



Christine Page

Holistic Planned Grazing **(mob grazing with a *plan*)**

March 2021



SMILING TREE FARM

“the health of the soil, plant, animal
and man is one, and indivisible”

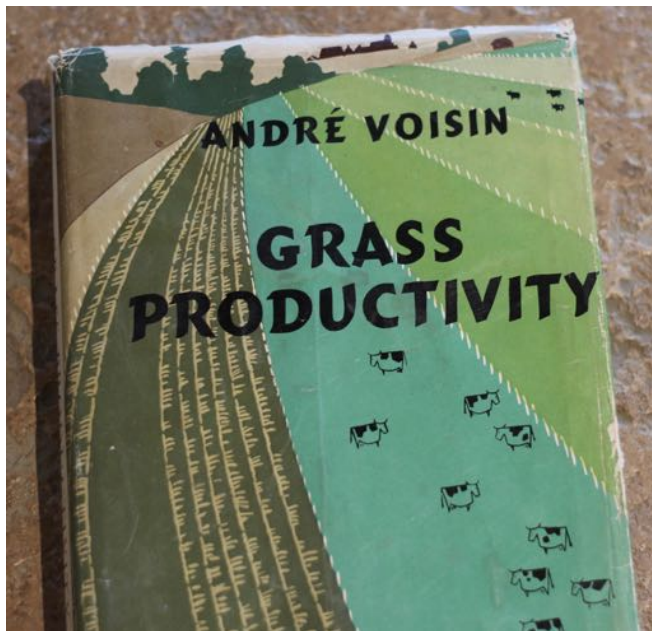
~ Sir Albert Howard

Mob grazing – nothing new



Old saying: *“Never leave the sheep in the same field long enough to hear the church bell ring twice”*

Andre Voisin’s book *Grass Productivity*, 1959:



James Anderson, Scotland 1777:

In *Essays Relating to Agriculture and Rural Affairs* (1777),¹ James Anderson of Scotland urged farmers to subdivide pastures into smaller paddocks, graze each one for a day, and then keep the animals out so the plants could regrow. Sounds like good grazing management! All this was long before the invention of electric fence, so Anderson had to use stone walls and a lot of labor to create paddocks. Anderson wrote:

To obtain this constant supply of fresh grass, let us suppose that a farmer who has any extent of pasture ground, should have it divided into 15 or 20 divisions, nearly of equal value: and that, instead of allowing his beasts to roam indiscriminately through the whole at once, he collects the whole number of beasts that he intends to feed into one flock, and turns them all at once into one of these division; which, being quite fresh, and of sufficient length of bite, would please their palate so much

Mob grazing = Light farming

Efficiently capturing the maximum free energy



Photosynthesis: capturing sunlight energy



Mob grazing *guiding** principles



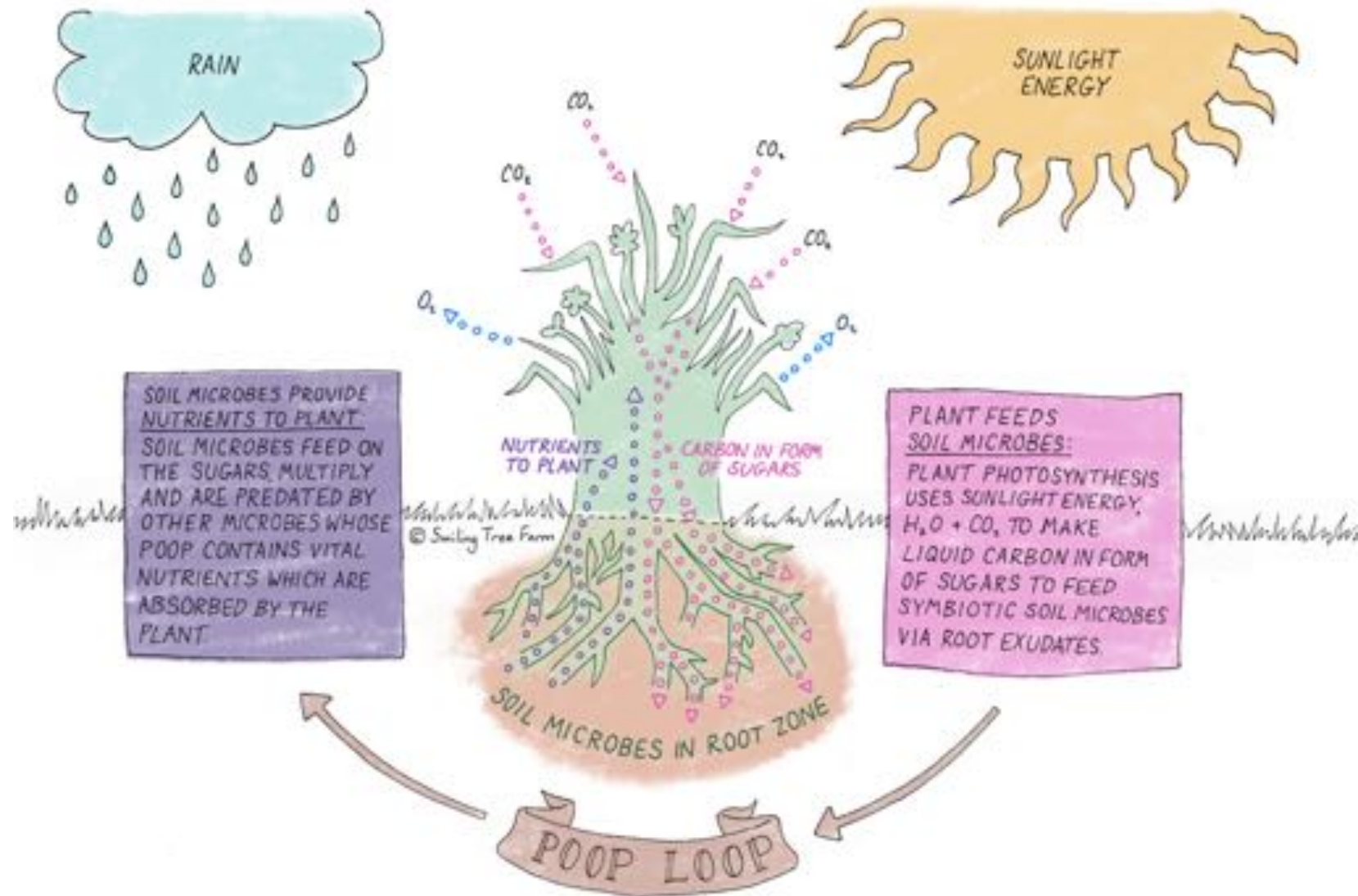
- 1. Grazing period:** 1-5 days (back fence) timing to move before taking a 'second bite'
- 2. Rest period:** 30-90+ days during growing season
- 3. Grazing impact:** Paddock sizes planned to take 30-60% forage, leaving min 4" residual

