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Case Report

Findings and strategies for treating horses injured in open range fires

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Summary

Eight horses with varying degrees of burns sustained in an Australian bushfire were treated over several months. The horses were attended at the scene of the fire and then hospitalised from 4 days to 4 months for burns sustained to the head, ventral body and legs. The clinical findings and treatment of two of the horses are described. Variations with barn fire injuries and treatment are noted. While some horses were subject to euthanasia, or died at the scene of the fire, all hospitalised horses recovered.

Introduction

Scientific literature describing equine thermal injuries is helpful when managing horses that have been burned in barn fires, but the literature regarding large numbers of horses in rural grass fires is scant (Geiser and Walker 1984; Hanson 2005, 2008; Adam 2012). In grass fires, the burns are often on the extremities and ventral abdomen, and the treatment of burns in these areas varies from the dorsal thermal injuries experienced in barn fires. While some online descriptions of injuries to the extremities exist, very little is available about the treatment of large numbers of horses that have sustained primarily ventral body burns (Heislers 2009).

Emergency treatment literature primarily comes from human-burn experience and even initial triage immediately following the fire is controversial. For example, recent literature suggests that icing may be deleterious; however, cooling with tap water may be beneficial (Raine *et al.* 1981; Marsh 2007; Yuan *et al.* 2007; Cuttle *et al.* 2009). Unfortunately, immediate triage and treatment at the scene of a grass fire may be limited when there are no standing facilities or running water. Several options for analgesia are available (Mathews and Carroll 2007), yet topical dressings and bandaging can be time-consuming to apply daily (Bischofberger *et al.* 2013). The economic burden for the owners, and often the veterinarians, of long-term treatment of burned horses can be prohibitive (Moyer *et al.* 2013; Herbert and Meyer 2016).

In November 2015, a grass fire burned over 200,000 acres in 5 h in South Australia. Many horses and thousands of livestock were killed or severely burned in this fire. In the first few hours after the fire, several horses were examined in the field and then brought to Adelaide Plains Equine Clinic for further treatment. Fourteen horses were hospitalised the first night; eight were severely burned and six required long-term hospitalisation of up to 4 months. Two horses treated at the scene were subjected to euthanasia on the night of, or in the days immediately following the fire. All horses brought to the clinic had corneal ulcers and burns on their muzzles, and most of the horses in this incident had extensive burns to the legs and ventral body; additionally, many had significant coronary band separation in the ensuing weeks. There are few reports of how to address the coronary band separation and predict outcomes, so phone conversations from anecdotal previous experience guided decisions on how to treat these horses. This case report describes the treatment for two of the eight severely burned horses from this fast-moving grass fire.

Case 1

A grey, 9-year-old Quarter Horse mare was examined and treated within an hour after being trapped in a stubble field with three other horses. She appeared to be in shock and obvious pain. Her skin was intact, but her mane and tail were singed with significant hair loss. Her coronary bands were leaking serum, her lips and face were burned, and she had bilateral corneal ulcers (**Fig 1**). She was treated at the scene with flunixin meglumine (Flunixon Injection)[1] 1.1 mg/kg bwt i.v. and was started on a triple antibiotic eye ointment containing zinc bacitracin 500 iu/g, neomycin sulphate 5 mg/g and polymyxin B sulphate 10,000 iu/g (Tricin)[2] q. 12 h and a cloxacillin benzathine eye ointment (Orbenin Eye Ointment)[3] q. 24 h. Silver sulfadiazine (SSD) (Flamazine Cream)[4] was applied to the coronary bands, lips and other burned areas on her head and legs. She was transported to the clinic a few hours later when vehicles were allowed into the fire area and a tetanus toxoid vaccine administered upon arrival.

In the first few days, daily icing of tissues was suggested to stop further destruction of laminae, but we chose not to ice based on reports about possible deleterious effects of loss of local circulation. The local human burn specialist suggested that hosing with tap water was preferred to protect the tissue (J.E. Greenwood, personal communication 2015).

