Managing Land for a Sustainable Future using -Holistic Management-

Ben Bartlett DVM

Log Cabin Livestock

Michigan, USA

Thank You for the Invitation to be part of 2nd ECHO East Africa Pastoralist Symposium

- I / We are Grass Producers that produces Sheep and Cattle
- I worked for Michigan State University for 30+ yrs
  as an Extension Educator
- I have been studying Holistic Management for over 15 years
  and it has been an important part of **our** lives

Michigan, USA
is not the same as
Kenya, Africa

What grows Grass?

- Sunshine
- Water
- Fertility
- Plant diversity

- Which ones can your grazing management impact?

  All of them!
- Kenya and Michigan have same issues!

Sunlight is “free” energy
almost “free” - you have to “capture” it

The sun + green leaves = photosynthesis

($6H_2O + 6CO_2 + Sun = C_6H_{12}O_6 + 6O_2$)

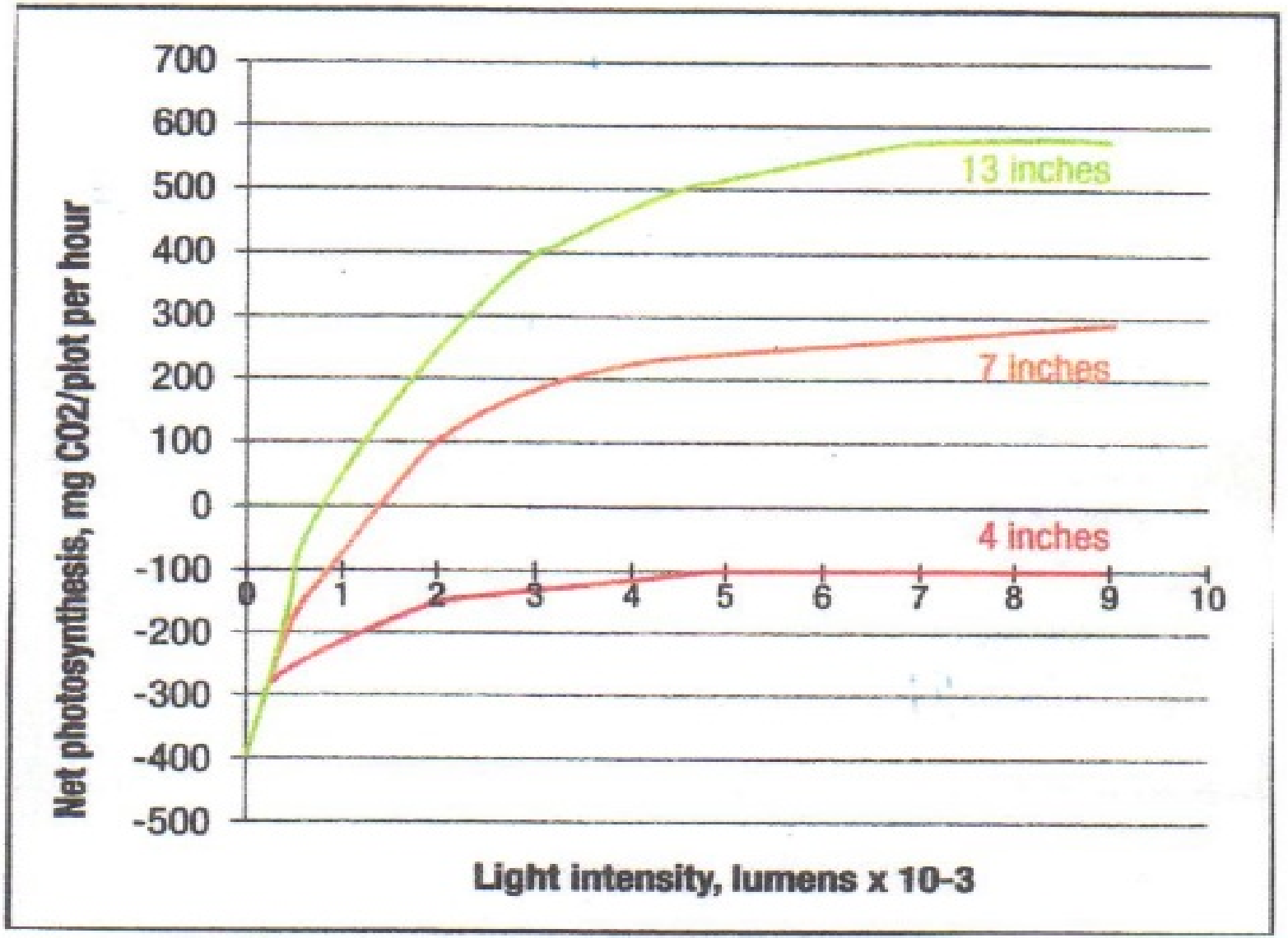
↘

Carbohydrates/Sugars (Carbon)

