

The Promise of Regenerative Agriculture: Lessons learned from 1000 Farms



Dr. Jonathan Lundgren
Ecdysis Foundation
Blue Dasher Farm



Science is Fallible, But it is the Best We've Got

Science provides
understanding, not truth

No amount of
experimentation can
ever prove me right; a
single experiment can
prove me wrong.



Albert Einstein

German Theoretical-Physicist

(1879-1955)

QuoteHD.com

Science is Manipulated

The tobacco industry helped revolutionize the art of obscuring data-driven discussions

World Health Organization. 2008. Tobacco industry interference with tobacco control. Report available on-line.

Naomi Oreskes. Merchants of Doubt (check out the documentary on this)

1. Obscure inconvenient studies.
2. Fund a preponderance of supportive evidence.
3. Discredit and intimidate inconvenient scientists.

Scientific Career

Grants

Students and
Post-docs

Publications



Federal advisory positions



We Started Asking Inconvenient Questions

Are agrichemicals hurting us more than they are helping us?

Is there a better way to farm?

Why?

The Washington Post

Magazine

Was a USDA scientist muzzled because of his bee research?

By Steve Volk March 3



Most Read

- 1 Late-night TV hoists react to Trump's presidency with disbelief, lots of praise
- 2 New dad's focus doesn't need to be on his trillion mother-in-law
- 3 Trump said it was important to look "presidential," but in victory, he

The Washington Post

Federal Insider

Suspended USDA researcher alleges agency tried to block his research into harmful effects of pesticides on bees, butterflies

By Steve Volk December 9, 2015

A prominent Agriculture Department scientist is alleging that he was suspended after complaining that the agency was blocking his research into the harmful effects of pesticides on pollinators, such as bees and butterflies.

In a whistleblower complaint filed Wednesday...

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the salt WHAT'S ON YOUR PLATE

FOOD FOR THOUGHT

How Free Are USDA Scientists to Speak Their Mind?

March 4, 2016 · 1:53 PM ET

DAN CHARLES

Mother Jones

POLITICS ENVIRONMENT FOOD MEDIA CRIME & JUSTICE

This Scientist Uncovered Problems With Pesticides. Then the Government Started to Make His Life Miserable.

TOM PHILPOTT DEC. 4, 2015 6:00 AM



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Is the USDA Silencing Scientists?

"There's a message: If you want to prosper, don't make waves"

BRANDON KEIM | NOV 3, 2015 | SCIENCE

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MPRnews

Election 2016 Local, statewide and national results

Bee expert: USDA punished me for research on pesticides

Dan Gunderson · Oct 28, 2015





*As soon as the generals and the politicians
can predict the motions of your mind,
lose it. Leave it as a sign
to mark the false trail, the way
you didn't go. Be like the fox
who makes more tracks than is necessary,
some in the wrong direction.*