The next day, 18 h after she was burned, the mare began to show signs of abdominal and limb oedema. She was eating and drinking with difficulty due to her burned muzzle and still showing signs of pain. She had tachycardia (76 beats/min) and a normal temperature (37.4°C). Auscultation of the mare's heart was over the burned skin, so placement of a stethoscope may have increased her resting heart rate. She was observed passing red urine twice; thus, she was placed on i.v. fluids (Hartmann's Solution)[5] 10 mL/kg bwt/h for 3 h until she appeared to stabilise and was observed eating and drinking, after which no more discoloured urine was observed. The following day, 42 h post rescue, in-house blood biochemical analysis[6] showed increased muscle enzymes,

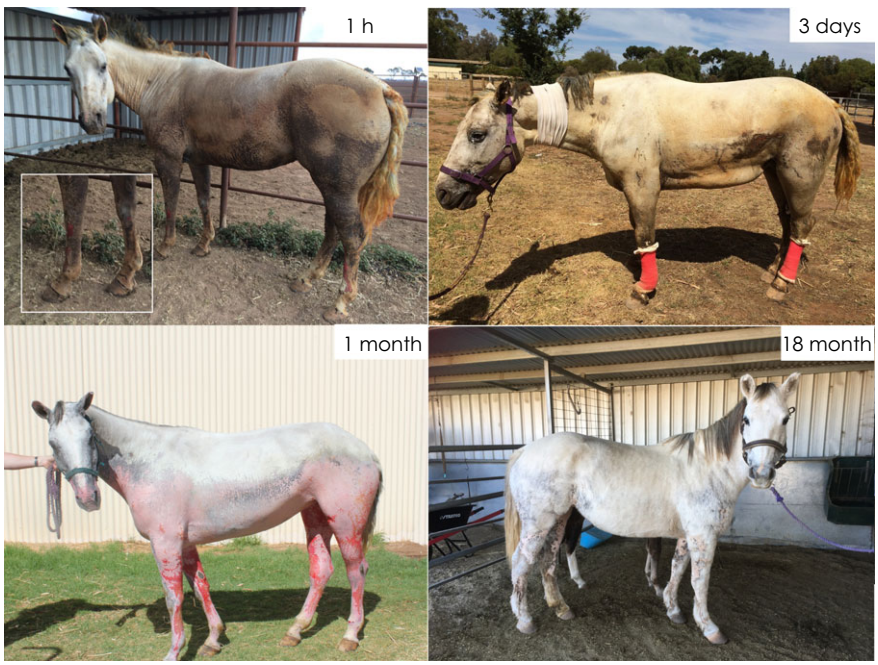

Fig 1: Case 1: The visual stages of healing after being caught in an Australian bushfire.

creatine kinase 592 μ/L (reference range 120–470 μ/L), aspartate aminotransferase 468 μ/L (reference range 175–340 μ/L), decreased albumen 22 g/L (reference range 22–37 g/L), decreased total protein 51 g/L (reference range 57–80 g/L), decreased calcium 2.64 mmol/L (reference range 2.88–3.55 mmol/L) and increased glucose 9.5 mmol/L (reference range 3.6–6.1 mmol/L). Urea and creatinine, which were monitored for several weeks, were within normal limits. It was considered likely that the red urine discolouration was due to haemolysis associated with the severe heat (Norman *et al.* 2005).

Over the next few days the mare's skin, appetite and pain levels were monitored. Oedema increased over 3 days (**Fig 1**). The skin became dry and sensitive to touch and she began to show hair loss on her legs, neck, perineum and abdomen. Despite her pain, her appetite was always good and she showed interest in other horses and her environment over the next few days. The corneal ulcer medication was continued and she was given flunixin twice daily for pain. She was placed on omeprazole (Gastrozol Daily)[7] 1 mg/kg bwt per os q. 24 h. She was also started on trimethoprim/sulphadimidine (Trimidine)[8] 30 mg/kg per os q. 12 h for 4 days.

On Day 6, she had a small abscess from her i.v. catheter which had been removed on Day 4. *E. coli* and β haemolytic *Streptococcus* were cultured. She was given ceftiofur (Norocef)[1] 2 mg/kg bwt i.m. q. 24 h for 4 days.