How to capture more sunshine

- Have **more green, growing leaves**
  - More plants
  - Bigger leaves
  - Plants actively growing
  - Diversity of canopy/plants
- Have green **leaves for more days**
  - Have leaves from as early in possible in spring to late in fall
  - Diversity of plants

Figure 2 Light response curves for orchardgrass cut to 4, 7 and 13 inches



Water

Is your soil <u>catching</u> and <u>holding</u> all the rain that does fall?

Catching the rain:

If the soil has plants and litter cover

it will stop the rain from running off.

If it has good soil structure – aggregates and pores

the rain can get into the soil

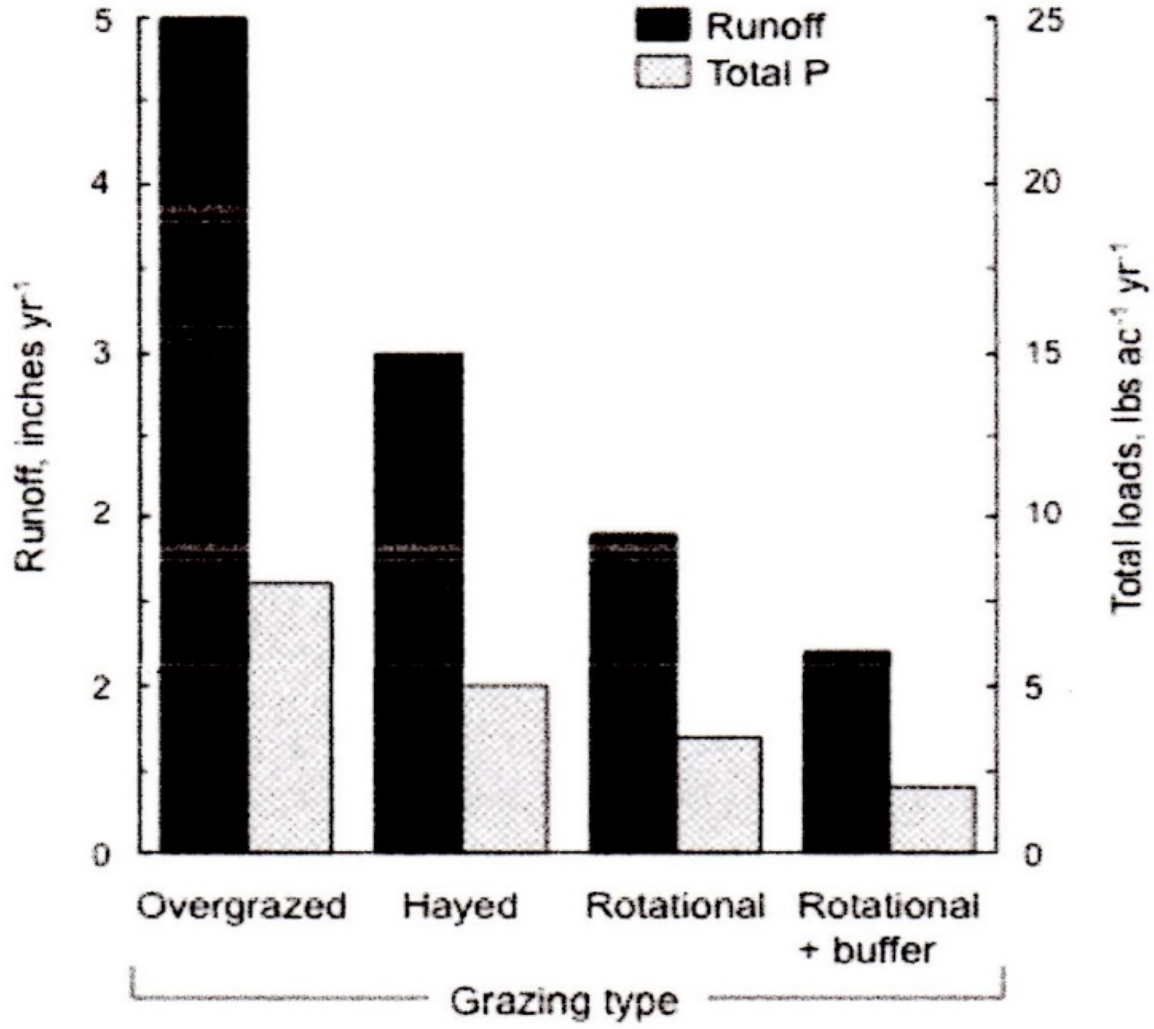
Think about tilled vs non-tilled soil after a rain….

