Submission No 35

PREVENTION OF CRUELTY TO ANIMALS AMENDMENT (VIRTUAL STOCK FENCING) BILL 2024

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Submission on the Prevention of Cruelty to Animals Amendment (Virtual Stock Fencing) Bill 2024

This is the submission of John Hellstrom BVSc PhD ONZM, animal welfare and biosecurity expert, past chair of the New Zealand Biosecurity Council and the National Animal Welfare Advisory Committee and currently animal welfare advocate with Halter New Zealand, a virtual fencing company. My submission is based on a detailed knowledge of the published scientific literature on virtual fencing along with my personal experience of working with Halter, which currently has almost 200,000 cows in New Zealand, Tasmania and the United States being managed actively within their virtual fencing system. As a result Halter has the world's largest database on which to assess cow behaviour within virtual fencing and herding systems.

Virtual fencing technology has huge potential to improve animal welfare, farm productivity and profitability, environmental impacts and farmer and community well-being. The various systems utilising this technology provide benefits ranging from basic to sophisticated depending on their complexity. Some of these benefits can also be provided from products that do not incorporate virtual fencing but there are advantages from the integration of multiple functions within a single system. The Halter product for dairy cows includes an active virtual herding function that delivers many of its benefits. This submission primarily focuses on animal welfare.

Summary of my submissions

- I submit that there should be mandatory measures to protect animals from the most significant and likely of the potential harms that are unique to virtual fencing and virtual herding.
- I submit that both active and passive virtual herding be included as purposes of a virtual stock fencing device in section 16(1)(b) of the schedule to the Bill.
- I submit that duty of care obligations should require regular inspection of cattle in virtual fencing systems by humans.
- I submit that generic welfare requirements that apply to all fencing and herding systems should not be uniquely directed at virtual fences as they could result in unjustifiable restrictions on the use of a potentially transformative technology.

Animal welfare benefits of virtual fencing and virtual herding

Virtual fencing and the associated virtual herding technology have the potential to transform pastoral farming systems to greatly increase the welfare of animals. When applied correctly, with appropriate safeguards in place, animals farmed within these technologies should have far higher welfare outcomes than is achievable under existing pastoral farming practices.

Virtual herding, with appropriate safeguards, allows cows to largely move at their own pace rather than being forced to move. Active herding involves encouraging animals to move with a structured set of sound or vibrational cues whereas passive herding involves a moving virtual boundary that excludes cows from areas they have vacated. Under these conditions cows experience minimal disruption of social hierarchies and have better health and welfare

outcomes than if driven by conventional methods. These benefits will vary depending on the extent to which other enhancements are embedded within the basic virtual fencing technology.

Justifiable societal reasons for concern

The development of technology for the virtual fencing of livestock is a good example of innovation outpacing societal consideration of its associated potential benefits and harms. The technology has emerged in a number of jurisdictions that have no effective regulatory framework to manage its development or use. In a number of other jurisdictions, such as NSW, legislated prohibitions or controls on dog shock collars have been inappropriately used to control or prevent its development. Some jurisdictions, including Norway, United Kingdom, New Zealand and currently Australia, have reviewed or are reviewing the scientific and ethical context of virtual fencing and virtual herding in order to consider whether and how they might be regulated. So far none of these reviews have identified fatal flaws in these technologies. While some potential welfare issues have been identified few have so far been regulated though a few jurisdictions have specifically prohibited virtual fencing technology for livestock.

Why won't dog shock collar regulations work for the control of virtual fencing?

Dog shock collars have many shortcomings leading to animal welfare problems. In general these have arisen from a lack of scientific understanding of animal training methods when the technologies were being developed, associated with historically much lower societal expectations of animal welfare. Problems include:

- the size and frequency of the shocks administered are under direct human control and are subject to misuse
- there are often no automated training cues incorporated into the collars to warn dogs of an impending shock
- there is very little or no operator training on how to use the collars without causing harm.

As a result a frequent outcome from the use of dog shock collars is the induction of a state of 'learned helplessness'. This is a condition arising from the inability of animals to avoid or control pain or to associate it with any of their own behaviours. In other words many dogs learn there is nothing they can do to prevent what they perceive as random shocking and effectively they become depressed, sometimes severely so.