All three depend on season, speed of growth, individual goals/context

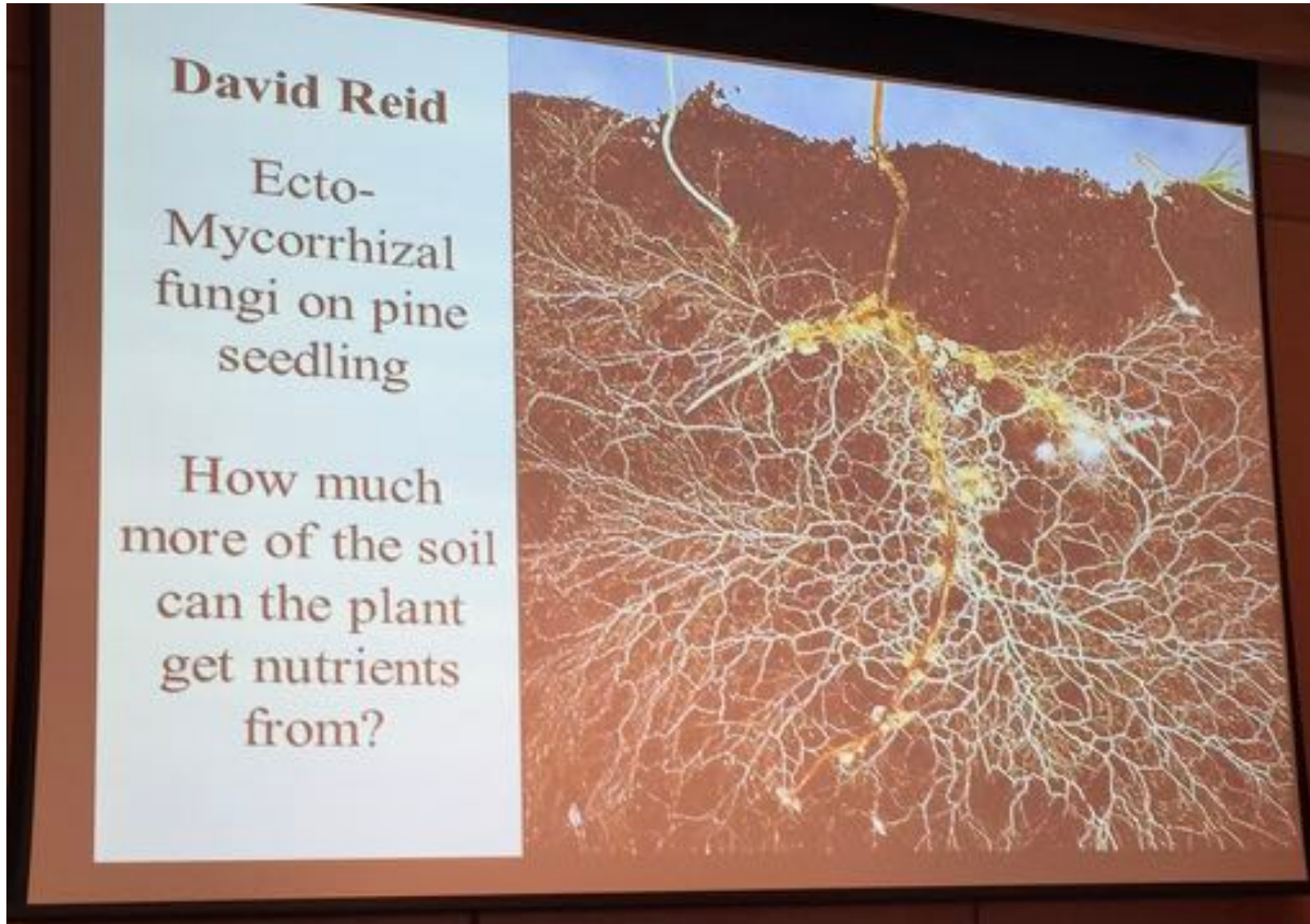
**Guidelines, not fixed rules*

Soil Science 101

The "Poop Loop"



Fungal highways



Liquid Carbon Pathway



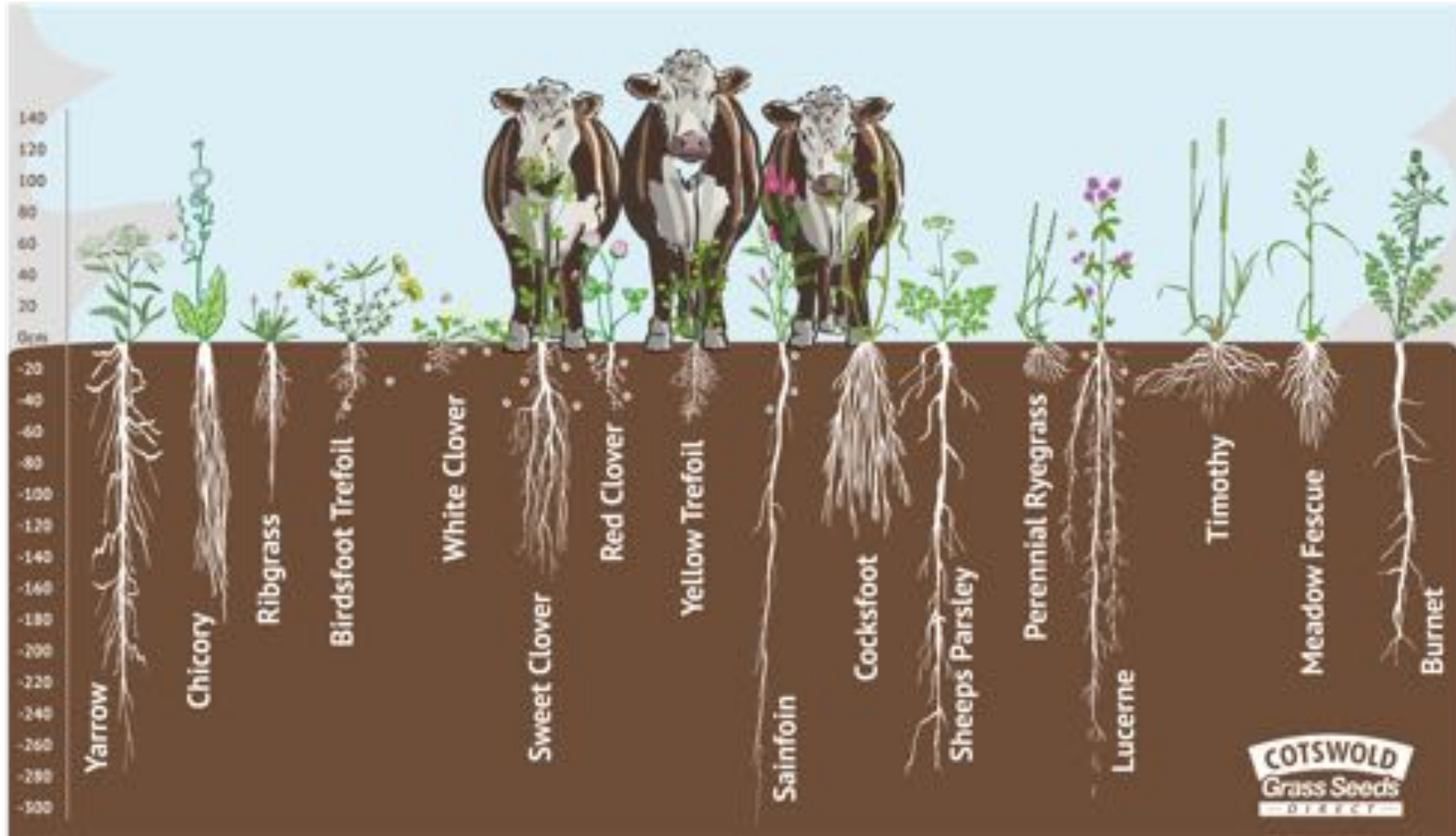
“The direct transfer of photosynthate through saprotrophic and symbiotic fungal networks accounts for the major portion of energy entering the soil food web via the rhizosphere - and also accounts for the major portion of stable carbon sequestration in soils.”