Over the next 2 weeks, she lost more hair and pigment. Her neck and thorax became dry, and there was a noted loss of elasticity. Areas that had not been painful to touch were now very sensitive. At this stage, Aloe vera gel[9] was introduced and applied twice daily to exposed areas before washing and debridement. The observable burns now covered about 60–70% of her body surface area (**Fig 1**). Most of the affected areas would be classified as deep second degree burns with some small areas of third degree burns on the distal limbs and face. The general impression of staff was that the worst of the visual damage was realised on about Day 18. The pinna of both ears began to show signs of erosion; they both eventually contracted, resulting in a permanent contracture (**Fig 2**). Unlike the other horses burned in the fire, this mare was very slow to heal especially in the perineal and mammary regions (**Fig 2**).

Daily skin care initially required sedation with detomidine HCl (Dozadine)[7] 0.01 mg/kg bwt i.v. and xylazine (Ilium Xylazyl-100)[10] 0.22 mg/kg bwt i.v. The legs, ventral abdomen and perineal area were washed with a mild soap (L.O.C.).[11] Antibacterial soaps such as a chlorhexidine or betadine scrub were tried, but they were irritating to the skin and induced erythema and exudation. The L.O.C. soap was also found to soften the eschar and allowed for easier removal. Cotton wool stuck to the eschar and on advice from a burn specialist nurse, a sterilised woven fibre cloth (Chux)[12] was used to clean the wounds.

At first, locally produced raw honey was used on one side of her legs and body and SSD cream on the other. After 1 week, the raw honey appeared to be superior with less exudation and erythema and the SSD cream was discontinued for a few weeks, except on her exposed unbandaged areas where honey dried quickly and attracted insects. We were cautioned that SSD cream was degraded by sunlight to colloidal silver as noted by the darkening of the product, so precautions were taken to prevent exposure to direct sunlight (Kunkely and Vogler 2007; Fuller 2009). Oral ulceration was noted around her gums and tongue. Concern was raised that this could be from licking SSD cream, which can be severely irritating to the mucous membranes and conjunctiva in people. The oral ulcers eventually resolved without confirmation of the source.

Initially, the mare was heavily bandaged and slings created using human medical arm slings (Actimove Sling)[13] were used to hold the bandages high on both the front and

Fig 2: Case 1: a) Peak of thermal damage to the ear pinna; b) contracture of the ears over next 2 months; c) perineal area at 1 month post fire; d) perineal area at 4 months showing significant pigmented epithelialisation.

Fig 3: Case 1: a) Applying a honey soaked Chux; b) demonstrating comfortable mobility in the Hidez compression suit; c) larger initial bandages demonstrating the support straps. Note: this is another horse; d) thinner bandages used after the first few weeks.

hind legs (**Fig 3**). Combinations of honey, SSD and Aloe vera gel were applied to her legs. The honey tended to dry quickly, thus, petroleum-impregnated gauze (Jelonet 10 cm × 7 m)[4] was also used over the wounds to prevent drying.

Flexing and lifting the limbs was initially difficult and made all the burned horses anxious. After a few weeks, the heavy bandages were replaced with thin bandages comprised of the woven cotton fibre cloth impregnated with honey and overlayed with 15 cm cast padding (Soffban orthopaedic padding)[4] and tubular crepe socks (Tubifast 10 cm),[14] still held in place by the slings (**Fig 3**).

Acticoat dressing[4], a silver impregnated dressing, was used at 1 month following the incident which helped decrease the frequency of bandaging. The sheets of Acticoat dressings were difficult to wrap around the contours of the legs, but they remained in place for 48 h.

The majority of the mare's pain was controlled with i.v. flunixin. Occasionally, ketamine (Ketamil)[10] 0.44 mg/kg bwt combined with detomidine 0.0055 mg/kg bwt i.m. as needed was also employed for pain relief. At one point, methadone (Methadone Injection)[10] 0.05 mg/kg bwt b.i.d. was used for 2 days until the mare showed signs of colic. After 2 weeks, pruritus was also becoming evident, and topical corticosteroid creams were ineffective in controlling the itching. Reserpine (Rakelin)[15] 0.0055 mg/kg bwt per os was used daily and then used two or three times weekly for about 5 weeks during a period of very high ambient temperatures.

Air conditioning fans directed to the stall also helped with the pruritus. In the evening, she was given access to pasture and this seemed to improve her mental attitude.

On Day 41, her skin was dry and tight and during the night it split in several places, including the back of her carpi, axillary areas and groin (**Fig 4**). Since there was nothing she could rub against that would cause the splits, it was considered likely that this condition was due to dryness and lack of skin compliance. Thereafter, she was lathered in a paraffin-based emollient (Sorbolene)[16] and other emollients 2–3 times daily. This created a setback of several months in full epithelisation of the entire body.

