

The Normal and Abnormal Equine Neonatal Musculoskeletal System



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KEYWORDS

- Musculoskeletal • Ossification • Synovial infection • Osteomyelitis • Flexural limb
- Angular limb

KEY POINTS

- The first few weeks of life are critical in horses.
- Cuboidal bone ossification at birth can vary and should be assessed in premature and dysmature foals.
- Flexural limb deformities, angular limb deformity, and laxity are common in neonatal foals and should be assessed and treated early.
- Neonatal foals are susceptible to septic orthopedic conditions owing to immature immune system and physeal blood flow. Early recognition and treatment is key to success.

NORMAL OSSIFICATION

In the typical foal, the tarsal and carpal bones ossify in the last 2 to 3 months of gestation.¹ The normal process of endochondrial ossification starts centrally within the bone and the process continues until the periphery of the bone is mature with the normal surrounding cartilage. Ossification of the cuboidal bones plays an important role in the foal, but should not be confused with total skeletal maturity.² In the human, skeletal maturity is determined by radiographs of the axial skeleton because cuboidal bones are not a reliable index for total skeletal maturity.^{3,4}

A skeletal ossification index has been used to standardize the evaluation of newborn foals.² The index is based on 2 radiographic views of the carpus and tarsus, and 4 grades have been developed.

- Grade 1: Some of the cuboidal bones of the carpus and tarsus have no radiographic evidence of ossification (**Fig. 1**).
- Grade 2: Some radiographic evidence of ossification of all of the cuboidal bones of the carpus and tarsus (excluding the first carpal bone). The proximal physes of the third metacarpus/metatarsus were open (**Fig. 2**).

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Fig. 1. Grade 1 ossification. Some of the cuboidal bones show no evidence of ossification.

- Grade 3: All of the cuboidal bones were ossified, but they were small with rounded edges. The joint spaces thus seemed to be wide in these individuals. The lateral styloid process and the malleoli were distinct. The proximal physes of the third metacarpus and metatarsus were closed ([Fig. 3](#)).



Fig. 2. Grade 2 ossification. All cuboidal bones have some evidence of ossification. There is a faint line representing the open proximal metacarpal physes.

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