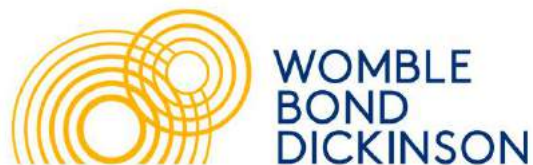


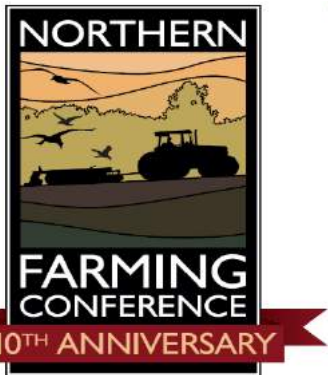
NORTHERN FARMING CONFERENCE 2019

“Sweating the Assets”



Morning Chairman

Matthew Curry, Head of Farming, Morpeth, Strutt & Parker



Northern Farming
Conference 2019
Sweating the Assets



The Northern Farming Conference 2019

“Sweating the assets”

Mark Suthern – Managing Director – National Head of Agriculture

Sweating the Assets

- What assets do you want to sweat ?
- Why do you want to sweat them – what is the goal?
- How will you sweat them – depends on the goal?



Supporting the roots of UK agriculture since 1744

Dedicated support for the UK farming sector.

- As a client of Barclays Agriculture, our long pedigree in the farming sector means you can rely on us to understand your needs and find the right solutions.
- Barclays has over 327 years of banking experience, and our dedicated support for agriculture began over 270 years ago. Our dedicated Agricultural Managers, across the UK, harness this heritage and knowledge to give them a genuine insight into the challenges you face and the agricultural finance solutions that can help.
- Industry knowledge, an experienced team, sector specialisms and full UK coverage are just some of the reasons why farmers and growers might choose to bank with Barclays.



Challenges for the UK/global food system



Population



Urbanisation



Growing Economies



Diet and Health



Climate Change



Water Availability



Labour



Environment & Energy

UN Sustainable Development Goals

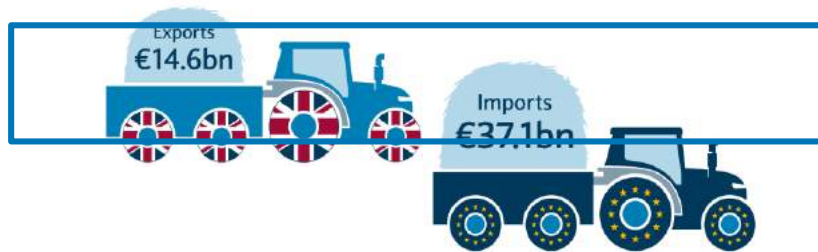


Weaknesses

- UK's performance on goal 7, which calls for universal access to affordable, reliable, sustainable and modern energy, is unsatisfactory. The country comes second-last for renewable energy, with just 3.2 percent of total energy consumption coming from renewable sources.
- On goal 2 (which calls for improved nutrition and sustainable agriculture) UK only manages 27th place, with high levels of nitrogen and phosphorous used in farming which are harming the environment.
- The country also has an alarmingly high rate of obesity, with one in four Britons affected, compared to just one in ten in Switzerland or Norway.
- UK comes in 29th for its income gap between rich and poor

Four Key Drivers for Farming Businesses

1 Trade Deals



Source: Brexit - Future UK Agriculture Policy
11 September 2018, House of Commons Library

2 Labour/ Technology



3 Subsidy/Environmental Payments



4 Public Opinion



UK Bank Lending Figures



Debt Up

2.1%

YoY



Drawn Debt

£19.379 billion

Credit Balances

£7.734 billion



Credit Up

1.4%

YoY

Source:

Bank of England July 2019

Lending basics

C	h aracter
A	b ility
M	e ans
P	u rpose
A	m ount
R	e payment
I	n surance

The New Agriculture Revolution

History has a habit of repeating itself

- The output of the early pioneers,
- the Industrial revolution – delivered by machines
- The “Green” revolution of the later half of the 20th century underpinned by new genetics, pesticides and modern fertilizers.

We are now at the start of the digital agricultural revolution

- Biotechnology innovations, where the sequencing of DNA is becoming routine
- The key advances are now in bioinformatics, the digital interpretation of masses of genetic code.
- Extremely powerful computers using Big Data supporting advances in robotics and cobots.

What does this mean for the average farmer?