Skin grafts were contemplated for her legs, but the tissue was so friable and occasionally continued to spontaneously split, precluding the chance of successful grafting. Over the next 2 months, she continued to grow fine, thin skin. Exuberant granulation tissue on the back of her carpi was periodically removed. Over the next year, there were still areas without pigment and significant areas without hair, particularly on the legs. The swelling in her lower limbs abated and she moves freely.

The perineal, mammary and inner thigh regions, considered to be initially deep grade 2 burns, were very slow to heal. Fortunately, no fungi or yeast were grown on cultures. Several different types of products, including zinc oxide diaper rash creams were tried to no avail. Finally, at 4 months, all washing and treatment of the area was discontinued and, over the next few weeks, the area began to heal (**Fig 2**).

Fig 4: Case 1: a) Progression showing the return of pigment and then hair on the thigh at 1 month; b) 18 months following the fire with incomplete return of pigment and hair; c) spontaneous split on the palmar right carpus; d) 18 months later.

At this time, the only product used on her legs and body was a combination of sorbolene and SSD cream; the bandage changes were extended to every 2–3 days. The mare was kept in an air-conditioned environment, which appeared to be useful for comfort and decreasing reactions to the dressings. The mare's new skin was pink, but over time it regained some of the normal pigment of a grey horse and then hair regrew (**Fig 4**).

At about 4 months, a body compression suit was used (Hydez)[17] so she could be outside during the day **(Fig 3**). These suits are made to order and fitted to each horse. On Day 134, she was discharged but came back twice weekly for bandage changes.

Her coronary bands did not separate as much as in some of the other affected horses, but as they grew out, the line of damage was evident. At 6 months, she became lame, but no rotation was noted on radiographs (**Fig 5**). She was shod with pads on the front feet, resulting in reduced lameness.

During her time at the clinic, it was obvious from the extent of scarring and thickening of the extremities that she would not be ridden again in the immediate future and she was bred through artificial insemination. In February 2017, she foaled a healthy colt. Because of the severe damage in her perineal and inguinal area, her ability to produce milk was a concern, but she made sufficient milk for the foal's needs. The legs have completely healed; however, large areas of skin without hair continued and will probably remain. She is sound, but slightly disfigured (**Fig 1**).

Case 2

An 8-year-old chestnut Thoroughbred mare was examined on site 3–4 h after the same fire as in Case 1. She had run through a fence with other horses during the fire to avoid the flames. The mare appeared to be in moderate to severe pain and was stomping, avoiding skin contact, exhibiting muscle tremors and appearing anxious. She had burns to her face, legs and ventral abdomen and coronary band effusion. Her burns were classified as grade 2 with some grade 3 on her hock, forearm and fetlock. She had bilateral corneal ulcers, as did the other six horses that were with, or near, her on this property. She was treated with flunixin, SSD cream and eye ointments like the previous horse and at the same dose rates (**Fig 6**).

She was transported to the clinic that evening, where assessment of her condition revealed lacerations on the right proximal carpus, left dorsal hock and fetlock on her right hind leg.

She was administered trimethoprim/sulfadimidine immediately as per Case 1 and maintained on antibiotics because of puncture wounds from attempting to escape the

Fig 5: Case 1: Right fore hoof at 6 months showing regrowth.

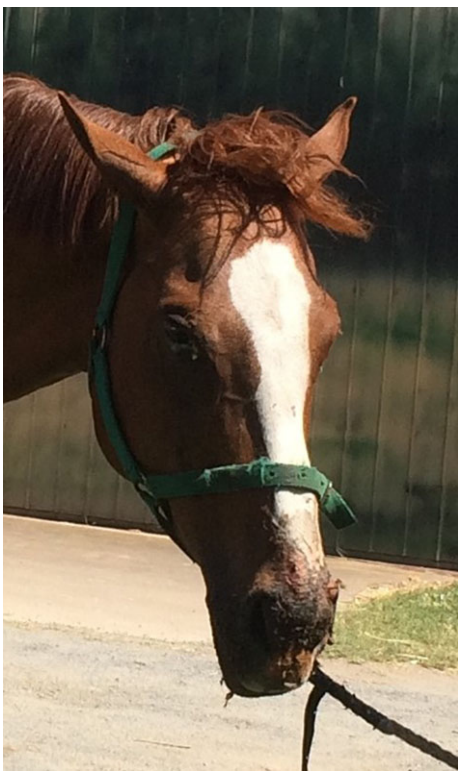

Fig 6: Case 2: The initial presentation before the extent of the damage was obvious.

fire by running through a fence. Tetanus toxoid was administered. She had a good appetite on the first night and ate hay, despite the pain from her blistered lips.

