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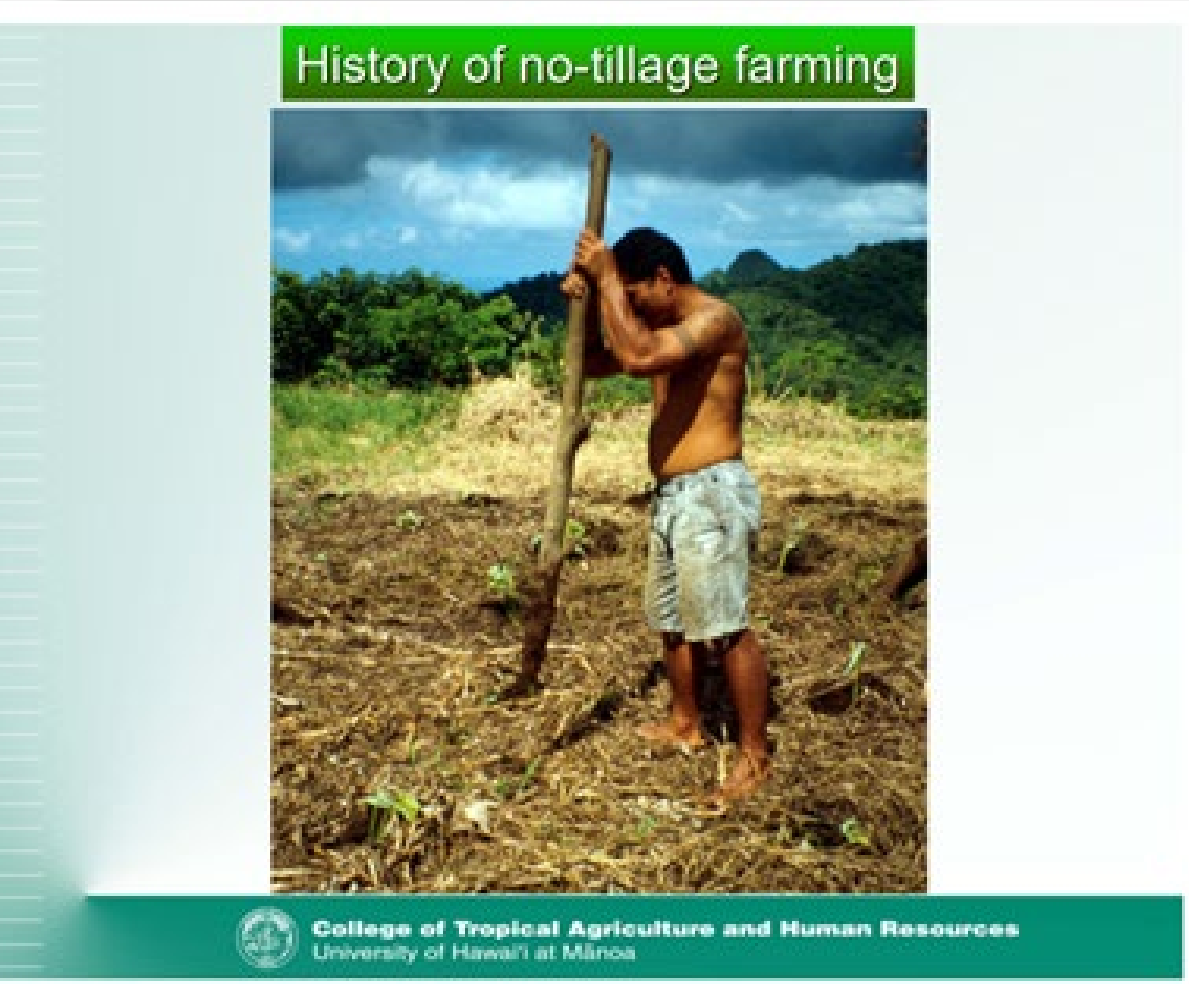
Social and Economic Considerations



Marlon Winger

NRCS – Soil Health Division- WY, CO, UT

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Objectives

- Describe common challenges to SHMS adoption and transition.
- Learn some economic topics of discussion so you can sit down with a farmer and talk about the about the economic effects of a SHMS
- The principles of SH are universal, how you implement them on your farm is unique!

Adopting Soil Health Practices

- "Requires not only an understanding of the physical resource data but also social data."
- Awareness and understanding of key human social & economic considerations can assist with implementation & long-term adoption

What is the current perception of soil health in your region?

What keeps people from implementing & how have others overcome these obstacles?

Source: The Adoption and Diffusion of Conservation Technologies, People, Partnerships, and Communications, Issue 7, Updated June 2005

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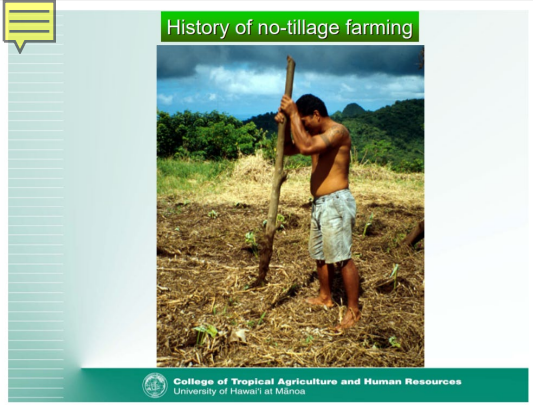
How To Impact Change