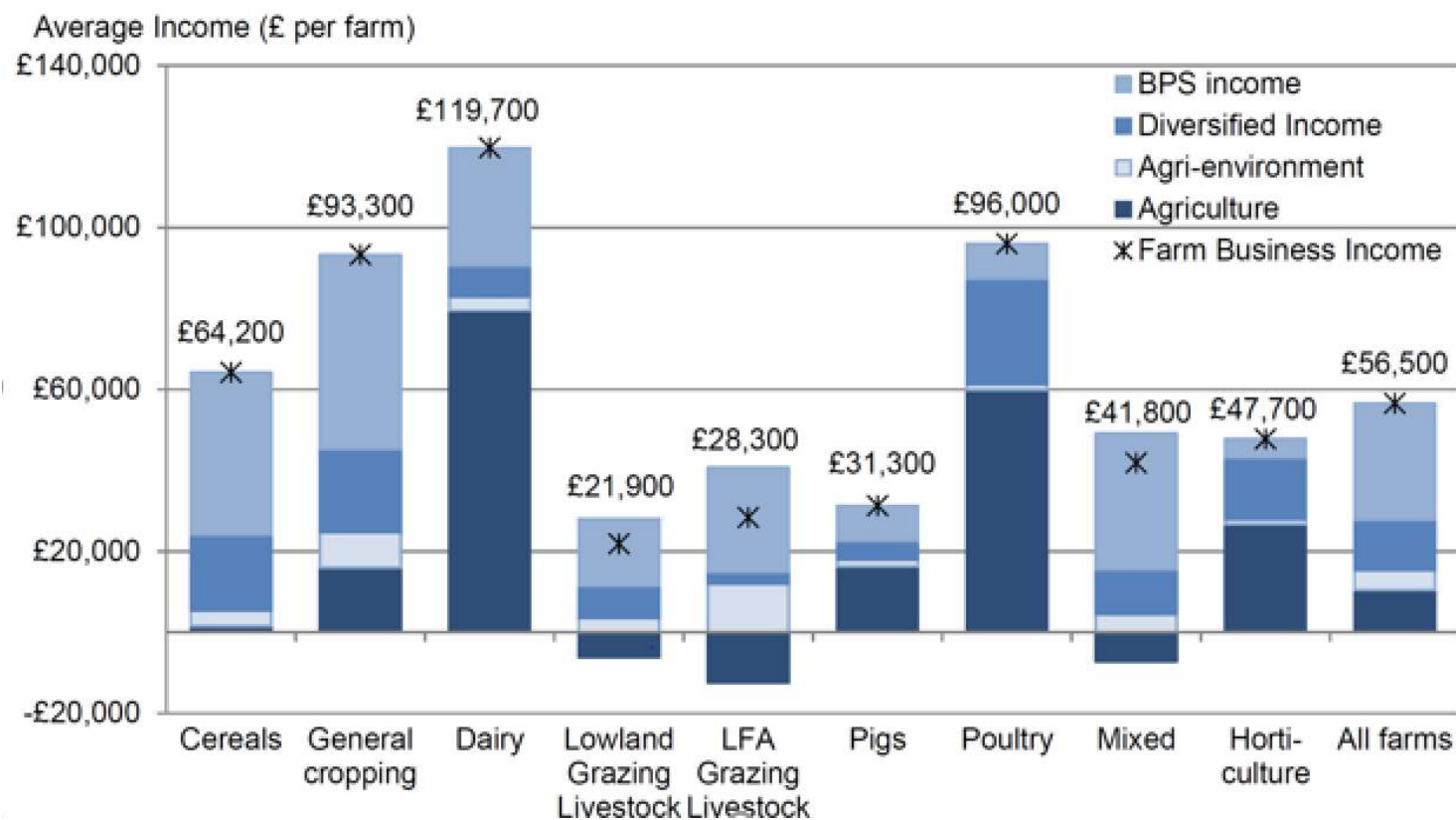
- A farmer is a frustrated engineer/business finance expert/soil scientist/chemist/vet,/environmentalist/ecologist
- The new agricultural revolution means that the modern farmer must now add computer scientist and digital engineer to their list of skills

Supporting the farming industry: economic challenges, public funding and new opportunities for sustainable land management

- what advantages do we have?

