THE UNIVERSITY OF ARIZONA
Cooperative Extension

Natural Resources
& the Environment

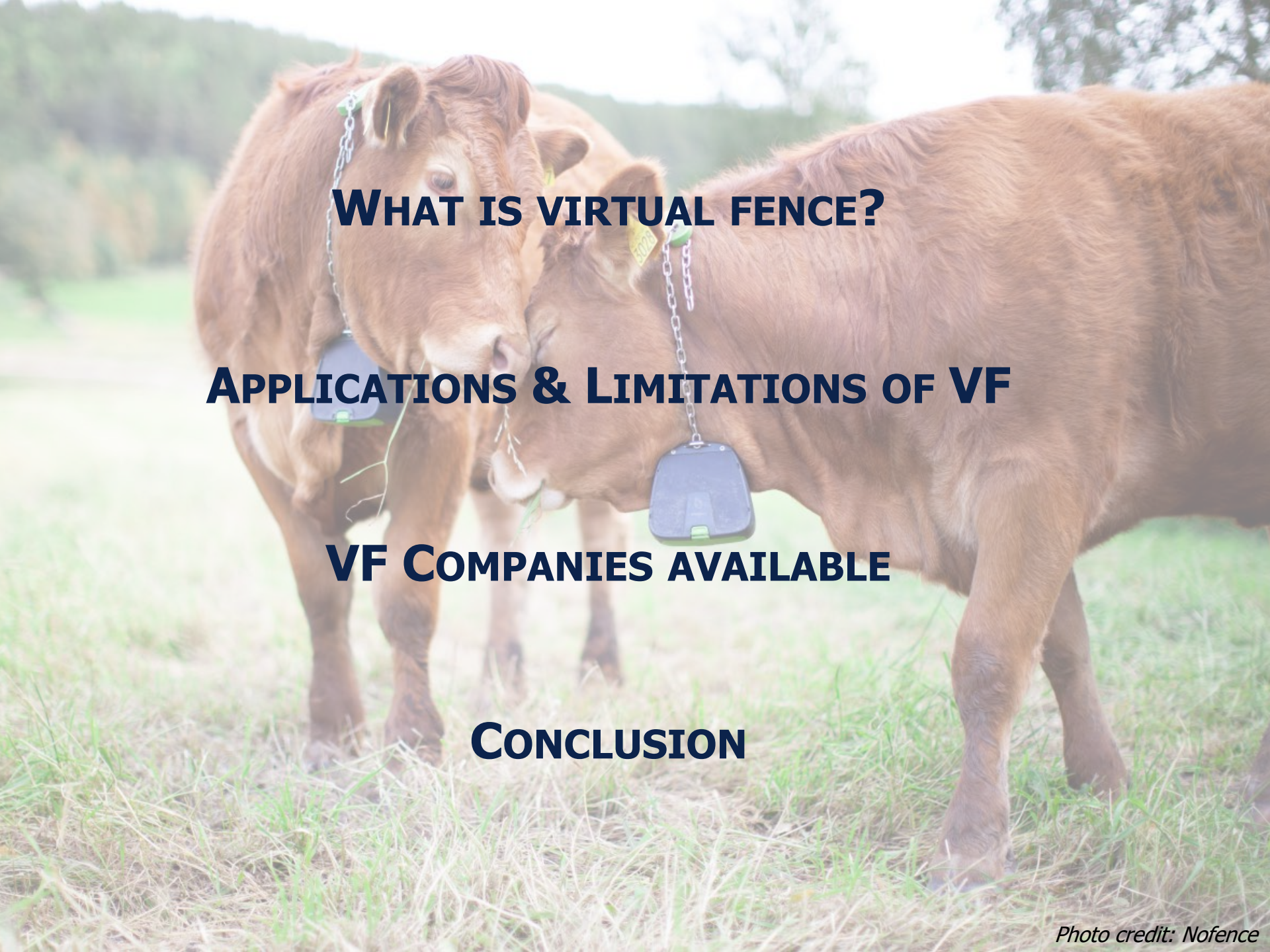
Virtual fence Technology: How it works, applications, And Available companies



AZ ASFMRA, Phoenix, Arizona – March 7th 2025

Photo credit: Nofence

Flavie Audoin



What is virtual fence?