Adoption

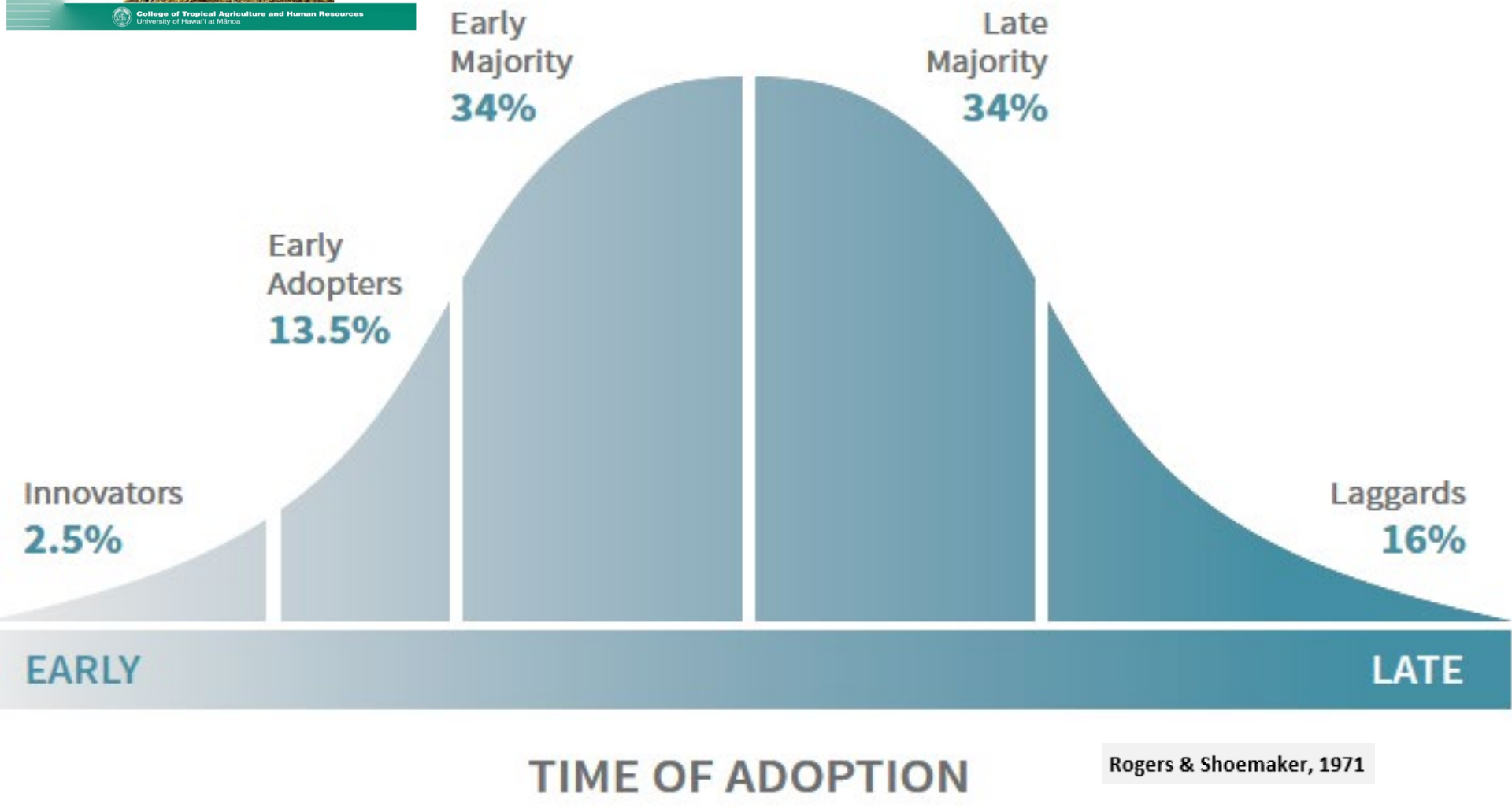
Behavior associated with an individual's or group's decision on whether or not to accept new ideas, practices or products

Technology Transfer

The process by which the adoption of a new idea, practice, or product spreads throughout a group, community or society



Adoption Categories



Individual stages of adoption

The producer can return to any one of these stages at any time during the adoption process

Rogers and Shoemaker, 1971

Stages of adoption

- As a planner where do you fit in the five stages?
  - In all of them
- What stage can you fail the landowner?
  - Any stage: by lack of follow through or interest after the initial contact at the awareness stage or any time when the producer seeks assistance.

Remsberg, SARE

What are Some Obstacles to Soil Health Adoption?

- Lack of technical information
- Lack of social/financial community support
- Inter-Agency organizational barriers
- Landlord/tenant relationships
- Management capability

These obstacles can lead directly to economic instability because of

extra input cost and/or
mis-management which leads to yield loss.

To the farmer making management decisions, a perceived cost is a real cost.

Economic Considerations

- How many producers have used these arguments to not improve soil health or do any conservation practices?
  - Lack of time to seed cover crops
  - Uses too much water
  - There is a yield drag
  - Don't want any extra weeds in my field
  - It costs too much
  - **"If you can or you can't your probably right"**

Remsberg, SARE

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What practices have we as an agency historically used to deal with the issues a degraded soil cause?

Traditional Conservation Practices

Terrace and Underground Outlet
Cost per acre of $1200-1500 per acre

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Denitrifying Bioreactor

Cost of $12,000-$20,000

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Traditional Practices

- What is a producers return on investment?
- Do these practices treat the root cause or a symptom?