Dr Christine Jones

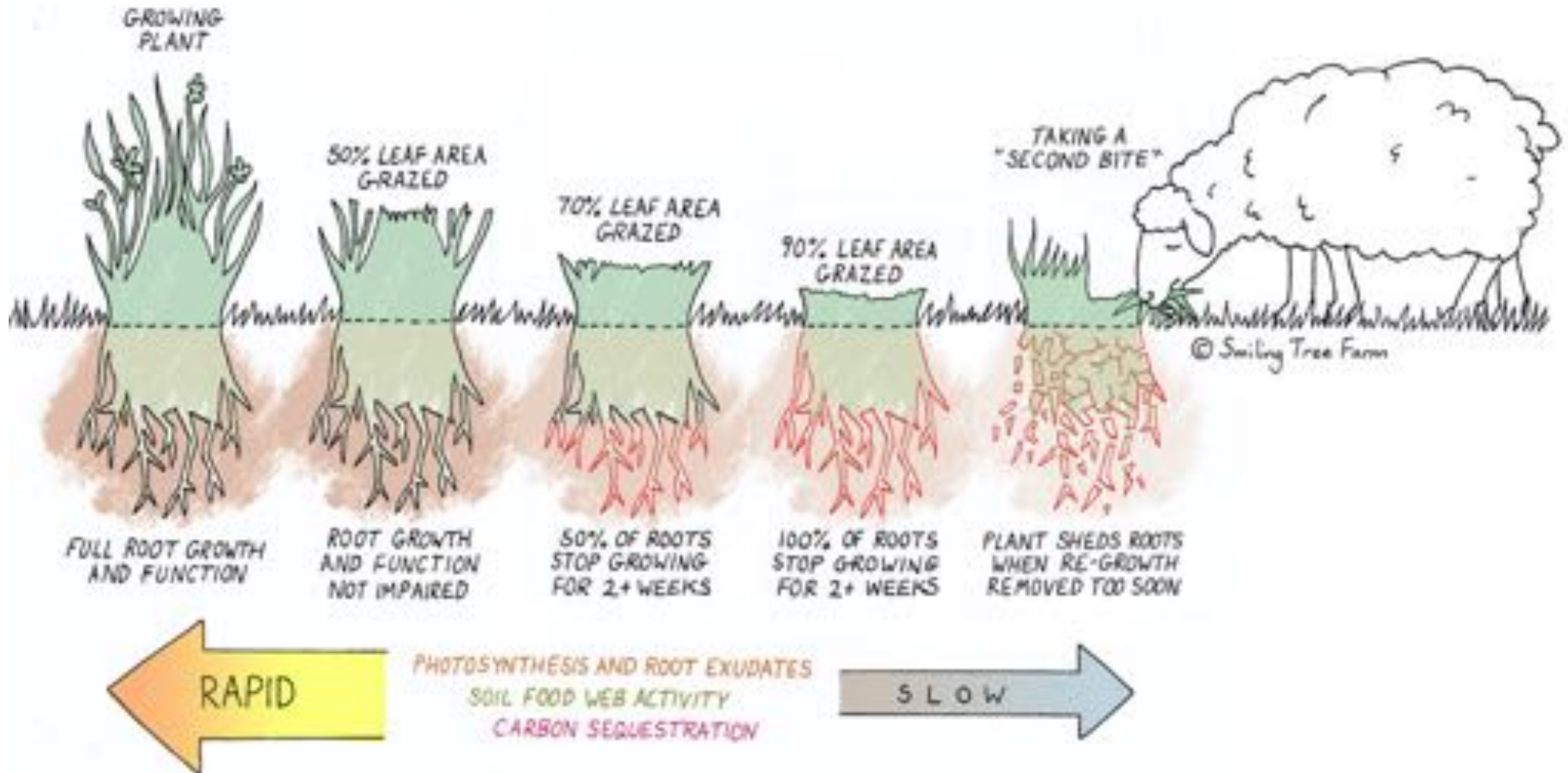
See example of [relevant research here](#) and how soil food webs with a dominant fungal energy channel function more efficiently [here](#).

Minerals & root depth

Importance of species diversity & root depths



Grazing impact on plant roots



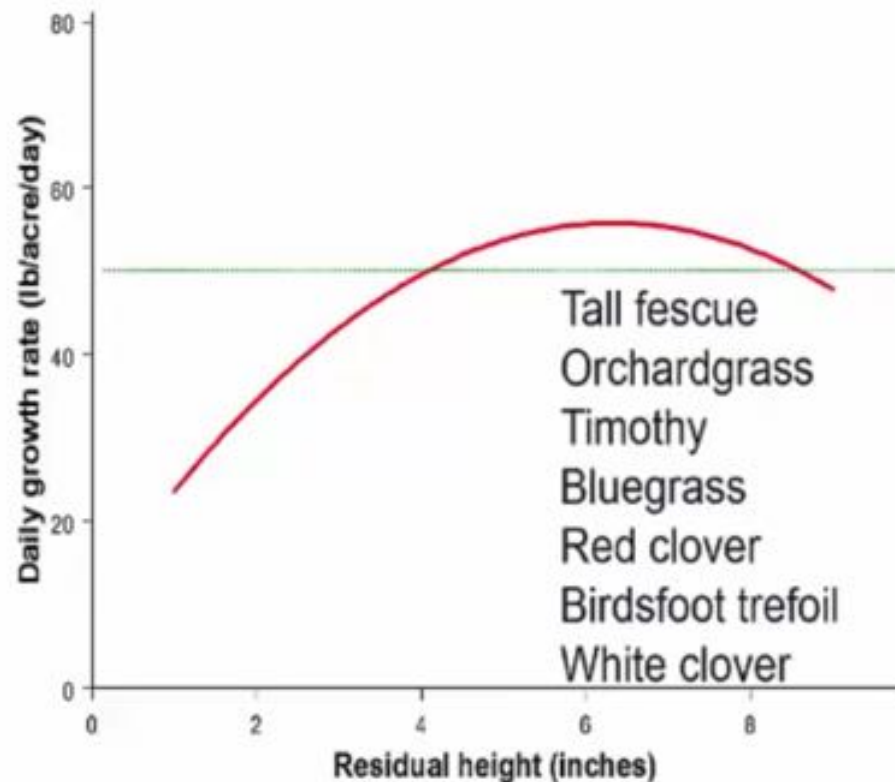
Data source: [Franklin J Crider 1955: Root-growth stoppage resulting from defoliation of grass](#) and see [this article](#) summarising Crider's work.

