.

## Potential Technology to Diagnose Early-Stage Bumblefoot

Currently, Bumblefoot is diagnosed after symptoms are visible (Grade II-V). Researchers have used thermography technology to test for early stage Bumblefoot infections. Although the results are promising, more research is needed before this method can be used on-farm.

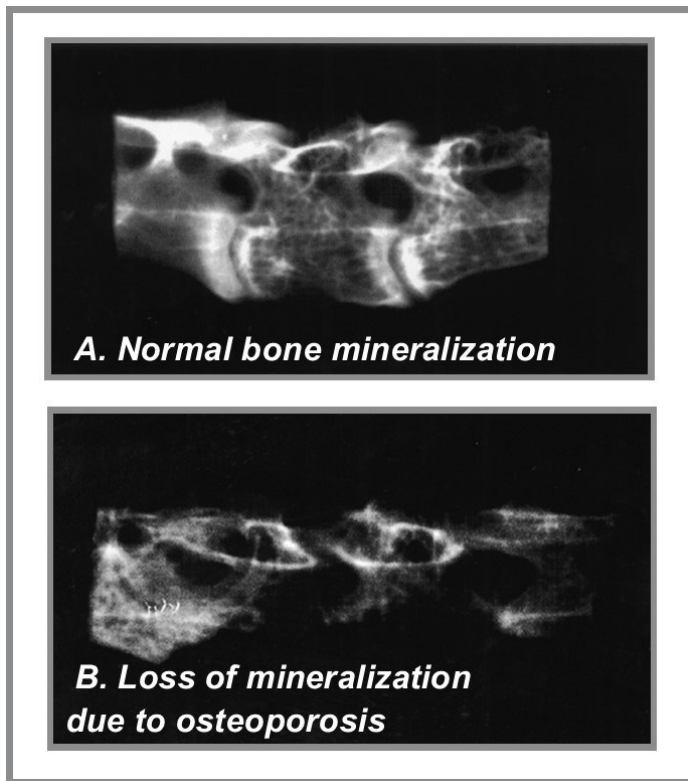
Link to study: <https://doi.org/10.3382/ps.2008-00446>

**Although there are treatments for Bumblefoot prevention and early detection are key to keeping birds healthy. Proper diet and clean housing with minimal environmental risk for birds to injure their footpad, reduces incidences of Bumblefoot.**

## What is Osteoporosis?

Osteoporosis is a skeletal disease characterized by the loss of mineralization in bones.

In 1955, a term "caged layer fatigue" was first used to describe osteoporosis symptoms, including: increases in brittle bones, paralysis, and death in caged laying hens. (Grumbles, 1959)



Radiograph (X-ray) images showing vertebrae with and without osteoporosis. Source: Whitehead and Fleming

**What Causes Osteoporosis?**

- ▶ Mature bones are constantly undergoing cellular processes to break down and replace the existing bone tissue.
- ▶ If the rate of break down becomes faster than replacement, then osteoporosis develops.

**What Does Osteoporosis Look Like?**

- ▶ Osteoporosis is more common in laying hens during the laying period because calcium is used for egg shell development.
- ▶ Osteoporosis can lead to bone fractures throughout the skeletal system.
- ▶ Birds may be reluctant to walk.
- ▶ In very severe cases, paralysis may develop shortly before death.

**How Do You Prevent Osteoporosis in Your Flock?**

- ▶ Before "lighting up" (increasing daily light hours to stimulate egg production), supplement pullets with additional calcium in the diet.
- ▶ Feeding a well-balanced diet. Nutritional deficiencies may increase the severity of osteoporosis.

- ▶ If you suspect osteoporosis in your flock, you can supplement oyster shells along with vitamin D for 3 days to reduce likelihood of mortality.
- ▶ Select breeds with lower incidences of osteoporosis.
- ▶ Ensure hens have an environment that encourages exercise. Research shows that inactivity is likely to increase the risk of developing osteoporosis.