Applications & Limitations of VF

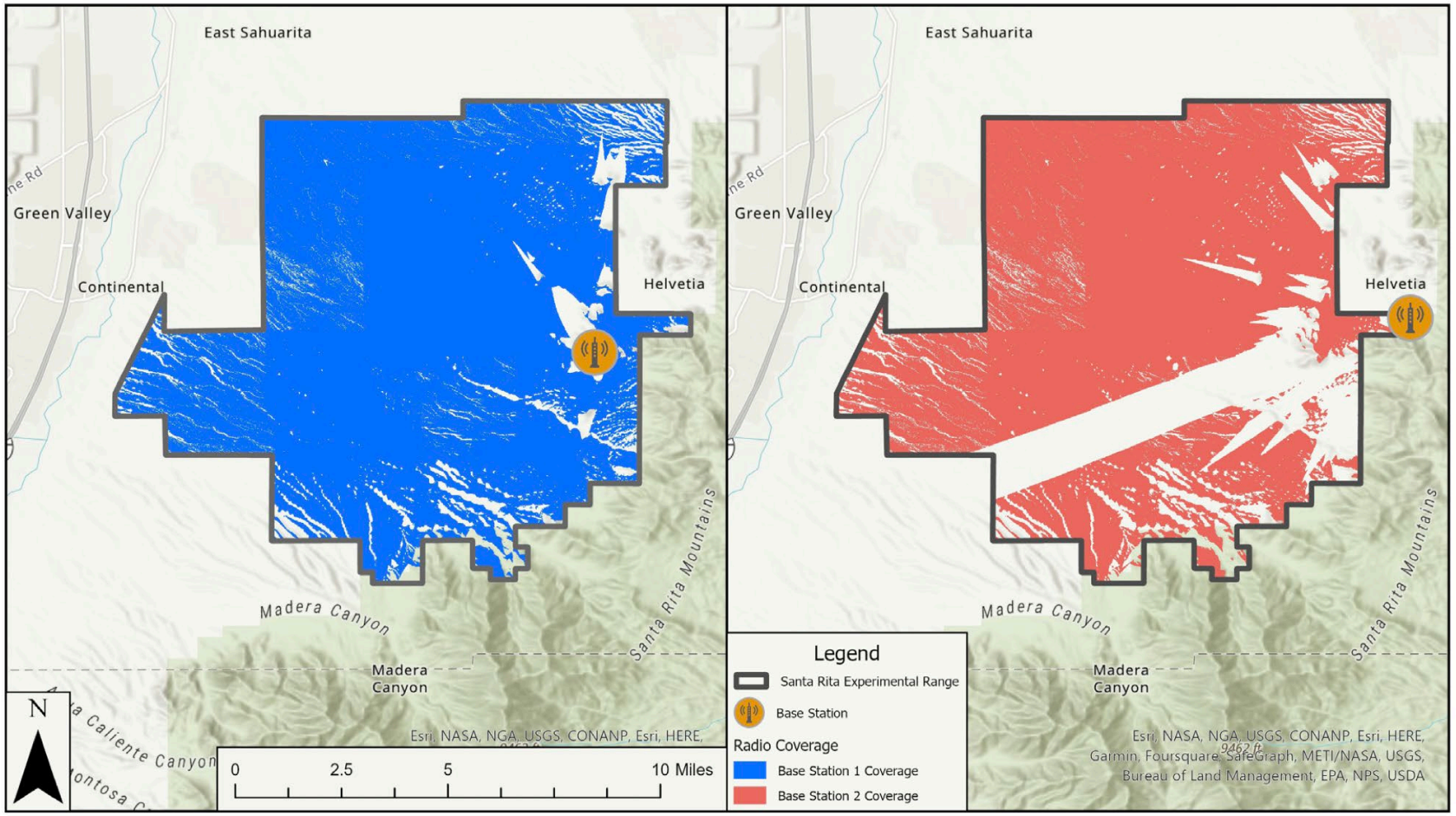
VF Companies available

Conclusion

Photo credit: Nofence

What is Virtual Fence (VF)?