Practice Resurrection

Wendell Berry

We Need to Rethink how Science is Applied



Ecdysis Foundation & Blue Dasher Farm:
A new model for agricultural research



We Need Science, But It Has to be Done Right



A Different Kind of Science is Needed



Systems-level

Farmer-driven

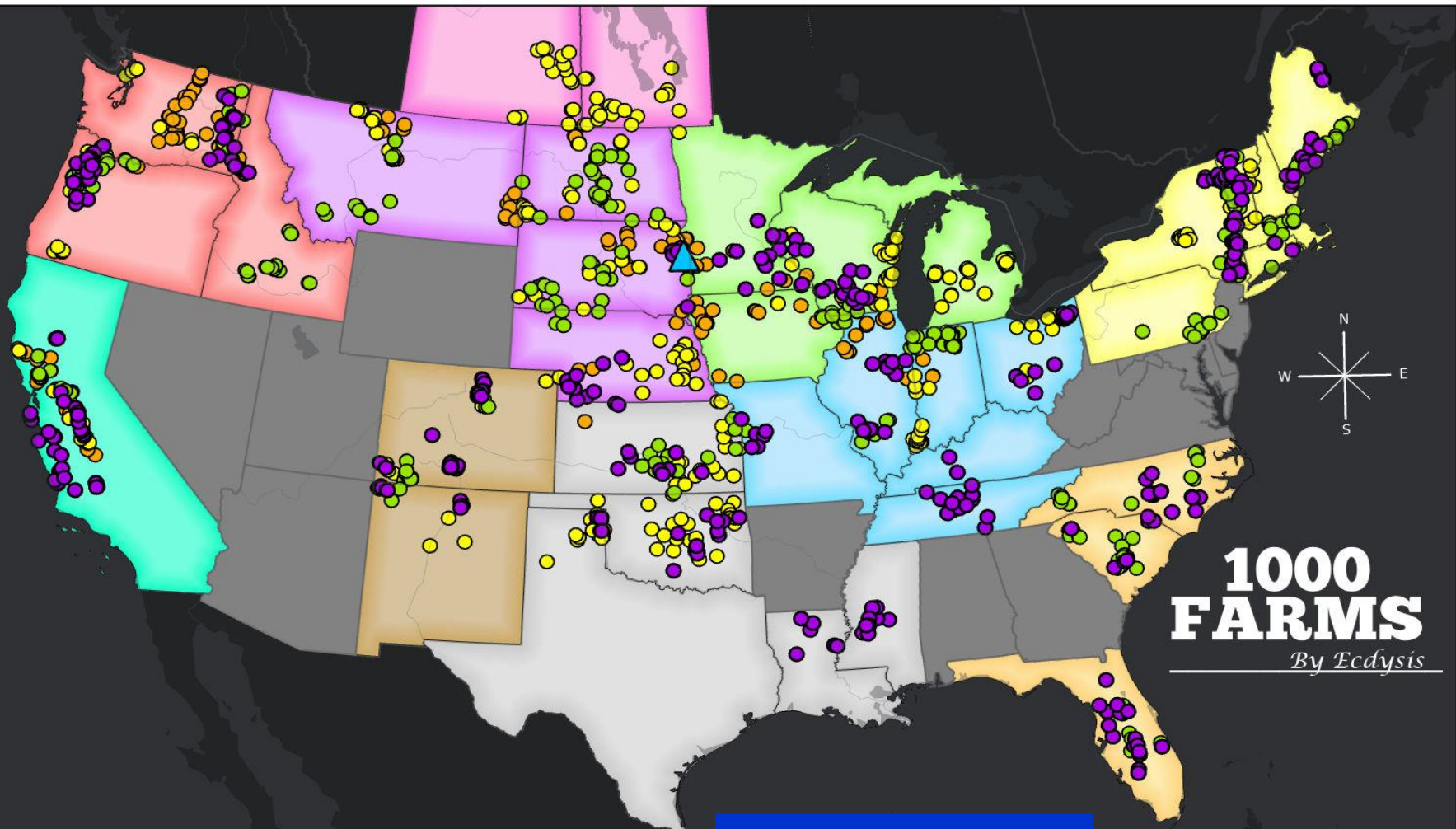
Across ecoregions

Reflect food systems

1000 FARMS



What is our food system capable of?

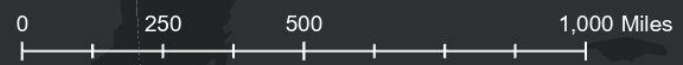


1000 FARMs

By Ecdysis

1700+ farms to date
 38 states
 2 Canadian provinces

Sample Sites	Regions	
Sampling Year	 Northeast	 Northwest
● 2022	 Upper Midwest	 West
● 2023	 Ohio Valley	 Southeast
● 2024	 South	 Canada
● 2025	 Southwest	 States Not Sampled
	 Northern Rockies and Great Plains	▲ Ecdysis HQ



Each Ranch Represents a Set of Management Practices

Conventional

Fewer animals
Short rests
Long grazes
Multiple parasiticides



Regenerative

More animals
Long rests
Short grazes
No parasiticides

We assess this using a Regenerative Score (1-8)

What are we measuring?

Soil microbes



Nutrient abundance and diversity



Birds



Plants



Economics and Mgmt



Invertebrates



Water



Soil chemistry and physical properties



Cows and Climate Change

Cattle produce a lot of greenhouse gases

4-14.5% of annual CO₂e are produced by cattle (USDA; FAO)

How does range management affect these equations?

Lundgren et al. Increasing cattle and regenerative management increases biodiversity and carbon storage. Nature, in prep

≤ 25" Rainfall			
	0	1	2
Stocking density (AU/ha)	< 2	≥ 20	2 – 20
Rotation frequency (grazing d)	≥ 32	6.3 – 32	≤ 6.3
Rest period (d)	≤ 20	20 – 110	≥ 110
Deworming treatment frequency (doses per year)	≥ 2	1	0
> 25" Rainfall			
	Worst (0)	Intermediate (1)	Best (2)
Stocking density (AU/ha)	≤ 2	2 – 25	≥ 25
Rotation frequency (grazing d)	≥ 23	2.5 – 23	≤ 2.5
Rest period (d)	≤ 41	41 – 80	≥ 80
Deworming treatment frequency (doses per year)	≥ 2	1	0

Regenerative Rangeland Management

	Stocking density (AU/ha)	Grazing period (d per grazing event)	Rest period (d per growing season)
Regenerative (162)	50.39 ± 7.03	14.20 ± 1.12	78.29 ± 3.80
Conventional (61)	2.71 ± 0.61	98.95 ± 9.07	36.70 ± 5.28

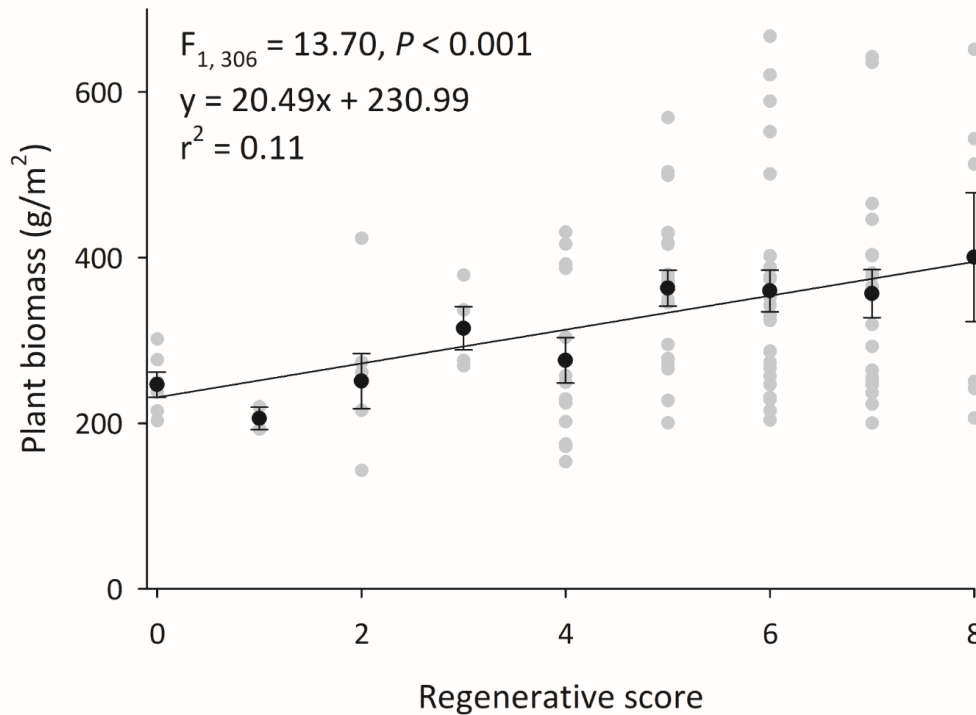
In arid areas...

