
SMILING TREE FARM
Christine Page
Smiling Tree Farm
Why what we feed animals matters

Why Animal Feed Matters

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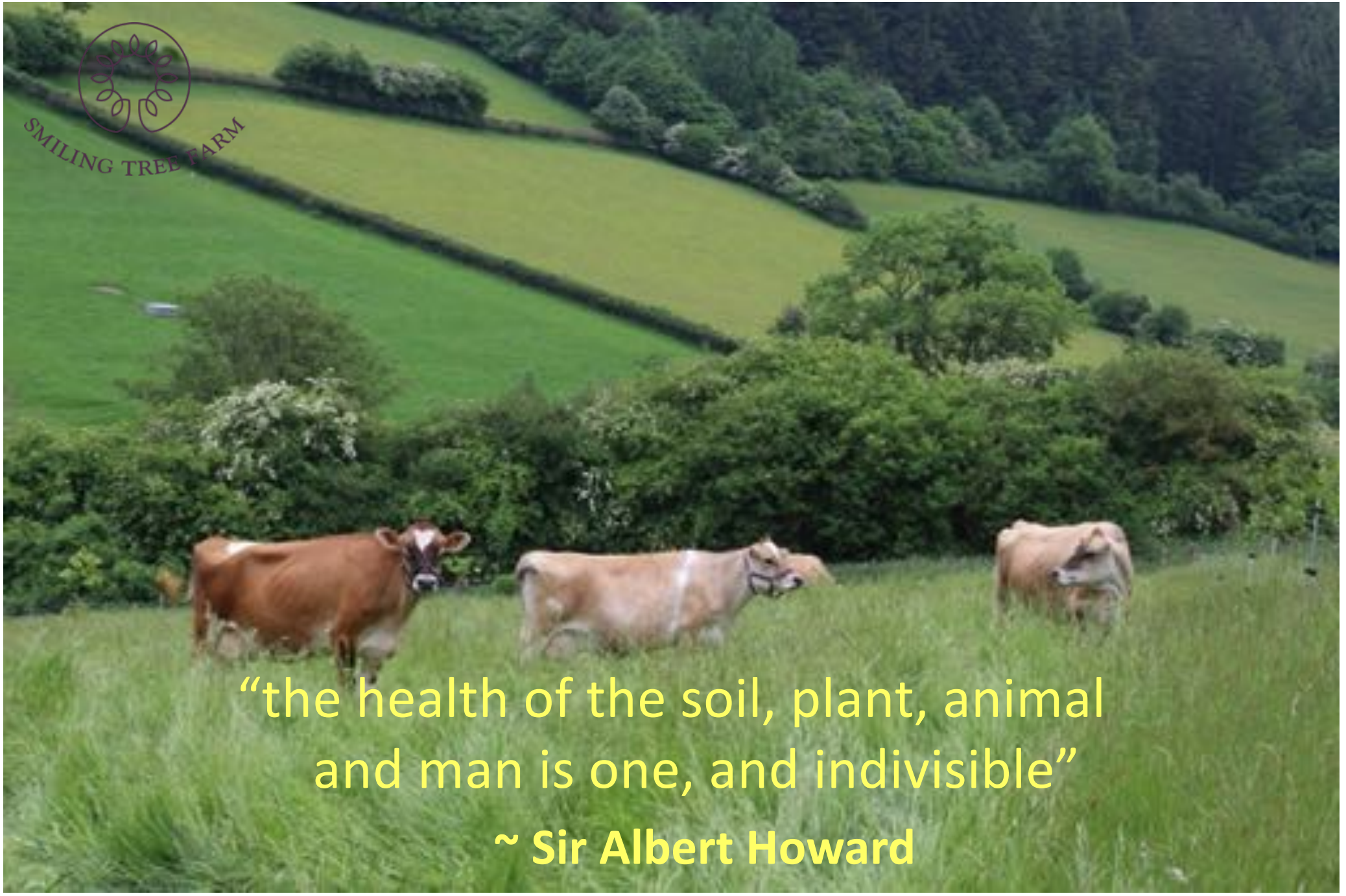
- It affects the **health & wellbeing of the animal**
- It affects the **flavour & nutritional value of their meat or milk**
- How animal feed is produced/grown can
  - destroy or **create wildlife habitat**
  - **regenerate soil health** or erode soil
  - **sequester carbon** or emit it

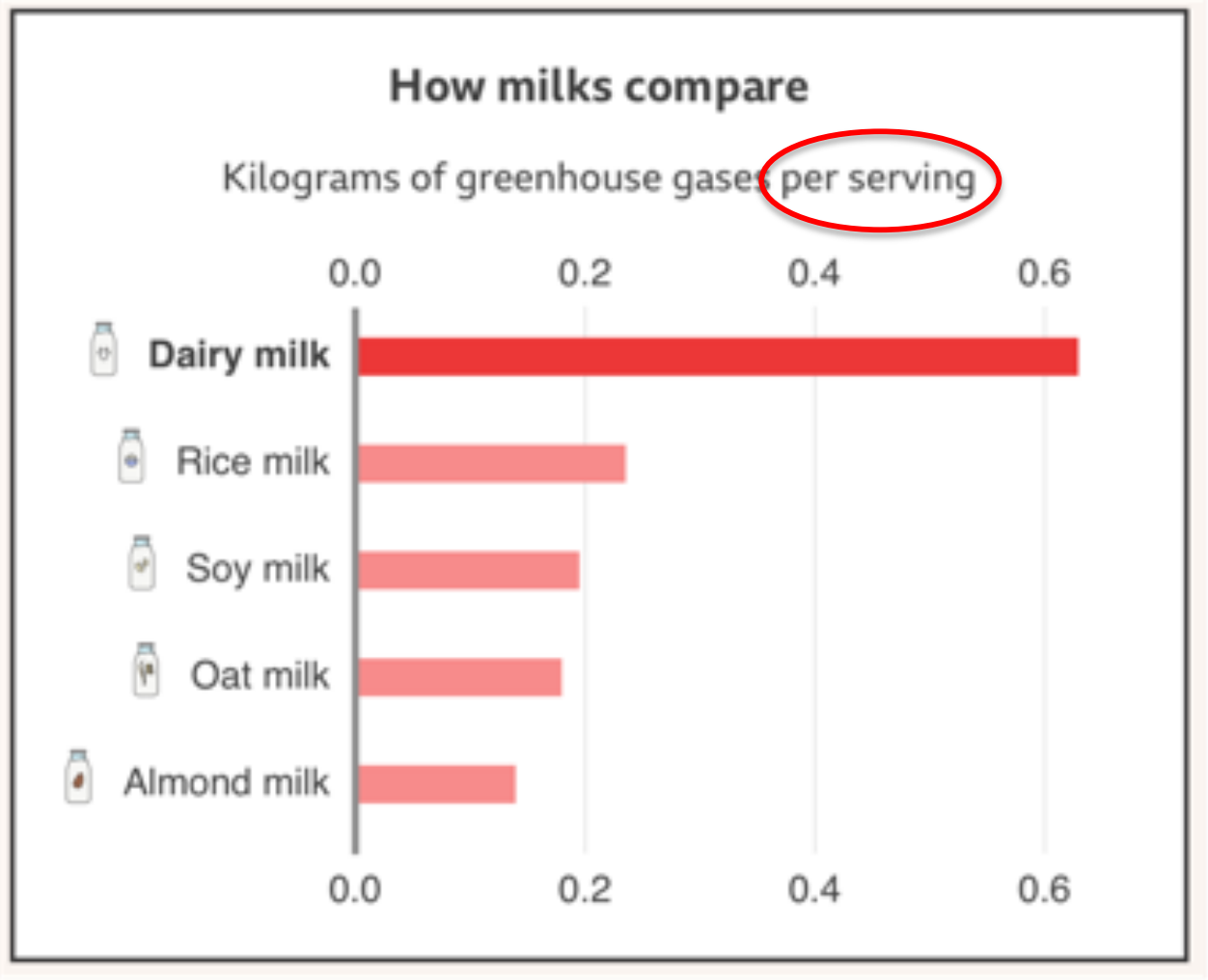

SMILING TREE FARM
“the health of the soil, plant, animal
and man is one, and indivisible”
~ Sir Albert Howard

Smiling Tree Farm, South Shropshire

- Small-scale 70 acre pastoral farm
  - Steep land (650-1020ft) unsuited to growing arable crops
- Traditional Hereford beef suckler herd
- Cow-calf micro-dairy of Jersey cows
- No routine wormers, medications or vaccinations

  #PreventativeMedicine #Homeopathy
- **Feed: diverse pastures & browsing trees**
- Farm run using holistic management, organic & permaculture principles
- We practice regenerative silvo pastoral agriculture

What is being compared?



All these liquids are mostly water, this is a comparison of water that has been metabolised through the body of a cow vs water added to a processed crop.

Without considering what nutrients are in each serving the comparison is pretty meaningless.

But is good click-bait!

Source: BBC website food carbon footprint tool using global averages of industrial production & not taking into account any carbon sequestration benefits.