- Management tool that uses **invisible barriers**, established using Global Positioning System **(GPS) coordinates**, that influence livestock movement with a combination of **auditory and electrical cues**.

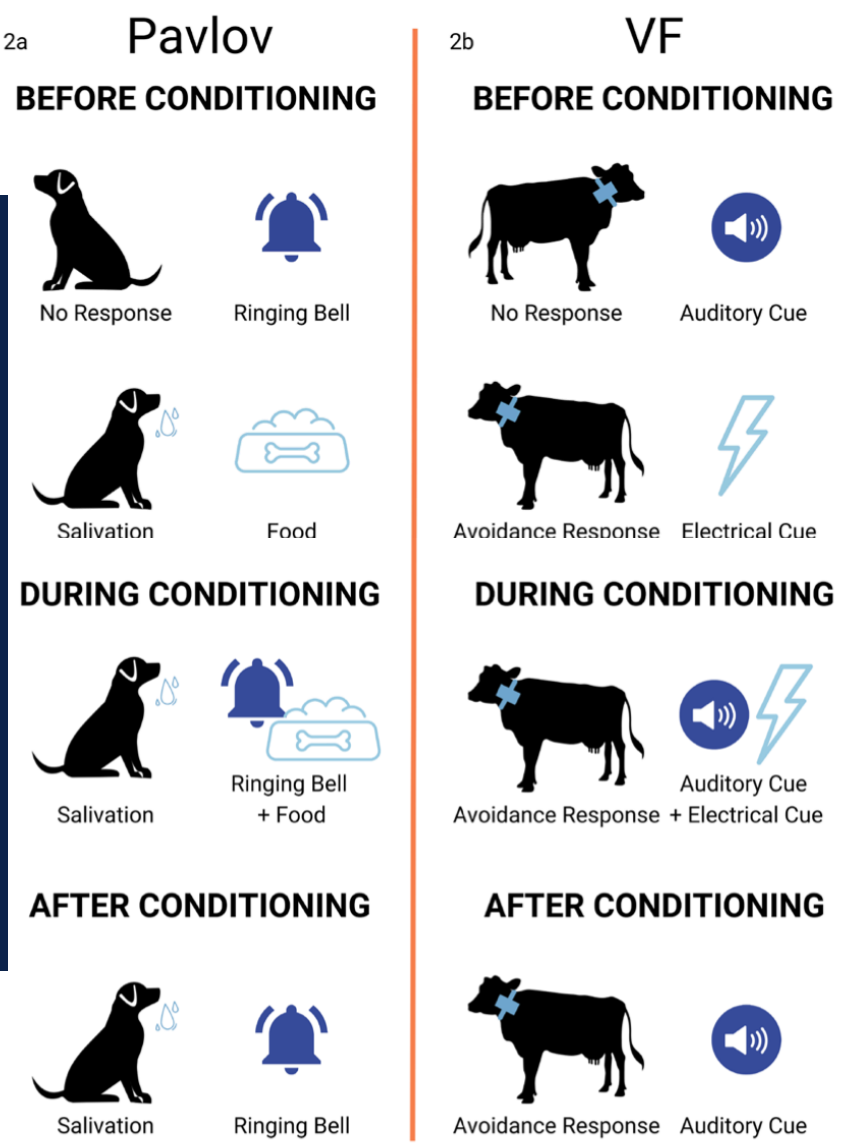


Antaya A. et al., 2024. Arizona Cooperative Extension az2079

What is the learning process for Virtual Fence (VF)?

Classical conditioning

An involuntary learning process where a novel stimulus is paired with a naturally occurring response and, over time, the novel stimulus can independently trigger the response



Negative reinforcement

A learning process where an unpleasant stimulus is removed to increase the likelihood of a desired behavior