Why does rain "puddle" on the tilled soil?

Answer = Limited soil pores!! - <u>Due to limited soil aggregates</u>

Catching the rain…

Figure 5. Effect of grazing on runoff and total P loads compared to forest/background levels. From the UA demonstration project.



Water

Is your soil **holding** the rain for future use?

Soil Organic Matter is the most important factor

Going from 1% to 3% SOM will double the water holding capacity

Bottom line: more organic matter = more water holding capacity

Grazing short & no surface residue & poor soil structure

= less litter, less roots, less organic matter = LESS SOIL WATER

Fertility – Does it come from fertilizer?

Not exactly!

Dr. Jill Clapperton: USA soil scientist

75% of the available N and 65% available P Comes from soil biological processes

Dr. Christine Jones: Australian soil and carbon expert

85~90% of plant nutrients are “microbially mediated”

80% of P fertilizer is “tied up” and not available to plants

Each 1% of SOM holds $750/acre of soil nutrients

Even without extra fertilizer – plants grow

Where do the nutrients come from?

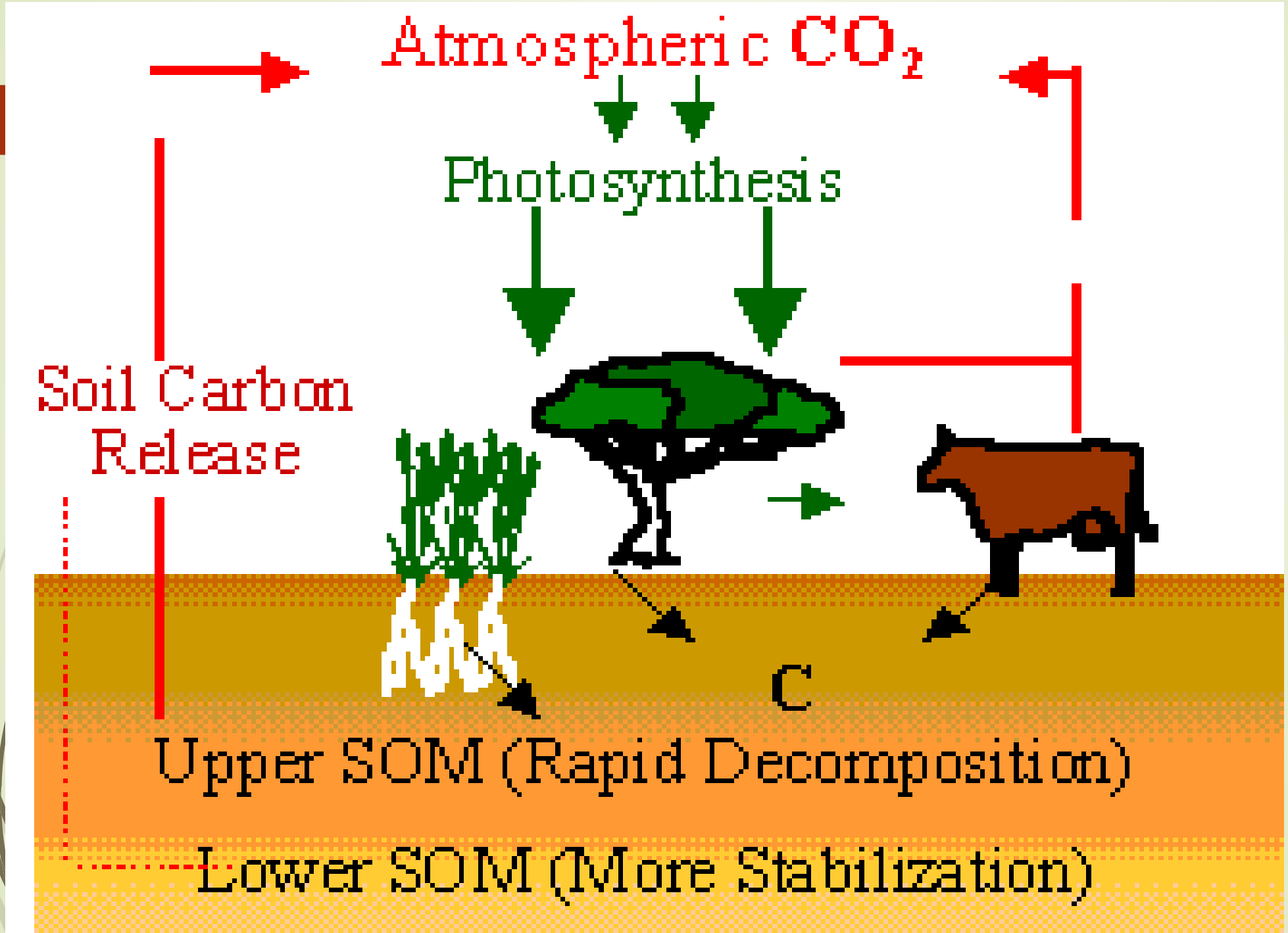
What is a Healthy Soil System?
--*the "very short" story of* ***microbial fertility***--

