Submission No 37

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

Organisation: MSD Animal Health

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NSW Legislative Assembly Committee on Investment,
Industry and Regional Development
Parliament House
Macquarie Street
Sydney, NSW 2000

Submission via online portal

Dear Committee,

Re: Inquiry into the Prevention of Cruelty to Animals Amendment (Virtual Stock Fencing) Bill 2024

MSD Animal Health welcomes the opportunity to make a submission to the parliamentary inquiry into the Prevention of Cruelty to Animals Amendment (Virtual Stock Fencing) Bill 2024 (NSW).

MSD Animal Health supports the bill in its current form. The bill proposes an amendment to the *Prevention of Cruelty to Animals Act 1979* (NSW), section 16 to exclude virtual stock fencing devices from the prohibition against the use of certain electrical devices on animals. If adopted, the amendment will effectively permit graziers and stockmen to lawfully use virtual fencing technology in New South Wales for the purposes of confining, tracking, and monitoring stock animals.

Virtual fencing technology has rapidly evolved over time and is designed with animal welfare in mind, ensuring minimal stress and discomfort to stock animals fitted with a virtual stock fencing device. The technology supports graziers and stockmen who are confronting increasing challenges, including heightened demands for productivity, rising input costs, labour shortages, animal health and welfare priorities, as well as environmental challenges, including natural disasters such as fires, floods, and droughts.

About MSD Animal Health

MSD Animal Health is the animal health division of Merck & Co., Inc., which operates as MSD outside the United States and Canada. MSD Animal Health offers veterinarians, farmers, pet owners, and governments a wide range of veterinary pharmaceuticals, vaccines, and health management solutions and services, including antiparasitics, anti-infectives, reproduction management, pharmaceutical specialties, innovative animal health programmes, and technology solutions including identification, traceability, and monitoring products, including virtual stock fencing devices.

In 2022, MSD Animal Health acquired the US company Vence, a virtual fencing technology for cattle. Founded in 2016, Vence spent several years heavily focused on research and development and product and equipment trial testing for its “Cattle Rider Collar” (the virtual stock fencing device) and its Herd Manager virtual fencing custom software technology before significantly expanding its commercial efforts in 2021. In the United States, the Vence virtual fencing technology is now deployed on 177 ranches covering 3,270,960 acres across 21 states with over 45,000 Cattle Rider Collars in use. Vence currently distributes its products and virtual fencing technology in the

United States and Australia (where permitted by legislation or for use in official trials). The Australian legal entity is Vence Corp AU Pty Ltd.

Over the past decade, there has been a significant advancement in understanding the animal factors necessary for effective and minimal-stress virtual fencing. This progress has occurred alongside technological advancements and enhanced knowledge regarding the deployment of the technology and the training of human operators with Vence at the forefront of this innovation.

The Vence virtual stock fencing device

The Vence virtual fencing technology provides graziers and stockmen the ability to track, monitor, and manage the movement of livestock using GPS and sensor technology for the purpose of detecting animal movement and confining livestock to a pre-determined area without using the traditional fixed fencing method. The Vence virtual stock fencing device (described below) delivers a combination of sensory cues such that animals learn not to approach or cross a virtual boundary. It includes a radio chip that communicates with and receives instructions from a solar-powered base station, designed to cover 10,000-100,000 acres and function for over 10 years in the field with little to no maintenance. Using a computer, tablet, or smartphone, graziers and stockmen have the capability to manage cattle movement to facilitate rotational grazing, monitor mob and individual animal behaviour, and locate lost or sick livestock quickly, while reducing costs of labour and traditional fencing materials.

The Vence virtual fencing stock device, the “Cattle Rider V2.5 Chain Collar,” weighs approximately 1.13kg, including the battery. The collar’s housing is constructed from moulded plastic and encases a printed circuit board (PCB) and a lithium-ion battery with a battery life ranging from 6-24 months depending on how actively graziers and stockmen manage their livestock and the size of the land under virtual management. It features a stainless-steel chain, while the chain bridge links, which are designed for larger animals, are made of plastic. To secure the collar around the animal’s neck, twist-locking carabiners are utilised. The collar bridge is positioned at the top of the neck, with the chain encircling the neck and the cattle rider housing suspended beneath, facing forward away from the animal’s body to minimise contact with the animal’s hair. The plastic chain bridge which sits at the top of the animal’s neck is designed to be the weakest link, with a load rating of approximately 360kg, thus it would break under excess pressure to avoid strangulation. Vence provides comprehensive collar attachment guidelines within its training materials, including for younger animals whose neck sizes are expected to increase, and advises regular visible inspections of growing animals to adjust the collars as appropriate.