Mayer B. et al., 2024. Arizona Cooperative Extension az2088

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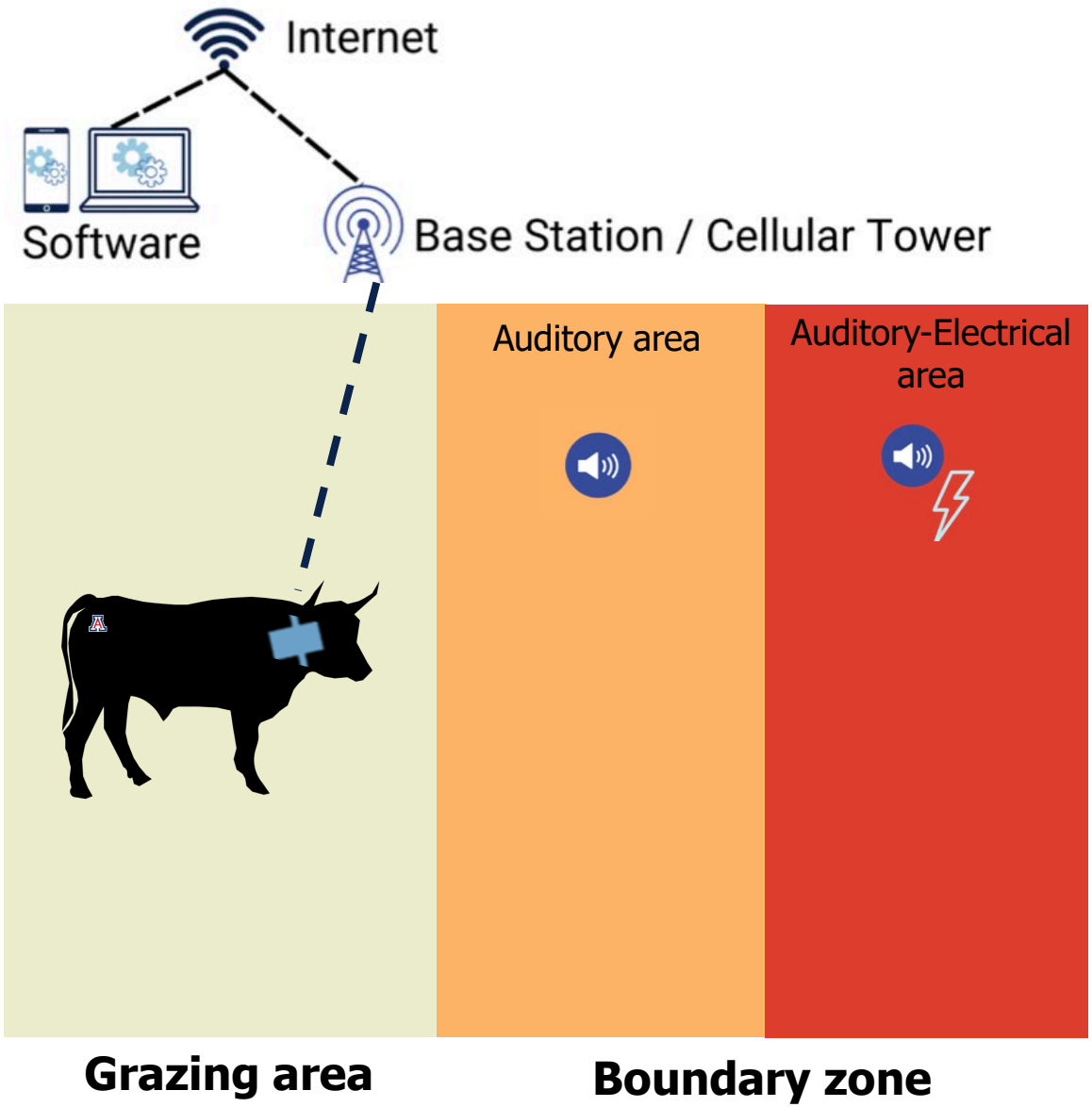