Grazing impact on regrowth

'Wasting grass'



Figure 1. Effect of post-grazing residual on pasture daily growth rate (MU-FSRC)



“If the land manager is attentive and thoughtful the proper balance will build topsoil without chemicals, e.g., fertilizers, pesticides, fungicides. Input in dollars is replaced by comprehensive (holistic) land management. In the end a farmer grows plants that grow topsoil. If he is not growing topsoil, he is not a farmer. He is a miner.”

Don Duncan comment on the linked video below

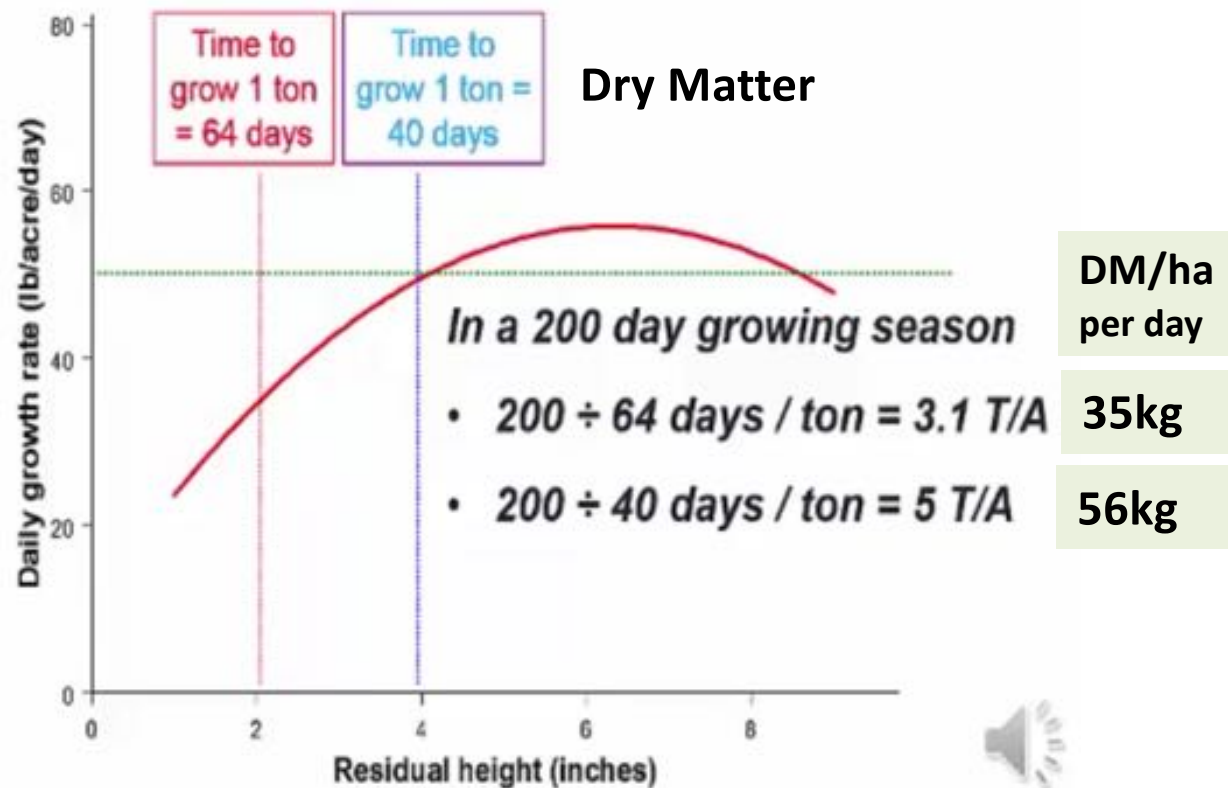
Source: Dr Jim Gerrish, see [15 min video on 'Wasting Grass' here](#)

Grazing impact on regrowth

'Wasting grass'



Effect of post-grazing residual on pasture daily growth rate (MU-FSRC)



"We decided we would 'waste grass' by leaving more residual and we grew 60% more grass"

Dr Jim Gerrish

"If you graze plants into the ground you lose future production as they need to use root energy to regrow their tops and that takes time."

Dr Christine Jones

Source: Dr Jim Gerrish, see [15 min video on 'Wasting Grass' here](#)



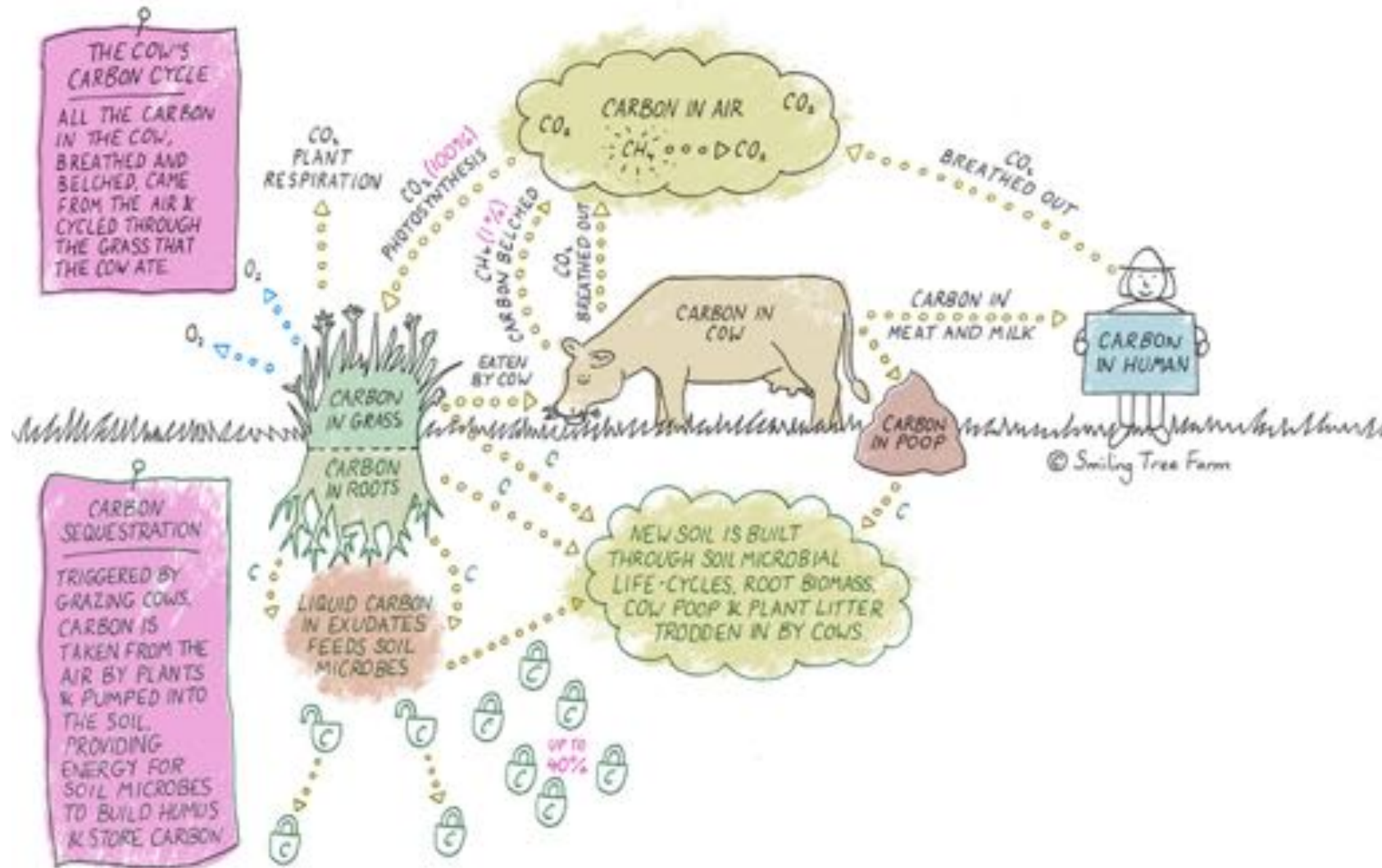
- Mob grazing vs artificial fertiliser
- With fertiliser heading up to £300/tonne
- What value mob grazing??