- Photosynthesis produces carbon products for the plant
- Up to 40% of the photo-synthates are excreted by roots to soil
- The C exudates and dying roots feed the bacteria & fungi
- The B & F "trade" water and nutrients (N & P) for carbon/sugar
- Soil organisms secrete gums and glues for soil aggregation
- Most of the nutrients in the soil are in the "organic" form and NOT available to the plant,
- Silt loam soil example : 1,000# +of N, 1000# P, 7,000# K, 5,000# Ca / A.
- 85% of all plant nutrients are "microbially mediated"

Short version of: plant - soil "barter"

- The plant exudate provides carbohydrates to the microbes
  - Bacterial and fungi
- The bacterial and fungi reproduce
  - Bacterial populations can double in 20 minutes
  - Bacteria and fungi have a 3:1 carbon – nitrogen ration
- Protozoa eat the new abundance of bacteria and fungi
  - Protozoa have a 10:1 carbon – nitrogen ration
- Protozoa poop out the extra N they don't need in a form, nitrate, available for the plant

Very simplified version!!


Atmospheric CO_2
Photosynthesis
Soil Carbon Release
C
Upper SOM (Rapid Decomposition)
Lower SOM (More Stabilization)

Plant community

- Diversity is critical
  - Feeds different bugs which generate more nutrients
  - Keep soil covered and have green leaves
  - Consider both diversity in each field
    and – diversity across the farm

Perennial pastures and some annual crops

What's holding your operation back?

- Sunlight
  - Are you wasting daylight?
- Water
  - Does "your" rain run away from your land?
- Fertility
  - Are you buying fertility?
- Plant community
  - Diversity "optimizes" - keeps things in balance

YOU!

$ystem

Livestock

Livestock

GRAZING

GRAZING

SOIL

Remember this:

- **You manage** the livestock
- To harvest the grass
- To feed the soil life
- To feed the grass
- To feed the livestock
- To feed you
- To manage the livestock….

What is probably the most important thing we have left out of the discussion … so far?

- Your Goals
  - Profitability (you have to feed your family)
  - Quality of life (what do you want - really)?
  - Your Legacy (what do you want to leave behind?)