2.85-fold increase in carrying capacity on US ranges

In arid areas: (2.12 ± 0.51 v 0.55 ± 0.08 AUM/ha)

Forage

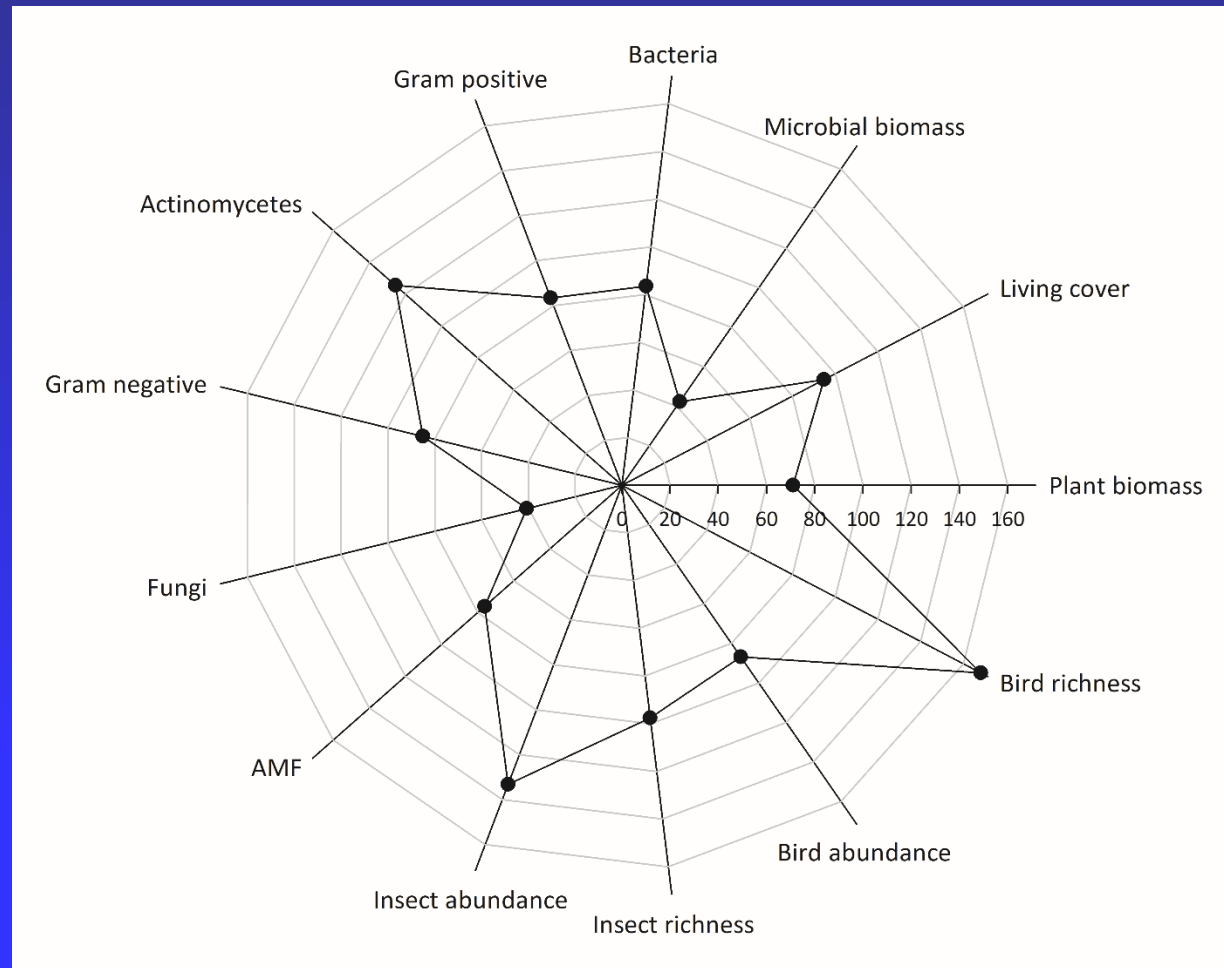
Plant biomass (g/m²)