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Soil Health System of No-Till/Cover Crop

- They do have an initial per acre cost of $15-$60
- Done correctly they have a positive ROI
- They treat the root cause of the problem

Can We Make Soil Health Pay?

- Reduce weeds
- Reduce compaction
- Reduce fertilizer needs
  - Prevent nutrient loss over winter
  - Fix nitrogen
- Prevent soil erosion
- Livestock feed
- Equipment/labor

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Can We Make Soil Health Pay?

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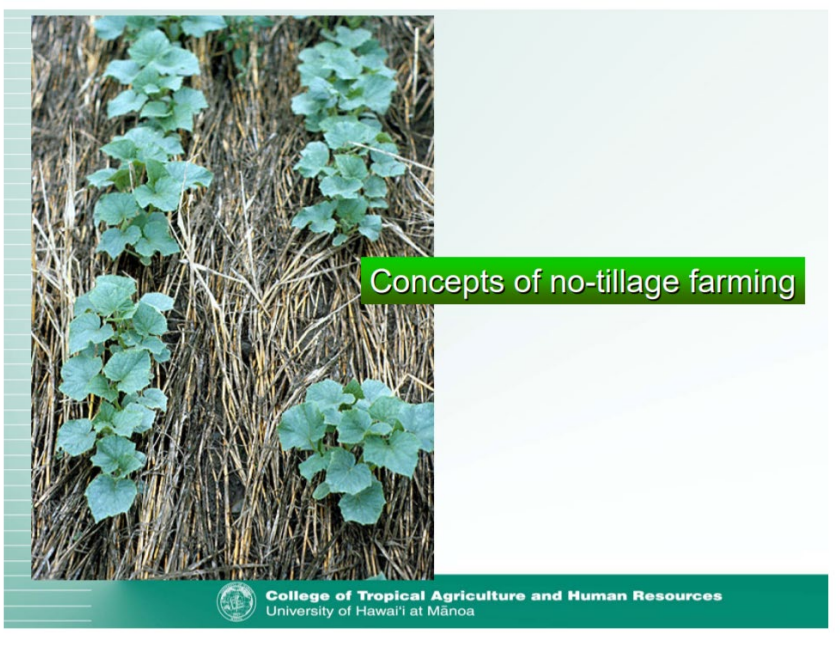

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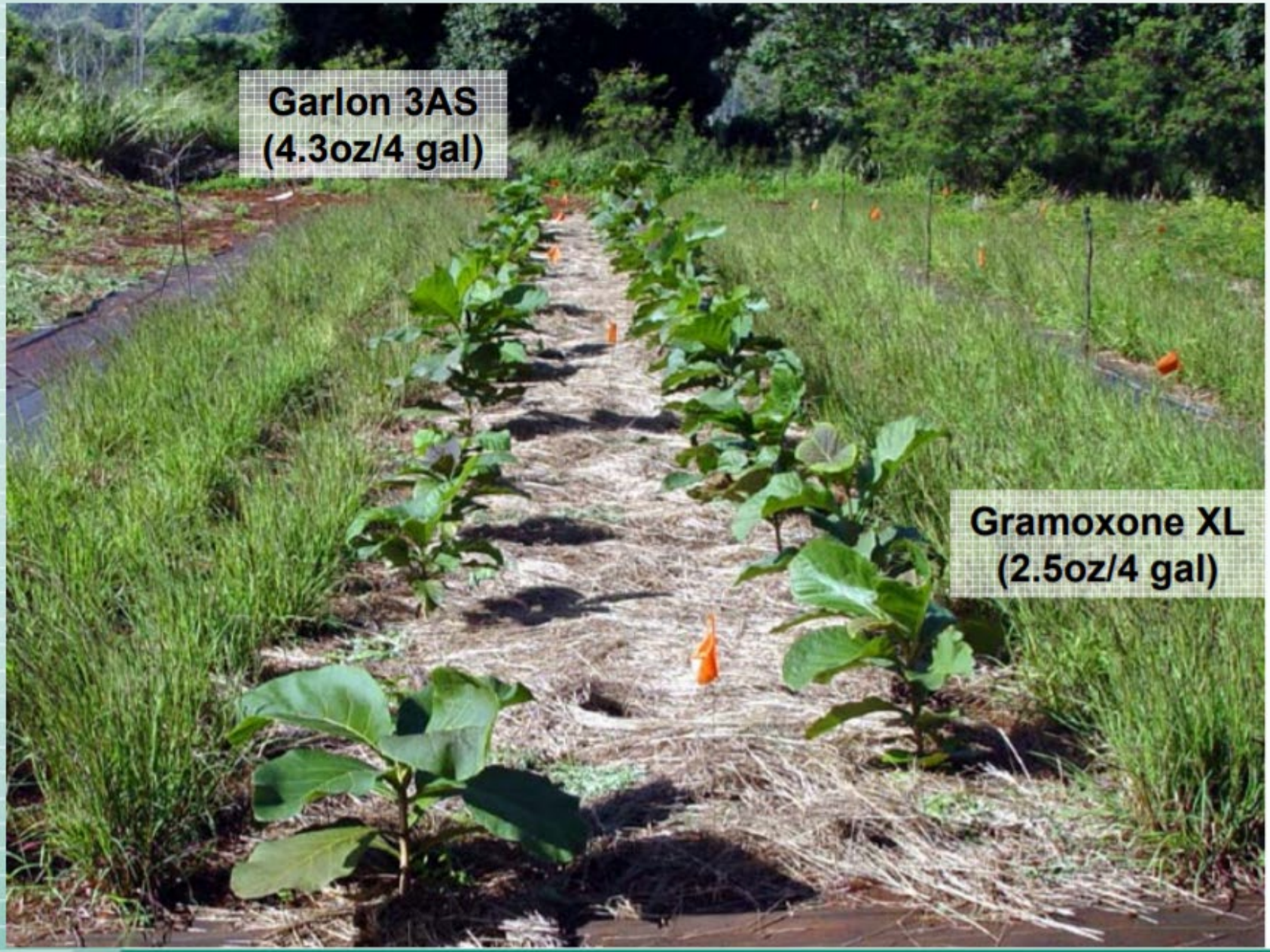
Spring Weed Suppression
IPM BCSCD Site