Beginning Exercise - (getting people involved)

- What's holding your grazing system back?
  - Sunlight
  - Water
  - Fertility
  - Plant community
- Your Goals
  - Profitability
  - Quality of life
  - Your Legacy

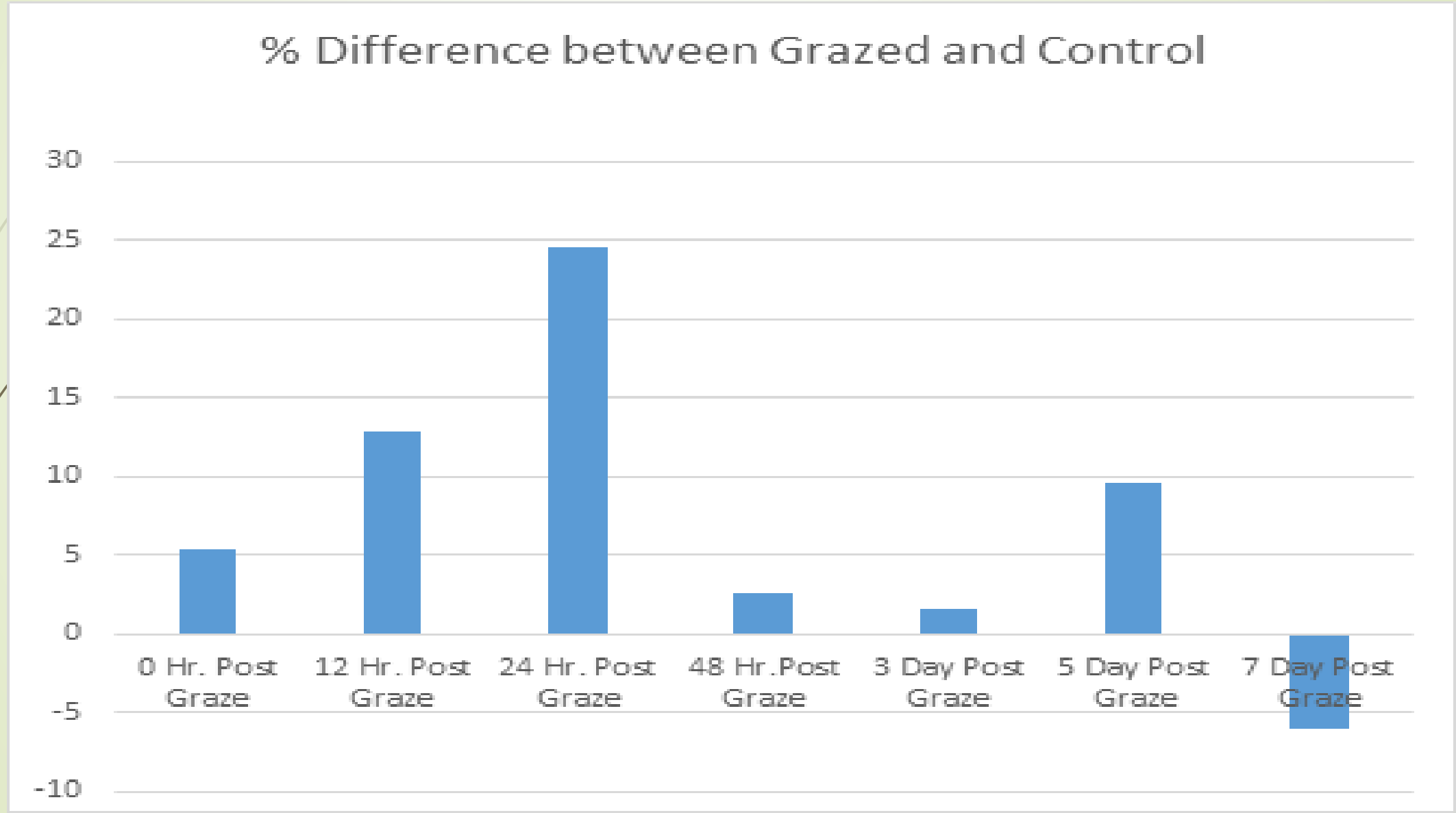
What management practices will grow more pasture?

#1 More animals on **smaller** spaces for **less** time

- Increase harvest efficiency
- More uniform grazing (less patch grazing)
- Less re-grazing of re-growth (3 day rule of thumb)
- More "herd" effect (*acute stress* to soil life)

- Holistic Grazing is a powerful tool to consider

Solvita Test: Measures CO2 given off by soil
Indicator of amount of life in the soil – Our Farm



Results from South African Farm

- Soil samples from 2 paddocks sude by side
- “Grazed” was grazed 3 days previously
- “Not Grazed” looked like “grazed” before stock turned in
- “Grazed” had 7 times (2 vs 14 mg/kg CO_2 –C) as “Not Grazed”

- Grazing stimulated an increase in soil microbial life

What management practices will grow more pasture?