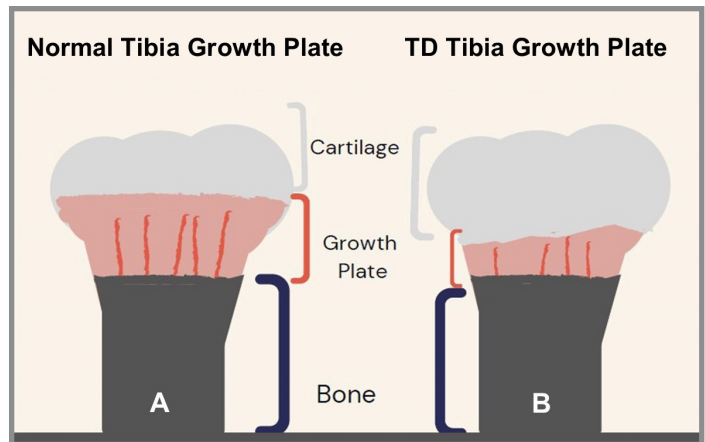
**Why Does Osteoporosis Matter?**

- ▶ Mineralization loss decreases the strength of structural bones.
- ▶ Decreased bone strength increases the risk of fractures.

**There is no cure for osteoporosis. Monitoring and prevention is key. These are accomplished with proper nutrition, breed consideration, and housing environments which encourage exercise.**

**What is TD?**

Tibial Dyschondroplasia (TD) is a skeletal disease of the tibia bone at the proximal growth plate characterized by large regions of cartilage at the growth plate in poultry. TD is most common in broiler chickens.



Source: Anna Magnaterra

- A.** During normal development, cartilage at the growth plate is replaced with mineralized bone tissue. Blood vessels bring the necessary bone cells to break down the cartilage and build the bone tissue in its place.
- B.** In birds with TD, there are not enough blood vessels at the growth plate. This means the cartilage is not replaced with bone tissue.

**For more information on the role of blood vessels in TD, this link (<https://doi.org/10.3382/ps/pez497>) to review paper is a great place to start!**



### What Does TD Look Like On-farm?

- ▶ TD will look like other leg health issues. You will likely see birds walking abnormally or unable to walk.
- ▶ To confirm TD, scoring is done to the bird's tibia bone after death.

### How Do You Prevent TD in Your Flock?

- ▶ Feed a well-balanced diet that contains minerals such as calcium and phosphorous.
- ▶ Keep breeds without a history of leg issues. TD is more common in broiler breeds.

### Why Does TD Matter?

- ▶ Severe cases of TD can prevent birds from accessing food and water because they cannot or will not walk.
- ▶ TD is likely painful for the bird.

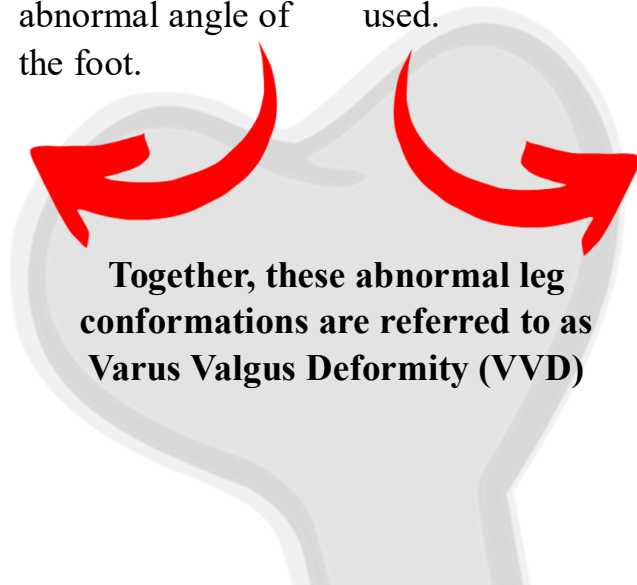
**There is no treatment for TD. Monitoring and prevention is key. These can be done with proper nutrition and choosing breeds with good leg health.**

## What are Twisted Legs?

Twisted leg describes an abnormal angle in poultry legs. The “twist” is caused by a rotation in the tibia bone near the hock joint.