Garlon 3AS
(4.3oz/4 gal)
Gramoxone XL
(2.5oz/4 gal)

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Pili grass establishment

3. No-till planting – 42 days after seeding to trays






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Weed Control – 6/24/17

Applying Preemergence after 1st mowing

Liquids and WP

Granular Ronstar

Can We Make Soil Health Pay?

- Reduce weeds
- **Reduce compaction**
- Better drainage
- Reduce fertilizer needs
  - Prevent nutrient loss over winter
  - Fix nitrogen
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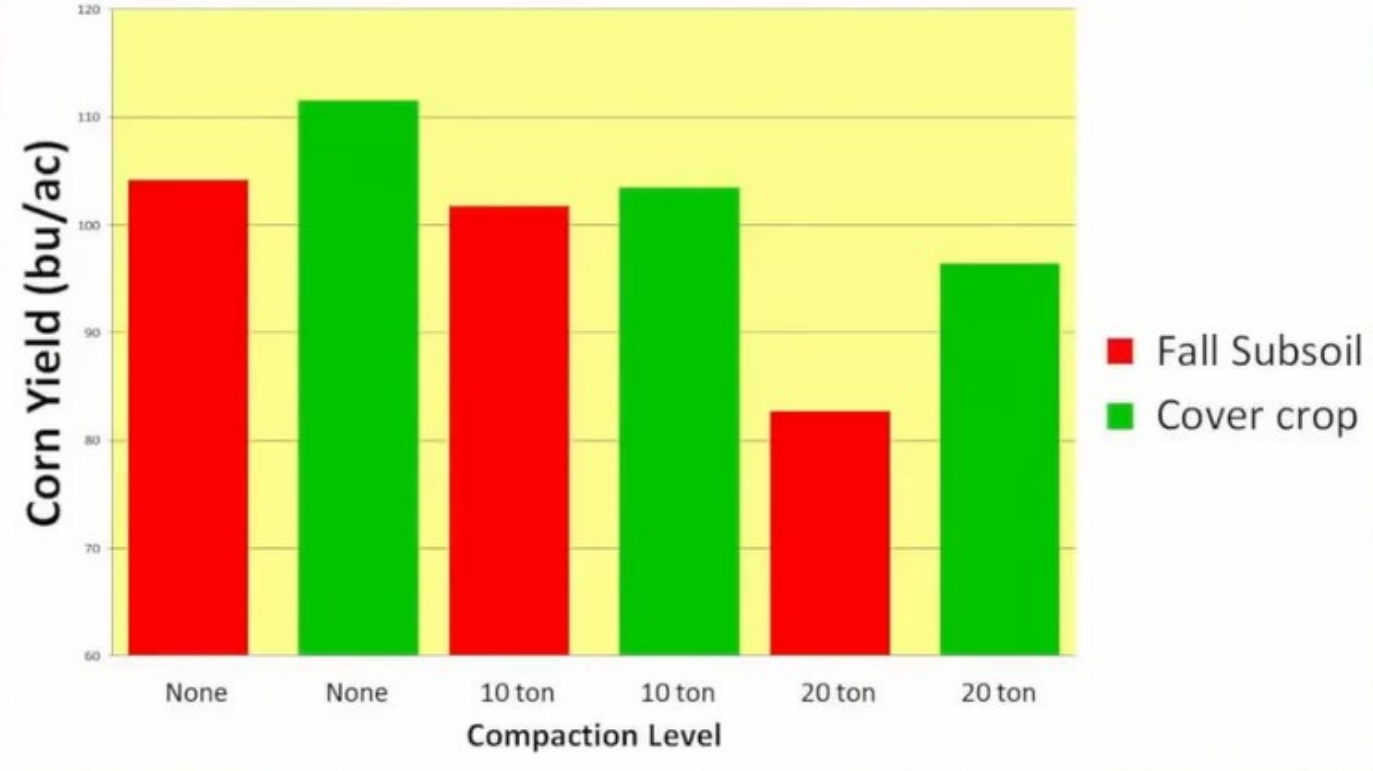
Reduce Compaction

- Deep ripping can cost $30+/ac
- Deep rooted and/or fibrous rooted cover crops break up compaction
- Advantage of root

  vs tillage???

Reduce Compaction



"You can't solve your problems with steel. Soil structure problems can be better solved by natural rooting systems of cover crops."

- Alan Sundermeier, Ohio State

Compaction relief with a plant

“Plants fix dirt”

Mulching the tree crop row.
Pili – 78 days after planting

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Can We Make Soil Health Pay?

- Reduce weeds
- Reduce compaction
- **Reduce fertilizer needs**
  - **Prevent nutrient loss over winter**
  - **Fix nitrogen**
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Reduce N losses

- Nitrogen is mineralized from crop residues and soil OM is highly soluble through the winter
- N Leaching can be 50lb-100lbs/ac. even **without** fall applied N.