#2 Leave more residual

- Grass grows more grass!
- Grazing grass grows more grass
- Soil cover (litter) protects & feeds soil life

Day 1

(24 hours after clipping)

1” Continuous 3.5” Rotational

UK

UNIVERSITY OF KENTUCKY

College of Agriculture

Day 2

1” Continuous 3.5” Rotational

UK
UNIVERSITY OF KENTUCKY
College of Agriculture

Day 3

1” Continuous 3.5” Rotational

UK
UNIVERSITY OF KENTUCKY
College of Agriculture

Day 4

UK
UNIVERSITY OF KENTUCKY
College of Agriculture

Day 5

1” Continuous 3.5” Rotational

UK
UNIVERSITY OF KENTUCKY
College of Agriculture

Day 6

1” Continuous 3.5” Rotational

UK
UNIVERSITY OF KENTUCKY
College of Agriculture

What management practices will grow more pasture?

#3 Provide adequate recovery periods between grazings

- Time to grow roots
- Time to feed the life in the soil
- Time for plant to build reserves
- Time for plant to be balanced nutrition

Frequent defoliation results in an underdeveloped root system.

How else can we grow more forage?

- Consider annual crops to diversify farm crop mix
- Use of “cover” crops for grazing
- Use “annuals” for “weak” spots with perennal forages

This is the Critical Part

We all have “good” intentions, lots of them!

How do we turn those intentions into real change,

and move closer to

what is important in our lives?

The most valuable tool is?

A Plan! - A Written Plan! A Plan Written by YOU!

"A goal without a plan is just a wish"

- 1- What are your goals
  - Profitability
  - Quality of Life
  - Legacy
- 2-What part of the grazing system is your weak link?
  - Sunlight harvesting
  - Water utilization
  - Fertility (manure & chemical)
  - Plant community

What's your Weak Link in 2016?

3 - To get more out of your current program in 2016

- The **weak link idea** – You CAN NOT do "everything" right!
- The 20-80 rule – 20% of the effort gets you 80% of the results
- Work on your "weakest link" - the thing holding your progra back
- Your **"weakest link"** is also your **"goal for the year"**

Example: I feed hay too early in the fall/ extend my fall grazin season

Working on Your Plan

4 -Strategies: What can you do about those weak links?

Start out brainstorming- Consider all the possibilities!

Great place to bring in other people to make sure you are looking all possible options.

Example: want more fall grazing,

Options: fence in hay field - plant annual crop - rent neighbors cover crops - etc…

Get everyone's ideas

Write down the strategy you decide on.

Working on Your 2016 Plan

5 - Tactics

This is a very important part of the sheet.

It's a "thinking through" of what it is going to take to actually make this happen.

Will you have the **time**, the **resources,** the **money**, & the **knowledge** to make this happen

AND - do the other people in your operation agree?

Working on Your Plan

6- Execute your plan:

- **Keep plan handy for reference**
- **Need to monitor outcomes**
  - Will you all meet next fall to compare notes?
  - It will hold you accountable

Wrap Up

Part 1: What grows grass?

- Sunshine, water, fertility, plant diversity
- Critical to understand that:

  You + Livestock + Forage + Soil life are an interdependent ***SYSTEM***

Part 2: How to impact the "system" with your grazing management

- More animals on smaller spaces for less time
- Leave more residual
- Provide adequate recovery

Part 3: Making Change Happen

- Have a Written Plan
- Identify weak link/greatest opportunity
- Develop a strategy
- Do the Tactics - critical

YOU!

Livestock

$ystem

Livestock

GRAZING

SOIL

GRAZING

Some Images of African Soil Health

Conclusion:

- I think there is trememdous potential in African soil
- I think there is imformation that can help:
  - Reduce eroision
  - Catch more water
  - Grow more crops
  - Graze more livestock
- It will take changes in thinking & management
- It will take time & patience
- It will take an investment of carbon

The tool of “Holistic Management” can help

Thank You

- Questions?

Ben & Denise Bartlett

Log Cabin Livestock