A more useful comparison

albeit of industrial dairy, Real Milk would fare much better

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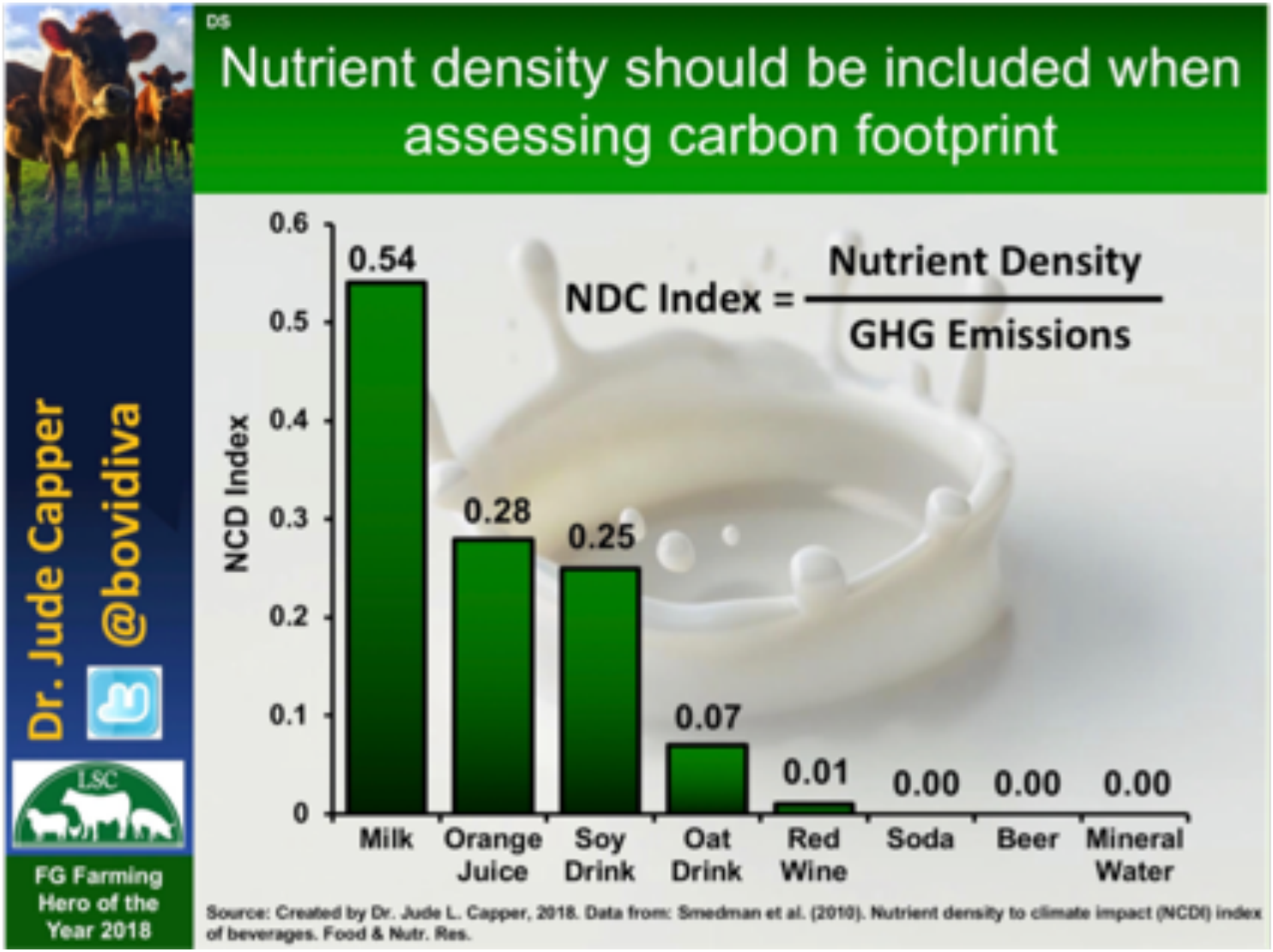

This tells us that milk is a nutrient-dense food.

You get twice as much nutrition per GHGe from milk than soy drink, and more than 7x more than oat drink.

BUT more importantly, what are those nutrients?

Micro-nutrients the key to optimum health…


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Cows are UPCYCLERS
Through the magic of fermentation they take human inedible plants and upcycle them to highly nutrient-dense foods

Nutrients in Milk

Fat-soluble nutrients particularly impacted by diet of cow

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There is huge variation in actual micro-nutrient content which depends primarily on the diet of the cow, but also her breed, age, health, stage of lactation & contentedness.

CREAM

FAT SOLUBLE MICRO-NUTRIENTS:

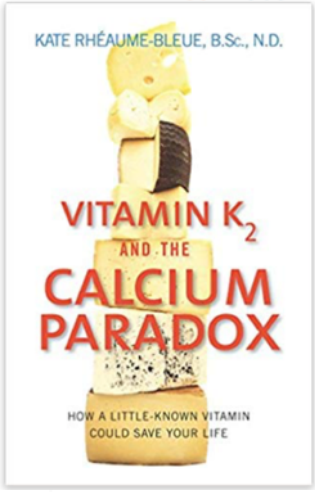
- Omega 3 - the essental DHA form
- CLA - conjugated linoleic acids
- Vitamin A & beta carotene
- Vitamin D
- Vitamin E
- Vitamin K2 - vital nutrient deficient in most

The fat-soluble nutrients are needed for the effective absorption of the water-soluble nutrients - always drink WHOLE milk.

SKIMMED MILK

WATER SOLUBLE MICRO-NUTRIENTS:

- Calcium
- Magnesium
- Phosphorus
- Potassium
- Selenium
- Zinc
- Folate
- Vitamin C
- Vitamin B1, B2, B3, B5, B6, B12



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What does this equation represent?

6CO2 + 6H2O + sunlight => C6H12O6 + 6O2

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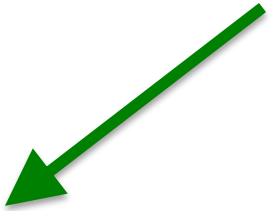
All life depends upon

PHOTOSYNTHESIS:

$6CO_2 + 6H_2O$ + light energy => $C_6H_{12}O_6 + 6O_2$

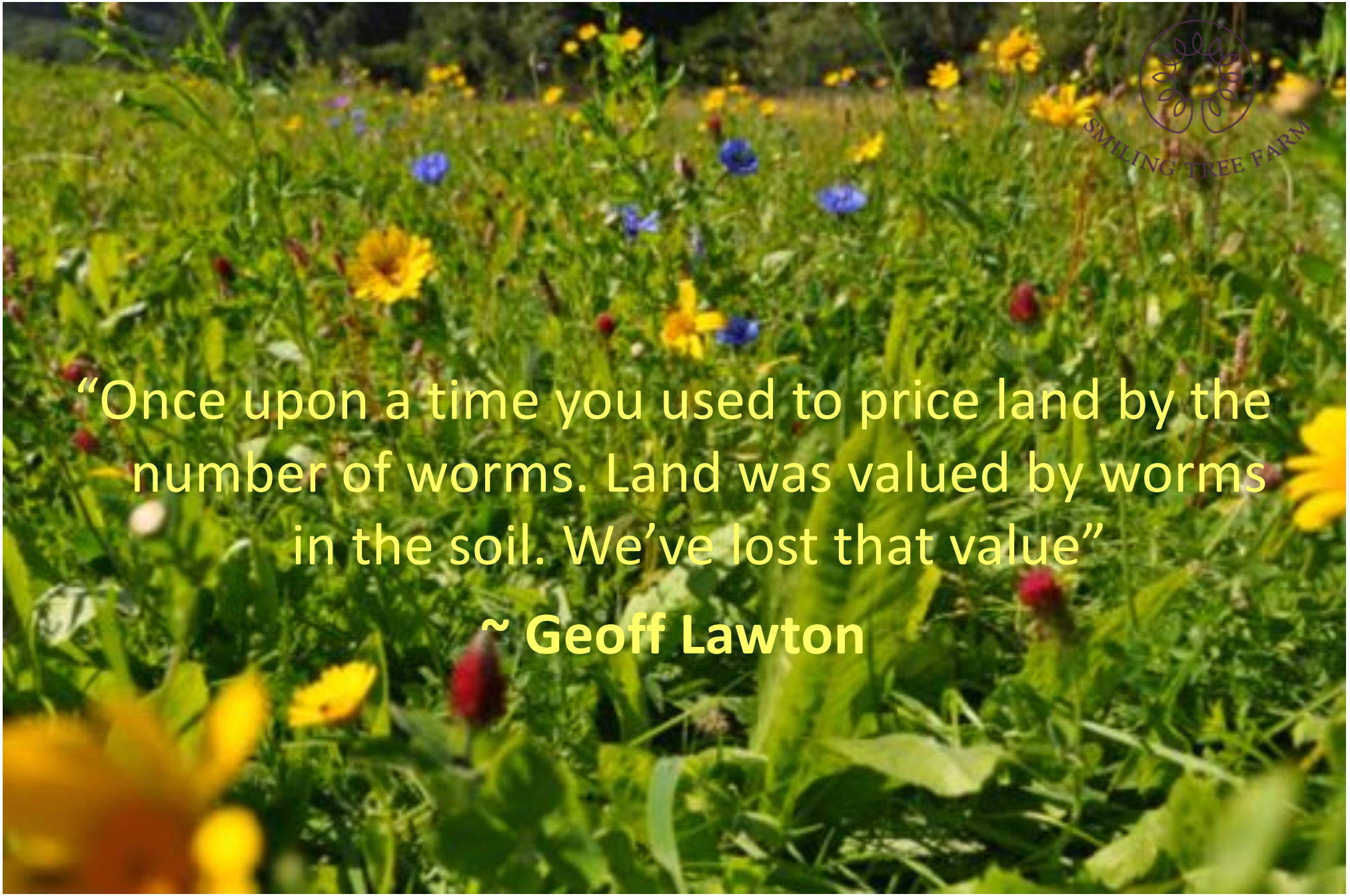
Carbon dioxide + water + sunlight => sugar + oxygen



The “liquid carbon pathway” (Dr Christine Jones)