The next morning, she was reassessed with heavy sedation as per Case 1. Her legs were cleaned and bandaged using SSD cream. The primary concerns were coronary band effusion, possible shock and carpal and hind limb lacerations, which may have penetrated the carpus and fetlock joints. She was given Hartmann's solution at the same rate as previously reported, as well as flunixin and omeprazole. While the lacerations and especially the puncture wound on the carpus were an issue and required continued antibiotic administration, this report concentrates on the effects of the thermal injuries. She drank and ate well despite the burns on her muzzle and i.v. fluids were discontinued after the first day when the laboratory report indicated adequate hydration overnight. The eyes were treated with the same antibiotic ointments mentioned in Case 1 and her face and chest initially treated with raw honey. Her coronary bands showed further signs of inflammation with continued leakage and honey was applied.

After the first day, her legs were bandaged with raw honey on one side and SSD cream on the other to assess which treatment was best. This application was continued for a week before the SSD cream was discontinued because of hyperaemia and effusion; honey was used under the bandages instead.

On Day 9, radiographs of her four feet were taken. Both dorsopalmar and lateromedial views were examined (**Fig 7**). No early sign of distal phalangeal rotation was evident, despite the continued separation of the coronary bands. At one point, maggots invaded the sites of coronary band separation and fipronil (Frontline spray)[18] was applied to the area with no apparent deleterious effect.

Pruritus was evident on Day 10. Different topical dressings, including SSD, Aloe vera gel, sorbolene and honey, were interchanged with no decrease in the pruritus. The mare would also have periods where her appetite appeared to decrease and then resume. The pain control was changed to meloxicam (0.6 mg/kg bwt, per os q. 24 h)[19] as her pain appeared to be decreasing. Visual deterioration of the burns peaked at about Day 12 (**Fig 8**).

On Day 22, she no longer needed sedation for treatments and bandaging, but on Day 28, the mare was intensely pruritic and appeared agitated; she was toe pointing and the source of the pain was not clear. Venograms were considered, but the process of injecting through already inflamed skin was prohibitive. Radiographs in the affected foot showed no distal phalangeal rotation. It appeared that her bandage was the most likely cause of the irritation. She was given ketamine combined with detomidine, as per Case 1. A new bandage was applied, she was turned out to grass and the pain seemed to subside.

The ambient temperatures were very high during this period. Again, water coolers were implemented and the mare was notably more comfortable and showed less evidence of pruritus. She returned to eating and was no longer agitated. The ketamine-detomidine combination was continued as needed, no more than three times per day for a few days.

Over the next 2 weeks, her wounds continued to improve and the burns re-epithelialised quickly (**Fig 8**). She became more animated and even cantered around when given access to a yard in the evening or early morning when the outside temperatures were cooler (**Fig 9**).

The mare was discharged after 40 days of hospitalisation. Subsequently, she was examined at 3 and 6 months. The burns on her legs healed with very little residual scarring. Her lacerations also healed, but she was lame from the puncture wound to her carpus. Her coronary band defects were growing out and not causing any lameness.

However, at 9 months, she developed lameness when the last of the hoof wall defect was growing out, as in Case 1. Sole pressure was painful, but when her feet were cleaned, the pain subsided. Also at 9 months, she developed bilateral sole abscesses, which were poulticed. At the next hoof trim, the last of the old sole was removed and she was deemed sound except for loss of range of motion in the damaged carpus. In February 2017, she was successfully bred and will foal in January 2018.

Of the initial 14 horses brought to the clinic, eight were considered significantly burned. The range of hospitalisation for all the horses was 4–134 days. Six of the horses stayed approximately 1 month. All but two of the horses admitted to the clinic have returned to their designated sport. The days for various treatments and days hospitalised for the worst cases are presented in **Table 1**.