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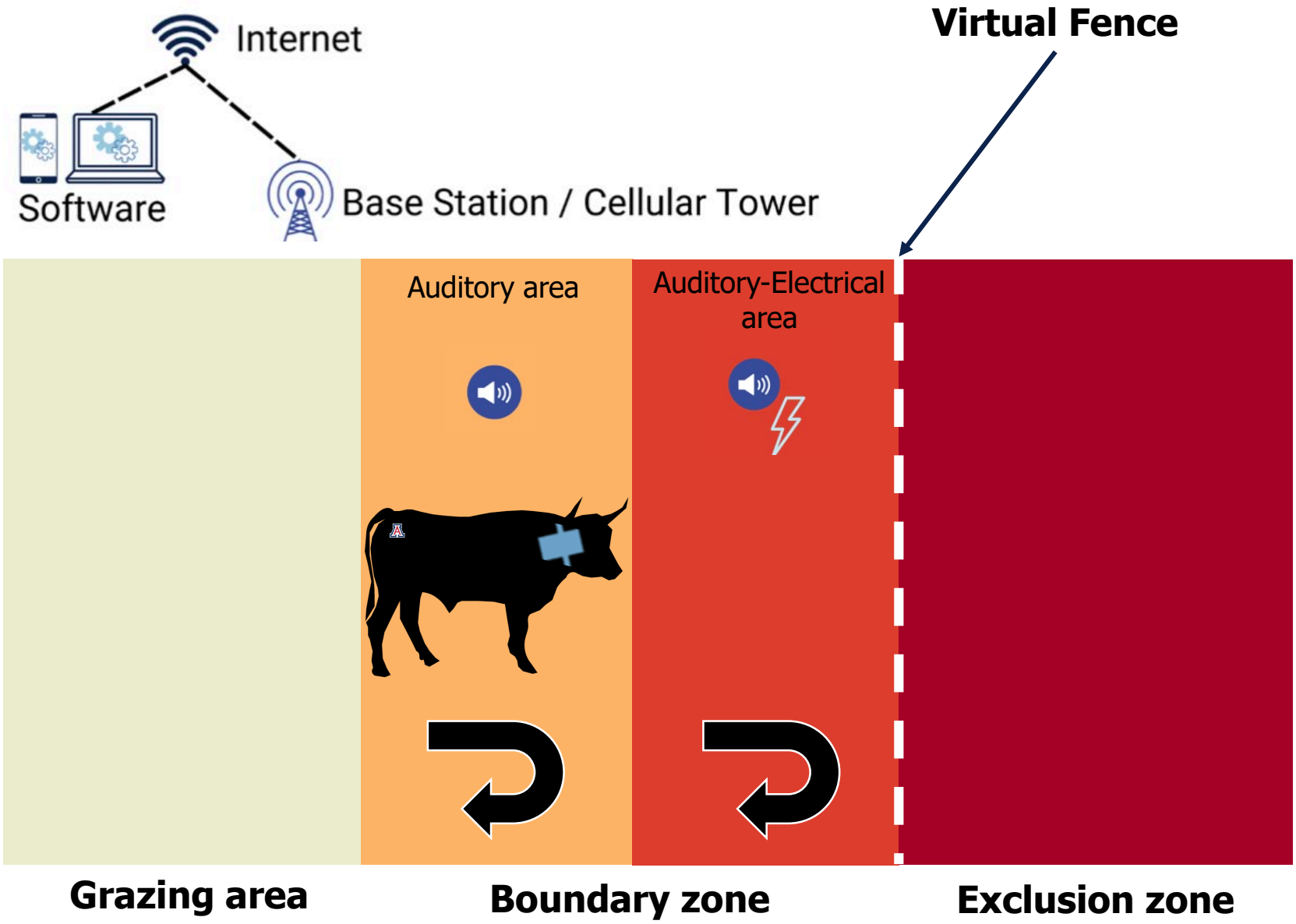


Applications of Virtual Fence technology

- Improve grazing management plan and livestock distribution
- Avoid areas with noxious weeds
- Post-fire grazing
- Locate your livestock ➔ gain of time gathering and useful in case of a problem
- Riparian exclusion
- Fuel break for wildfire prevention
- Targeted grazing for invasive species
- …





Limitations of Virtual Fence technology

- Fast evolving technology
- Expensive technology
- Not a 100%...
- Peer and environmental pressure

Future use at the Santa Rita Experimental Range

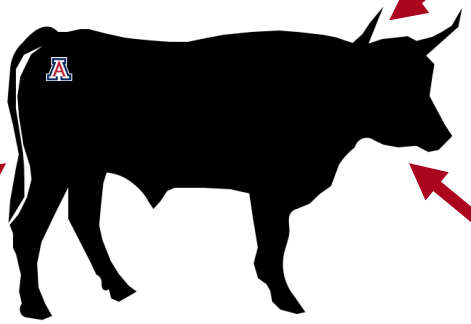
- Livestock distribution and grazing management
- Acute and chronic stress
- Targeted Grazing