- **Yield and quality advantage**
- **Assurance and uniqueness**
- **Intellectual tradition**

Profitability by Income Base & Sector



Source:
Defra Farm Business Survey 2018

Focus on profitability

Top all-year-round calving herds made 12 .6 more margin than the bottom 25 per cent and costs were 10.5 ppl lower*



Think margin
not yields

A good yield doesn't
always equal margin



What is the cost of
production



Contract
Location
Succession
Management

Source:
Lower costs drive profits on the top dairy farms, AHDB, April 2019
<https://ahdb.org.uk/news/lower-costs-drive-profits-on-the-top-dairy-farms>

Tregothnan Estate

- Tregothnan Estate started its tea plantation in 1996, the first commercial tea farm in the UK
- The business, based in Cornwall, knew its unique climate mirrored that of Darjeeling – and took a risk on tea – which is now stocked at Fortnum & Mason while also keeping passengers' thirst on the Great Western Railway quenched
- Over the last five years there has been a 39% increase in domestic sales and a 140% increase in international tea sales

“When we were looking for alternatives, we considered our strengths – our location, the local climate and our soil. We get warm summers and mild winters, with a degree of humidity. Once we had identified our assets, we were able to decide what opportunity we should explore further. We’ve applied that principle to everything we’ve done since.”



Papley Grove Farm

- Based in Cambridgeshire, the owner of Papley Grove Farm is a passionate advocate of the countryside and its wildlife
- The business invested in satellite technology in order to work out which parts of the land are best to use – a form of crop rotation that returns parts of the land to wildlife when they're no longer effective for farming
- The farm has now had seven years without insecticides and there are at least two to three pairs of grey partridges per field. The business also loans the technology to other farms in the area

"If you've got an idea, talk to other people in a similar situation. If you can, see it in person, and get to know the market you're trying to be part of."