Pumping carbon via plant root exudates into the soil

Every bite primes the carbon pump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"Once upon a time you used to price land by the number of worms. Land was valued by worms in the soil. We've lost that value"
~ Geoff Lawton

Carbon moooves…

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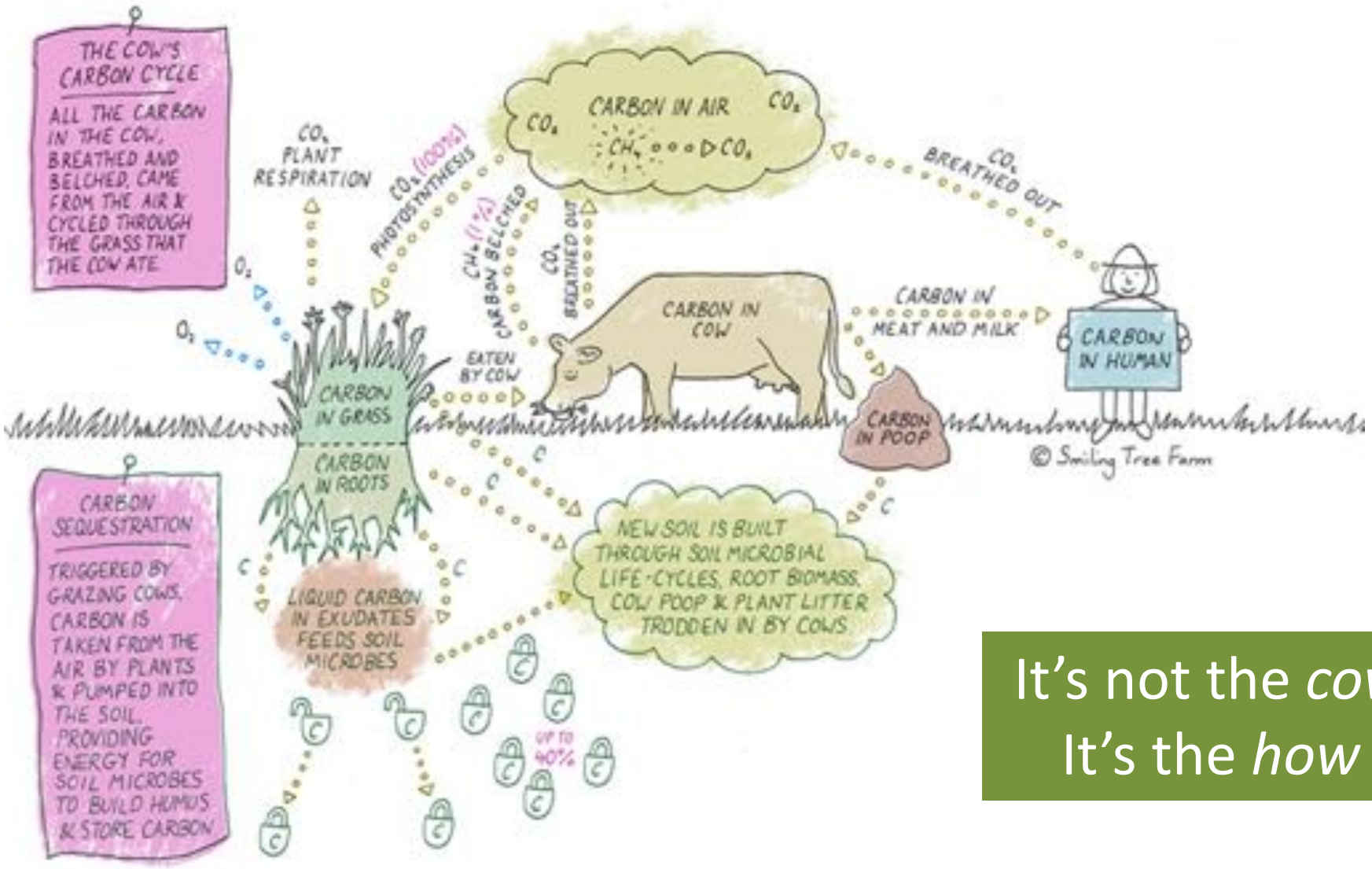


It's not the *cow*
It's the *how*

Carbon Sequestration from Mob Grazed Cows VS their Methane Emissions

	CO2 sucked in by photosynthesising plants (choose your unit)	… of which, carbon used for plant growth (60%)	… of which, carbon sequestered in soil (40%) *	Cumulative carbon sequestered in soil	Carbon emitted as methane from cows eating plants (1%) **	Number of Cows (choose your unit)	Methane from enteric fermentation (choose your unit)	Annual methane oxidisation	Methane in atmosphere
Year 1	100	60	40	**40**	1	100	10		**10**
Year 2	100	60	40	**80**	1	100	10		**20**
Year 3	100	60	40	**120**	1	100	10		**30**
Year 4	100	60	40	**160**	1	100	10		**40**
Year 5	100	60	40	**200**	1	100	10		**50**
Year 6	100	60	40	**240**	1	100	10		**60**
Year 7	100	60	40	**280**	1	100	10		**70**
Year 8	100	60	40	**320**	1	100	10		**80**
Year 9	100	60	40	**360**	1	100	10		**90**
Year 10	100	60	40	**400**	1	100	10		**100**
Year 11	100	60	40	**440**	1	100	10		**110**
Year 12	100	60	40	**480**	1	100	10	-10	**110**
Year 13	100	60	40	**520**	1	100	10	-10	**110**
Year 14	100	60	40	**560**	1	100	10	-10	**110**
Year 15	100	60	40	**600**	1	100	10	-10	**110**
Year 16	100	60	40	**640**	1	100	10	-10	**110**
Year 17	100	60	40	**680**	1	100	10	-10	**110**
Year 18	100	60	40	**720**	1	100	10	-10	**110**
Year 19	100	60	40	**760**	1	100	10	-10	**110**
Year 20	100	60	40	**800**	1	100	10	-10	**110**
Year 21	100	60	40	**840**	1	100	10	-10	**110**
Year 22	100	60	40	**880**	1	100	10	-10	**110**
Year 23	100	60	40	**920**	1	100	10	-10	**110**
Year 24	100	60	40	**960**	1	100	10	-10	**110**
Year 25	100	60	40	**1000**	1	100	10	-10	**110**
Year 26	100	60	40	**1040**	1	100	10	-10	**110**
Year 27	100	60	40	**1080**	1	100	10	-10	**110**
Year 28	100	60	40	**1120**	1	100	10	-10	**110**
Year 29	100	60	40	**1160**	1	100	10	-10	**110**
Year 30	100	60	40	**1200**	1	100	10	-10	**110**
- - -									
Year 100	100	60	40	**4000**	1	100	10	-10	**110**

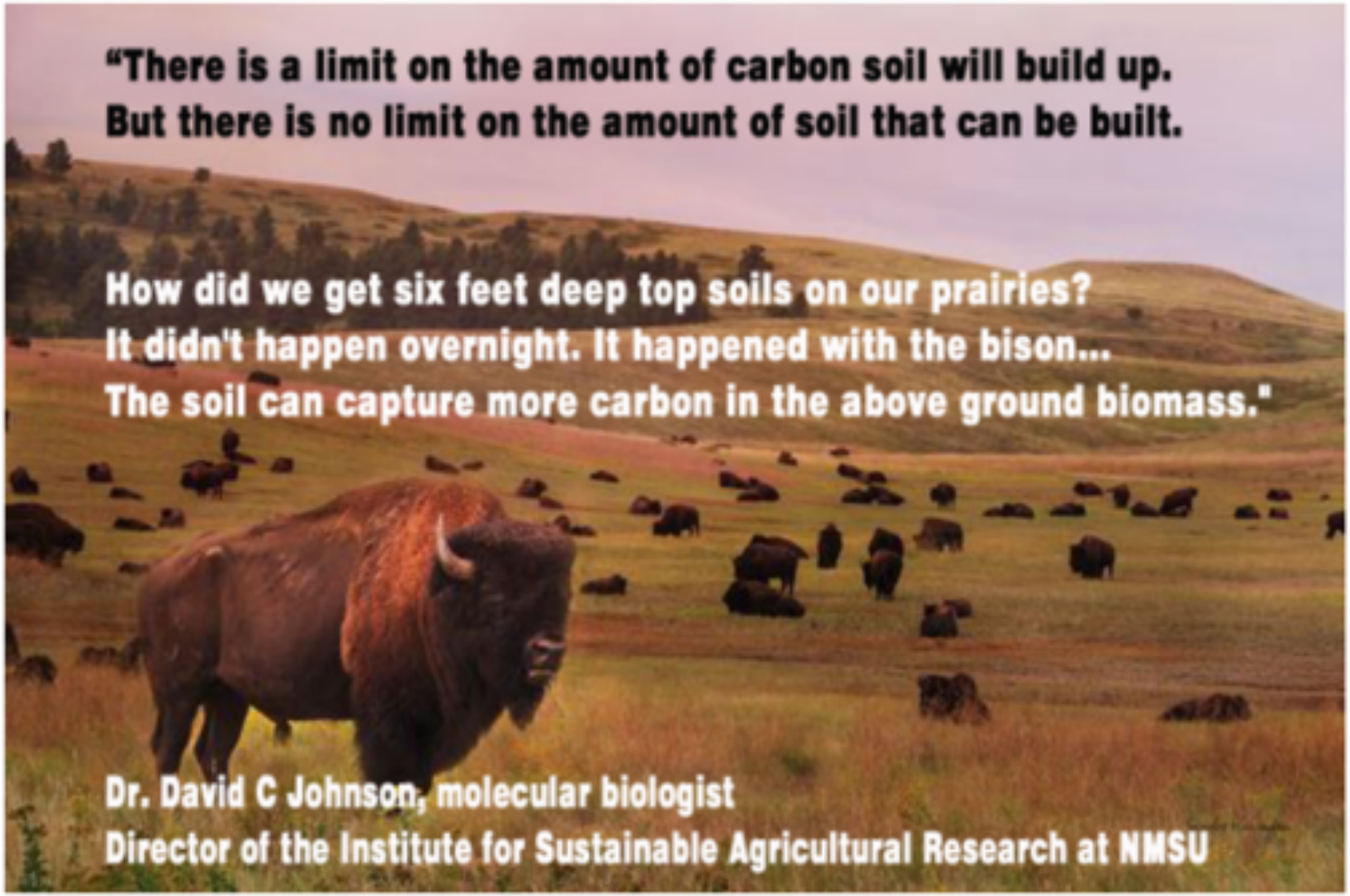
Methane emitted in yr1 is fully oxidised by yr 11

Carbon locked in soil BUILDS every year

Methane remains constant

Well managed 100% grass-fed cows build soil carbon without increasing atmospheric methane

Refs: * work by Dr Christine Jones, 40% of carbon removed from atmosphere by photosynthesing grasslands is sequestered in soil with good grazing management.
** work by Prof Tony Parsons, 1% of carbon removed from atmoshpere by photosynthesing grasslands is emitted as CH4 from enteric fermentation from cows eating that grass.