GALLAGHER

New Zealand

Halter

New Zealand



Nofence

Norway

VENCE

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Nofence

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New Zealand



Base station

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Cellular network

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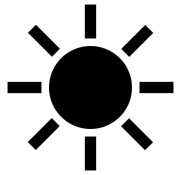


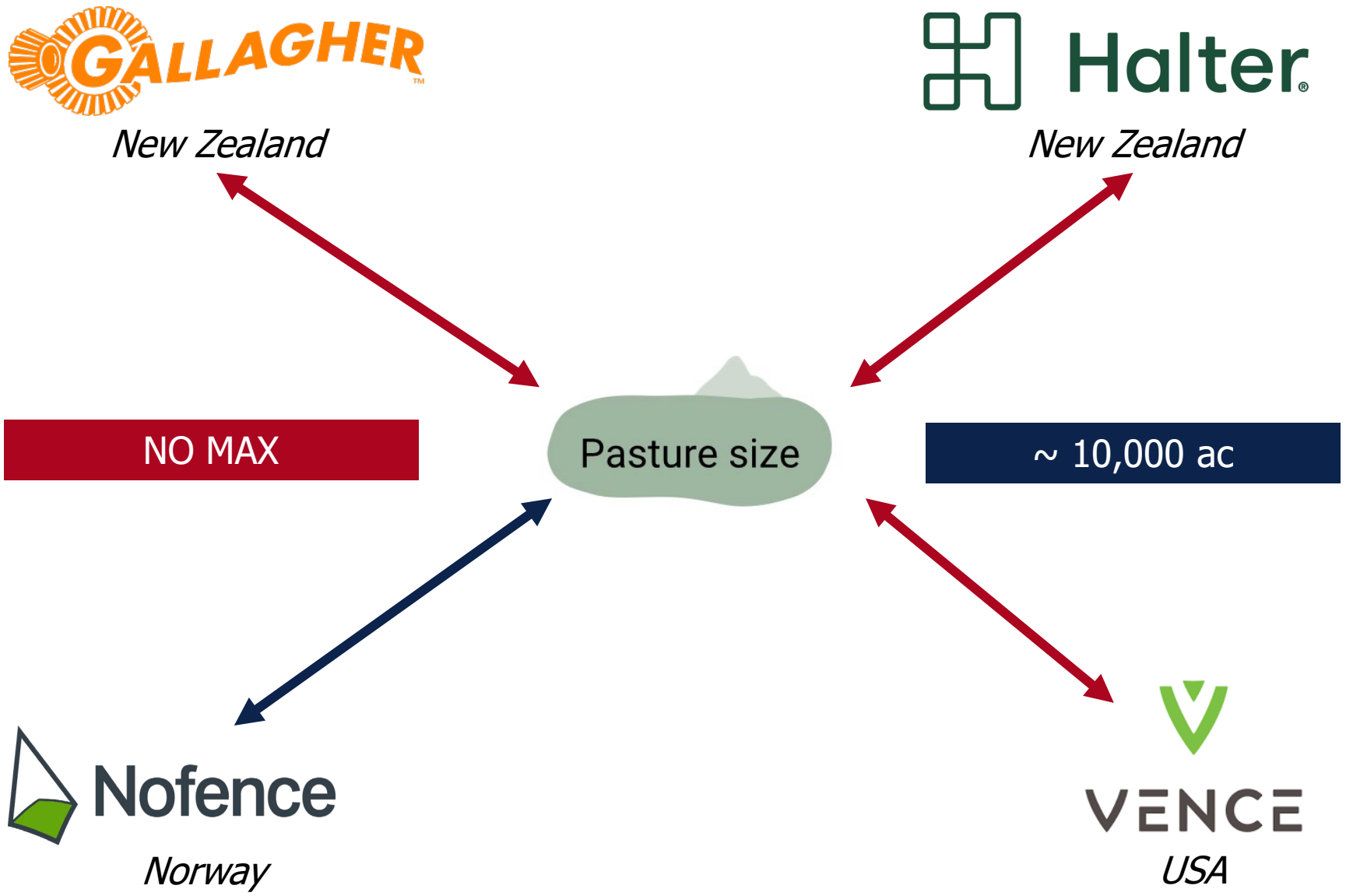
Solar powered

Nofence

Norway

VENCE