The collar features a speaker to emit audio signals and two metallic electrical contacts, positioned 5cm apart, for the stimulus function. As an animal nears a virtual boundary, it initially receives an auditory cue. Should it persist in moving towards an unwanted direction and enter the exclusion zone, it then receives a mild electric stimulus. Upon receiving the mild electric stimulus, the animal is encouraged to move away from the source of stimulation, altering its course away from the virtual perimeter.

The collar employs a specific stimulus pattern to manage livestock. Initially, a sound is emitted for 0.5 seconds, followed by a 1.5-second pause with no stimulus. If the animal remains in the exclusion zone, the system escalates to an electronic stimulus lasting another 0.5 seconds, followed by a 2.5-second pause. This cycle repeats for a maximum of 100 seconds, totalling 20 potential stimulus events. Following this, there is a 180-second "cool down period" with no stimulus, after which the pattern may repeat. If the animal does not exit the exclusion zone for some reason stimulus this pattern could be repeated 4 times, signifying a maximum of 80 potential electronic stimuli. Thereafter, the system will automatically disable the stimulus permanently, requiring a manual reset. This amounts to a maximum potential of 40 seconds of electronic stimulus (80 half second stimuli) spread over 15 minutes before shutdown.

The stimulus is predictable, controllable, and significantly weaker in energy than the 'shock' from a standard electric fence. A properly constructed standard electric fence will have an output voltage of around 4000 to 8000 volts (powered by energizer units between 18 to 40 joules), while the Vence collar has a voltage output of around 800 volts, *i.e.*, emits a maximum strength of around 0.18 joules.

The collar also incorporates several safety features in its algorithms. It automatically disables virtual fencing under certain conditions, such as prolonged network communication failures, low battery levels, or when preset stimulus thresholds are exceeded, ensuring the safety and welfare of the livestock.

Value of virtual fencing technology for the producer, industry, and environment

- **Cost savings over time with virtual fencing vs. traditional fencing**: Virtual fencing technology represents a significant cost saving for graziers and stockmen, reducing the need for expensive physical fences and associated maintenance costs. In Australia, the standard price is currently AUD $45 +GST to rent one Cattle Rider Collar for the year, approximately $12 for each battery (one battery per collar) plus towers as required, and currently includes the full tech support from Vence, potentially reducing long-term maintenance and troubleshooting costs.

  By contrast, the cost of traditional fencing can vary significantly depending on the location and terrain, typically ranging from $8,000 to $15,000 per kilometre, inclusive of materials and labour, depending on the type of electric wire fencing material. Traditional fencing attracts ongoing operational and maintenance costs, including materials such as fence posts, wire, insulators, and the electric fence energizers, along with the labour required for installation. Additionally, ongoing maintenance is needed to ensure proper function, involving regular inspections, repairs, and potential replacement of worn or damaged components. Operational expenses may also arise from the energy used to power the fence, whether through electricity or solar panels.

  Vence's Herd Manager Software also provides considerable costs savings when designing and planning virtual fences, allowing operators to visualise pastures and important property features such as ponds, rivers, and roads. Virtual fencing can be established and arranged well in advance and adjusted easily as necessary. The software also enables tracking of individual animals and analysis of Vence performance through heatmaps. Additionally, the technology facilitates the association of ear tag IDs with collar IDs and allows monitoring of the battery health of the devices.

- **Increased stocking density through better utilisation of existing forage**: Virtual fence technology allows for real-time tracking and management of grazing patterns. Graziers and stockmen can optimise the use of pasture by controlling where and when cattle graze, leading to better forage utilisation. This strategic grazing management, enabled by virtual fences, supports higher stocking densities without compromising the quality or sustainability of the pasture. Enhanced pasture management through virtual fencing can lead to more consistent and increased forage yield, making the land more productive.

- **Manage cattle inventory, find lost livestock quickly, and reduce entanglement in traditional fencing**: Virtual fences integrate GPS tracking that enables precise monitoring of each animal's location. This facilitates quick location and recovery of strayed or lost livestock, reducing labour and time spent on manual searches. Accurate and real-time location data also helps maintain up-to-date inventory control, crucial for effective breeding, sales, and financial planning. The technology also enhances the security of the herd by minimising risks associated with theft and predator attacks. Furthermore, virtual fencing technology minimises the risk of injuries caused by entanglement in traditional physical fences. By setting up virtual boundaries at a safe distance from existing physical barriers, this technology effectively keeps animals away from potential hazards, including physical fences and other dangerous areas.