Discussion

Our experience with these severely burned horses from a large, rapidly moving bushfire showed some differences with the predominant equine burn literature, which is more

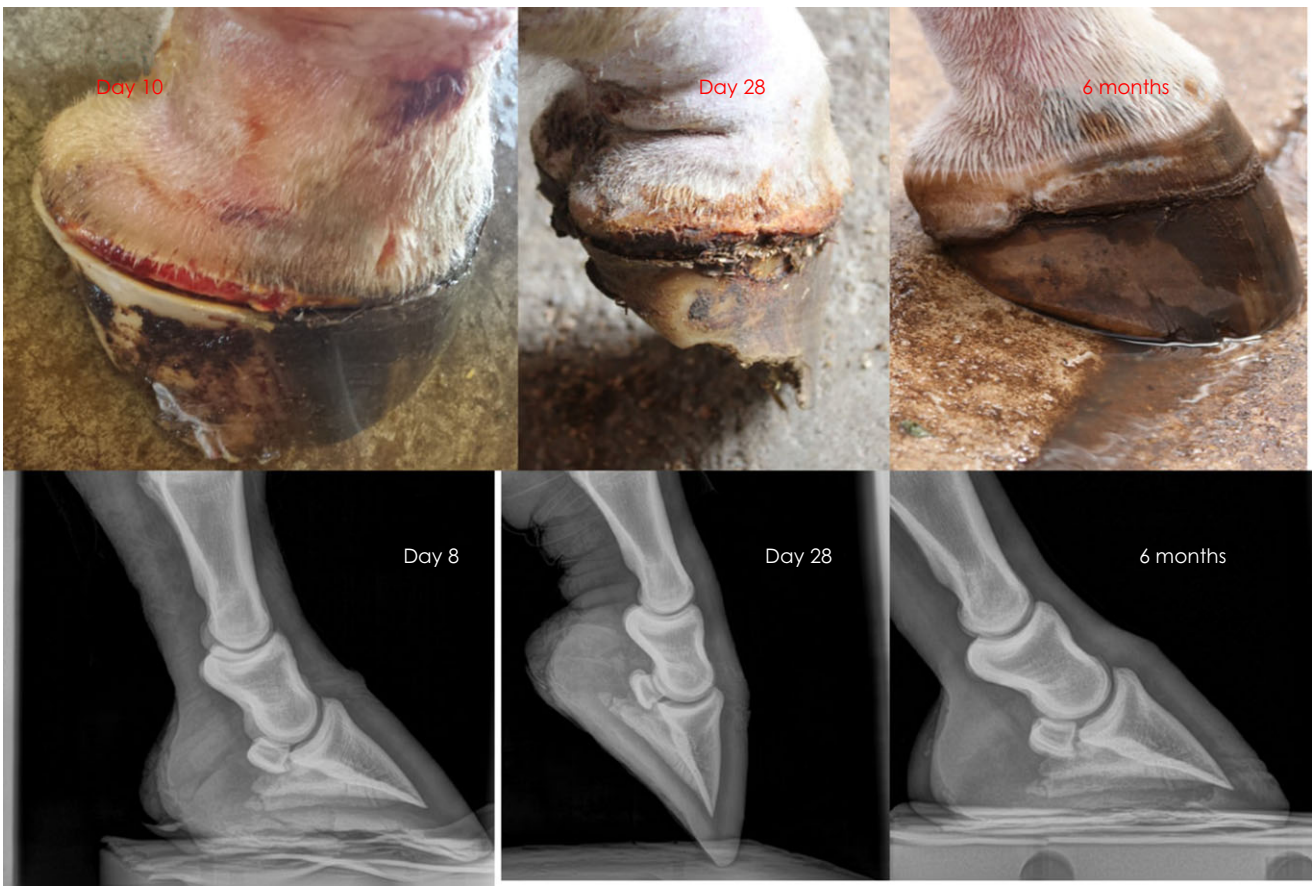

Fig 7: Case 2: Coronary band/hoof wall separation over time.

focused on barn fires. For example, significant issues at the scene of the fire, such as lack of water and infrastructure, meant we did not have facilities to cool the limbs. Also, a local human burn specialist we consulted following the fire suggested that we apply SSD cream to the burned skin and wrap the legs with cling wrap for the initial immediate treatment to preserve the skin and reduce contamination (J.E. Greenwood, personal communication 2015).