If the foot turns inward, the term **varus** is used to classify the abnormal angle of the foot.

If the foot turns outward, or away from the body, the term **valgus** is used.



A. *Varus deformity of both legs*  
Source: Guo et al (<https://doi.org/10.3382/ps/pez269>)



B. *Valgus deformity of the right leg*  
Source: Guo et al (<https://doi.org/10.3382/ps/pez269>)

*Akbas and team estimate that VVD is moderate to highly heritable, meaning that it is very likely that a parent may pass this disease on to their offspring. It is important to note that heritability is likely to vary between breeds of chickens. Link to study <https://go.umd.edu/akbas2009>*

### How Do You Prevent VVD in Your Flock?

The prevalence of VVD in flocks will vary depending on:

- ▶ Breed: Commercial broilers (or meat) birds are more likely to develop VVD than slower-growing birds.
- ▶ Nutritional deficiencies: Poor nutrition may predispose a flock to develop VVD.
- ▶ Sex: VVD is more often seen in males.

VVD is not an infectious disease and cannot spread from bird to bird.

**There is no treatment for the skeletal deformity that causes VVD. Monitoring and prevention are key. Provide proper nutrition and consider breeds with good leg health.**

## References

- Grumbles, L. C. 1959. Cage layer fatigue (cage paralysis). *Avian Diseases*, 3(2), 122. <https://doi.org/10.2307/1587714>
- Guo, Y., Tang, H., Wang, X., Li, W., Wang, Y., Yan, F., Kang, X., Li, Z., & Han, R. 2019. Clinical assessment of growth performance, bone morphometry, bone quality, and serum indicators in broilers affected by valgus-varus deformity. *Poultry Science*, 98(10), 4433–4440. <https://doi.org/10.3382/ps/pez269>
- Huang, S., Kong, A., Cao, Q., Tong, Z., & Wang, X. 2019. The role of blood vessels in broiler chickens with tibial dyschondroplasia. *Poultry Science*, 98(12), 6527–6532. <https://doi.org/10.3382/ps/pez497>
- Merck Sharp & Dohme Corp. 2021. *Merck Veterinary Manual*. <https://www.merckvetmanual.com/>.
- Weimer, S. L., Wideman, R. F., Scanes, C. G., Mauromoustakos, A., Christensen, K. D., & Vizzier-Thaxton, Y. 2019. The utility of infrared thermography for evaluating lameness attributable to bacterial chondronecrosis with osteomyelitis. *Poultry Science*, 98(4), 1575–1588. <https://doi.org/10.3382/ps/pey538>
- Wideman, R. F., & Prisby, R. D. 2013. Bone circulatory disturbances in the development of spontaneous bacterial chondronecrosis with osteomyelitis: A translational model for the pathogenesis of femoral head necrosis. *Frontiers in Endocrinology*. <https://doi.org/10.3389/fendo.2012.00183>
- Wilcox, C. S., Patterson, J., & Cheng, H. W. 2009. Use of thermography to screen for subclinical bumblefoot in poultry. *Poultry Science*, 88(6), 1176–1180. <https://doi.org/10.3382/ps.2008-00446>

ANNA  
MAGNATERRA  
amagnate@umd.edu

SHAWNA  
WEIMER  
slweimer@umd.edu

This publication, *Leg Health in Chickens* (FS-1179), is a series of publications of the University of Maryland Extension and the Department of Agriculture.

The information presented has met UME peer review standards, including internal and external technical review. For help accessing this or any UME publication contact: itaccessibility@umd.edu

For more information on this and other topics, visit the University of Maryland Extension website at [extension.umd.edu](http://extension.umd.edu)

*University programs, activities, and facilities are available to all without regard to race, color, sex, gender identity or expression, sexual orientation, marital status, age, national origin, political affiliation, physical or mental disability, religion, protected veteran status, genetic information, personal appearance, or any other legally protected class.*