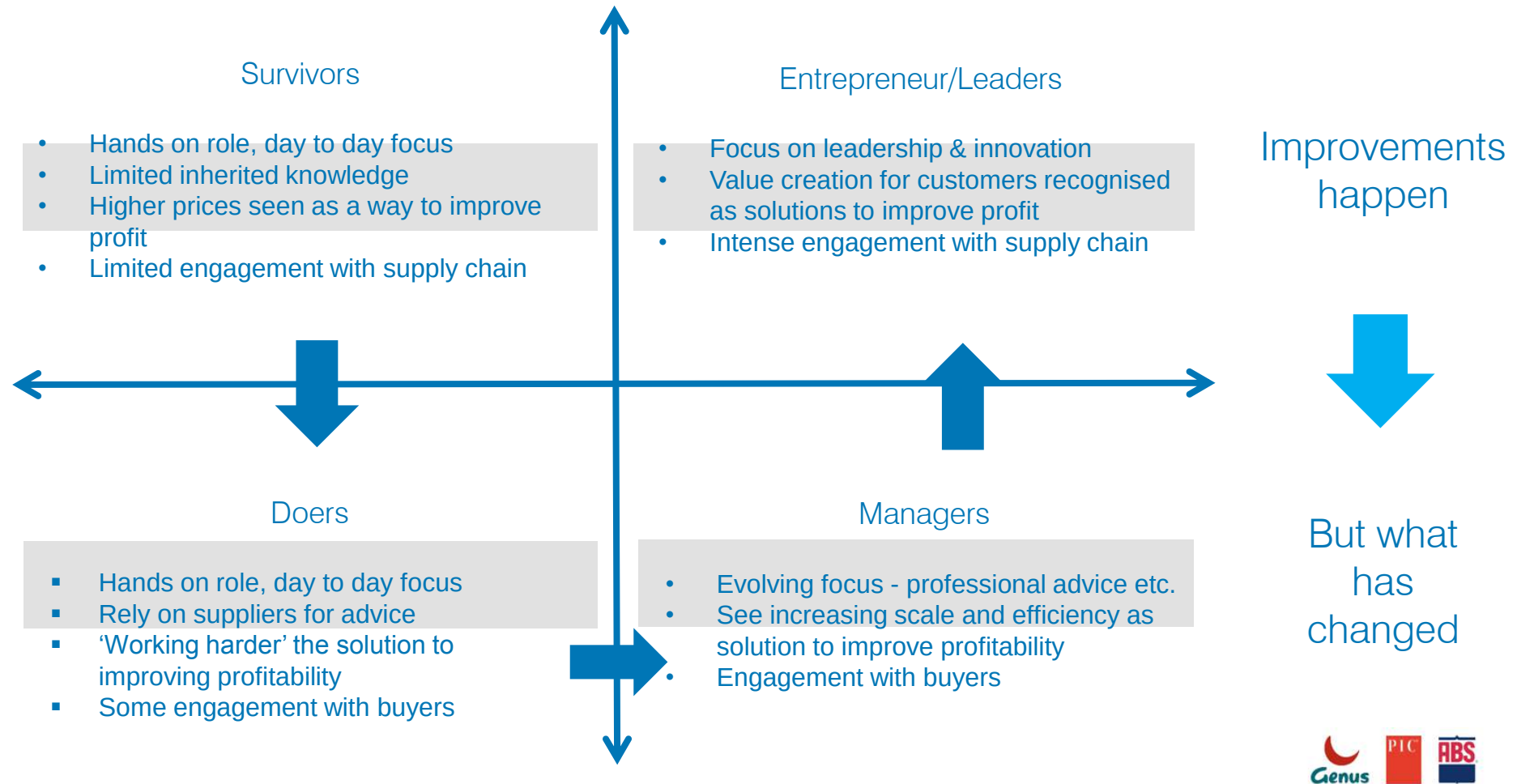
Gazegill Organics

- The farmhouse on Gazegill Organics' land, Lancashire, dates all the way back to 1580
- Picking up on the local demand for organic produce, the business converted an old piggery into a shop – which is now open seven days a week
- They sell 600 boxes of organic produce a week online and streamlined the process of internet orders and automated booking couriers, saving around four hours a day

"We'll continue to invest in our farm's sustainable activities, supplying consumers with organic produce – there's a clear demand for it across the UK and investing in this will continue to propel us forwards."

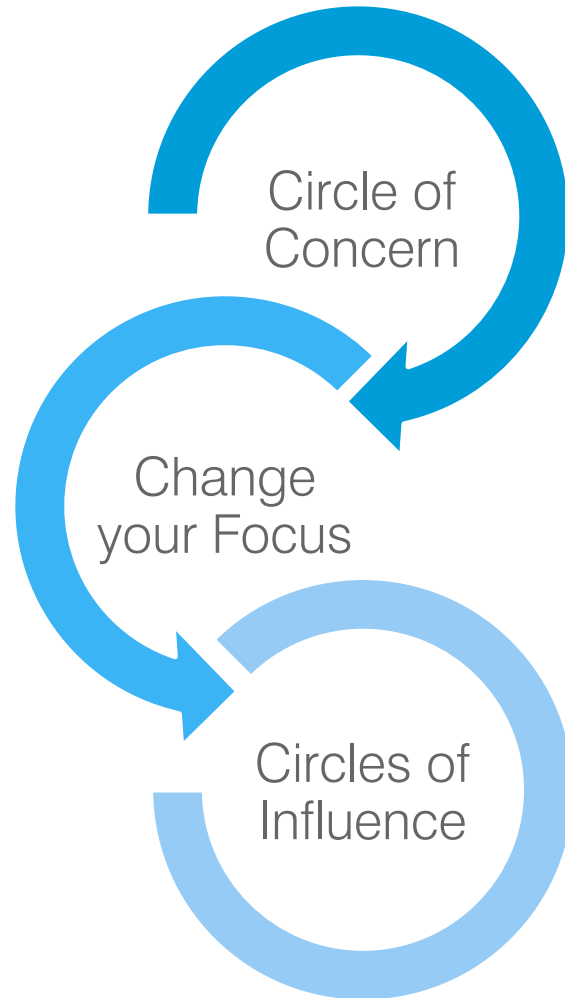


Human Capital Development Model



Source: Promar International

Consider your circles of influence



Very often the outcome of a situation is not the scenario presented - that is just the backdrop. It is the actions taken which define the outcome

Disclaimer

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Regulatory changes for agricultural firms in a no deal scenario



Food labelling

Labelling rules will change for some food and drink



GMOs

The same controls on the environmental release of GMOs will apply and will be implemented by the competent authorities in the UK.



Fertilisers

You'll still be able to buy the same amount and quality of fertiliser for 2 years after the UK leaves the EU, all products can still be sold under the domestic framework and the EC fertiliser label



Pesticides

You must meet any new regulations for producing or placing pesticides on the market



Water regulations

You must still meet the conditions in your permits or licences that related to water. Regulations using the same processes and standards will remain after Brexit

Source:

GOV.UK: Prepare your farming business for a no-deal Brexit, February 2019 - <https://www.gov.uk/guidance/the-farming-sector-and-preparing-for-eu-exit>

Draft domestic Agriculture Bill*

(2) The Secretary of State may also give financial assistance for or in connection with the purpose of starting, or improving the productivity of, an agricultural, horticultural or forestry activity.

(3) Financial assistance under subsection (1) or (2) may only be given in relation to England.

(4) For the purposes of this section—

“improving productivity”, in relation to carrying on an activity, includes—

(a) improving the quality of any products deriving from the activity, and

(b) improving the efficiency of the activity in terms of the resources used in, or in connection with, it;

“livestock” includes any creature kept for the production of food, drink, oils, fibres or leathers, or for the purpose of its use in the farming of land.