Daily Live Weight Gain



- Most of the energy, protein and nutrients are in the most recently emerged leaves
- DLWG and fertility are higher if only the top half of the plant is grazed

Carbon moooves!



Grazing tall grass

Each bite primes the carbon pump



How to sequester carbon:

*“Put them in when the grass is up to their knees,
take them out before you see their feet.”*

Dr Christine Jones

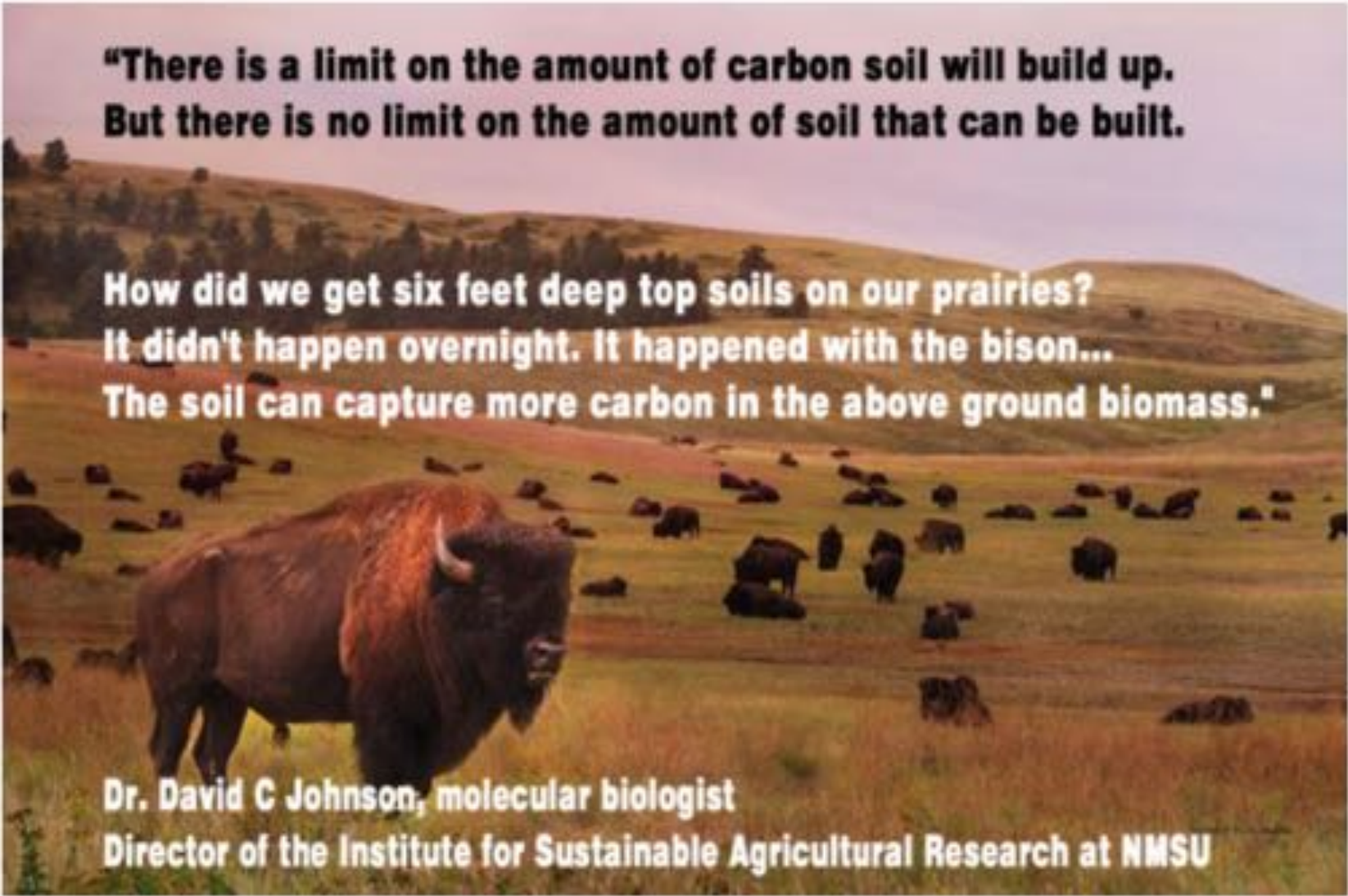
Soil: the planet's largest carbon sink



Jordan Fink
@BuildSoil

Following

perennial grasses can live 500 years and they pump carbon into the soil to feed soil microbes. They co-evolved with large herds of grazing animals which help cycle their biomass (with the help of dung beetles) and with proper planning, cows can do that same work...



**"There is a limit on the amount of carbon soil will build up.
But there is no limit on the amount of soil that can be built.**

**How did we get six feet deep top soils on our prairies?
It didn't happen overnight. It happened with the bison...
The soil can capture more carbon in the above ground biomass."**

**Dr. David C Johnson, molecular biologist
Director of the Institute for Sustainable Agricultural Research at NMSU**

Carbon moooves!



Consider a possible future, with China continuing to develop an industrial economy based largely on the burning of coal, and the United States deciding to absorb the resulting carbon dioxide by increasing the biomass in our topsoil. The quantity of biomass that can be accumulated in living plants and trees is limited, but there is no limit to the quantity that can be stored in topsoil. To grow topsoil on a massive scale may or may not be practical, depending on the economics of farming and forestry. It is at least a possibility to be seriously considered, that China could become rich by burning coal, while the United States could become environmentally virtuous by accumulating topsoil, with transport of carbon from mine in China to soil in America provided free of charge by the atmosphere, and the inventory of carbon in the atmosphere remaining constant.