Increased
available
nutrients

N, P, K, Ca, Mg, S,
Mn, Bo, Mo

Regenerative Rangelands Support Life





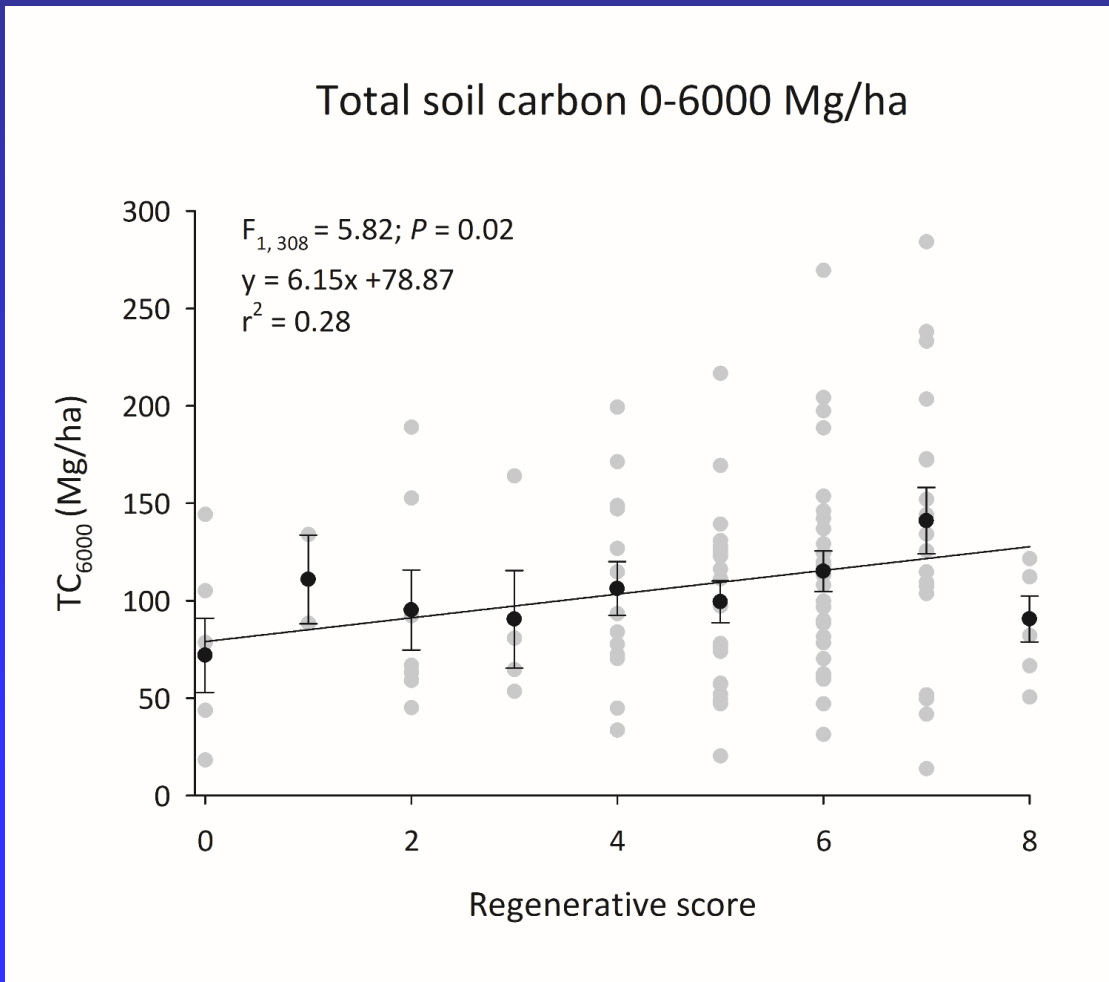
Carbon in Rangelands

Current cropland soils store 6.43 ± 1.33 gigatons of carbon
(1000 farms data!)

Agriculture comprises approximately
11% of these emissions

U.S. produces a lot of carbon dioxide and other
greenhouse gases (6 gigatons CO_2e per year).

Rangelands and Carbon Storage



Turning U.S. rangelands to fully regenerative would store carbon equivalent to 4.76 years of annual emissions

Regenerative Management Provides Services

Dung removal



Pollinators

Service: Dung Removal

Why is dung removal important?

- Pasture fouling
- Pest control: flies and helminths



Insects Remove Dung

- Dung beetles are valued at \$380 million annually
- Services include nutrient recycling, increased pasture quality, and pest suppression, etc.

Numbers are 40 years old





Excluding Insects

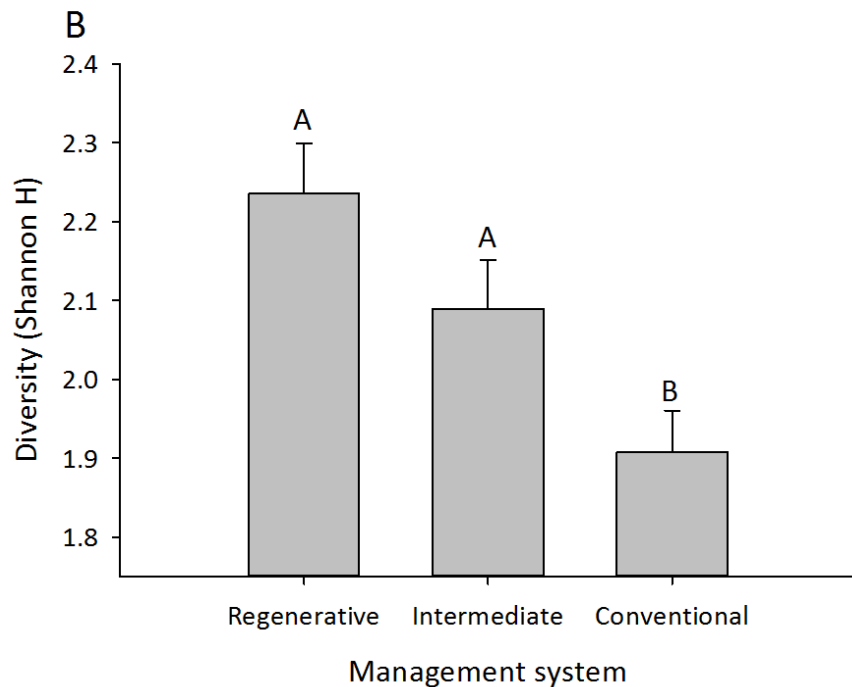
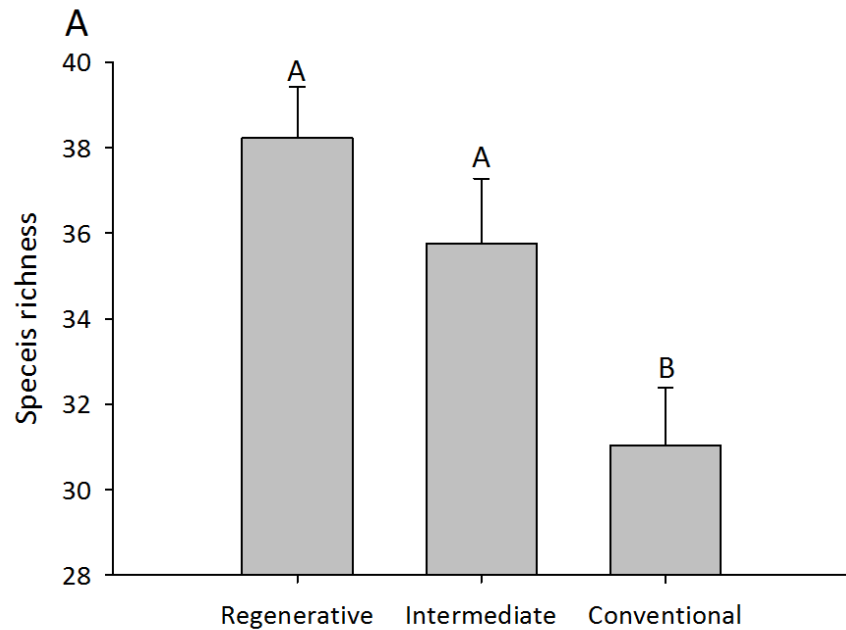
Pats were either caged or uncaged (n = 36 each)