Our initial treatment of i.v. fluid therapy could have been started as soon as the horses arrived at the clinic, but this was in the middle of the night and we were limited at that stage with personnel and had to concentrate on getting the horses accommodated. We were surprised to see that even the worst of the horses were eating and drinking. Having had a previous experience from a fire where no horses were burned, but many horses got post-stress colic from transportation out of the path of the fire, we only offered small amounts of food for the first 2 days. It was only later that day we realised that many of the horse's injuries were worse than initially thought.

The extent of burns on the horses was far greater than the predicted survival rate in the literature (Hanson *et al.* 2013). On a visit to see the horses, the human burn specialist suggested that the classification of the wounds on these two horses' extremities would be deep second and third degree burns in many areas. He expected we would be doing skin grafts to achieve final resolution. This was not the case which might highlight potential differences in classification of burns in man. Our criteria for euthanasia were uncontrollable pain and loss of appetite. Despite the extent and depth of burns and intravascular haemolysis in the peripheral tissue, Case 1 did not stop eating and was very vocal in the morning when food was distributed. Only one horse showed any respiratory signs from smoke inhalation, which resolved in 24 h. While we heard of horses with respiratory compromise from this fire, we ourselves did not see any. In comparing cases from another interstate practice with a similar fire 1 month following this fire, they found it was rare to have respiratory compromise. Perhaps, this is due to a fast-moving fire and strong winds that sweep away smoke and ash.

Current published literature suggests that infection can be a significant problem (Geor and Ames 1991; Kemper *et al.* 1993; Marsh 2007). We found that infections were only problematic if the horse had significant penetrating wounds, such as in Case 2, and that SSD cream and honey were both satisfactory for dressing the legs. However, SSD cream has somewhat fallen out of favour in the human burn literature because SSD has been shown to slow down healing (Al-Waili 2004; Malik *et al.* 2010; Bischofberger *et al.* 2011; Heyneman *et al.* 2016). The use of Acticoat dressing antimicrobial bandages did allow us to increase the interval between dressing changes, but because we did not experience significant infections, the

Fig 8: Case 2 showing the progression of healing on the forearms following thermal injuries from a bushfire.

expense of these dressings may not be warranted in all cases (Heyneman *et al.* 2016).

While some horses seemed to respond better to one or the other topical burn product, they may be successfully switched after a few days if supplies are low. Aloe vera mixed with other skin emollients proved to be helpful for dry skin that did not actually slough and was beneficial for soothing the burned areas after the initial 10–14 days (Maenthaisong *et al.* 2007; Panahi *et al.* 2012). Reports of decreased healing time have been noted, although some patients experience pruritus and pain with Aloe vera applications and deterioration of the product may occur with storage (Maenthaisong *et al.* 2007). While manuka honey has been proposed to be a superior product, raw honey seemed to work well when the use of manuka honey was cost prohibitive and not readily available in the large amounts needed (Bischofberger *et al.* 2011).

Mild soap seemed to facilitate softening and removal of dead skin and was well tolerated. Both dilute chlorhexidine and betadine were tried, but they caused significant skin irritation in all the horses.

While every horse brought to the clinic had corneal ulcers, there were no complications from the ulcers. Simple twice daily treatments with triple antibiotics plus daily cloxacillin resulted in corneal healing with no scarring (Kuckelkorn *et al.* 2002). It was expected that some of the ulcers might have fungal contamination, or the affected eyes may have developed significant uveitis, but this did not eventuate.

Long-term use of nonsteroidal anti-inflammatory drugs did not result in clinical signs that would suggest toxicity. Despite severe stress, bowel motions were normal throughout hospitalisation and appetites were not suppressed. The prophylactic use of omeprazole may have been beneficial in preventing adverse effects.

Bandaging was difficult in the initial stages because of pain. The horses did not want to lift their legs when we applied stocking bandages. The use of lighter-weight material

Fig 9: Case 2: 1 month after the fire: the mare was now moving freely except for a loss of range of motion from a penetrating carpal wound.

