

Promising results with a new treatment for Foot-and-Mouth disease

Foot-and-Mouth disease (FMD) is a viral disease that affects many farm animals, including cattle, buffalo and small ruminants. In many developing countries, farmers often don't have access to preventative treatments, and outbreaks are common. Professor Emeritus Peter Windsor and his team at the University of Sydney, Australia, believes a new product called Tri-Solfen may be an inexpensive and effective solution to treat FMD, instead of the antibiotics currently used. After clinical trials in Laos and Cameroon, results have shown emphatically that when Tri-Solfen is applied to FMD lesions, infected animals return to eating and walking normally within just a few days.

Foot-and-Mouth disease (FMD) is an infectious viral disease that affects cloven-hoofed animals, including cattle, buffalo, pigs and small ruminants. It is thought that 32 million livestock are affected by FMD annually. The virus typically causes fever which can last for a few days, followed by blisters on and inside the mouth and on the feet that are incredibly painful and cause lameness, excessive salivation, lack of appetite, loss of body condition and occasionally, mastitis and abortion.

While developed countries like the UK, US, Canada and Australia work hard to maintain their FMD-free status, this disease is a common condition in many developing countries in Africa and Asia, with estimated losses rounding 7 billion dollars every year. Sadly, in these countries, farmers often don't have access to preventative control programmes including vaccinations and they seek treatments methods for their sick animals.

In affected countries, use of antibiotics for FMD is common, but this approach increases the risk of creating long-term antimicrobial resistance with potential food safety risks when these animals are marketed. Sick animals can also be treated with painful disinfectants or anti-inflammatory drugs, but the benefits are limited. For the many farmers who don't even have access to these, lesions caused by FMD are treated with painful traditional therapies, including scraping

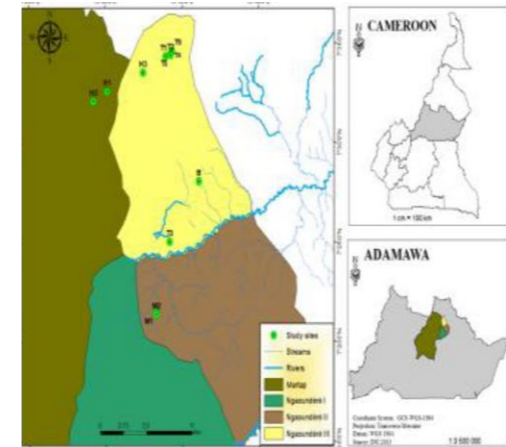
the lesions with tree bark or applying lemon Juice. These options likely increase the pain and suffering animals have to endure during outbreaks.

Given this current scenario, alternative management options for endemic FMD-infected countries are urgently needed. Peter Windsor, Professor emeritus at the University of Sydney, believes a new product called Tri-Solfen may be the answer. This product has been shown to effectively mitigate wound pain and has been registered in Australia and New Zealand to use during surgical procedures, including tail-docking, castration and dehorning.

A NEW SOLUTION

Tri-Solfen's formulation includes two topical anaesthetics: lignocaine and bupivacaine, as well as adrenalin and cetramide, mixed in a gel matrix. This blue gelatinous product is sprayed directly onto the wound, creating a long-lasting barrier over the lesions, numbing the pain, reducing infection and encouraging healing.

This elegant formulation offers both viricidal effects due to an acidic pH (around 2.7) and anti-bacterial properties coming from the antiseptic cetramide, cleverly avoiding the need for other treatments, including antibiotics and anti-inflammatories. Furthermore, lignocaine and bupivacaine, combined with adrenalin, provide rapid and prolonged pain relief and alleviate the initial sting from applying such an acidic product. This pain-free effect is estimated to last over 24 hours and is sufficient to kill or reduce the virus load without causing pain to the animal.



Trial location in Cameroon and oral treatment of a restrained cow with Tri-Solfen.

For the researchers, the perfect opportunity to set up two clinical trials to test Tri-Solfen arose when there was an outbreak of Foot-and-Mouth disease in Laos in April 2019, followed by a second outbreak in Cameroon in November 2019. In Cameroon, the study also compared the responses using a common antimicrobial known as oxytetracycline. In both cases, the trials were conducted in extensive cattle farms, where animals were free to roam and were rarely seen by a veterinary technician (para-veterinarian) or veterinarian.

In both Laos and Cameroon, Foot-and-Mouth disease can have devastating effects, perpetuating the cycle of smallholder poverty. Infected animals cannot be sold on the market, they have reduced value and the costly treatments currently used strain the finances of these smallholder farmers. In Laos, for example, losses may add up to 60% of the annual household income, particularly where farmers use antibiotics, causing severe financial impact on households just to treat Foot-and-Mouth disease.

SPECTACULAR RESPONSES

Results from both the Laos and the Cameroon clinical trials were conclusive: Tri-Solfen enabled much faster healing of lesions caused by FMD. Lesions in Tri-Solfen treated cattle with FMD significantly reduced in size and almost entirely disappeared in less than ten days, without returning for a full two weeks after the initial infection.

As a consequence, these animals recovered their mobility without

being lame and started eating almost immediately after treatment, suggesting this is a beneficial therapy to enable cattle to walk and gain access to water and feed. "There were spectacular responses to treatment, with immediate clinical improvement", said Prof Windsor. "Treated animals recommenced eating and walking within a few days due to more rapid healing of oral and feet lesions".