At 0.98 cents/lb that is $49.00 - $98.00 an acre

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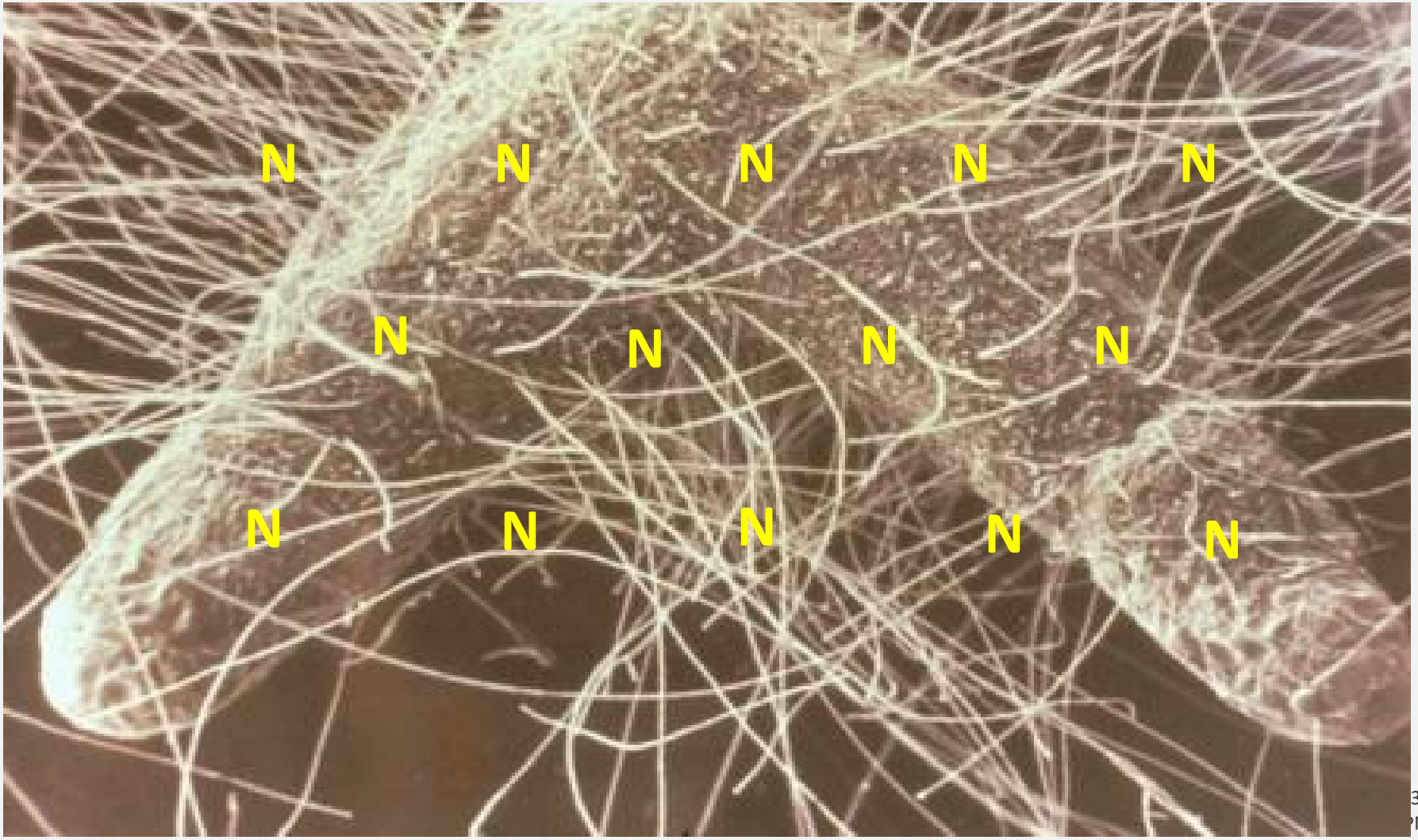
Nutrient Efficiency of a Biologically Based Soil



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Nutrient Efficiency

Nitrogen Efficiency:

- 30-50% conventional
- Increase to 80-90% with Cover Crop & No-till

Phosphorus Efficiency:

- 50% conventional
- Increase to 80-90% with Cover Crop & No-till

Nutrient Efficiency

- 186 lbs Nitrogen @ $0.98 per lb. - $182.28 save 40% $72.91
- 62 lbs Phosphate @ $0.67 per lb. - $41.54 save 40% $16.62

$89.53

Healthy Soils are Productive Soils

Healthy Soils are Economically Efficient Soils

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Producing Nitrogen
How much can be fixed?

Producing Nitrogen

150 lbs of N @$0.98 is $147.00

$147.00/$7.00 = 21 bushels

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Why invest in soil health?

- Reduce weeds
- Reduce compaction
- Reduce fertilizer needs
  - Prevent nutrient loss over winter
  - Fix nitrogen
- **Prevent soil erosion**
- Livestock feed
- Equipment/labor

Idaho

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Soil Erosion

Texas

Hawaii

Recently plowed field left uncovered, credit: Amy Koch

Utah

Economic impacts of **NOT** building Soil Health

- National water & wind erosion rate of 7.6 t/ac/yr
- $104 per acre each year to replace the lost nutrients with fertilizer
- Total cost of soil and water lost annually from U.S. cropland amounts to on-site productivity loss of > $27 billion each year
- Georgia water & wind erosion rate of 5.20 t/ac/yr
- $71.14 per acre each year to replace the lost nutrients with fertilizer

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Why invest in soil health?