TABLE 1: The number of days and treatments required for the hospitalised horses in 2015–2016

Horse	Days hospitalised	Days needing pain medication	Days on antibiotics	Days to resolution of corneal ulcers	Days on omeprazole	Days requiring sedation for bandage changes
1	26	20	3	8	25	21
2	26	19	3	8	24	11
3	134	38	12†	6	65	17‡
4	27	16	3	3	22	22
5	40	40	20	7	37	37
6	4	4	3	4	4	*
7	27	10	3	16	22	18
8	4	2	3	3	4	*

* Horses were discharged and brought back to the clinic periodically to treat coronary band lesions.
† A second course was given for the split skin.
‡ Sedation was used for occasionally bandaging.

TABLE 2: Lessons learned in an Australian bushfire

Surface thermal injuries covering a large percentage of the body were not predictive of prognosis, nor were coronary band effusion and separation
It took 2 weeks or more to visualise the full extent of the burn injuries
Respiratory compromise may not be a problem in range or bushfires
Raw honey worked well in the early period
Corneal ulcers tend to be transient
Infection was not a significant factor except with penetrating wounds
Lightweight bandages were superior and less expensive than bulky bandages
Cotton fibre cloth can be used for bandages and mild detergents are helpful in daily cleaning of burns
Long-term use of nonsteroidal anti-inflammatory drugs did not result in obvious clinical signs of toxicity. The use of omeprazole may be warranted
Continuous use of moisturisers on exposed skin was important to prevent the skin from splitting
Evening 'grazing' helped with all the horses' mental attitudes

such as woven cloth, cast padding and reusable stockings did seem to be endured better by the horses and was of significant benefit to the overall costings. Once the burns started to heal, horses tolerated body compression suits and were observed trotting and cantering with the suits on. They did not sweat under the body suits, despite the high ambient

temperatures. Compression suits are standard of care in human patients and the human burn specialist noted they seemed to be as good as those used in people. The use of cooling fans and occasional oral reserpine helped with the pruritus, which lasted for a few weeks.

Coronary band effusion was noted on the first day; separation to some degree occurred in most of the horses over the first week, but it was quite severe in three horses. The coronary band separation resulted in abnormal hoof growth until the hoof grew out at about 6 months. When the old hoof was nearly replaced, two horses exhibited lameness, which coincided with winter rain and mild abscessation in some feet. We are of the opinion that the thickened hoof wall distal to the coronary band protected the majority of the laminae from thermal injury.

We hope that the information we have shared from our experience will assist other veterinary specialists to care for horses caught in wild fires; many of these methods possibly could be modified for similar large animals such as cattle. Some rural fires necessitate alternate approaches to immediate triage and the type of fire leads to patterns of fire damage and treatments somewhat different from a typical barn fire. Lessons learned are summarised in **Table 2.**

Author's declaration of interests

No conflicts of interest have been declared.

Ethical animal research

Not applicable.

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Authorship

The author was the primary and mostly sole veterinarian overseeing the horses, and the manuscript was prepared by the author.

Manufacturers' addresses

[1]Norbrook Laboratories Pty Ltd., Tullamarine, Victoria, Australia.
[2]Jurox Rutherford, New South Wales, Australia.
[3]Pfizer, West Ryde, New South Wales, Australia.
[4]Smith & Nephew, Waverley, Victoria, Australia.
[5]Baxter, Toongabbie, New South Wales, Australia.
[6]REM Systems, Ryde, New South Wales, Australia.
[7]Axon Animal Health, Belrose, New South Wales, Australia.
[8]International Animal Health Products, Huntingwood, New South Wales, Australia.
[9]Aloe Vera Australia, West End, Queensland, Australia.
[10]Troy Laboratories Pty Ltd, Glendenning, New South Wales, Australia.
[11]Amway of Australia, Bella Vista, New South Wales, Australia.
[12]Signet, Padstow, New South Wales, Australia.
[13]BSN Medical Rutherford College, North Carolina, USA.
[14]Independence, Melbourne, Victoria, Australia.
[15]Ceva Animal Health, Glenorie, New South Wales, Australia.
[16]Livingston International, Rosebury, New South Wales, Australia.
[17]Hidez Australia, Windsor, New South Wales, Australia.
[18]Merial Australia Pty Ltd, Macquarie, New South Wales, Australia.
[19]Randlab Veterinary Medicines, Chipping Norton, New South Wales, Australia.

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