In contrast, whilst animals treated with oxytetracycline in the Cameroon study also managed to heal most of their lesions, these tended to re-appear after two weeks, most likely from the onset of secondary infections, with some animals

were still lame and struggling to walk after 15 days of symptoms.

In an even worse situation, untreated animals had lesions that persisted and continued to enlarge for over two weeks, suggesting that healing was severely compromised and delayed. Not surprisingly, these animals remained in pain and had poor appetite while they were sick, leading to profound loss of body condition. Some animals simply refused to move, and those that managed to walk were lame and struggling.

Given these positive results, Prof Windsor and his team found that all

It is thought that 32 million livestock are affected by Foot-and-Mouth disease annually.



Tri-Solfen therapy is readily applied to FMD lesions, as with this cow in Nigeria.



Tri-Solfen's formulation includes two topical anaesthetics.



Tri-Solfen has been shown to be effective in removing the pain from routine surgical husbandry procedures, including castration in lambs and calves.

farmers involved in these clinical trials appreciated the product and were keen to purchase it for their cattle to treat future outbreaks. The researchers believe this motivation to use Tri-Solfen can increase the proportion of infected animals receiving an appropriate treatment for the condition and may encourage farmers to come forward and report more outbreaks when they purchase this new product for their cattle, assisting disease control. In fact, the researchers believe that in the long term, the benefits go beyond just

treating FMD. The ability to effectively treat animals and improve their welfare empowers many farmers and they continue to improve their own livestock husbandry skills, recognising that healthier and more valuable livestock offer pathways to reduce food insecurity and enhance rural community resilience.

"Tri-Solfen offers a non-antimicrobial therapeutic option for treating clinical FMD, one that appears to have superior clinical efficacy to prolonged parenteral use of oxytetracycline and potentially

other antimicrobial therapies," said Prof Windsor. "Product registration for FMD is now achieved in Laos and Cameroon, with registration in several other countries pending."

NO ADDITIONAL FINANCIAL BURDEN

Importantly, the new Tri-Solfen product doesn't cost any more than the antibiotics or anti-inflammatories that it may replace, nor does it come with a warning of antimicrobial resistance or the presence of residues in the food chain. Prof Windsor expects Tri-Solfen treatment for FMD may change the way farmers treat infected cattle, shifting from expensive and inappropriate antibiotics to a solution that improves animal welfare and encourages farmers to report outbreaks. As Tri-Solfen may increase the chances of farmers reporting outbreaks to obtain treatment of their animals, this assists disease surveillance and enables future vaccination delivery through extension advice.

"These observations indicate the huge potential of Tri-Solfen in having a profoundly positive impact on the health and welfare of livestock-owning families and their animals in the future," concluded Prof Windsor. "If made available for purchase and administration by farmers, this product provides a viable alternative approach for treating Foot-and-Mouth disease and in addition to vaccination and improved biosecurity, may assist disease control in Asian and African countries and other developing countries globally."

Treated animals recommenced eating and walking within a few days due to more rapid healing of oral and feet lesion.



Tri-Solfen is applied to FMD lesions, infected animals return to eating and walking normally within just a few days.



Behind the Research Professor Peter Windsor

E: peter.windsor@sydney.edu.au T: +61 438983367 W: <https://mekonglivestock.wordpress.com>

Research Objectives

Peter Windsor's recent studies explore the improvement of animal welfare in Foot-and-Mouth disease.

Detail

Address Peter Windsor, Sydney School of Veterinary Science, The University of Sydney Camden, NSW 2570, Australia

Bio

Peter Windsor is Professor emeritus and specialist veterinarian at The University of Sydney, Australia, where he manages one health and food security projects involving numerous students and collaborators, aimed at sustainably improving food and fibre security, health and welfare from livestock production. He has over 250 peer-reviewed journal and book chapter publications and in 2011, was awarded the Kestevan Medal by the Australian College of Veterinary Scientists and Australian Veterinary Association for his contributions to international veterinary science.

Funding

Initial studies evaluating Tri-Solfen were funded by an Australian Research Council Linkage Grant from the Australian government with contributions from Animal Ethics Australia and Bayer Animal Health Australia.

Collaborators

Participating livestock farmers, plus government staff in Laos and Cameroon led by Drs Syseng Khounsy and Svedizem Lendzele, respectively, and Mr Charles Olsson in Laos.

Personal Response

Are you planning clinical trials in other countries affected by Foot-and-Mouth disease?

// Preliminary clinical trials in other countries affected by Foot-and-Mouth disease have occurred and all participants have been impressed with the results, although more formal studies have been delayed by the global Covid-19 pandemic restricting the travel of the research team members. //

References

Lendzele, S.S., et al. (2020). Efficacy and application of a novel topical anaesthetic wound formulation for treating cattle with Foot-and-Mouth disease: A field trial in Cameroon. *Transbound Emerg Dis.* 2020; 00:1–12. <https://doi.org/10.1111/tbed.13923>

Windsor, P., et al. (2020). Managing Welfare and Antimicrobial-Resistance Issues in Treating Foot-and-Mouth Disease Lesions: A New Therapeutic Approach. *Veterinary Medicine: Research and Reports.* 11 99–107. <http://doi.org/10.2147/VMRR.S273788> and accompanying video abstract <https://youtu.be/RpGDU5808CA>

Business Partnerships Platform. (2019). Positive Impact from Partnership: a new foot-and-mouth disease treatment in Laos. <https://thebpp.com.au/blog/a-positive-impact-from-partnership-a-new-foot-and-mouth-disease-treatment-in-laos/> [accessed 10/06/2021]

