

Indications and Limitations of Splints and Casts

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KEYWORDS

• Cattle • Fracture • Cast • Orthopedic • Lameness

KEY POINTS

- Simple casts are indicated for close transverse or short oblique fractures and carries an excellent prognosis.
- The foot should always be included with full or short limb casts.
- A transfixation pinning and casting technique avoids collapse of the comminuted fracture or severe overriding of long oblique fractures during weight-bearing.
- The cast should be changed every 3 to 4 weeks in newborn calves to avoid complications regarding their fast growing rate.



Videos of full limb casting on a young calf and a young heifer with a full limb cast with a quasi-normal gait accompany this article at <http://www.vetfood.theclinics.com/>

Long bone fractures are relatively common in cattle whether they result from a self-inflicted trauma or from external factors (herd mate or farm machinery).¹ Various advanced orthopedic techniques have been described to stabilize and treat fractures in cattle with success. Unfortunately the use of most of those techniques remains unrealistic in a field setting, rendering the realization of splints and casts still accurate for the treatment of long bone fracture in cattle. However despite that use of cast is reported in cattle for more than a century,² some guidelines need to be followed to assure the best results to the investment made by the owner. This article refers to the use of all external coaptations and their specific indications as well as their limitations.

USE OF CASTS IN CATTLE

The goal of casting is to provide early weight-bearing and achieve adequate bone healing rapidly. Most patients are young with a strong periosteal healing potential.

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Therefore, cattle are great orthopedic patients regarding fracture repair.¹ Compared with other species, they tolerate limb immobilization very well because of their calm nature, making the use of casts common in field conditions as well as in referral centers.

The principle of the application of a cast to treat a fractured limb is to immobilize the joints distally and proximally to the fractured bone so that once reduced and imbedded in the cast the bone fragments stay aligned for a sufficient period of time to allow secondary bone healing. Based on the anatomy of cattle, the most proximal joints that can be immobilized in a cast are the carpus in forelimbs and the tarsus in hindlimbs. Therefore fractures of the metacarpus and metatarsus III–IV are best suited to be treated with simple external coaptation.

Plaster of Paris and synthetic casting tapes have been commonly used in cattle. Plaster cast is cheap and easy to conform to the limb, but it is not waterproof and it is weaker and heavier than synthetic casts. Moreover, it takes 24 hours to cure and to gain its final strength-retarding weight-bearing.³ It is still in used in neonates but it should never be used in an older, heavy animal. Nowadays synthetic casting is routinely used in farm animals. The conformability has been greatly improved over the years by using fiberglass or polyester fiber with polyurethane resin. Although more expensive, fiberglass casting is used more often because of its rapid curing, light weight, permeability, and radiolucent property. An *in vitro* study tested a synthetic cast cylinder under compression and torsion.³ After 10, 30, 60, and 120 minutes of curing, the cast cylinder was at 30%, 62%, 70%, and 100% of its strength, respectively. Considering the time it takes to conform the casting tape and getting the animal standing, the cast can support the weight of the animals after 30 minutes. Fiberglass casting tapes keep 70% to 90% of their strength after being immersed in water and dried out. Even with this loss of strength, a wet fiberglass cast is 33% stronger than a dry plaster cast.⁴

Casting tapes come in different widths (2, 3, 4, and 5 inches) to fit different patient sizes. The appropriate width that will allow perfect conformability without any fold should be used. Usually smaller tapes are used first to better conform the limb, followed by wider tape. It was shown in an *in vitro* cast cylinder model that 5-inch casts were stronger.⁵ The tape is spiraled around the limb with a 50% overlap from bottom to top.

SELECTION OF THE PATIENTS

The fractured animal should be carefully examined before attempting to put a cast on the leg. Characterization of the fracture with 2 orthogonal radiographic views (dorso-palmar/plantar and lateromedial) should be performed. Casts are especially indicated for simple transverse or short oblique diaphyseal fractures (**Fig. 1**) and metaphyseal fractures (Salter-Harris type 1 and 2) (**Fig. 2**). The use of a simple cast in the case of compound diaphyseal fractures and long oblique fracture is debatable as reinforcement with a walking bar or use of the transphyseal pinning and casting technique may be more appropriate if external coaptation has been chosen for treatment to external skeletal fixators; the use of open reduction and internal fixation will provide a better stability to the fracture.⁶

Examination of skin integrity is extremely important because casts are indicated for a closed fracture. The distal limb is not well protected by soft tissue, increasing the risk of open fracture, and contamination is highly probable in farm injuries. Any skin injury around the fracture line should be carefully examined. If doubtful, the hair should be clipped, and the wound cleaned and probed to evaluate its depth.

Alteration of the vasculature in the case of chain-induced fracture in newborn calves during forced extraction may occur without a clear break of the skin barrier (**Fig. 3**).

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