~ FREEMAN DYSON 2007

Source: https://www.edge.org/conversation/freeman_dyson-heretical-thoughts-about-science-and-society

Mob grazing Benefits



- Plants grow deeper roots & soil becomes more fungal dominated
 - Fungal dominated soils sequester more carbon & neutralise more methane
 - Increasing biomass of soil microbes & accessing minerals deep in the soil
 - Making channels in the soil for water to infiltrate
- Leaving more leaf area (solar panels)
 - Plants can generate more energy to re-grow faster
 - More photosynthetic capacity enables more carbon sequestration
- Growing a soil sponge capable of absorbing large quantities of water
 - Prevents run-off & soil erosion / alleviates flooding
 - Releases water during dry periods / drought tolerance
- More even grazing & distribution of manure
 - Increases plant diversity & soil health
- Long rest periods between grazing
 - More than 95% of the land left undisturbed at any one time
 - Wildflowers able to flower (pollinator food) & set seed (bird food)
 - Ground nesting birds undisturbed
 - Long grass creates habitat for beetles, bugs, voles – barn owl hunting grounds
- Healthy livestock & more nutritious food
 - Longer grass has less sugar but much higher in micro-nutrients => healthier stock
 - So meat and milk also much higher in micro-nutrients (vitamins, minerals, essential fatty acids)
 - Considerably less (no) anthelmintic use as longer rest periods break parasite life-cycle



Why mob graze: Summary

- Capture more sunlight
- Grow more grass
- Improve DLWG
- Healthier livestock
- Reduce your costs
- Grow your soil capital
 - Sequester more carbon
 - Grow the 'soil carbon sponge'*
 - Build soil fertility & wider eco-system services
 - Improve soil function: liberate & cycle minerals in soil

Soil Sponge:

*Soil can hold an additional
8g water for every
additional **1g carbon***

(*see [Dr Walter Jehnes](#))

Mob grazing: How

Planning essentials



- Livestock type & weight (kg)
- Expected daily growth rates of growing stock
- Land available to graze (grazing platform ha)
- Daily grass growth rates, if known, otherwise use UK averages until actuals known & adjust for paddock value
- Set guideline grazing parameters (entry & residual covers)
- Water points / mobile troughs to enable back fence
- Energiser points / consider security

Mob grazing: How

Planning considerations



- Plan paddock sizes:
 - stock weight, use livestock units (LU) (eg 500kg)
 - daily demand (kg DM)
 - grazing duration to leave seasonally appropriate residuals
- Create a practical paddock system, easy to set up & manage and does not take too much *TIME*
- Consider access to water & shade/shelter
- Plan to have the stock where you need them at certain times ie TB testing, lambing/calving, etc
- Avoid paddocks at certain times eg water-logging, rare flowers, nesting birds, etc
- Stocking rate vs stock density