Insects and pats were collected regularly over 42 d

Dr. Jacob Pecenka



Insect community

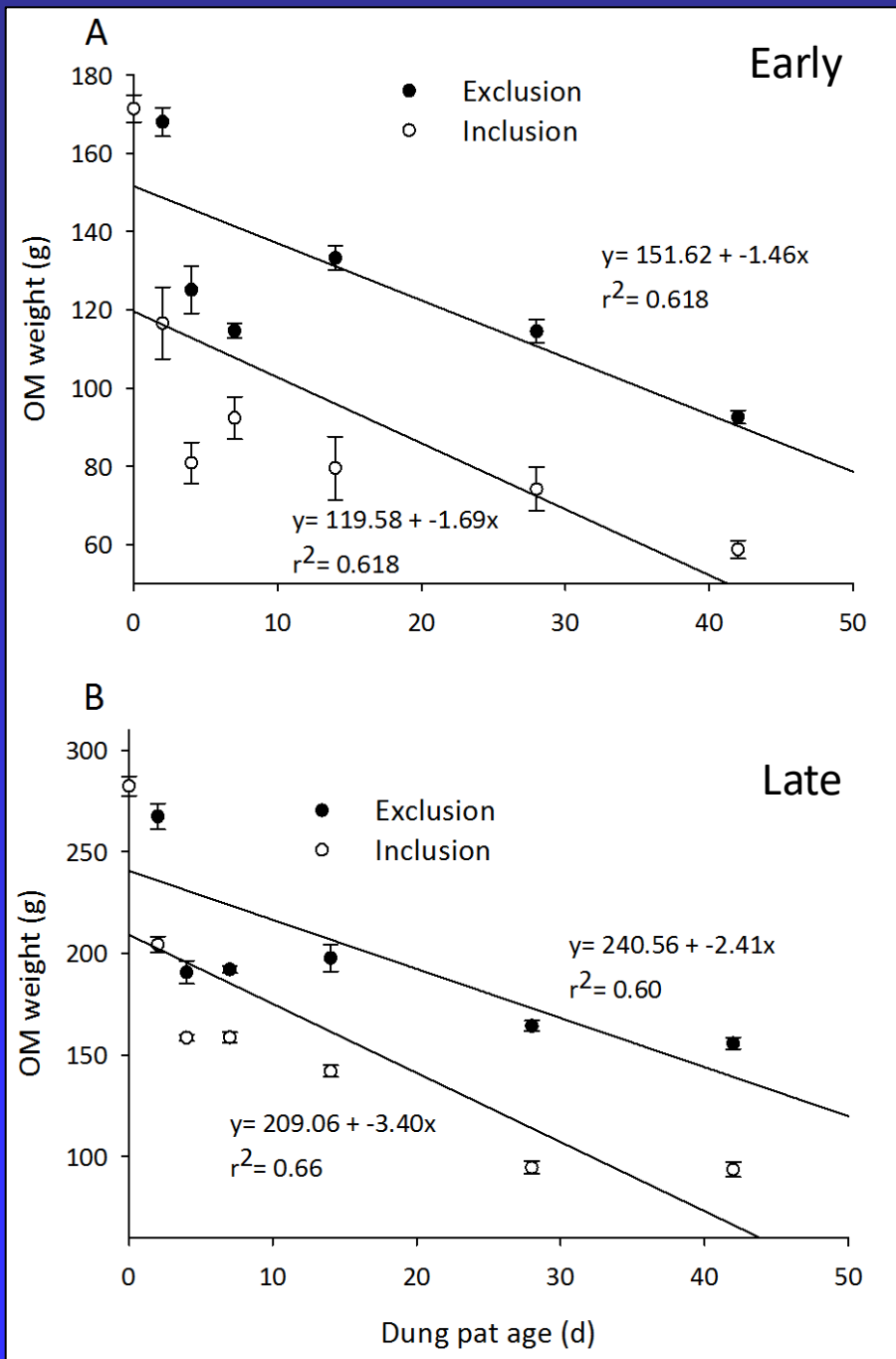


Species diversity was encouraged by regenerative herd management

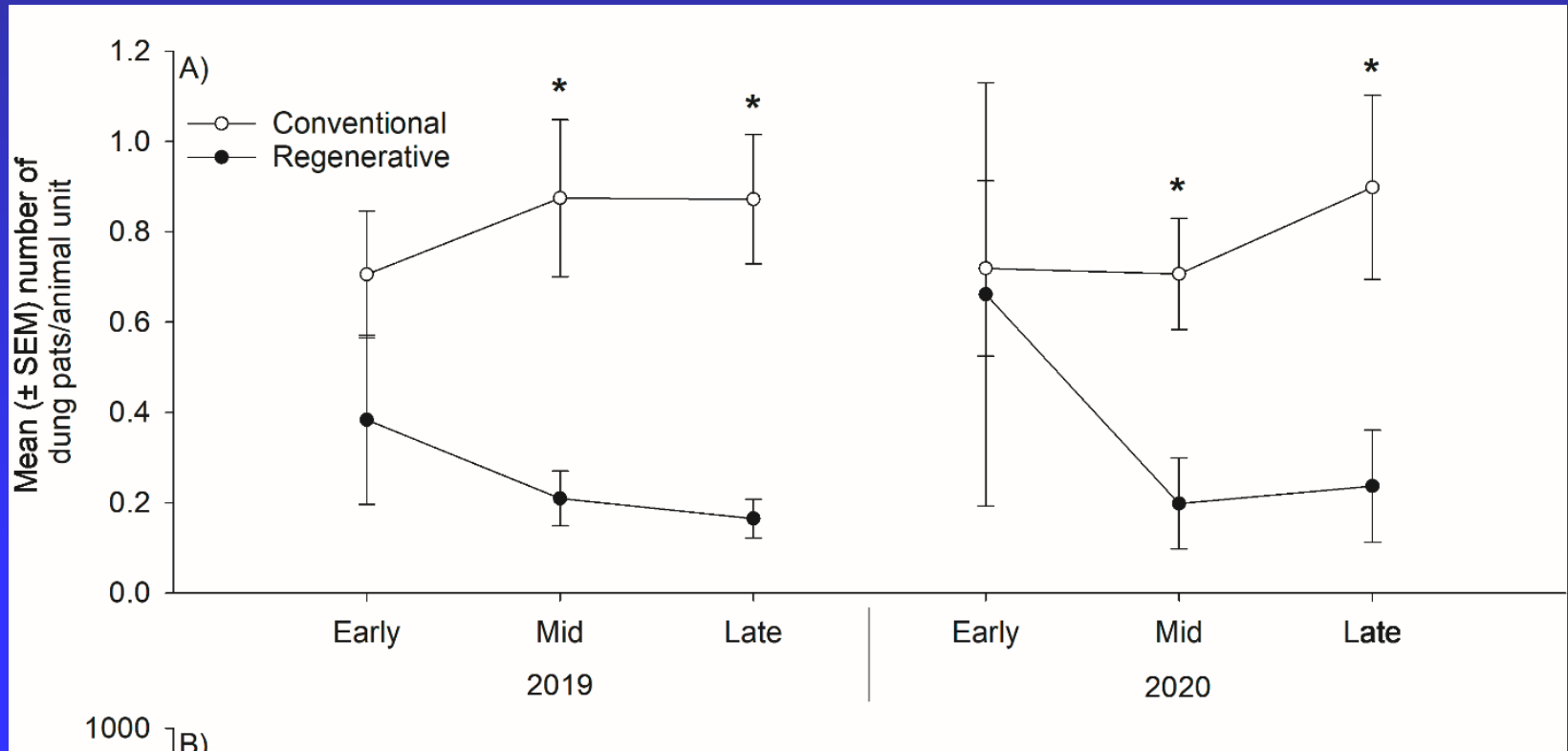
Dung weight

Insects significantly increase the rate of dung degradation

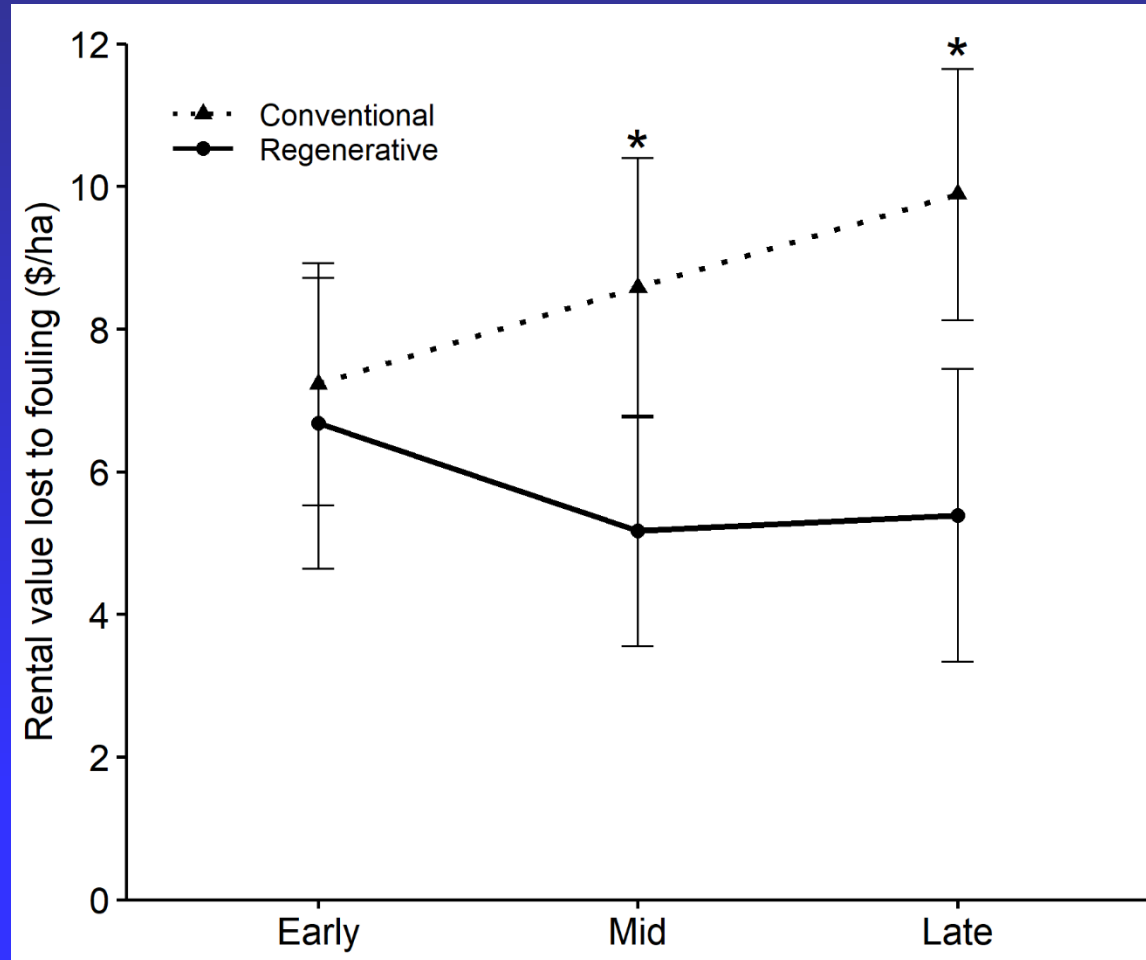
The biggest contribution comes on Day 1



Regenerative pastures have fewer dung pats



This Reduction in Pasture Fouling is Worth Money



Pest Management and Dung

Avermectins

Neurotoxin that disrupts cell membranes

Very effective insecticide
and nematicide.
Applied in a number of
ways.

Applied the majority
of cattle in the U.S.