Virtual fencing technology is different

On the other hand virtual fencing technologies are grounded in sound principles of animal training and have a range of safeguards to prevent or minimise animal welfare harms. Essentially they are entirely different products from dog shock collars and should be considered within a different regulatory framework. The key differences include:

- they are fully automated and are thus extremely consistent and predictable
- the shocks administered are far smaller than those used in dog shock collars
- there is no direct human control over the size, frequency or number of shocks administered

- the animals receive warning cues, such as sound or vibration stimuli, that allow them to avoid or anticipate an impending electric shock
- in general there is a prescribed approach to training animals to the new systems that avoids causing harm to animal welfare
- there is now an emerging understanding of the deep influence of conspecifics on the learning process, animals learn better when trained in groups not as individuals.

It is now clear from scientific research and practical experience that animals cannot be trained to interact effectively with virtual fences using punitive techniques. While all cows do need to experience the pain of an electric shock during training in order to understand the warning cues the number of shocks administered is small and declines rapidly during training. After a few weeks most animals never, or very infrequently receive shocks because they have learnt to avoid the virtual boundary in response to audible cues[1].

Virtual fencing compared with traditional fencing systems

There is a significant risk of making bad decisions about the use of virtual fencing without comparing it against alternative containment measures used in cattle farming. Although there are a number of unique animal welfare risks arising from the use of virtual fencing that do need to be controlled most concern has focused around the use of aversive electric shocks to enforce the virtual boundary. Generally no such concerns are raised about the use of traditional electric fencing. There have been a few academic studies of the comparative welfare impacts of physical and virtual electric fences but none have raised significant concerns. Furthermore, there is very little useful information in the literature about any welfare impacts of physical electric fences.

There is some published information and much anecdotal material about training cows or calves to physical electric fences, which is usually unsupervised, is highly aversive and often involves significant pain and distress. Advice is generally along the lines of “give them a good belt at the start so they learn quickly”. On the other hand training cows to Halter’s virtual fencing system is structured and involves direct farmer observation and supervision. Also, based on the details provided by the current virtual fencing companies, the shocks used are of much lower energy than those used with physical fences.

There is virtually no information available about the interaction of trained cows with physical electric fences so that the size, number and frequency of received shocks is unknown. A key benefit of virtual fences is the ability to monitor the behaviour of cows responding to them in real time. As a consequence the size, number and frequency of audio and electric stimuli is known and recorded for every cow. None of this information is available for traditional electric fences and yet these are considered safe from an animal welfare perspective and, as far as I am aware, they have not been banned for use in pastoral farming in any jurisdiction .

[1] Verdon M, Hunt I, Rawnsley R. (2024) The effectiveness of a virtual fencing technology to allocate pasture and herd cows to the milking shed. J. Dairy Sci. TBC https://doi.org/10.3168/jds.2023-24537

Virtual herding compared with traditional herding

Active virtual herding requires more complex training processes for cows to understand warning cues and avoid aversive shocks than training cows to avoid crossing virtual fences. Passive virtual herding requires no additional training.

Active virtual herding is an essential part of the Halter system for managing pastoral dairy farming. The system allows cows to move to alternative paddocks or to the milking shed largely under their own control rather than being driven by a herder with dogs or vehicles. The structured training programme requires more human assistance than virtual fence training and takes longer but is still completed within the same 7 day training period. The sequencing and nature of the vibrational and audio cues alert and direct cows towards their new location. As long as they are moving in the correct direction the system remans silent but if a cow stops vibrational cues start again and warn of an impending shock unless the cow starts moving again. The system is customised to control the size and number of shocks each cow can receive and deactivates for a few minutes if the cow stops at a water trough to allow uninterrupted drinking. Both active and passive herding methods are slower than conventional herding by stock handlers and avoid crowding of cows. Cows can move largely at their own pace and within their preferred social grouping. Importantly they are able to choose their own track and avoid ground hazards and as a result have consistently lower rates of trauma-induced lameness.

I submit that both active and passive virtual herding be included as purposes of a virtual stock fencing device in section 16(1)(b) of the schedule to the Bill.

Measures to avoid potential animal welfare harms

In the past two years there have been two major assessments[2][3] of virtual fencing and herding based on reviews of the scientific literature and information provided by suppliers of virtual fencing systems. These assessments have identified a number of potential risks to animal welfare and suggested possible remedies. Currently available virtual fencing systems each have a range of safeguards to avoid some of these risks of harm to animal welfare. However, these vary between products.