“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

Soil: the planet's largest carbon sink

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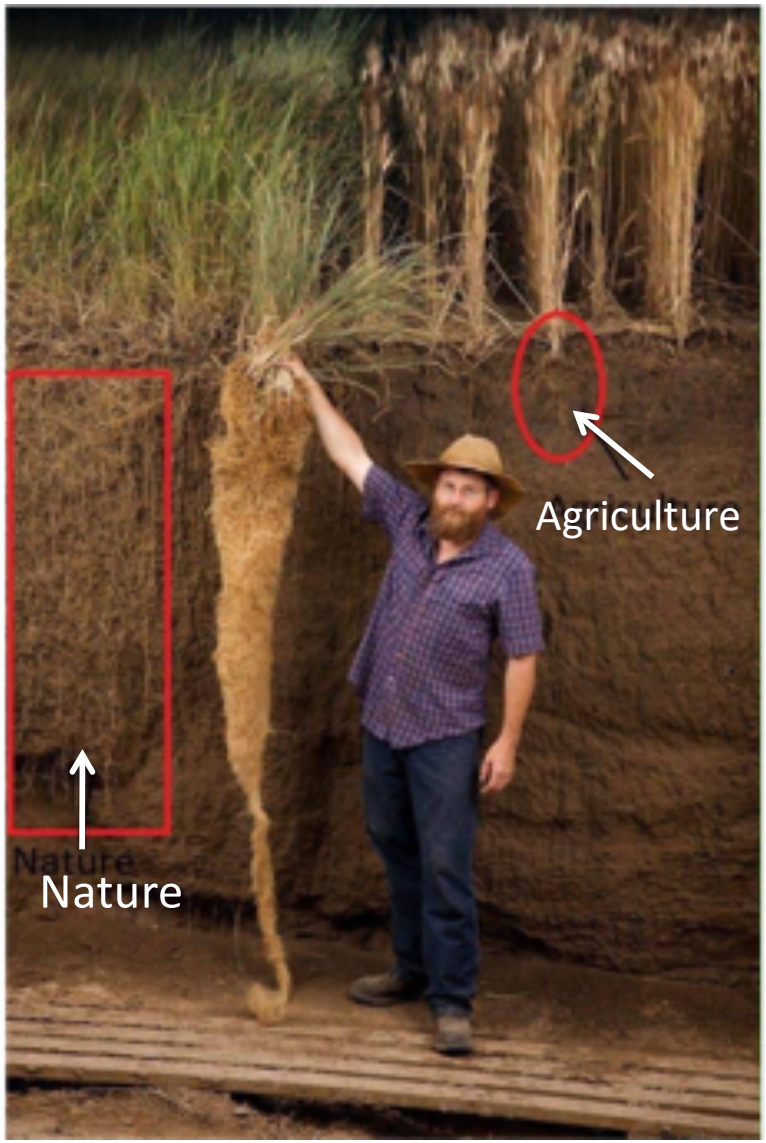

Jordan Fink
@BuildSoil

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...

Carbon in, carbon out

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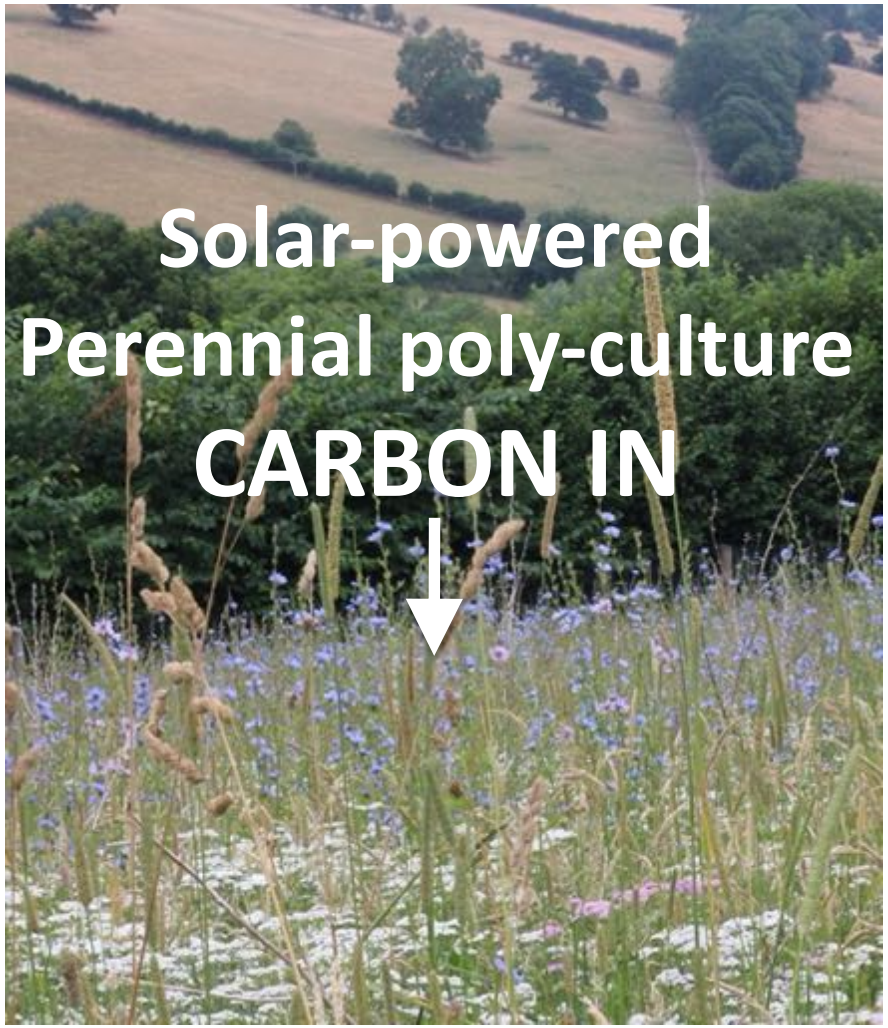

Microbes & nutrition

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- A cow is a walking bio-digester!
- When a cow grazes, she is not feeding herself, but the microbes in her rumen
- 1ml of rumen fluid contains around:
  - 25 billion bacteria
  - 10 million protozoa
  - 10 thousand fungi
- Each cow has a quadrillion 1,000,000,000,000,000 rumen microbes!!!
- By-products of microbial action on forage is what nourishes the cow & in symbiosis microbes in cow saliva stimulate plant growth
- BUT what the cow eats directly impacts the balance of microbes & the resultant by-products => nutritional value of her milk or meat
- Changes to rumen pH causes microbial populations to change, below pH 5.4 microbes die, lactic acid builds up => rumen acidosis
- Concentrates like cereals, soya, brewers grains, fodder beet, maize, etc all lower rumen pH => poor cow health, produce impacts human health

Organic more nutritious

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Study finds clear differences between organic and non-organic products

Published on: 16 February 2016

A new study has shown that both organic milk and meat contain around 50% more beneficial omega-3 fatty acids than conventionally produced products.

Largest study of its kind

Analysing data from around the world, **the team led by Newcastle University, reviewed 196 papers on milk and 67 papers on meat and found clear differences between organic and conventional milk and meat**, especially in terms of fatty acid composition, and the concentrations of certain essential minerals and antioxidants.

Publishing their findings today in the British Journal of Nutrition, the team say the data show a switch to organic meat and milk would go some way towards increasing our intake of nutritionally important fatty acids.