Problems with Avermectins

Most of the treatment
comes out in the dung

Campbell 1985. Science 221: 823

A half-life of 240 days

Herd 1995. Internat J Parasitol 25: 875

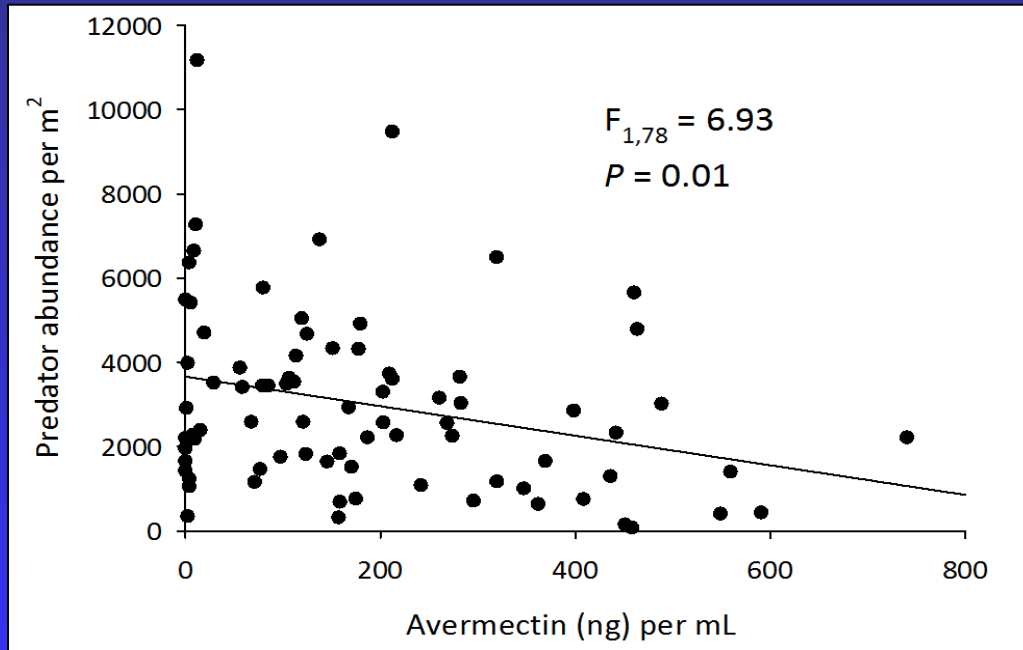


Avermectins kill the 98% of insects
(non-pests) found in dung



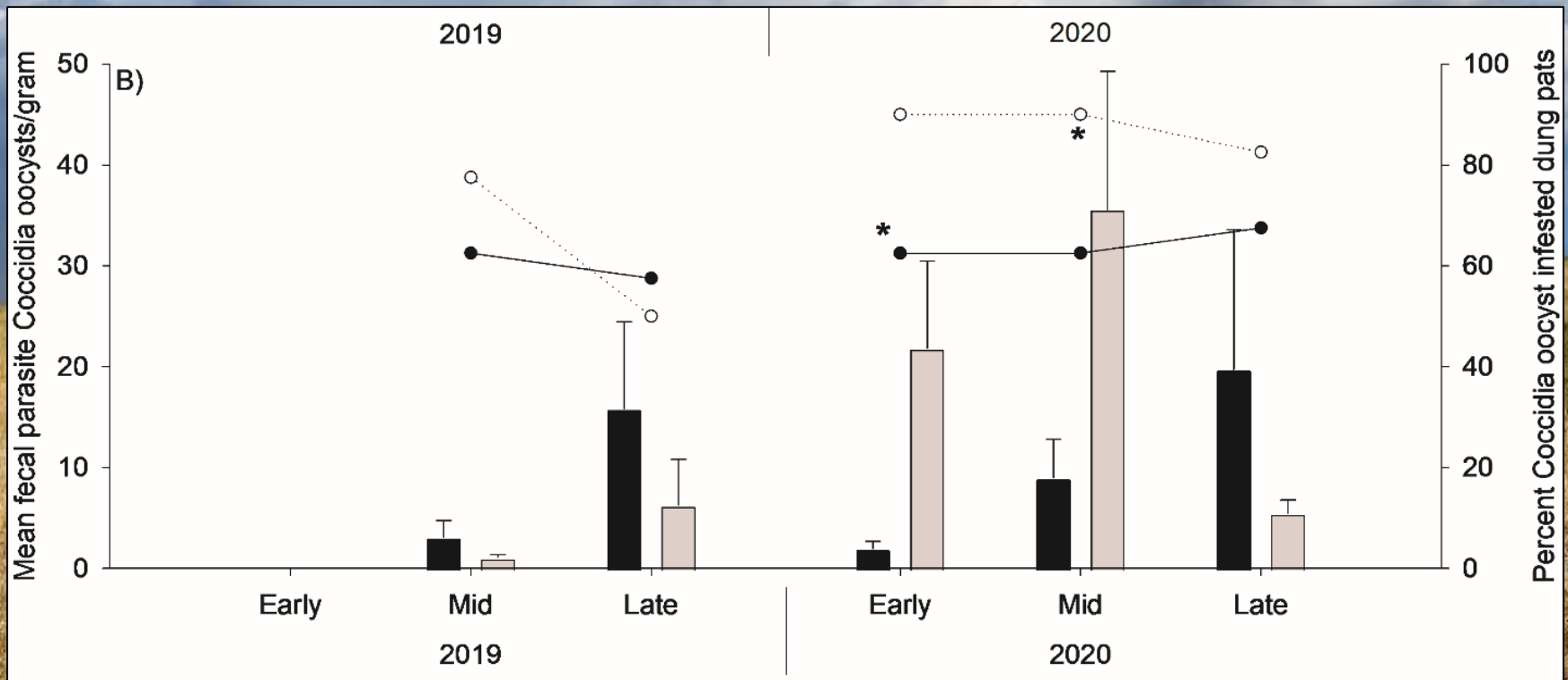
Predators

Predators in dung were favored by regenerative herd management



Good herd management works better than parasiticides

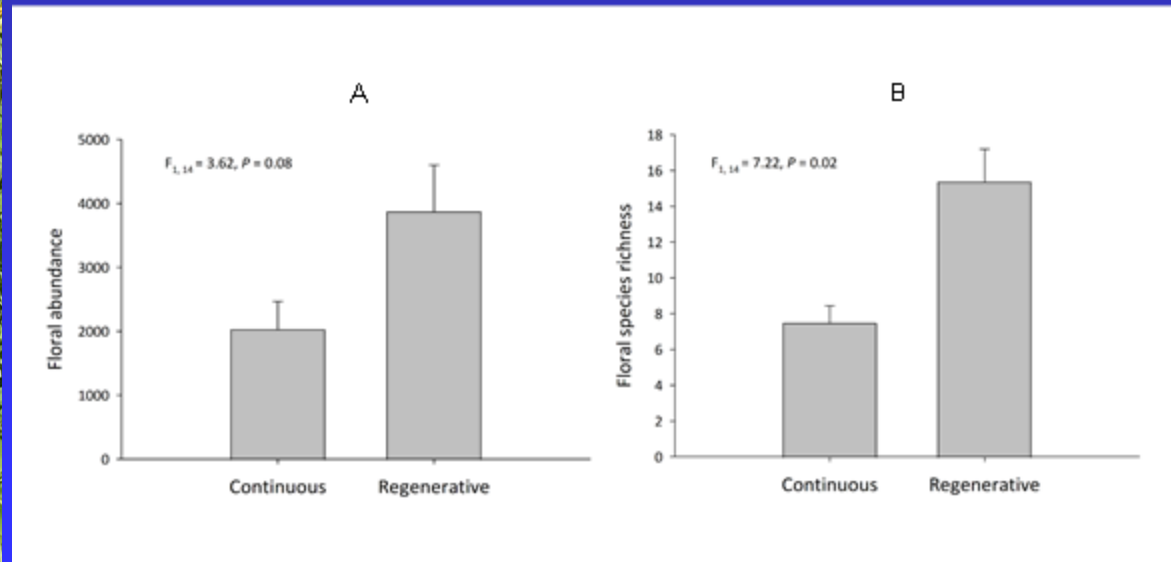
Black bars: regenerative; grey bars: conventional



Rangeland Management and Honey Bees

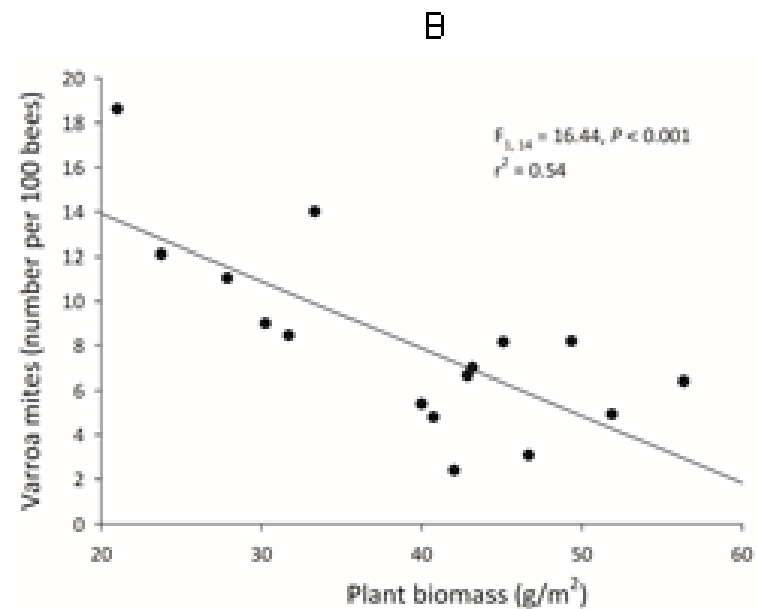
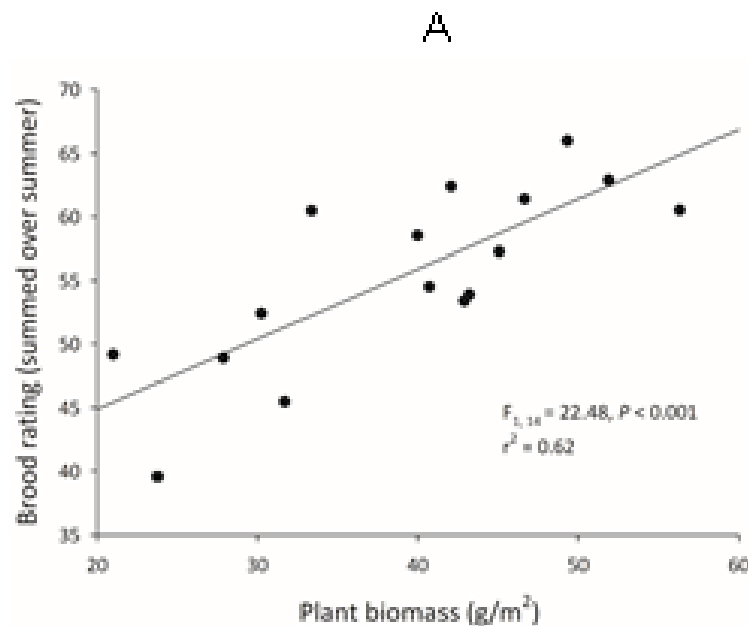


There are more flowers on regenerative rangelands



As plant communities resurge, bees

- Gain more weight (R: 21.92 ± 1.53 kg; C: 16.71 ± 1.20 kg; $P = 0.008$)
- Produce more brood
- Have fewer pests



A photograph of a field of tall, green grasses and weeds, likely a meadow or a field of wildflowers. The plants are dense and reach up to the top of the frame. The sky is a clear, light blue. The overall scene is bright and natural.

Pesticides and Fertilizers are an addiction

Pests are not the problem!

Change the system

Combating Pests Without Pesticides

Abandon pesticides

Frequent movement of animals

High intensity grazing

Integrate herds



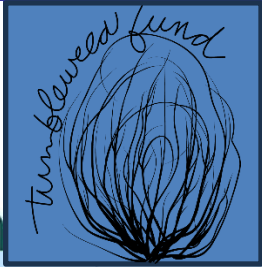
What really matters?



“Regenerative farmers farm smaller and better, not bigger and simpler. Their feet touch every acre of their farm. They grow food for their families and their communities. They celebrate life.”

-Dr. Jonathan Lundgren, Ecdysis Foundation





Sills Foundation

Tundra Glacier Fund

Tortuga Charitable Foundation

Stranahan Foundation



60+ Donors per year
Hundreds of helpers



Please Sign Up Your Farm!



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