- Reduce weeds
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- Better drainage
- Reduce fertilizer needs
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- Prevent soil erosion
- **Livestock feed**
- Equipment/labor

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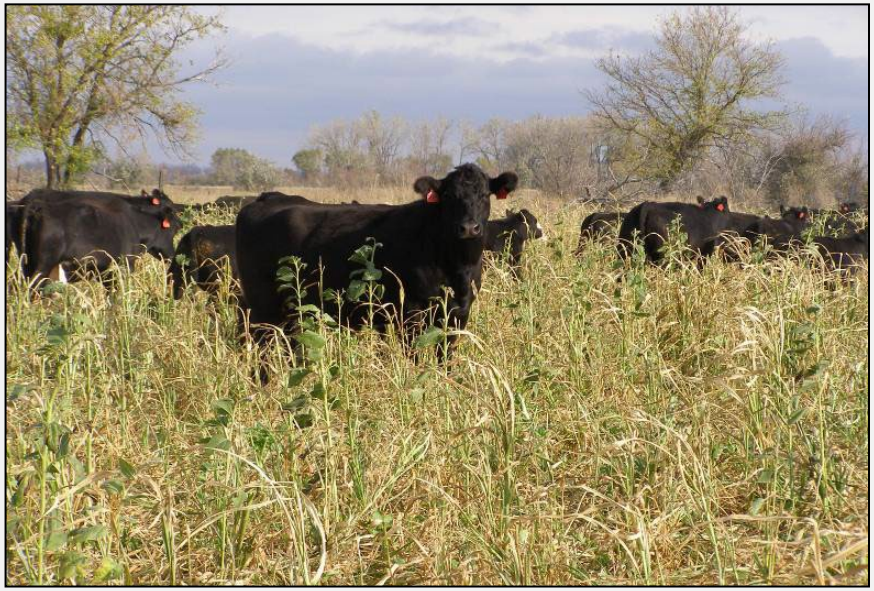
Dual Feeding System
Soil Biology and Livestock



Livestock Feed

- Animal Days per acre:
  3,600 lbs/ac total prod. × 50% H.E. = 1,800 lbs/ac grazed
  1,800 lbs/ac ÷ 40 lbs/AD (Animal Day) = 45 AD/ac
- Alternative feed costs (hay): $2.25/AD
- 45 AD/ac × $2.25/AD = $101.25/ac

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Why invest in soil health?

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- Prevent soil erosion
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- Equipment/labor

Equipment Cost Analysis $/ac.

	Wayne Fredericks	Benchmark Database	Difference
2006	44	127	83
2007	51	117	66
2008	72	132	60
2009	74	128	54
2010	69	142	73
2011	80	151	71
2012	103	153	50
2013	71	135	64
Average	**71**	**136**	**$65**

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Labor Cost Analysis $/ac.

Over that same 8 year period he showed a $27 per acre advantage for labor

Play video

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Positive Return on Investment

Equipment advantage	**$65**
Labor advantage	**$27**
Total advantage	**$92 per acre**

County Average Yields - 180.6 and 50.4
His 10 year Av Yields - 181.2 and 52.9

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Can We Make Soil Health Pay?

• Reduce weeds	$20
• Reduce compaction	$30
• Reduce fertilizer needs	
– Prevent nutrient loss	$98
– Nutrient use efficiency	$86
– Fix nitrogen	$91
• Prevent soil erosion	$71
• Livestock feed	$100
• Equipment/labor	$92

$588

Case Studies

- Give real world examples
- Usually use partial budget
- Good case studies address all aspects of adoption, not just the positive aspects.
- Must be relatable.
  - Location, climate, crops
  - Available resources
- Read with a critical eye – ask:
  - "Are the benefits applicable to you?
  - How about the costs?"

Concepts of no-tillage farming

Hawaiian notillage for fruit or forestry:

- You have some old cane land in Hamakua or Puna or Pahala or Wailuku or wherever
- If sugar and grassy weeds are present, roll, crush or mow all vegetation. When regrowth occurs, apply Roundup (in combo with Garlon for perennial broadleaf weeds), may need more than one spray application to get all perennial weeds.
- Old dead cane should be worked into the soil and not scrapped off into holes or gulches (this is the standard procedure in Hawaii)
- Obtain a soil test and amend the soil for long term pH adjustment. For pH adjustment use a coarse ground coral in combination with a very fine lime. The fine lime will give quick effect and the coral will provide pH adjustment for 5-7 years

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Things to Remember

1. Adopting a soil health conservation system is a long-term investment but in todays economic environment it must also pay in the short-term.
2. Just like soil degradation does not happen over night, improving soil health also takes time.
3. There are agronomic benefits that result in economic benefits that may not be easily measured, such as reduced risk of yield variability.
4. To realize the greatest benefits from a SHMS, we must find what works best for a producer given THEIR objectives and goals.

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Moving from Awareness to Adoption

- Work to develop relationships with producers
- Pursue opportunities for producer education
- Invite and accompany them to soil health-related events
- Invite them to the field and do the assessment together.

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Moving from Awareness to Adoption (cont.)

- Conduct demos at SWCD meetings, equipment auctions, fairs, their farms, etc.
- Develop and coordinate an email listserv or social media group of interested producers
- Conduct periodic coffee and doughnut meetings around SH topics

➢ What other approaches do you use or think you could use to engage your producers?