Gillian Butler, Senior Lecturer in animal nutrition at Newcastle University

Grass-fed beef vs
Grass-fed 'grain-finished' beef

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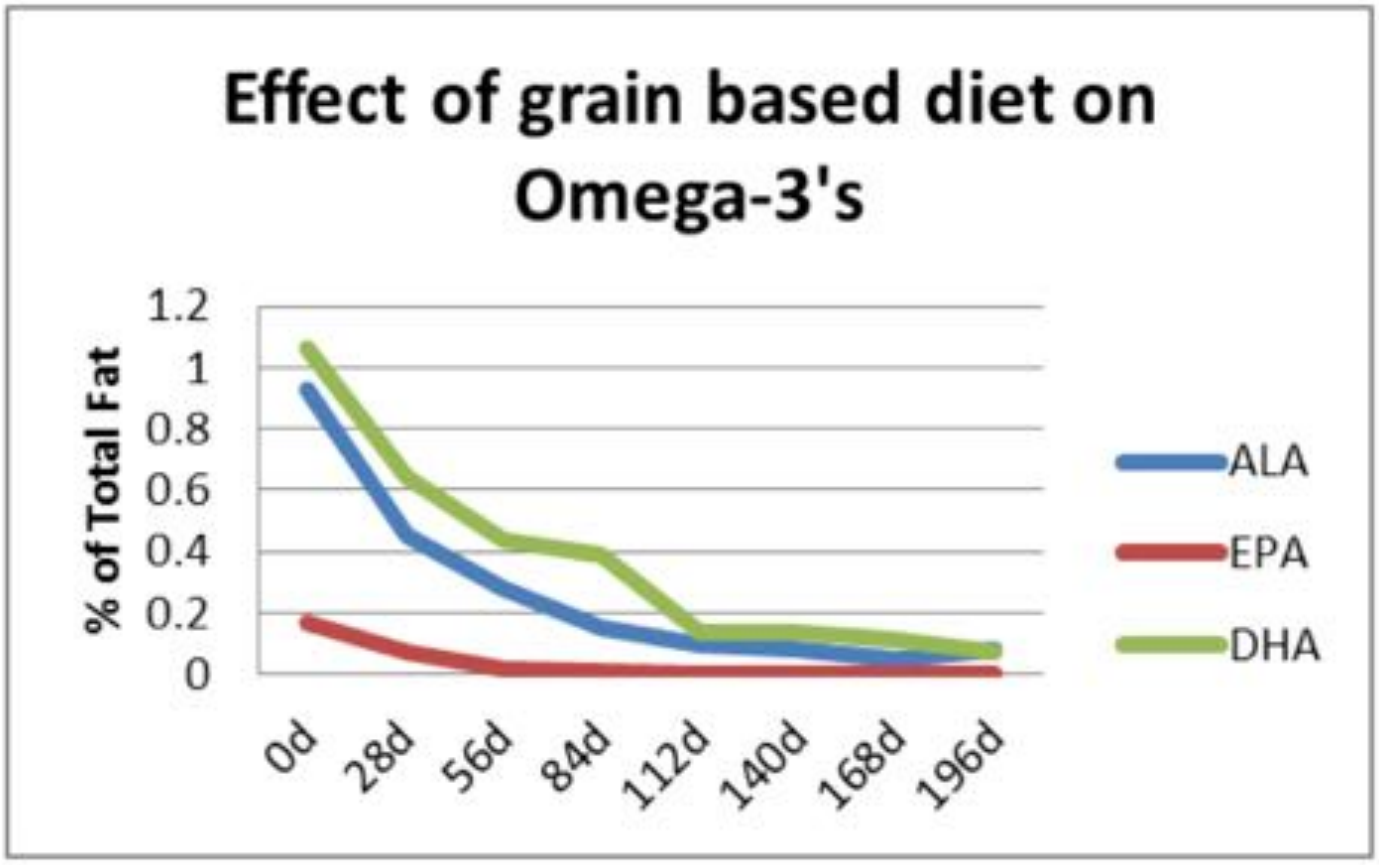

Figure 1: The effect of a grain-based diet on the omega-3 content of beef. (Duckett, S. K., Wagner, D. G., Yates, L. D., Dolezal, H. G., & May, S. G. (1993). Effects of Time on Feed on Beef Nutrient Composition. *Journal of Animal Science , 71*, 2079-2088.)

Pasture diversity

Is vital to the health of soil & cow microbiome

Provides invertebrate & small mammal habitat

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NOT just ‘grass’-fed: diverse pastures contain many different species of grasses, herbs, forbs, etc. ‘Grass-fed’ could mean a monoculture of rye grass soaked in chemicals.

Flavour starts in the Soil

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- Flavour & nutrition inextricably linked
  - Innate desire to hunt & gather diverse range of foods containing health-giving nutrients
  - Complex nutritional richness creates complex flavour
  - Phytonutrients create a myriad of flavours & aromas
  - Palates corrupted by refined & processed foods
- Plants exchange ‘exudates’ (liquid carbon/sugar) for nutrients
  - More diverse soil life, deeper roots, more ‘solar panels’ = more connections & more nutrients available
  - Plants produce phytonutrients (antioxidants & myriad other micro-nutrients) to grow, reproduce, attract pollinators & protect itself from disease or pest attack
  - These phytonutrients health-giving to grazing animals & humans => organic produce more nutritious
  - Plant alkaloids are the medicinal components of food

Herbs oversown into pasture

Salad bar beef: some herbs natural anthelmintics

Cattle kept healthy naturally: no need for wormers, vaccinations, etc

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Importance of species diversity & root depth

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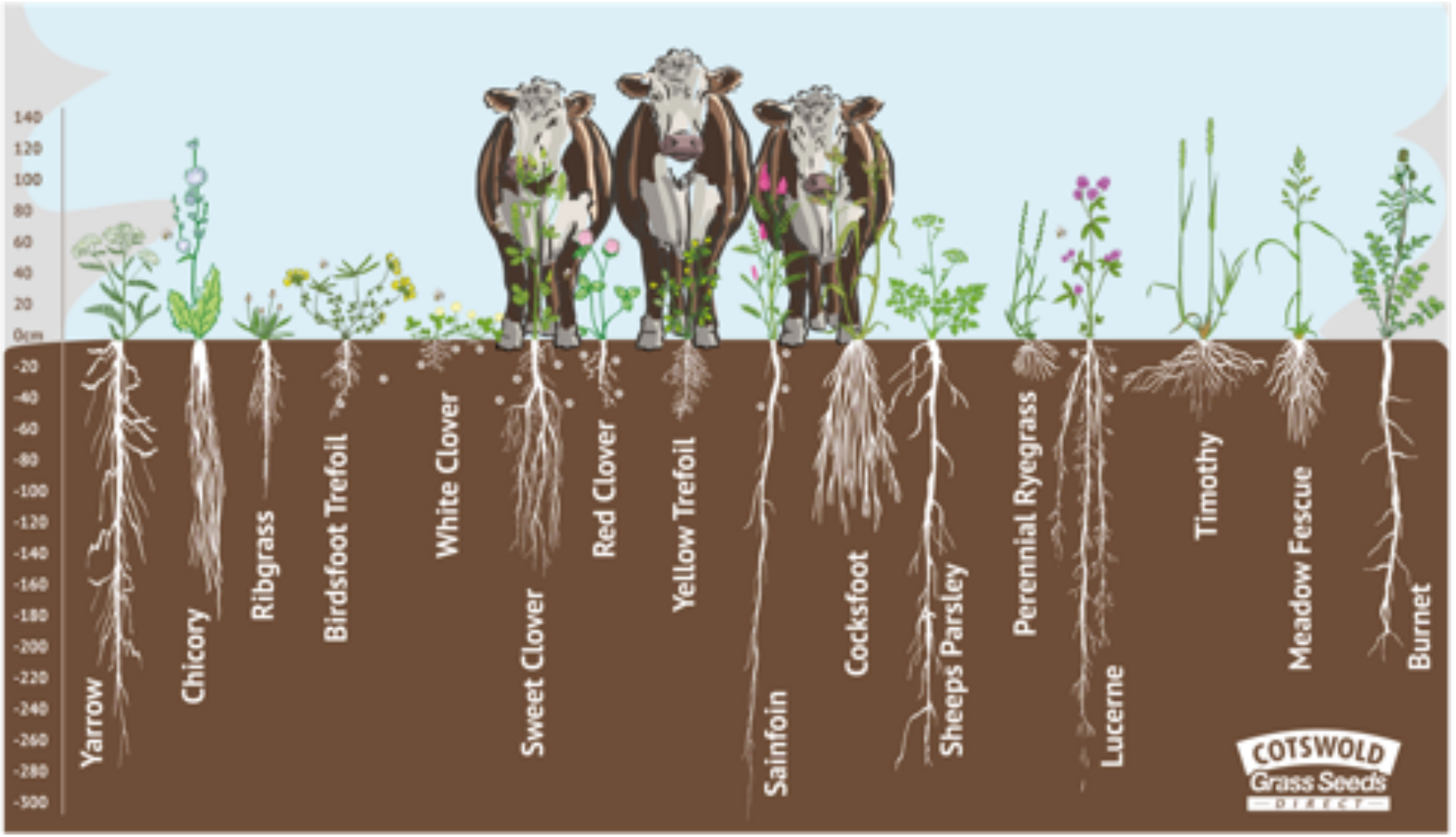

Diverse hedgerows

shelter, shade, browse for cows

more invertebrate & small mammal habitat

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Trees as important as pasture

self-medication for cows

more wildlife habitat

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Mob-grazing – nothing new

mimicking natural grazing systems

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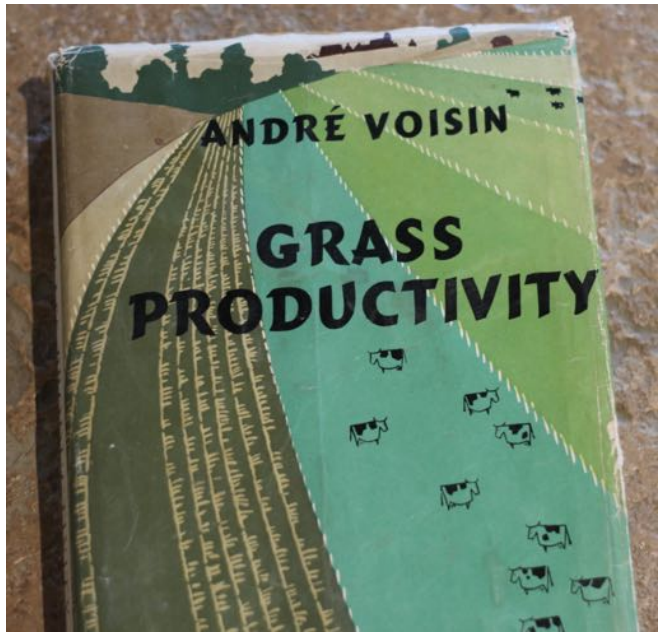
Old saying: *"Never leave the sheep in the same field long enough to hear the church bell ring twice"*

Andre Voisin's book Grass Productivity, written in 1959



In essays on agriculture from 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 paddocks

Pasture, a carbon pump, the ultimate perennial crop

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Creating silvo pasture

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Beyond mob grazing

Shelterbelts & pasture

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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

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

The Poop Loop!