This overlay technique ensures enhanced safety for livestock by reducing the chances of accidents and injuries.

- **Allows for intensive rotational grazing programmes on any landscape**: Virtual fences make it feasible to implement rotational grazing programs efficiently, even in landscapes where physical fences are impractical or impossible to install. Using rotational grazing allows producers to move livestock from field to field, allowing the animals to feed on their own and managing the field to allow forage to grow resulting in improved animal health, improved soil health, increased biodiversity, and providing sufficient forage for the animals – all controlled via virtual boundaries. The system also provides for an outcome-based programme for graziers and stockmen through implementation of the management practises and generation of reports based on those actions.

- **Manage livestock in terrain not suitable for traditional fencing**: Virtual fences provide a viable alternative to traditional fencing in rugged or expansive terrains, maintaining livestock within designated areas. This reduces the environmental and financial costs associated with physical fences, such as installation and maintenance in challenging terrains, and reduces the need for helicopters, quad bikes, horses, and dogs to muster cattle.

- **Remove fencing that harms wildlife and comply with conservation and public land guidelines**: Eliminating physical fences reduces wildlife injuries and deaths caused by fence collisions, promoting a healthier ecosystem. The absence of physical barriers enhances habitat connectivity, crucial for the survival and proliferation of native species. By managing where livestock graze more precisely, virtual fencing can help reduce conflicts between livestock and wildlife. For example, it can prevent livestock from encroaching on water sources needed by wildlife or from grazing in areas where they might disturb nesting sites or other critical wildlife habitats. Compliance with wildlife conservation and public land guidelines is easier with virtual fences, as they prevent disturbance to protected areas while managing livestock effectively.

- **Set up exclusions around sensitive environmental and cultural areas**: Virtual fencing can be used to protect sensitive environmental areas, such as riparian zones, wetlands, and areas of high biodiversity by restricting livestock access without the need for physical barriers. Similarly, exclusion zones can be set up around cultural areas, such as Indigenous Protected Areas (IPAs) where traditional fencing cannot be erected or the boundary of the cultural area changes over time. A series of backup virtual fences can be employed to ensure that livestock does not encroach on IPAs or other sensitive areas.

- **Set up exclusions around burn allotments**: With virtual fence technology, exclusion zones can be set up around areas recovering from bushfires, allowing vegetation to regenerate without the pressure of grazing. Protecting these critical areas helps maintain the ecological balance and supports overall environmental health.

- **Emergency disaster fencing**: Virtual fencing can be a crucial tool in emergency disaster management in Australia, a country prone to extreme weather events such as droughts, bushfires, and floods. By using virtual fencing, livestock can be quickly and remotely redirected to safer areas without the need for physical barriers, which can be time-consuming and expensive to erect and may not be feasible during sudden disasters. This technology allows for flexible, rapid adjustment of boundary lines, ensuring that animals can be moved away from imminent threats swiftly and with minimal stress, thereby enhancing their safety and well-being during critical events.

Current use and experience of Vence virtual fencing technology in Australia

Virtual fencing represents an innovative step forward in livestock management, with the potential to transform both farming practices and environmental stewardship. Along with New Zealand and the United States, Australia has been at the forefront of researching and trialling virtual fencing technologies to assess the effectiveness, animal welfare implications, and practical applications of virtual fencing on Australian livestock farms.

Queensland, Tasmania, and the Northern Territory currently permit the sale and use of virtual stock fencing technology and devices, in accordance with legislative conditions. However, in addition to New South Wales, current legislation restricts the use of virtual fencing stock devices, and by extension virtual fencing technology, in Victoria, South Australia, Western Australia, and the Australian Capital Territory, with exceptions for research purposes and trials.

Current Vence operations in Australia are focused on "proof of concept" and targeted on trialling the virtual fencing technology and socialising it with graziers and stockmen.

- In Queensland, Vence is currently working with graziers and stockmen, including at a property near Augathella where 900 collars are deployed, and at Barkly Downs Station, near Mt. Isa, also at Clermont on a Glencore mine site where animals fitted with collars are located to help strip graze rehabilitated coal mine land.

- In Western Australia, Vence's virtual fencing has undergone official trials at the Rio Tinto-owned Hamersley Station in the Pilbara (2021-2023) under a partnership with the University of Western Australia and Meat and Livestock Australia (as part of the BeefLinks project). The trials were conducted in phases, commencing with a small number of animals fitted with the collars and confined in a small area for a month to monitor for any signs of pain or stress with subsequent phases involving up to 500 animals over a larger area. The trial has proven to be very effective at controlling cattle movements on vast expanses of land where the costs of traditional fencing are prohibitively expensive.