Soils

Soil Health

Soil Surveys

Profiles in Soil Health

Pacific Islands Area farmers are using soil health management systems to make their farms more profitable, productive and sustainable.

Cheryl Carden
Kona, Hawaii
Operation: Forestry
Practices: Tree Establishment

Local Farmers Reaching Heights with Soil Health (PDF; 2.4 MB)

Atto Assi (right) and Neena Ramel (left)
Hilo, Hawaii
Operation: Piggery
Practices: Mulching and Composting

Local Farmers Prosper with Soil Health (PDF; 4.39 MB)

Nolan Nobriga (left)
Hilo, Hawaii
Operation: Ranching
Practices: Lined Pond

Local Rancher Benefits from Soil Health (PDF; 2.76 MB)


McPeak
Grass &
Cattle
Ranch
Bismarck, ND
“Everything that is alive plays a role, bees to badgers to beef.
The more life on the ranch, the better I feel I am caring for the land.”

Hayland Production after three winters on 75 acres.

2011 = 155 bales (very little grass heading out)

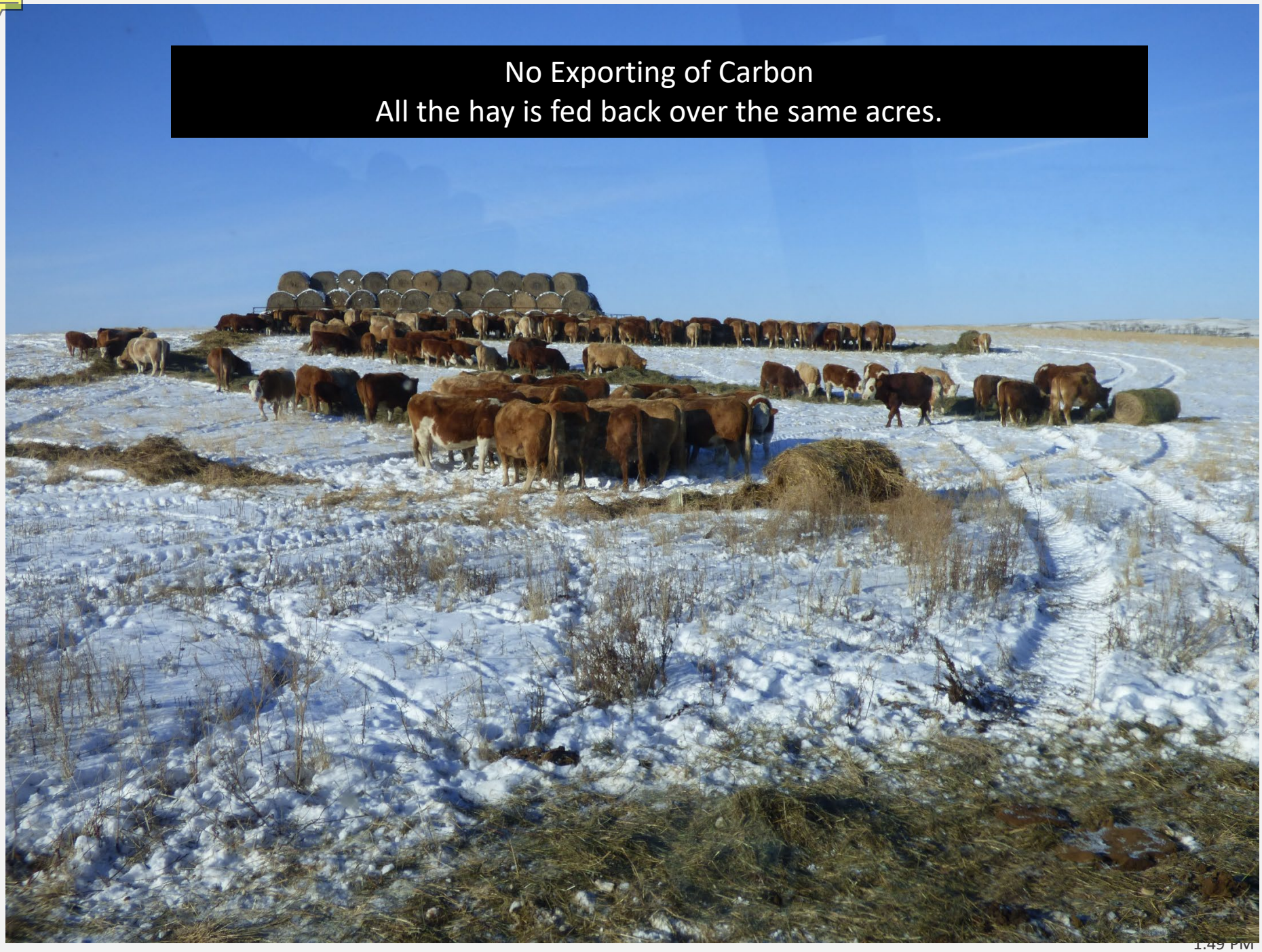
2012 = 211 bales

2013 = 218 bales (1/3 field hailed out)