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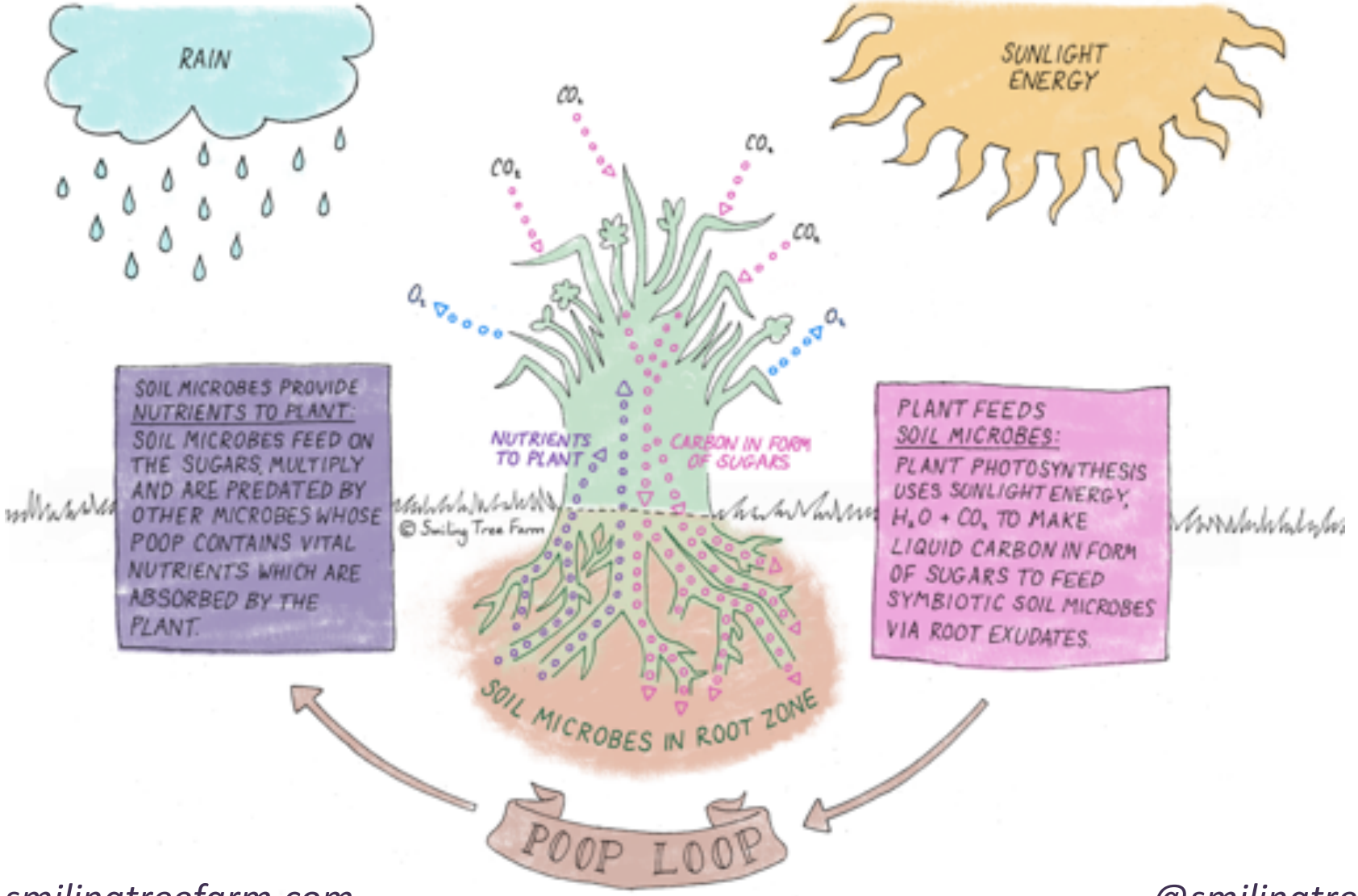

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Regenerative Agriculture

starts with a focus on supporting the

“Poop Loop”

to **maximise photosynthesis** &

root exudates

and

provide plants with **micro-nutrients**

Grazing impact on plant roots

Carbon sequestration, soil health, water retention…

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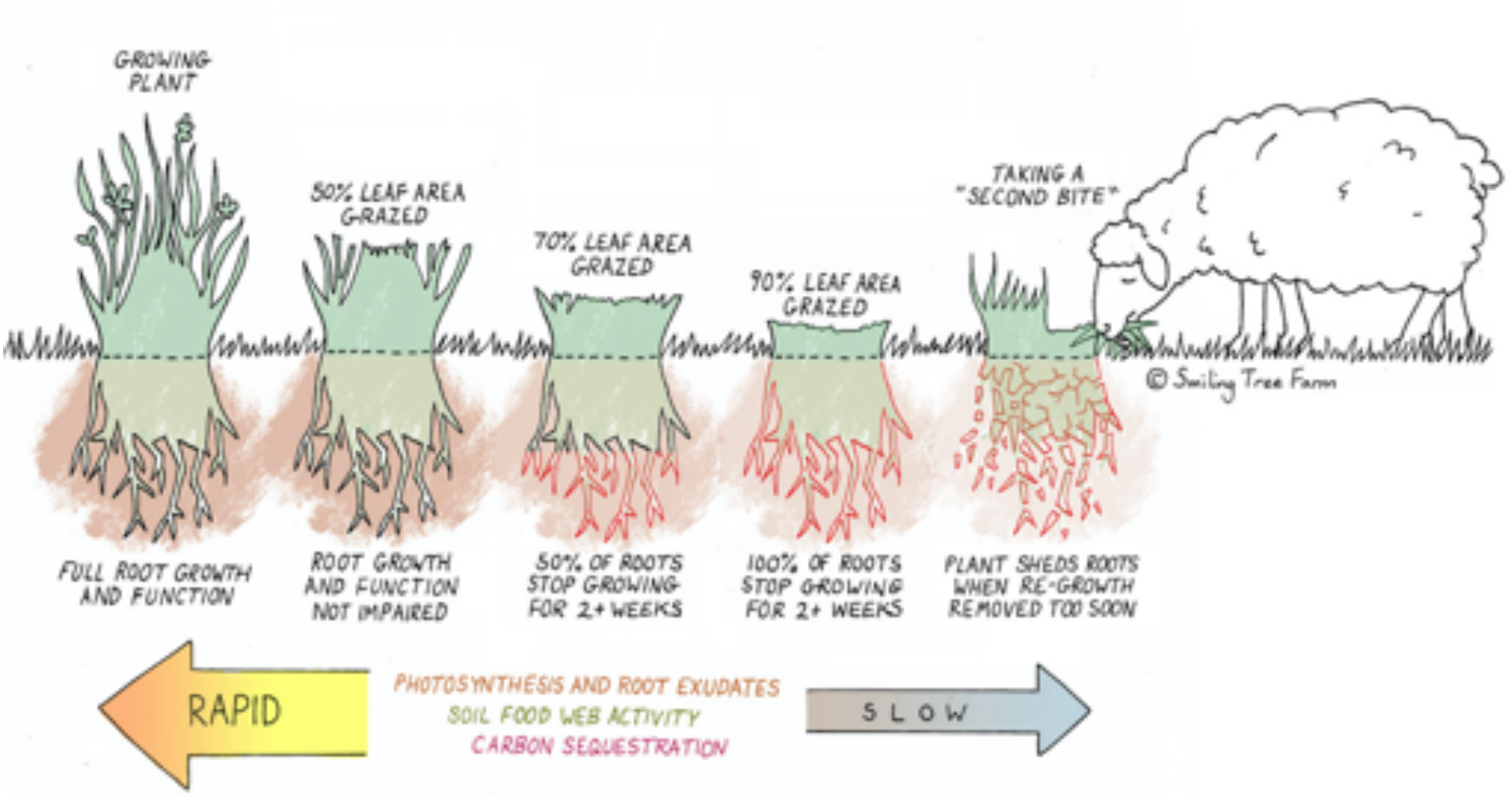