USA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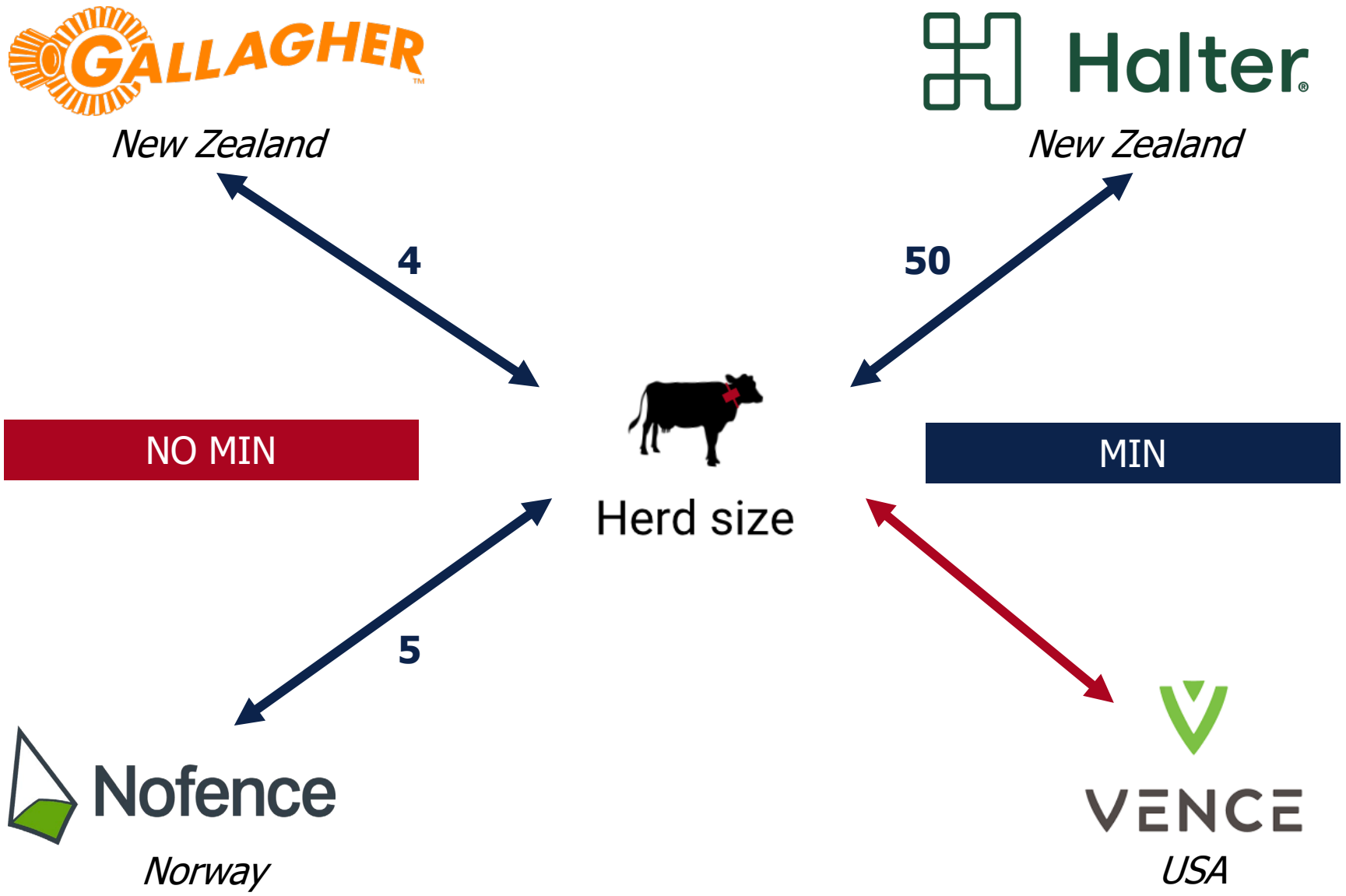
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If you are interested in VF, you should ask yourself these questions:

- What are my objectives and goals with using this technology?
- Am I going to use the technology all year around or not?
- Am I going to use the technology on private land and/or public lands?
- Is it worth it to my operation to purchase VF technology?
- Do I have good cell coverage or not?
- Do I want to change batteries or not?



