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Range Cattle Research & Education Center

Invisible Fence – A tool to optimize grazing management in Florida

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Southeast Rangelands

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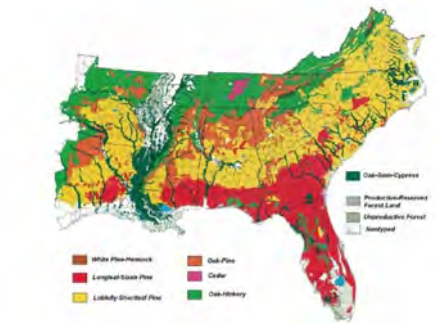

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South Florida Rangelands

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Management Practices

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Management Practices

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Management Practices

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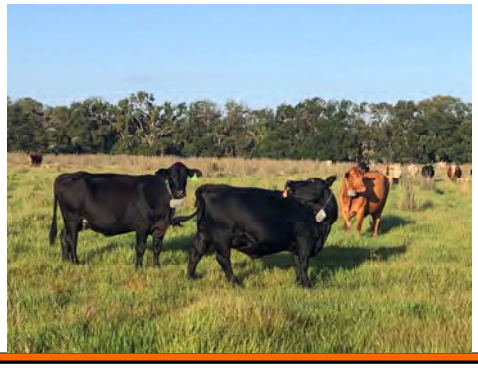

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Grazing

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- Additional source of income to landowners
- Promote plant diversity
- Increase nutrient cycling
- Ecosystem services?

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Grazing

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- Recent release of a series of grazing terminology with little or no scientific evidence of benefits to grazing systems
  - Holistic grazing
  - Savory grazing
  - Intensive grazing
  - Adaptive Intensive Grazing
  - Adaptive grazing management (AGM)
  - Mob grazing
  - Etc……

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Grazing

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"the vast majority of experimental evidence does not support claims of enhanced ecological benefits in intensive rotational grazing compared to other stocking strategies, including the capacity to increase storage of soil organic carbon." They concluded that of all the practices one may adopt for grazing, stocking rate is the primary factor that controls the resultant sustainability of rangeland as a forage source.

Briske et al. (2014)

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Introduction

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View Point

The Savory Method Can Not Green Deserts or Reverse Climate Change

A response to the Allan Savory TED video

By David D. Briske, Brandon T. Bestelmeyer, Joel R. Brown, Samuel D. Fuhlendorf, and H. Wayne Polley

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Introduction

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frontiers in Sustainable Food Systems

REVIEW

What Is Regenerative Agriculture? A Review of Scholar and Practitioner Definitions Based on Processes and Outcomes

Peter Newton, Nicole Civita, Lee Frankel-Goldwater, Katharine Bartel and Colleen Johns*

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Grazing

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- Grazing intensity
  - Stocking rate (AU/acre)
- Grazing methods
  - Rotational stocking
  - Continuous stocking

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Photo by Juliana Ranches

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Virtual Fencing Solutions for Regenerative Livestock & Range Management

VENCE

MERCK Animal Health

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A tool that can solves different problems for different producers, providing multiple values.

Cattle Rider	Base Station	Herd Manager
On-animal device that tracks and applies stimulus.	Light infrastructure enabling remote operations.	Custom software that allows planning and monitoring of herd movements.

When combined, these three components allow ranchers to manage their livestock virtually in remote and difficult terrain.

VENCE

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- Base Stations communicate with collars using LoRaWAN technology – ISM Band.
- Cellular Backhaul bridges collar data to the internet.
- Solar Panels allow independent operation in remote areas.
- Depending on the ranch topography, a base station has the capability to provide coverage for 10,000 acres or more.
- Designed to last 10+ years in the field with little to no maintenance.

VENCE

MERCK Animal Health

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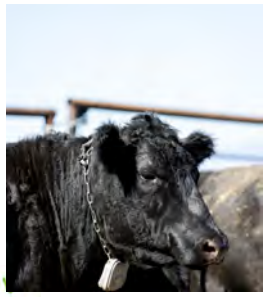

- Radio Chip communicates with and receives instructions from Base Station.
- GPS receiver determines animal's position in relation to Vence boundaries.
- If the animal encroaches on a Vence boundary, the collar deploys sound stimulus followed by sound + shock stimulus.
- The collars memory capacity allows autonomous operation even when out of range from Base Stations.
- Battery life depends on usage:
  - Daily Moves: 3-6 months
  - Weekly Moves: 6-9 months
  - Tracking Only: 24 months

VENCE

MERCK Animal Health

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- Animals managed via pressure applied by the collar based on location.
- When animal first approaches a boundary a sound warning is applied.
- If animal continue to encroach, a sound plus aversive stimulus is applied.
- Animals are trained to turn away from the collar pressure and return to the herd.
- Virtual fence line is a "one-way gate" animals receive pressure leaving the inclusion zone but receives no pressure when returning.
- When animal returns to the inclusion zone the virtual fence turns back on.

VENCE

MERCK Animal Health

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Animal Behavior

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Item	*Run 1*	*Run 2*	*Run 3*	*Run 4*	*Run 5*	*Largest SEM*	*P-value*
	Collar off	*Collar on*			*Collar of*		
Chute score	1.40	1.25	1.30	1.30	1.40	0.109	0.85
Chute exit velocity, m/s	2.10	1.45	1.80	1.85	1.90	0.244	0.37
Collar fit score	1.45^{b}	3.65^{a}	1.60^{b}	1.30^{b}	1.25^{b}	0.197	< 0.001

$^{a, b}$ Means within rows with different superscripts differ.