It is now generally understood that animals are sentient and so their welfare should consider their mental as well as their physical needs and that we have an obligation to provide positive states of welfare rather than merely minimising negative effects. A widely used tool to analyse this is the five domains model developed in New Zealand[4]. The Halter system is highly integrated to not only provide virtual fencing and herding abilities but also to provide significant welfare benefits across all five domains; nutrition, physical environment, health, opportunities for natural behaviour and mental enrichment. Assessment of the Halter system using this model indicates that it provides substantial animal welfare benefits and

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[2] https://www.gov.uk/government/publications/awc-opinion-on-the-wel...al-fencing-systems-to-contain-move-and-monitor-livestock#fnref:16

[3] Fisher & Cornish 2023 *Independent scientific literature review on animal welfare considerations for virtual fencing* - DAFF

[4] Mellor, D.J.; Beausoleil, N.J. Extending the 'Five Domains' model for animal welfare assessment to incorporate positive welfare states. *Anim. Welf.* **2015**, *24*, 241–253.

that it manages welfare risks effectively. However, it is unclear to what extent these risks are or will managed by other actual or potential providers.

I submit that there should be mandatory measures to protect animals from the most significant and likely of the potential harms that are unique to virtual fencing and virtual herding. Such mandatory measures could include requirements for the virtual fencing system to continue to contain animals safely in the event of communications failures, have in-built alerts to prevent farmers from creating impractical virtual fences that can't meet the animal's welfare requirements, such as avoidable boundaries, adequate social distancing or access to water and have system lockouts to prevent bolting, confused or immobile animals from continuing to receive shocks when they have no ability to understand or respond to them. It should also be mandated that active virtual herding systems must deactivate and the farmer be alerted if multiple animals stop moving, which would indicate an unexpected barrier such as fallen tree or mistakenly closed gate.

Duty of care

There is widespread concern amongst regulators and researchers that user over-confidence in virtual fencing and herding systems could lead to bad welfare outcomes. The ability of these systems to continually monitor the physiological status and location of the animals in real-time and to herd cows without the presence of a human creates a potential risk of problems going undetected resulting in harm to welfare. The animal welfare legislation of most jurisdictions places clear obligations on those responsible for the welfare of the animals to ensure that are under some form of regular observation in order to meet this duty of care. Legislators did not foresee the possibility of that duty being delegated to an automated system, nor are current virtual fencing systems capable of fully meeting those obligations.

I submit that duty of care obligations should require regular inspection of cattle in virtual fencing systems by humans.

Risks of over-regulation

The assessments, by the UK Animal Welfare Committee and for the Australian Department of Agriculture, Fisheries and Forestry, both included a number of substantially similar recommendations for the performance of virtual fences. However, many of these recommendations address features of containment that are not unique to virtual fencing. Most are equally relevant for physical electric fences yet I have found no jurisdiction that has specific welfare regulations for physical fences. Instead potential welfare risks arising from the use of physical electric fences are managed through generic requirements to provide adequate feed, water, shelter, freedom from pain and distress, supervision, etc.

I submit that generic welfare requirements should not be uniquely directed at virtual fences as they could result in unjustifiable restrictions on the use of a potentially transformative technology.

One specific area of my concern is the temptation to regulate the size, number or frequency of shocks employed by virtual fences in the absence of any evidence of their relationship to welfare. There is no evidence of a problem when these parameters are compared with the

same characteristics of physical electric fences and no meaningful scientific comparisons exist. Indeed such regulation could be counter-productive by enshrining standards that could be excessive as more experience with virtual fencing is acquired.

Biosecurity

Virtual fencing systems provide a unique ability to trace the movements of animals and observe their behaviour in fine detail 24/7. Currently, during the start-up phase of the technology, these records are kept within the databases managed by the providers. However, in the future as the amount of data continues to grow exponentially providers may reduce data storage costs by discarding redundant data. There could be substantial biosecurity benefits by requiring providers to maintain an historic database on animal movements at sufficiently detailed level, depending on the potential value of the data, to support biosecurity. For example, finely detailed data may help epidemiologists understand how a disease is spreading within a herd whereas much coarser data may be sufficient to trace potential points of contact between herds.

Virtual fencing systems could also be valuable during exotic disease emergencies by assisting timely livestock movements away from boundaries or places where risk of disease transmission is high and also critically, by providing real-time early detection of clinical changes in groups of animals resulting from infection.