Resources available

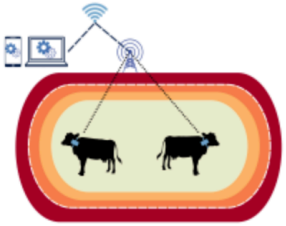
RANGELANDS GATEWAY

- LIBRARY
- PARTNER STATES
- TOPICS
- PROJECTS
- TOOLS
- HIGHLIGHTS
- GLOBAL

FOUNDATIONS OF VF

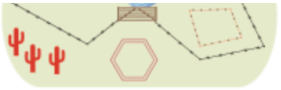
Basics of a Virtual Fencing System

Virtual fence (VF) is an emerging precision livestock management tool with multiple interconnected components.



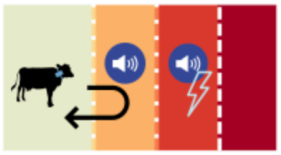
The Vital Role of

Virtual fence lines created in VF softw which requires a digital map of an entire ranch or land management area.



Training and Animal Welfare

How livestock recognize and interpret the auditory and electrical cues can limit potential risks for animal health and welfare.



Exploring the Complexities and Challenges

[coming soon!] Special consideration is needed when training livestock, designing fences, managing incentives, and gathering livestock.



The Financial Implications of VF

[in progress] Economic pros and cons of VF



Strategies for Collar Management

[in progress] Battery life, collar disposal, strategies



https://rangelandsgateway.org/virtual-fence

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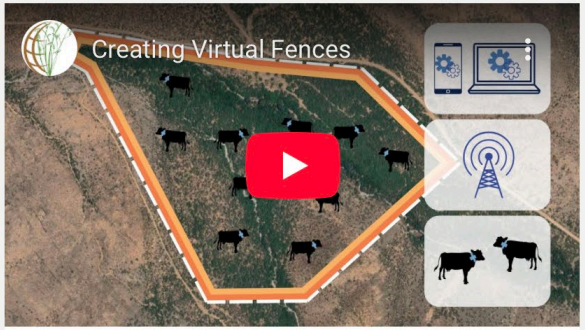
VIDEOS



Creating Virtual Fences

Visualize the basic process of setting up virtual fences in the VF software that include a grazing area, boundary zone, and exclusion zone for a virtual herd of livestock.



Placing Virtual Fences

Learn about some key considerations for placing invisible virtual fences on the landscape to help improve VF effectiveness and promote animal safety.

The University of Arizona

Virtual Fence Program

Supported by

THE UNIVERSITY OF ARIZONA Cooperative Extension

COLLEGE OF AGRICULTURE & LIFE SCIENCES Natural Resources & the Environment

THE UNIVERSITY OF ARIZONA Arizona Experiment Station

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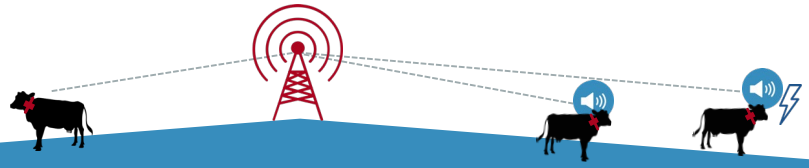
This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2021-38640-34695 through the Western Sustainable Agriculture Research and Education program under project number WPDP22-016. USDA is an equal opportunity employer and service provider. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

This work is supported by the AFRI Foundational and Applied Science Program: Inter- Disciplinary Engagement in Animal Systems (IDEAS) [award no. 2022-10726] from the USDA National Institute of Food and Agriculture.

Additional funding was provided by Arizona Experiment Station, the Marley Endowment for Sustainable Rangeland Stewardship, and Arizona Cooperative Extension.



rangelandsgateway.org/virtual-fence

Thank you

Any Questions?

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