Ranches et al. (2021)

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Animal Behavior

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Behavior	*Run 1*	*Run 2*	*Run 3*	*Run 4*	*Run 5*	*Largest SEM*	*P-value*
	Collar off	*Collar on*			*Collar off*		
Eating, %	**47.7^{a}**	**3.85^{b}**	**0.955^{b}**	**1.34^{b}**	**24.0^{a,b}**	**6.943**	**< 0.001**
Browsing, %	10.8	5.60	12.0	6.65	19.9	5.09	0.30
Idling, %	**21.9^{c}**	**52.3^{a}**	**54.9^{a}**	**57.8^{a}**	**36.6^{a,b,c}**	**6.95**	**< 0.01**
Walking, %	15.9	17.8	24.9	26.0	18.8	4.01	0.30
Head shaking, %	0.466	3.50	0.970	1.70	0.250	1.018	0.17
Walking; head shaking, %	0.485	4.01	0.888	2.83	0.252	1.240	0.15
Running/trotting, %	0.00	1.14	0.92	0.88	0.00	0.962	0.85
Running/trotting; head shaking, %	**0.00^{b}**	**5.54^{a}**	**1.60^{b}**	**0.800^{b}**	**0.00^{b}**	**0.815**	**< 0.001**
Jumping, %	0.00^{b}	1.08^{a}	0.232^{b}	0.235^{b}	0.00^{b}	0.240	0.01
Jumping and head shaking, %	0.00^{b}	1.86^{a}	0.927^{a}	0.00^{b}	0.00^{b}	0.405	< 0.01
Bucking and running, %	0.00^{b}	1.25^{a}	0.232^{a,b}	0.00^{b}	0.00^{b}	0.307	0.02

$^{a, b,c}$ Means within rows with different superscripts differ.

Ranches et al. (2021)

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Animal Behavior

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	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Largest SEM	P-value
Auditory stimulus, count^{1}	24.60^{a}	17.20^{a,b}	13.20^{a,b}	14.50^{a,b}	14.00^{a,b}	7.80^{b}	12.60^{b}	9.90^{b}	2.79	0.002
Electric stimulus, count^{1}	14.60^{a}	2.60^{b}	2.70^{b}	1.90^{b}	1.90^{b}	0.90^{b}	1.60^{b}	0.545^{b}	0.687	<0.0001

Ranches et al. (2021)

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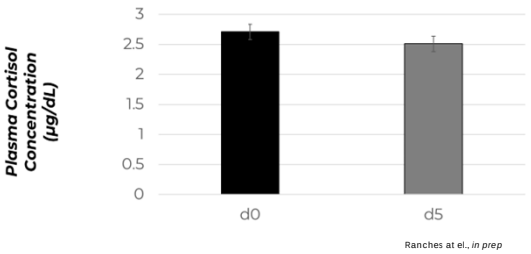
Animal Behavior



Ranches at el., *in prep*

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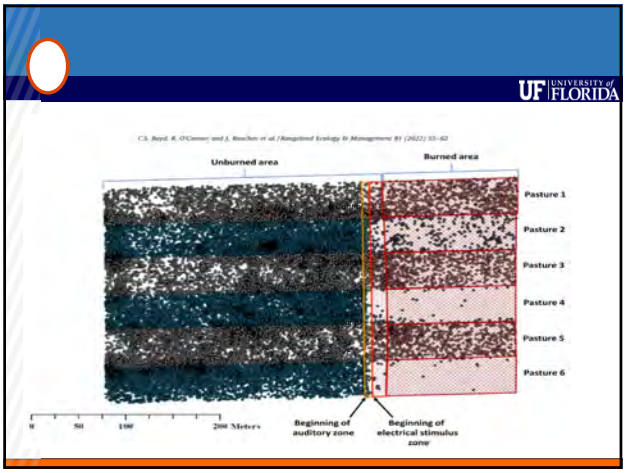

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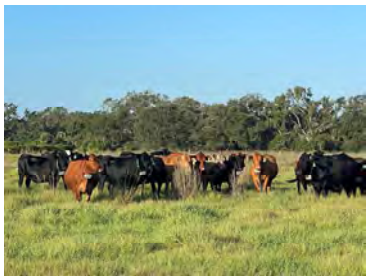
Virtual Fence - Florida

Jim Strickland – Blackbeard Ranch
NRCS – CIG Grant



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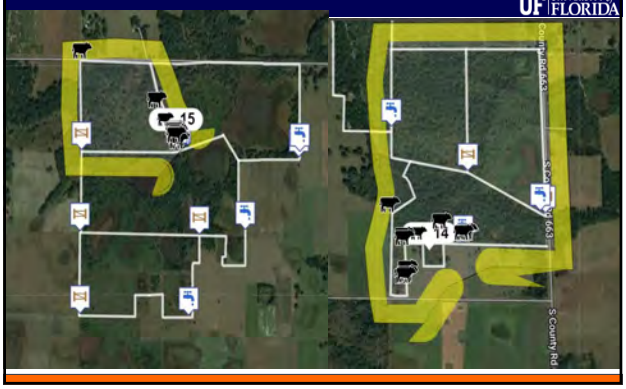
Grazing Method Trial - Ona



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Grazing Method Trial - Ona

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Grazing Method Trial - Ona

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Grazing Method Trial - Ona

	Continuous	Rotational	SE	*P* value
ADG (lb/d)	0.1	0.0	0.08	0.45
BCS initial	5.6	5.7	0.3	0.82
BCS final	5.8	5.8	0.3	0.94
BCS change	0.2	0.1	0.1	0.47

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Thank you

Acknowledgements:

Jim Strickland – Blackbeard Ranch
Dr. Juliana Ranches – Oregon State University
RCREC – Faculty, Staff, and Students

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