Carbon moooves…

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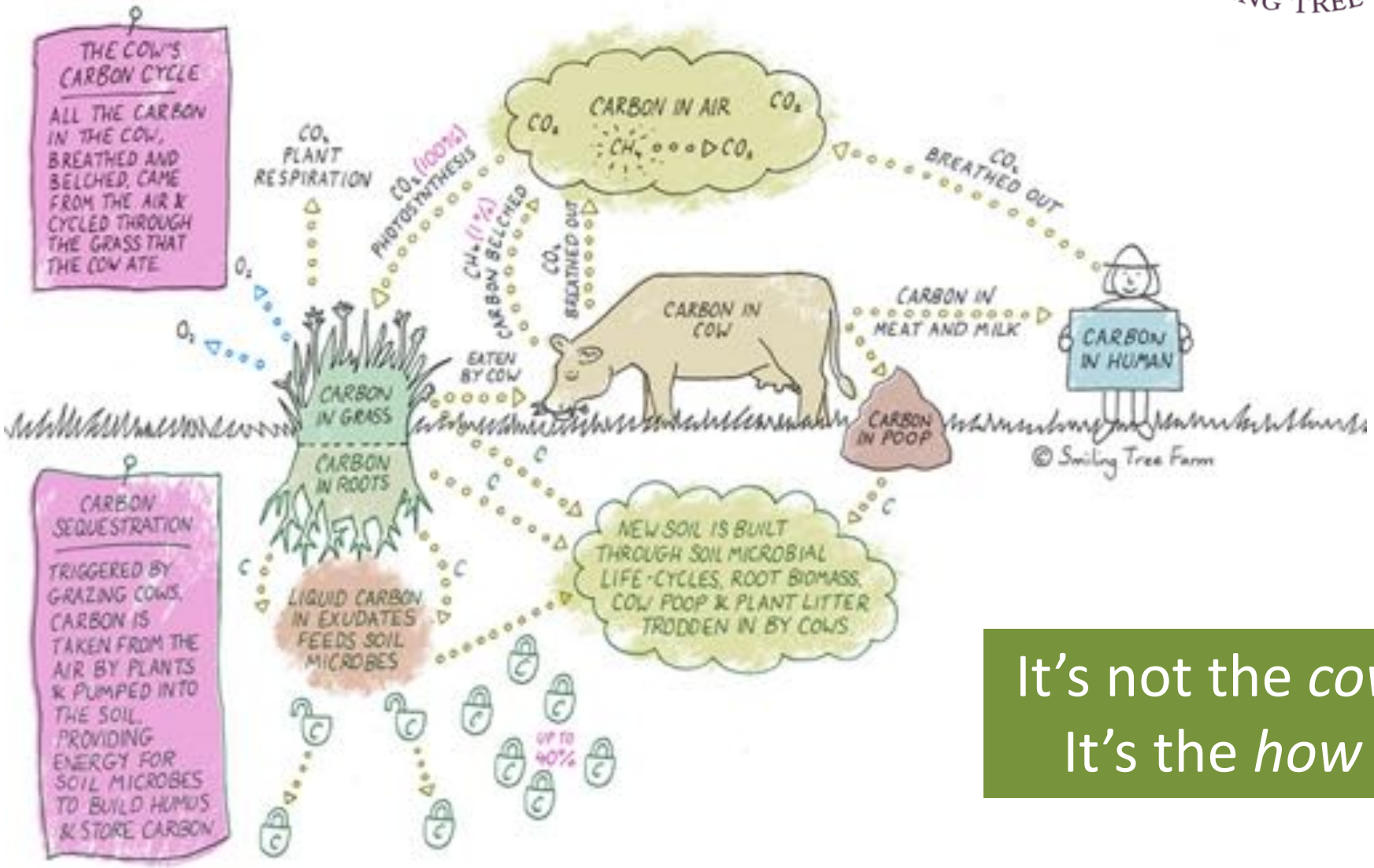

It's not the *cow*
It's the *how*

www.smilingtreefarm.com

@smilingtreefarm

Regenerative Agriculture

Sequesters more carbon than it emits

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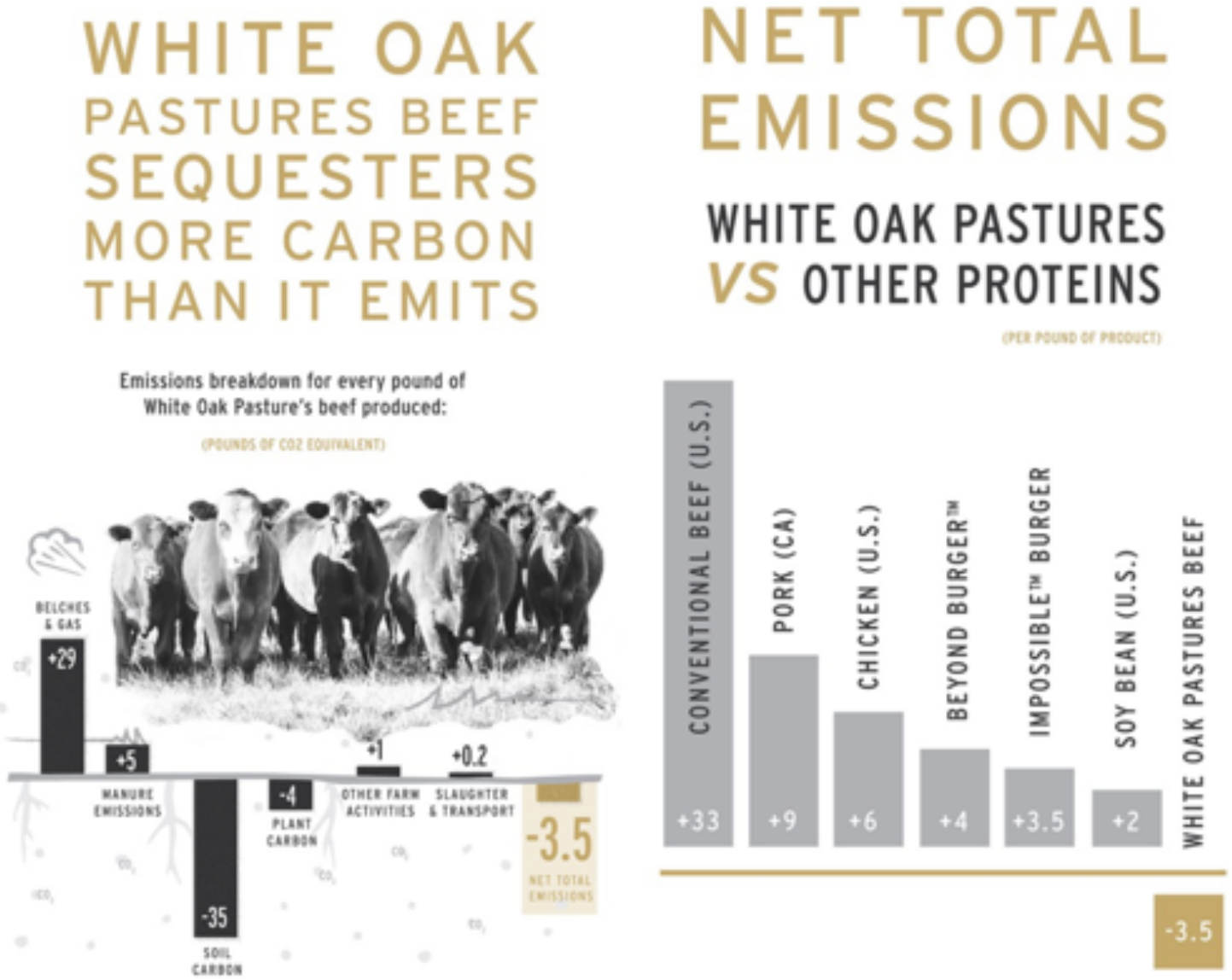

Carbon in soil

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For every gramme of carbon stored in the soil, the soil can hold an extra 8 grammes of water

1g carbon = 8g water held in soil

Chemical farming, using synthetic fertilisers, herbicides, fungicides, pesticides all damage soil structure and ability to store carbon

Carbon is fertility

The annual costs of soil degradation in England & Wales are between £0.9 and £1.4 billion, with a central estimate of £1.2 bn. These costs are mainly linked to loss of organic content of soils (47% of total cost), compaction (39%) and erosion (12%).

The total costs of soils degradation in England & Wales, Cranfield University (2015)

The UK has lost 84% of its fertile topsoil since 1850, with the erosion continuing at a rate of 1cm to 3cm a year.

The Committee on Climate Change (CCC) report (2015)

Grazing tall grass

Each bite primes the carbon pump

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Enteric vs fossil methane

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Food Climate Research Network
@FCRNetwork

Replying to @FCRNetwork and @freerangedairy

The difference between fossil methane and livestock methane is when the methane breaks down to CO2: with fossil methane, that CO2 is additional to the atmosphere, but with livestock methane, the CO2 is not additional to the atmosphere.