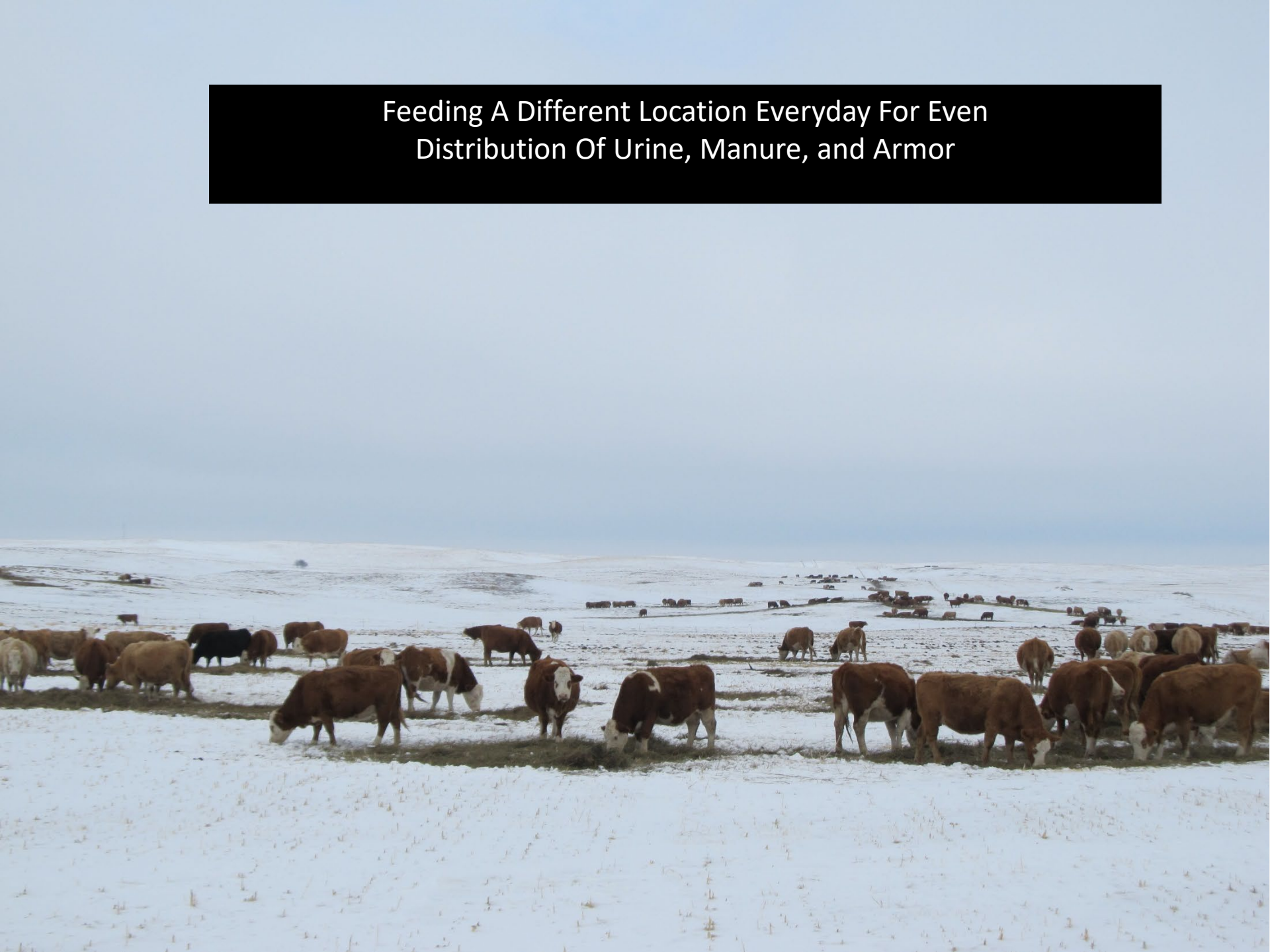
2014 = 265 bales

2015 = 274 bales

- 348 bale increase in four years.
- Average bale size is 1450 lbs.
- Production has increased over 1 bale per acre.


No Exporting of Carbon
All the hay is fed back over the same acres.

Feeding A Different Location Everyday For Even Distribution Of Urine, Manure, and Armor



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Livestock Stress Management

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Monitoring with Haney & PLFA Soil Tests
October 23, 2014

- Total Biology 1671 ng/g
- SOM 3.0%
- Solvita 50 ppm
- Organic Carbon 186 ppm
- Inorganic N 3.0 lbs
- Organic N 26.2 lbs
- pH 7.2

No Winter Feeding.

Hayland Seeded Spring 2014

- Total Biology 2502 ng/g
- SOM 5.1%
- Solvita 134 ppm
- Organic Carbon 257 ppm
- Inorganic N 3.6 lbs
- Organic N 47.9 lbs
- pH 6.9

3 Years Winter Feeding

Hayland Seeded Spring 2014

Carbon is Food for the Soil Biology

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Monitoring with Haney and PLFA Soil Tests October 22, 2015

- Total Biology 8776 ng/g
- SOM 6.6%
- Solvita 156 ppm
- Organic Carbon 322 ppm
- Inorganic N 18.4 lbs/ac
- Organic N 61 lbs/ac
- Phosphorus, P205, 66 lbs/ac
- pH 7.0

4 Years Winter Feeding On Hayland

20 Years + Hayland Stand

- Total Biology 7496 ng/g
- SOM 6.6%
- Solvita 142 ppm
- Organic Carbon 305 ppm
- Inorganic N 32 lbs/ac
- Organic N 60
- Phosphorus, P205, 84 lbs/ac
- pH 7.2

5 Years Winters Feeding On Hayland

20 Years + Hayland Stand

NRCS Economic Resources – Enter “NRCS Economics” in Search Engine