- In South Australia, Vence has collaborated with the South Australian Research and Development Institute (SARDI) virtual fencing project and trials. The SARDI research project is conducting trials in South Australia that focus on efficacy of technology, potential applications, and animal welfare associated with the technology in collaboration with, among others, the University of Adelaide and the Department of Agriculture, Fisheries and Forestry.

Animal welfare considerations

Over the last decade, there has been significant progress in understanding how to implement virtual fencing in a way that is effective and minimises stress for livestock. Collars are specifically designed to maximise animal comfort and safety. Each collar is individually paired with an animal to ensure precise and safe operation. Each day, the animal receives the same primary auditory cue, unlike traditional containment methods where cues can vary greatly, *e.g.*, changes in farm staff, human clapping, shouting, or physical movements, use of sticks or rattles, quad bikes, and electric fences. Consistency in cues is crucial for predictability and effectiveness of outcomes. The cues are precise and consistent to avoid confusion or stress among the animals, thus minimising welfare impacts and helping the animal maintain a sense of control. The technology tailors the strength of aversive cues (the electric stimulus) to the minimum necessary for each animal, automatically adjusting based on individual tolerance levels. Aversive cues have time-bound lockouts tailored to each animal's previous behaviour, preventing prolonged exposure.

A key objective of Vence's virtual fencing technology with respect to animal welfare is to enhance and support the natural behaviours of animals, minimising any disruption and promoting animal agency by cooperating with, rather than working against, the animals. Animals trained with the technology often learn quickly to be comfortable and trust the guidance cues provided. For most animals, the aversive cue becomes both predictable, meaning the animal understands when an escalation to this cue will occur, and controllable, allowing the animal to alter its course to avoid the cue or to understand the consequences of ignoring preliminary cues.

Numerous independent studies have confirmed that there is no indication of stress in cattle from the use of virtual fencing, making it a viable and humane alternative to traditional electric physical fencing for animal management. In 2022, Science Direct published a scientific paper that trialled virtual fencing technology with a controlled small group of animals with results showing that the physiological and behavioural responses to auditory and aversive cues indicated no increased

stress level in cattle. Moreover, the results confirmed that the primary behaviours of cattle on pasture remained unchanged by the type of fencing system used. There were no significant differences in live weight gain, herbage intake, or faecal cortisol metabolites. Additionally, the time it took for the animals to resume grazing after receiving an electric pulse from the virtual stock fencing collar was significantly shorter compared to the delay caused by an electric pulse from a traditional physical fence. Similarly, researchers at the University of Tasmania conducted a case study in 2021 to examine how well virtual fencing technology could confine groups of Angus heifers within grazing cells defined by semi-permanent electric side fences along with virtual front and back fences. This was compared to groups of heifers that were contained within cells outlined solely by electric fences. The virtual front and back fences effectively kept one group of heifers within their designated grazing area, whereas the second group increasingly entered the exclusion zone during the second and third allocations, leading to more frequent audio and electrical stimuli. Despite these differences in containment, neither electric nor virtual-fence treatments had an impact on changes in live weight or pasture utilisation.

Vence provides customers with extensive training and animal welfare guidance during the onboarding process. It also has inbuilt failsafe mechanisms within the software to protect animals from receiving too many stimuli from the collars. These safeguards are designed to enhance animal welfare and operational reliability, including settings that are locked and automated operations to minimise the risk of deliberate misuse. They also prevent inappropriate boundary delineation to ensure animals are contained safely. Additionally, there are cutoff mechanisms to prevent animals from receiving excessive stimulus in a short period and to minimise risks to animals showing extreme behavioural reactions. The system also alerts operators to any animal welfare risks associated with individual animals and notifies them of any systemic or network failures. Furthermore, the virtual fencing technology can detect the direction in which an animal is moving towards or across a boundary. This feature allows animals that have escaped to freely return to the containment area without the need for an auditory or aversive cue, whereas animals that breach traditional fences often remain outside until a grazier or stockmen can return them to the enclosure.

Continued support to share our expertise and be a partner for graziers and industry

Thank you for the opportunity to comment on the proposed legislative amendments which, if passed, will permit graziers and stockmen across NSW to adopt an animal-friendly confinement, tracking and monitoring system that would drive increased productivity and profitability across the industry while improving sustainability and environmental outcomes.

Sincerely,

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[redacted]
MSD Animal Health