Stocking rate



Grazing platform = 10ha

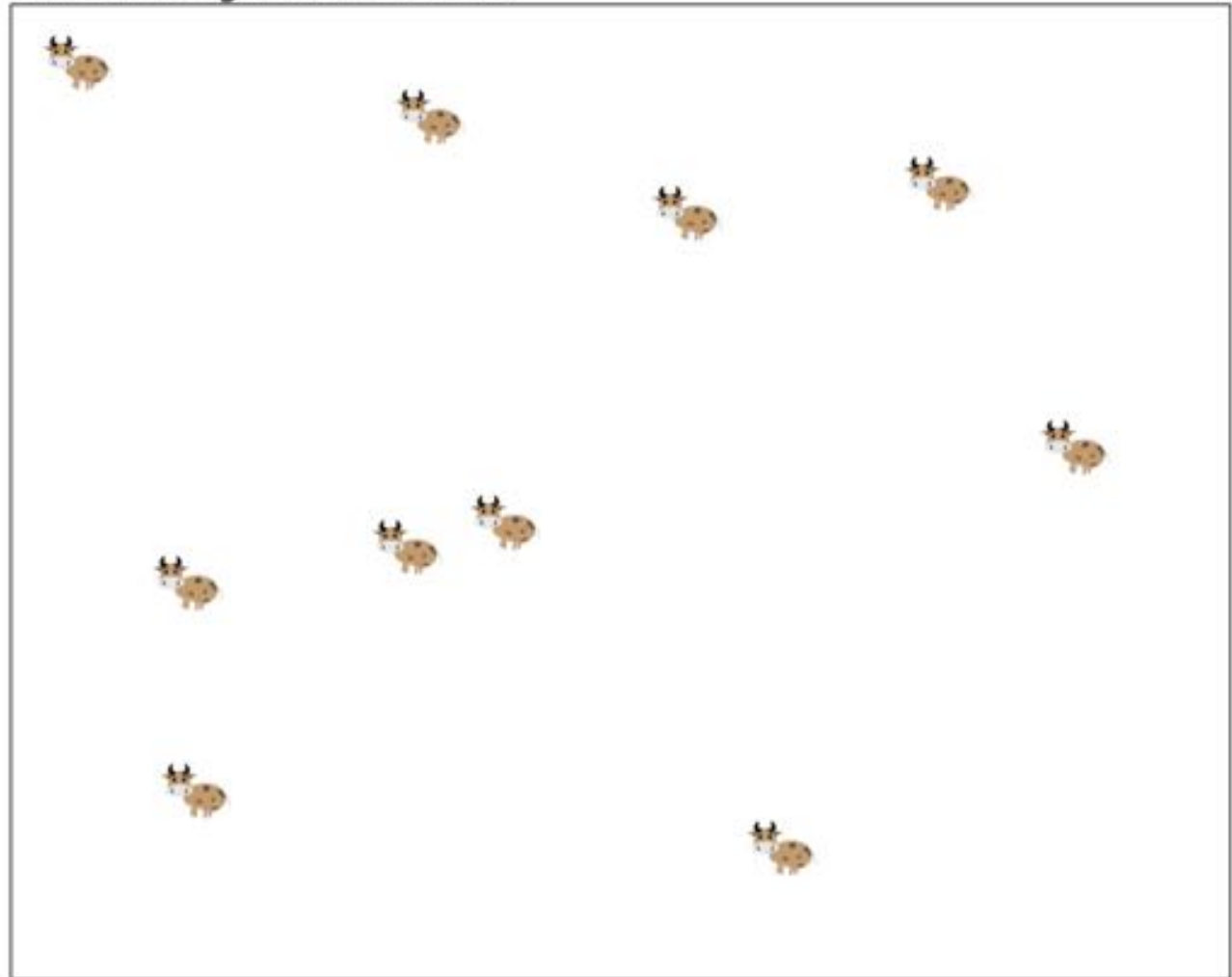
10 cows at 500kg = 10LU

Stocking Rate = 1LU/ha

If cows left to graze
entire platform in a
set-stocking system,
then also

Stock Density = 1LU/ha

Total Grazing Platform = 10ha



Stock Density



Grazing platform 10ha

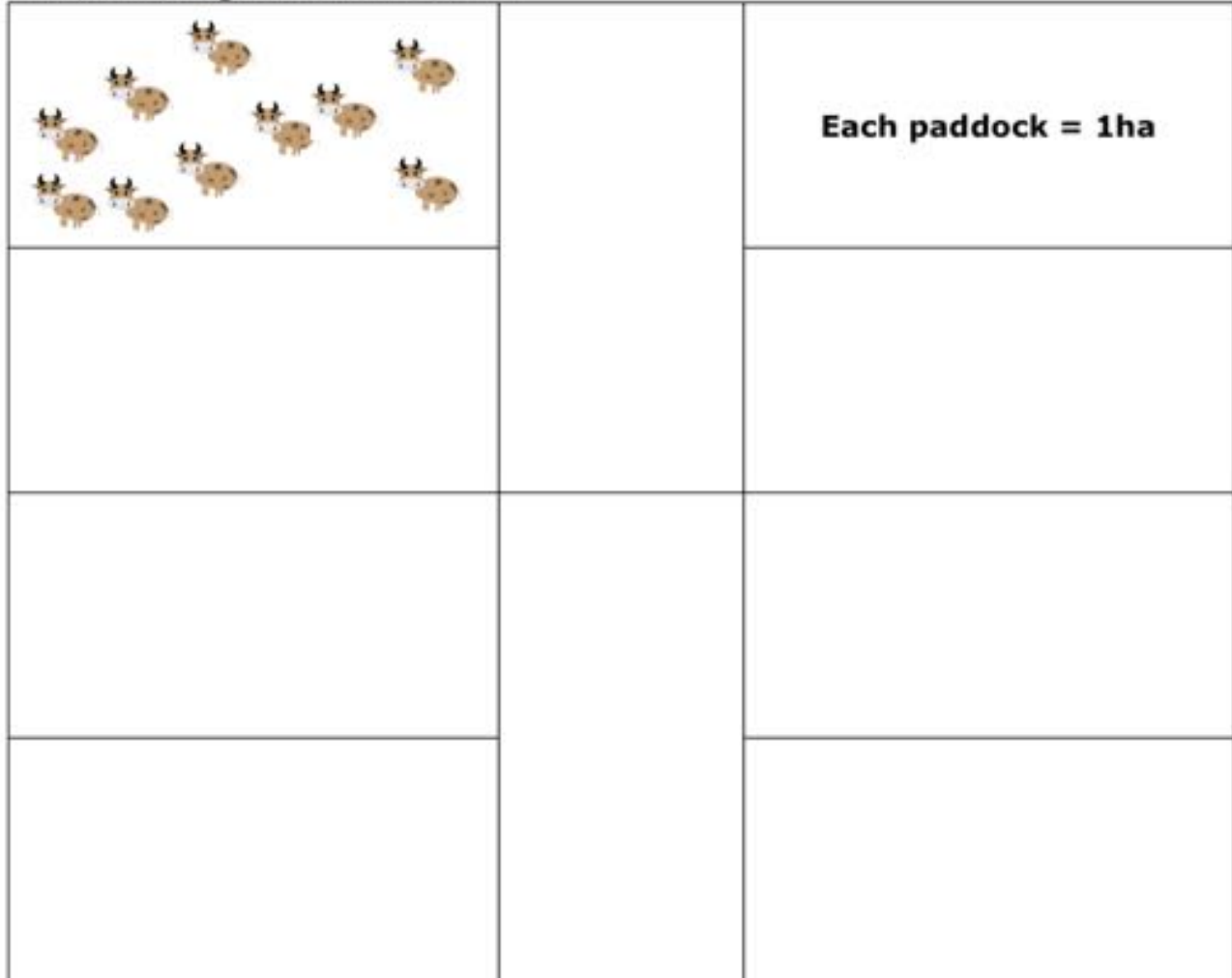
10 cows at 500kg = 10LU

Stocking Rate = 1LU/ha

Grazing platform sub-
divided into 10 paddocks
of 1ha, then

Stock Density = 10LU/ha

Total Grazing Platform = 10ha



Stock Density



Grazing platform 10ha


10 cows at 500kg = 10LU

Stocking Rate = 1LU/ha

Grazing platform sub-
divided into 20 paddocks
of 1/2ha, then

Stock Density = 20LU/ha

Total Grazing Platform = 10ha

			Each paddock = 1/2ha	

Stock density implications



- Rough rule of thumb:
 - Stock densities of 20-40LU/ha = moves every ~2-4 days
 - Stock densities of 60-80LU/ha = ~daily moves
- The higher the density the better animal impact
 - Less selective & more competitive grazing (↑ DLWG)
 - More even distribution of manure
 - More beneficial trampling
- BUT the higher the density the more careful observation required to avoid
 - Over grazing
 - Poaching in wet weather
- Daily moves better than every 5 days but require more labour depending on set up



Daily demand

- Daily demand is how much your flock or herd (or flerd) eats in kg dry matter (DM) / day
- Growing & lactating ruminants eat approx 3% of their **body weight** / day in DM
 - 1LU (500kg) x 3% = 15kg DM/day
 - 1LU eats 15kg x 365 = 5.48 tonnes DM/year
- Measure DM using a sward stick* or plate meter
- Measurements are always given in kg DM/ha

[*Get a free sward stick from AHDB](#)

England Avg Grass Growth

Don't turn out too soon



	Grass growth (kg DM/ha)	Days in month	Grass growth / month	% of annual grass growth
January	0	31	0	0%
February	5	28	140	2%
March	10	31	310	5%
April	25	30	750	11%
May	45	31	1395	21%
June	30	30	900	14%
July	20	31	620	9%
August	30	31	930	14%
September	20	30	600	9%
October	15	31	465	7%
November	10	30	300	5%
December	5	31	155	2%
Total annual grass growth (kg DM/ha)			6565	

(Grass growth data source: AHDB)

Note: 1LU eats 5.48 tonne DM/yr => 1ha will carry 1.2LU

These are **average** growth rates, you should expect to grow considerably more kg/ha than this (without fertilizer) with well managed mob grazing depending on field specifics (topography, sward age, species, etc) and farm location.

Grass needs its solar panels (leaf area) in order to capture and harness the free perennial source of energy from the sun => maximum leaf area at times of fastest growth => a week held back in April can give you a extra month of summer grazing & drought resilience in a dry year.

What is your limiting growth factor?



- CO₂*
- Water
- Sunlight
- Temperature
- Nutrients



	% of annual grass growth		UK avg Solar PV production
January	0%		3%
February	2%		5%
March	5%		9%
April	11%		11%
May	21%		12%
June	14%		14%
July	9%		14%
August	14%		12%
September	9%		9%
October	7%		6%
November	5%		4%
December	2%		3%

Building a SOIL CARBON SPONGE retains water to support continued high growth rates through drier summer months. Aim to move towards solar PV monthly production averages for maximum growth.