1:03 PM · Aug 9, 2019 · Twitter Web App

Cycling vs adding carbon

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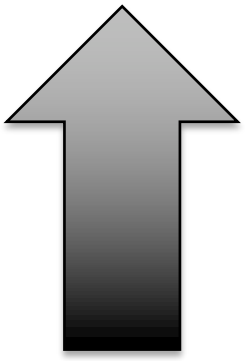
Cows fed perennial polycultures cycle & recycle carbon (including methane) using sunlight & rain



Any food or feed grown, harvested & transported using fossil fuels ADDS carbon

Carbon in, carbon out

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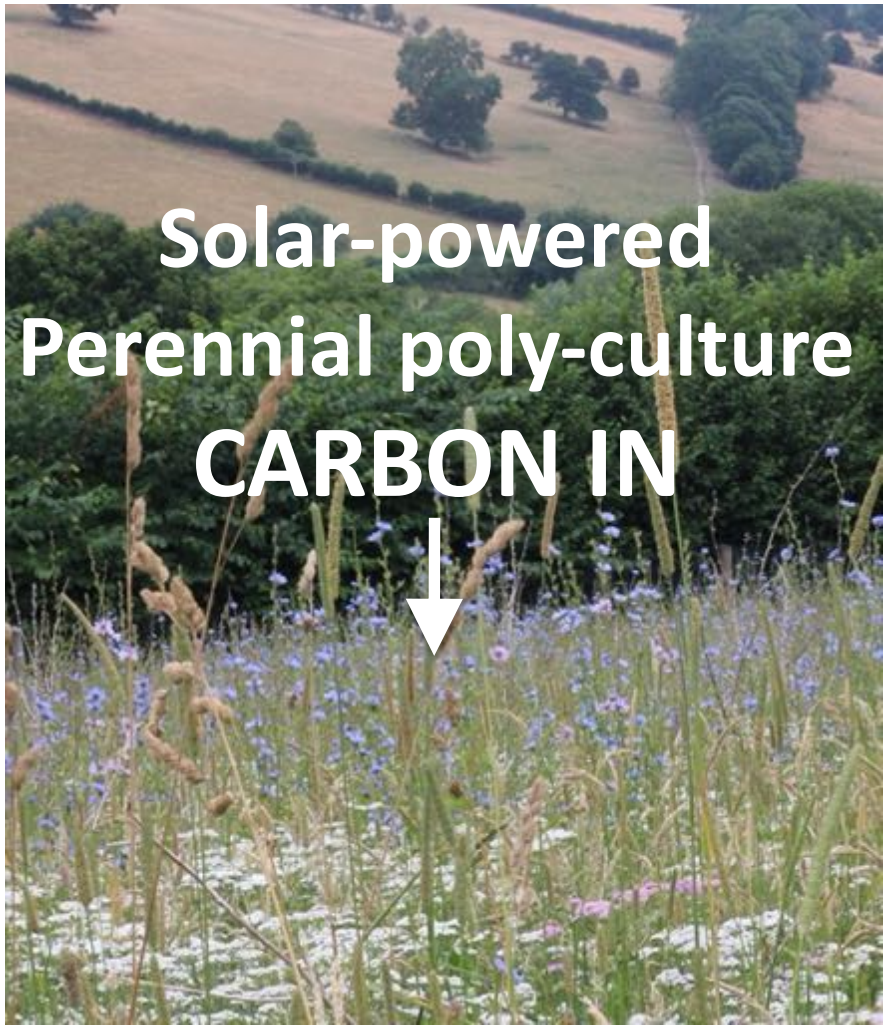

Influencing dietary advice for a plant-based future… FOLLOW THE MONEY

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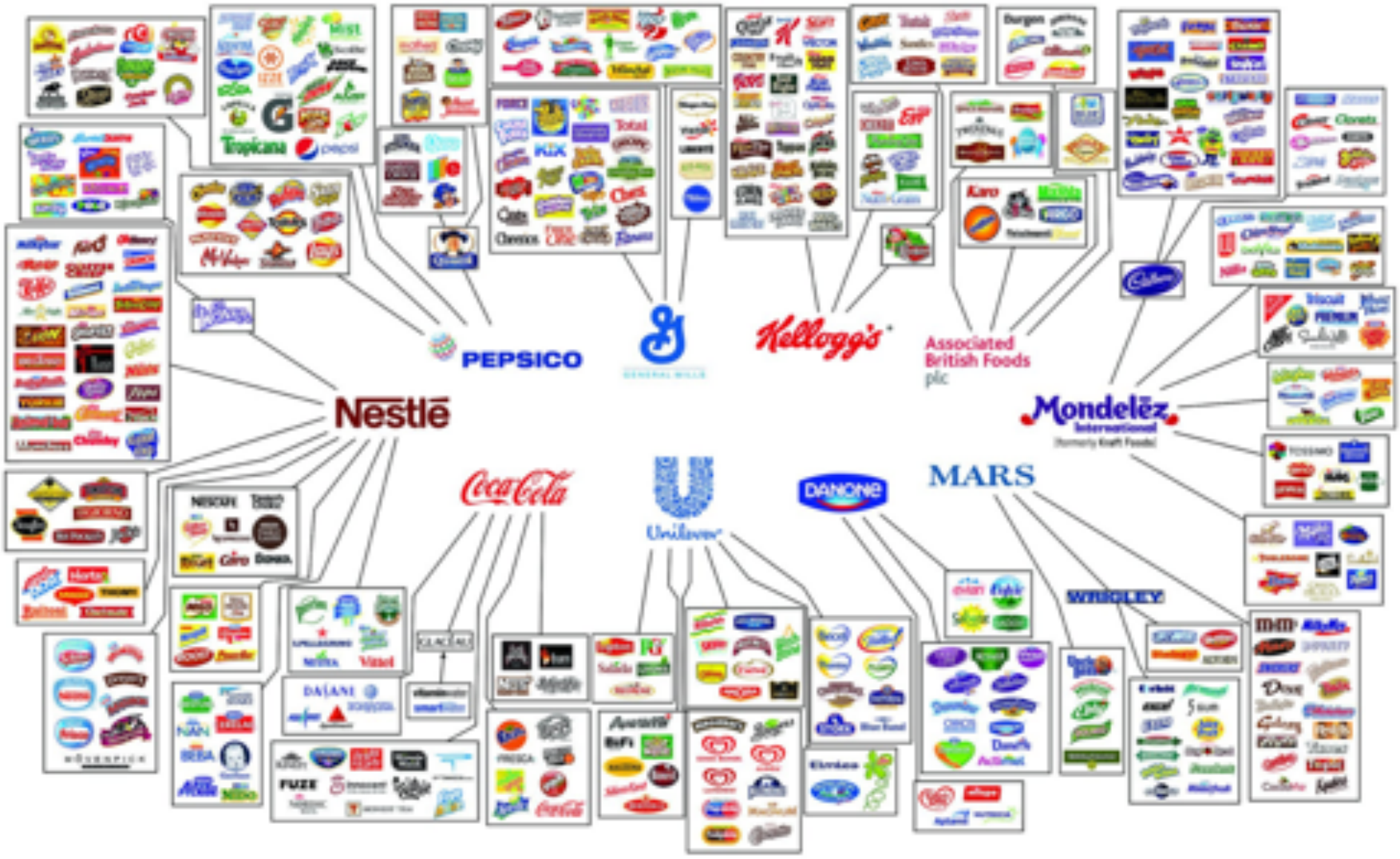

Dietary advice… FOLLOW THE MONEY
Companies behind the EAT Lancet diet

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Dr Vandana Shiva:

We could call the report “The diet of YARA and the Poison Cartel”. Yara is the biggest chemical fertiliser corporation in the world.

Patch: 2yo Traditional Hereford steer

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Animal protein perennial poly-culture

- Patch helped us build & **regenerate soil**
- His grazing stimulated grasses to suck in CO2 & **sequester carbon**
- He breathed out less than 1% of that carbon as methane
- The methane he did breathe out was oxidised by methanotrophs & the hydroxyl radical because he is grazing out on healthy soils
- One large mammal helps **create habitat for 1000s small mammals & other wildlife incl barn owl hunting grounds**
- He grew thanks to the perennial source of pasture & sunlight
- He **led a good life**, then **provided a 1,000 highly nutritious meals**

This is a regenerative food system that supports the planet, consumer & the farmer

Vs killing 1,000s of small mammals

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Plant protein annual mono-culture

- Soils ploughed & exposed to light and air, so **carbon is oxidised back into the atmosphere as CO2**
- Chemical sprays & fertilisers **diminish & harm soil microbial life** so nutrients become less available to crops
- **Fossil carbon burned** in annual production of mono-cultures, barren, lifeless, 'weed(diversity)-free'
- **1,000s small mammals & other wildlife killed**, crushed or sliced & habitat destroyed by machinery & chemicals
- To produce "ethical" plant proteins of poor nutritional value

This is an unsustainable, planet-destroying food system but one that supports BigAg, BigFood & BigPharma (as well as 'scientists', 'researchers', journalists, venture capitalists & fair amount of tax revenues too…)

FOLLOW THE MONEY…

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Food is a $5.75 ***trillion*** dollar business.

How are you being targeted to garner your spend as part of that?

Neuromarketing is used to get into your head & your wallet.

Neuropsychology – psychological operations, as is used in warfare, is being used to influence what you think, what you eat, how you vote…

Watch: THE GREAT HACK

Why Animal Feed Matters

SMILING TREE FARM

- It affects the **health & wellbeing of the animal**
- It affects the **flavour & nutritional value of their meat or milk**
- How animal feed is produced/grown can either create or destroy **wildlife habitat**
- It can regenerate **soil health** or erode soil
- It can sequester **carbon** or emit it

So feed cows:

SMILING TREE FARM

- Perennial polycultures of
  - Chemical-free, diverse pastures
  - Browsing hedgerows & trees
- Use holistic/mob grazing practices to
  - Stimulate photosynthesis & carbon sequestration
  - Build soil health, fertility & water retention
  - Integrate wildlife & food production

Future challenges/opportunities

Challenges:

- Reconnecting the consumer with food production
- Overcoming the perception that ‘cheap food’ is cheap
- How to beat the $$$$$ driven food propaganda!

Opportunities:

- More and more enlightened consumers are looking for high quality, ethically produced food, they appreciate its value and wish to support small-scale, local producers

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“Eating inextricably influences agriculture”

Wendell Berry

Whenever you eat, whether you are conscious of it or not, you are directly supporting the farming methods and the industry that produced the food on your plate.

For better or for worse, therefore, your food choices influence not only your own health and wellbeing but that of the farm animals, wildlife and the planet too.

You have 3 meals (votes) a day

Please…

Vote wisely!

Further Resources

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Weston A Price Foundation

Pasture Fed Livestock Association

Allan Savory

Dr Christine Jones

Dr David Johnson

Walter Jehne

Jordan Fink

Dr Sara Place

Peter Ballerstedt

Prof Frank Mitloehner

Dr Zoe Harcombe

Jayne Buxton

Fred Provenza