

## Traumatic injuries in New Zealand working farm dogs

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Orthopaedic injuries in working dogs can be a devastating and career ending event. The speed at which they work, the terrain, and the hazards of working around vehicles and stock often put working dogs at high risk for injury. What follows is a review of the types of orthopaedic injuries that can occur, and more importantly, the prognosis for return to work when these injuries are surgically treated.



### Carpal trauma

Severe trauma to the carpus, such as luxations or fractures, can result in joint instability and if not repaired, the development of osteoarthritis. Pan-carpal arthrodesis (PCA) is indicated when there is joint instability or luxation (such as carpal hyperextension injury), and where primary repair is either unlikely to be achieved or has a low rate of success for a return to work. Dogs that have severe carpal osteoarthritis would also benefit from PCA to reduce the pain in the joint. Worth (2008) found the most common cause of carpal hyperextension injuries in working dogs was trapping a foot in the carrier of the bike or truck when jumping off, or being stood on by cattle when the dog's leg was planted on the ground. Worth and Bruce (2008) investigated the outcome of twelve dogs with severe carpal injury that were treated by surgical PCA. Over a five-year follow-up period it was found that six of the twelve dogs could return to normal duties following surgery. A further four dogs could perform most, but not all, duties as before the surgery. This study, although small, does assist the owner's and veterinarian's decision as to whether to undertake surgery, or whether to spend resources on training a new dog. Worth and Bruce found that the majority of dog owners (n=11/12) felt that the surgical repair was worthwhile in a trained dog. These results are similar to those of a prospective study by Jerram *et al.* (2009) in which ten out of twelve dogs could perform duties normally or with some allowance for reduced performance, following PCA. Eleven out of twelve owners in this study reported that the results of

the surgery met their expectations. Three dogs had complications requiring implant removal, but this did not appear to affect the dog's ability to return to work.

Force plate analyses conducted on a group of PCA dogs found that peak weight bearing was no different from normal dogs (Maarschalkerweerd *et al.*, 1996). From this data, Worth (2008) surmised that any gait abnormality following PCA was due to altered movement in limb with the fused carpus rather than due to pain.

In some cases partial carpal arthrodesis has a superior functional outcome, with less gait abnormality; however the extra stress this places on the antebrachio-carpal joint can lead to osteoarthritis (Worth, 2010).

### Tarsal trauma

As with carpal injuries, the cost of corrective surgery has to be weighed against the dog's level of ability, breeding value and the cost of replacement. Conservative treatment of second and third degree sprains to the ligaments of the tarsal joint usually has a poor outcome. The intertarsal and tarso-metatarsal joints have little movement in the healthy animal, and so respond well to arthrodesis, resulting in a relief of pain and restoration of athletic ability (Scrimgeour *et al.*, 2012).

Scrimgeour *et al.* (2012) reported a case series of 14 working dogs that had undergone partial tarsal arthrodesis at Massey University Veterinary Teaching Hospital. Eleven of the 14 dogs returned to normal work, or could perform most of their prior duties, with some allowance made for lower performance. Three dogs had complications (infection) that were considered major as they required removal of the implants used for arthrodesis. However two of the three dogs returned to work once the implant was removed. The remaining dog was found to have malalignment from the axial plane, resulting in suboptimal compression and limited fusion. This dog remained lame and was no longer useful as a working dog. Thirteen of the fourteen owners were either satisfied or very satisfied with the outcome of the procedure. One owner was very disappointed, presumably the owner of the dog that was unable to return to work.

A British study of 13 sport dogs that underwent pantarsal arthrodesis using a customised medial or lateral bone plate reported excellent results in six dogs, good results in six dogs and a fair result in the remaining dog. These dogs were followed for 29 to 156 weeks after the surgery (McKee *et al.*, 2004). These results suggest that both pantarsal and partial tarsal arthrodesis may be feasible options for working farm dogs suffering severe trauma to the tarsal joint. Although the numbers of dogs in each study are relatively small, the preliminary results are

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encouraging. Further studies using larger numbers of dogs and longer term follow up are required.

### Common calcanean tendon damage

The common calcanean tendon (CCT) is made up of the superficial digital flexor tendon, gastrocnemius muscle group tendon, and the combined tendons of the gracilis, semitendinosus and biceps femoris muscles. Any attempt at repair of the tendon must be able to support the high level of athleticism required by working dogs. The potential for returning to strenuous work after CCT tenorrhaphy is unlikely (Johnson and Hulse, 2002), although most pet dogs can resume normal activities. Little information is available as to the long-term outcome of CCT tenorrhaphy in working dogs (Worth *et al.*, 2004).

CCT injuries can occur with blunt force trauma, laceration, or spontaneously with abnormal activity. Muscular or musculotendinous rupture of the CCT is common in mature working or racing breeds, whereas incomplete ruptures due to gastrocnemius tendon avulsion is more common in large breed, mature and overweight dogs (Bloomberg, 1993). Bloomberg states that traumatic rupture of the CCT is most often seen when the dog jumps from a height and lands on its hind-legs, causing sudden hyperflexion of the hock joint. In contrast, a study by Vaughan (1981) found lacerations to be the cause of rupture in nine out of ten dogs.

Worth *et al.*'s retrospective study (2004) investigated ten dogs that were surgically treated for CCT rupture. Two had become lame while running; two were injured falling from a truck, one of which lacerated the tendon during the fall; three dogs received trauma from stock; two involved falls while jumping and one caught a hind-leg in a fence. Five of the dogs in this study were Heading dogs, and five were Huntaways. Seven of the ten dogs returned to full or substantial work. The steepness of the farm terrain did not seem to preclude dogs returning to work. A follow-up survey showed that 71% of owners were satisfied with the degree of work the dogs could perform. The author proposed that post-surgical time off work, financial factors and individual owner expectations may have played a role in this result. Three of the ten dogs experienced major complications after surgery. The surgical site of one dog became infected whilst the limb was cast, with subsequent breakdown of both the skin wound and the tendon repair. One dog developed contracture of the superficial digital flexor muscle, resulting in difficulty placing the paw in the proper plantar position. The third dog re-injured the tendon and was presented in a plantigrade stance with a fresh laceration over the surgical site. It was found that the tip of the calcaneus had fractured resulting in avulsion of the CCT.

Worth *et al.*'s study highlighted the importance of rigid stabilisation of the hock joint following surgery. All (n=7/7) dogs treated with screw immobilisation of the hock joint during CCT tenorrhaphy returned to work. None (n=3/7) of the dogs stabilised post-operatively with a cast-only fixation returned to work, due to failure of the CCT to adequately heal, or due to complications associated with the cast itself.



### Conclusion

Although the numbers of dogs in each of these studies is relatively small, it does provide some guidance for farmers when deciding whether to undertake surgery for their working dogs. The main points to consider are ensuring the farmer has realistic expectations of the dog's performance post-surgery, and to avoid casts as the sole means of support when carrying out CCT tenorrhaphy.

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