

1 How to Deal with Adults with Horns

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DRAFT

7 Abstract

8 Conditions involving the horns of adult cattle requiring veterinary attention are not infrequent. Horns are desirable in
9 certain breeds of cattle (i.e. Longhorns and some foundation genetics) and for cattle engaged in certain disciplines
10 (i.e. rodeo bulls). Broken horns, skull fractures at the base of the horn, sinusitis (with or without a history of surgical
11 dehorning), and trauma are just some of the reasons horned cattle present to veterinarians. For each of these
12 conditions, treatment tends to have a more favorable outcome when instituted early.

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14 Keywords

15 Bovine, Sinus, Horn, Longhorn, Trephination

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17 Trauma

18 Head trauma of cattle involving the horns can occur in many different locations for many different reasons. Horns
19 can be fractured as the result of a fight between animals, getting the head and/or horns stuck in the fence or gate, as
20 the result of an accident in the hydraulic chute, or from predator attacks. Depending on the location of the fracture,
21 the horn could simply be trimmed back past the fracture line or in more severe cases, the horn surgically removed. If
22 the horn is transected past the fracture line and the sinus is opened (but was distant from, and unaffected by, the
23 trauma) capping the end of the horn with polymethylmethacrylate or an epoxy is warranted. Historically, the
24 treatment for horn fractures at the base of the horn has been surgical removal. Recently, three cases involving acute
25 frontal bone fracture and horn displacement in Longhorns have been successfully repaired by clinicians at Texas
26 A&M University Large Animal Teaching Hospital using Locking Compression Plates, steel buttress, and cast
27 stabilization (Figure 1) indicating that perhaps some cases may be amenable to fracture stabilization. If the fracture
28 is open or if there is substantial soft tissue injury or infection at the site, removal of the horn and aggressive wound
29 management should be implemented to support second intention healing.

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31 Sinusitis

32 Frontal sinusitis in cattle is the most common sequela of dehorning procedures during which the frontal sinus was
33 exposed following removal of the horn. However, it can also be seen following traumatic fracture of the horn and/or
34 frontal bone, tipping of horns (such as commonly seen in rodeo bucking stock), in certain breeds with large horns
35 (i.e. Longhorn), and sequestration of bone secondary to dehorning. Similar to the horse, the frontal sinus is the
36 largest of all the sinuses. However, in cattle, the frontal sinus is more compartmentalized which can make treatment
37 of sinusitis more complicated. The caudal frontal sinus is the most expansive, extending into the horn (if present) as
38 the cornual diverticulum in mature animals. Also unique to ruminants, a second diverticulum is located behind the
39 orbit, identified as the postorbital diverticulum which is often the site for retention of purulent material beyond reach
40 of fluid during a routine sinus lavage. The further compartmentalization of the caudal frontal sinus by irregular
41 osseous and membranous partitions can make successful treatment of purulent sinusitis a challenge due to the
42 inability to thoroughly and completely lavage the sinus. The frontal sinus normally communicates with the nasal
43 passage via multiple fenestrations into the ethmoid meatuses.

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45 Diagnosis and Treatment

46 When sinusitis is present, sinus lavage is a critical component of treatment. In acute cases of sinusitis when there is
47 still drainage from the nostrils, lavage can be performed through a small hole created in the caudal frontal sinus
48 using a 4mm Steinman pin inserted with a hand chuck. This hole will accommodate the male end of a fluid
49 administration set or Simplex outfit which will allow for routine lavage procedures. However, this method of lavage
50 will be inadequate when there is purulent material present and/or in chronic cases. When lavage through a relatively
51 small opening with a simple fluid administration set is unproductive, especially if there is an outflow obstruction of
52 the communication with the nasal passage, further intervention will be needed. Chronic cases of sinusitis,
53 complicated by the presence of inspissated pus, necrotic debris, bone sequestra, or thick secretions, usually require
54 more invasive approaches to the sinus. Importantly, antibiotic treatment alone is ineffective in treating purulent
55 sinusitis should be an adjunctive therapy to frequent high-volume lavage. Access to the frontal sinus can be
56 achieved on the farm or in the clinic via trephination with either a Galt or Michele trephine. The advantage of the
57 Galt trephine is that it results in a larger access portal to the sinus. The appropriate site should be chosen to best
58 access the affected sinus. (Figure 2) If helpful, radiographs can assist in determining the optimal site for the portal
59 based on fluid location.

60

61 Trephination

62 The patient's head should be appropriately restrained in a hydraulic chute or manual head catch. A halter or
63 hydraulic sweep should be used to further restrain the head to minimize movement during the procedure. The
64 trephine site should be clipped allowing for at least a 2-inch circumferential margin around the proposed site. A
65 rough preparation of the site should be performed with chlorhexidine scrub followed with alcohol. Ensure that these
66 solutions do not contact the eyes as this will result in severe chemical keratitis. A judicious amount of lidocaine
67 should be placed subcutaneously at the trephination site followed by a more thorough cleansing of the site with
68 scrub and alcohol. Using a scalpel blade, a full thickness circular area of skin should be removed corresponding to
69 the size of the trephine extending to the periosteum of the frontal bone. The trephine should then be used in a
70 clockwise rotation to remove a section of bone allowing access into the sinus. At this time, a sample of the fluid
71 within the sinus should be aseptically collected and submitted for culture and sensitivity. The sinus may now be
72 lavaged and/or investigated further using flexible endoscopy if necessary. Lavage fluid should be at minimum room
73 temperature, but preferably warm. Sterile saline can be used through a fluid pump for high-pressure, high-volume
74 lavage. If finances are limited, a very dilute betadine solution can be substituted using clean water. 3-5 liters of fluid
75 are recommended per lavage. Notably, in one study, 5% diluted povidone-iodine solution was shown to have better
76 outcomes than using saline alone.¹ A successful lavage will result in debris being floated out of the sinus through the
77 trephine hole and fluid should be also be observed flowing from the ipsilateral nostril. If fluid is not observed at the
78 nostril, this indicates the sinus drainage fenestrations are no longer patent and may result in a longer course of
79 therapy and cost of resolution.

80

81 Aftercare

82 Trephine sites and infected trauma/surgical sites should be left open to heal by second intention. Covering the sites
83 is recommended to keep debris and further contaminants from entering the sinus. A stent bandage using #2
84 polymerized caprolactam (Braunamid; Braun) (or other non-absorbable suture material) is easily made by placing
85 loose interrupted sutures through the skin perpendicular to the openings. Umbilical tape can then be passed through
86 each suture loop and a roll of 4X4 gauze sponges or a 4" roll gauze or a clean huck towel can then be placed over
87 the opening and secured in place by the umbilical tape. The bandage may then be removed and replaced for

88 subsequent sinus lavage procedures or alternatively left in place until the defect has closed. Patient care should also
89 include the use of anti-inflammatory medications such as meloxicam (0.5-1.0 mg/kg PO SID – EOD) or flunixin
90 meglumine (1.1 – 2.2 mg/kg IV as needed) and antimicrobial administration if indicated.

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92 Conflict of Interest Statement

93 The author declares no conflict of interest.

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95 References

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97 plastic dehorning in cattle. *Acta Scientiae Veterinariae* 2010; 38:25-30