Soil Sponge:
Soil can hold an additional **8g water** for every additional **1g carbon**

[*NASA CO2 fertilisation](#)

Seasonal considerations



- Flash / skim graze start of grazing season keeping maximum leaf area (solar panel) to capture maximum FREE sun energy
- Fast moves when grass is growing fast
- Slow moves when growth slows
- Short duration grazing (move every day or every 12 hrs) when ground very wet
- Plan stockpile if winter grazing
- When grazing stockpile in winter make paddocks square for least poaching
- Accept that you cannot graze every paddock at its optimum cover. Plan for best practical utilisation
- Considerable variation from year to year
- To optimise DLWG move at highest Brix

Tips for Success



- Observe & monitor
- Measuring grass in each paddock at start & end of growing season
- Measuring grass by paddock on each move (both Entry and Residual covers)
- Compare covers, re-growth & animal impact with each move to plan & adjust future moves accordingly
- Keep a bio-diary of temp & rainfall
- Weigh stock at start & end of season
- Compare actual grass growth & DLWG against plan so next year your plan is more accurate
- Adjust time of day of moves to achieve desired residuals

"The most important factor is human husbandry" Joel Salatin



Every farm is different

Farm location

height, aspect, soil type

Field specifics

topography, sward age, species,

historical management



Smiling Tree Farm

Smiling Tree Farm goals

(Holistic context)



- **Grow soil & improve soil health, function & fertility**
- Raise content, robust, **healthy livestock *naturally*** – no chemical inputs, zero anthelmintic or allopathic medicine use
- Produce flavoursome, **nutrient-rich food** in a **closed-loop system**
- Create a harmonious, wildlife-friendly, vibrant **place to live**, work & share
- Set an **example of best practice** for small-scale food production in an honestly sustainable way (environmentally & financially – without subsidies)
- **Earn sufficient** to live and place a high value on **TIME**

Smiling Tree Farm key facts



- 70 acres, spanning two sides of a steep valley between 650ft-1020ft on Welsh borders
- Thin clay loam soils onto rock
- Two holdings each running a **32 paddock mob grazing system**
- HOLDING 1: Traditional Hereford beef suckler herd
 - ~23LU on 12.1ha (30 acres) grazing platform (LU = 500kg)
 - 1.9LU/ha (0.78LU/acre) grazed ~8-9 months/year
- HOLDING 2: Cow-calf micro-dairy of Jersey cows
 - ~7LU on 4ha (10 acres) grazing platform
 - 1.75LU/ha (0.7LU/acre) grazed ~10-11 months/year
- Separate 4ha (10 acres) for hay making (plus 8 acres hay bought-in at 1.5tonnes/acre) = in total 1.28LU/ha (0.52LU/acre)
- Plus 20 acres woodland, hedgerows, shelter-belts, riparian zone, tracks, buildings, etc

My grazing journey



- Moved to STF in 2006, apart from a previous 10yrs in the thoroughbred flat-racing industry, unconstrained by any pre-conceived ideas of farming, livestock & grazing practices and began to learn by experience.
- Began with set-stocking. In 2009 started practicing various iterations of rotational grazing, observation naturally led to decreasing paddock sizes & more frequent moves
- The lightbulb moments came in 2014/15: HM training with Kirk Gadzia & did Dr Elaine Ingham's *Life in the Soil* course - made decision to fully implement holistic planned grazing (mob grazing) in 2015
- Using my farm goals / holistic context I made a **work and time plan** to reach those goals using HM principles & decision-making framework, for example:
- Key priority – **time efficiency** – after cost/benefit analysis invested up front in infrastructure to permanently (electric) fence & water to every paddock saving 20 mins/day* moving fences/water
- A fixed paddock system allows me to adjust grazing duration rather than paddock size & still achieve my goals & meet HPG principles

(*20mins/day in 8hr days is 3x5day weeks/year – for my context life is too short to spend that amount of time every year moving fences. I spent 3wks in the first year installing the infrastructure so that I could be a farmer that just opens and closes a spring-gate for a living.)

Grazing Plan summary

A plan is like the Pirate's Code, it's just *guidelines*



- Turn out on/around *Magic Day* (mid-April'ish):
 - Magic day is when daily grass growth on whole grazing platform = daily demand (total weight of cattle x 3%)
 - south-facing dairy holding is often 3wks ahead of north-facing beef holding
- 1st rotation: Skim graze 1 day moves building a grass wedge & maximising uptake of free solar energy (*move fast when grass grows fast*)
- 2nd rotation: 2 day moves
- 3rd rotation: 3+ day moves (*move slow when grass grows slow*)
- Continue rotations with 1, 2 or 3 day moves depending on weather & grass covers aiming to always put them in with the grass up to their knees (less in early spring/late autumn/winter) and take them out before you see their feet
- Bring the cows in when snow/ice/too much rain stops play (~end Dec)
- Utilise any dry winter periods to turn out and graze: 1 day moves (except last 3wks before turn out to build a grass wedge)
- Monitor and adapt – follow the Pirate's Code

Every farm is different
Every field is different
Every year is different

Mob grazing paddocks

Dairy cow paddocks with race to milking parlour



Electric fencing

Initial set up



Earthing is critical – use at least 3x 1m earth rods, daisy-chain connected to energizer.

Water

Initial set up



Water & Fencing Initial set up

Lead-out cable and water in same trench where possible.

Concrete water troughs immovable by rubbing cattle!

Bung for easy cleaning & quarter turn isolation taps on each tank, leave empty over winter

Keep photos of all underground joins in case of leaks (pressure test before closing in trench)



Diverse hedgerows

Next stage...



Instead of individual rabbit guards we ran a line of rabbit netting down both sides (photo before second side put in place) & turned out at base. Mulched with woodchip.

Diverse hedgerows

shelter, shade, browse for cows
more invertebrate & small mammal habitat



Learning experience...

NOT regenerative agriculture!



Out-wintered & bale-grazed Hereford cattle destroyed the soil structure. 5yrs later this field still struggles. I would not repeat this.

Herbs oversown into pasture

Salad bar beef; some herbs natural anthelmintics



Pasture diversity

vital to health of soil & cow microbiome
invertebrate & small mammal habitat



Trees as important as pasture

self-medication for cows
more wildlife habitat



Willow walkways

Viminalis hybrid bowles



*Work in progress
... to be mulched*

Beyond mob grazing

Silvo-pasture



Beyond mob grazing

Shelterbelts & pasture



Biodegradable rabbit guards (polylactic acid, degrades over 2yrs) & mulch mats made of recycled hessian rice & coffee bags.



*Tree density:
~1/sqm
Wild service tree
Wild cherry
Rowan
Whitebeam
Downy birch
Red oak
Aspen
Bird cherry
Field maple
Small leaf Lime
Spindleberry
Wayfaring tree
Large leaf lime
Dogrose
Silver birch
Hazel
Black poplar
Italian alder
Black walnut
Willow*

Beyond mob grazing

Shelterbelts & pasture



Also trialing rabbit guards made of PE coated cardboard – they are surviving amazingly well!

Soil disturbance = weed growth



Planting trees into very old thick sward, so rotovated first, which took the soil back to early succession (bacterial) stage and woke up the creeping thistle! None in the undisturbed fungal-dominated pasture

Future plans

Every mob grazing paddock surrounded by walls of diverse species trees & carpets of diverse pasture integrating wild habitats & food production



Equipment



Specialist livestock electric fencing materials:

rappa.co.uk



kiwitech.uk



Get 3:1 geared reels but don't buy cheap ones! Hotline are expensive but worth it.



Success or failure?



Success =

one who earns/grows* 100 each day but expends **99**

Failure =

one who earns/grows* 100 each day but expends **101**

Difference between success & failure is often in small incremental steps but compounds over time

*energy/money/soil/biomass



Questions?



Thank you

Christine Page

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