Source:

<https://publications.parliament.uk/pa/bills/cbill/2017-2019/0292/18292.pdf> - - The House of Commons, 20 November 2018

Since the draft of the Domestic Agriculture Bill was developed we have a new Prime Minister, Minister for Agriculture and Secretary of State for DEFRA.

The current state of the Bill is uncertain given the political situation in Parliament.

Draft domestic Agriculture Bill*

1. Secretary of State's powers to give financial assistance

(1) The Secretary of State may give financial assistance for or in connection with any of the following purposes—

- (a) managing land or water in a way that protects or improves the environment;
- (b) supporting public access to and enjoyment of the countryside, farmland or woodland and better understanding of the environment;
- (c) managing land or water in a way that maintains, restores or enhances cultural heritage or natural heritage;
- (d) mitigating or adapting to climate change;
- (e) preventing, reducing or protecting from environmental hazards;
- (f) protecting or improving the health or welfare of livestock;
- (g) protecting or improving the health of plants.

Source:

<https://publications.parliament.uk/pa/bills/cbill/2017-2019/0292/18292.pdf> - - The House of Commons, 20 November 2018

Since the draft of the Domestic Agriculture Bill was developed we have a new Prime Minister, Minister for Agriculture and Secretary of State for DEFRA. The current state of the Bill is uncertain given the political situation in Parliament.

Key impacts of Brexit for agriculture



Draft domestic Agriculture Draft Bill

The document very much covers England, although there are many references to the devolved governments and indicating that it is the government's expectation that the process (developing a domestic agricultural policy) will lead to an increase in decision-making powers for of the devolved administrations



Basic Payment Scheme (BPS) Year 1

Direct Payment band**	Reduction percentage
Up to £30,000	5%
£30,000 - £50,000	10%
£50,000 - £150,000	20%
£150,000 or more	25%

**For example, for a claim worth £40,000, a 5% reduction would be applied to the first £30,000 and a 10% reduction would be applied to the next £10,000

- No change expected in 2019 or 2020 (TBC)
- 7 year transition period from 2021 (TBC) – then no Area Payments from 2028 (TBC)
- Flexibility to lengthen or pause the transition
- No Provision to reverse the transition

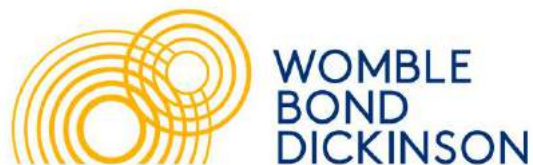
Source:

Agriculture Bill: Analysis of the impacts of removing Direct Payments, September 2018

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740669/agri-bill-evidence-slide-pack-direct-payments.pdf

NORTHERN FARMING CONFERENCE 2019

“Sweating the Assets”



CLA DEPUTY PRESIDENT

MARK BRIDGEMAN



EMBRACE CHANGE



\$0

NETFLIX

\$130bn

FALLODON ESTATE



2350 ACRES MIXED ESTATE

1360	Brunton Farm - mixed organic farm managed in hand
800	Let Farms - three AHA tenancies
200	Woods
31	Properties
	Biomass
	Property development

REVENUE SPLIT - 2019 BUDGET

	%
Cropping	
Grazing, silage, straw	
Pig B&B	
FARM TOTAL	44
HLS/ELS	
BPS	
CAP PAYMENTS	19
Holiday lets	20
Biomass	3
Let farms	7
Let properties	7
TOTAL REVENUE	100%

ORGANIC MIXED FARMING

- 2-3 years nitrogen fixing clover
- Wheat, wheat/spelt, beans, oats
- Novel crop trial with Coastal Grains & Newcastle University
- Yield 2t wheat vs 3.75t conventional
- £265/t organic vs £150/t conventional
- Organic mushrooms
- Collaboration is key – livestock, machinery and inputs (FYM/grass)



B&B PIGS

- Arrive at 7kg and leave 9 weeks later at 40kg
- Mosey supply feed, medication and support
- Farmer supplies roof, water, straw and stockman



BRUNTON HOUSE & COTTAGES

- 4 properties accommodate 28 guests in total
- Visit England 5 star, gold award
- North East Best Self-Catering Holiday Provider 2017
- 85-90% occupancy
- New website www.bruntoncottages.co.uk











BIOMASS – INSTALLED 2012



- Brunton Farm - 13 houses on district heating system
- Fallodon Hall and Cottage
- Timber from estate and local suppliers
- 20 year RHI payments – payback over 8-12 years



HOUSING DEVELOPMENT – CREIGHTON PLACE, EMBLETON



HOUSING DEVELOPMENT – CREIGHTON PLACE, EMBLETON



BREXIT



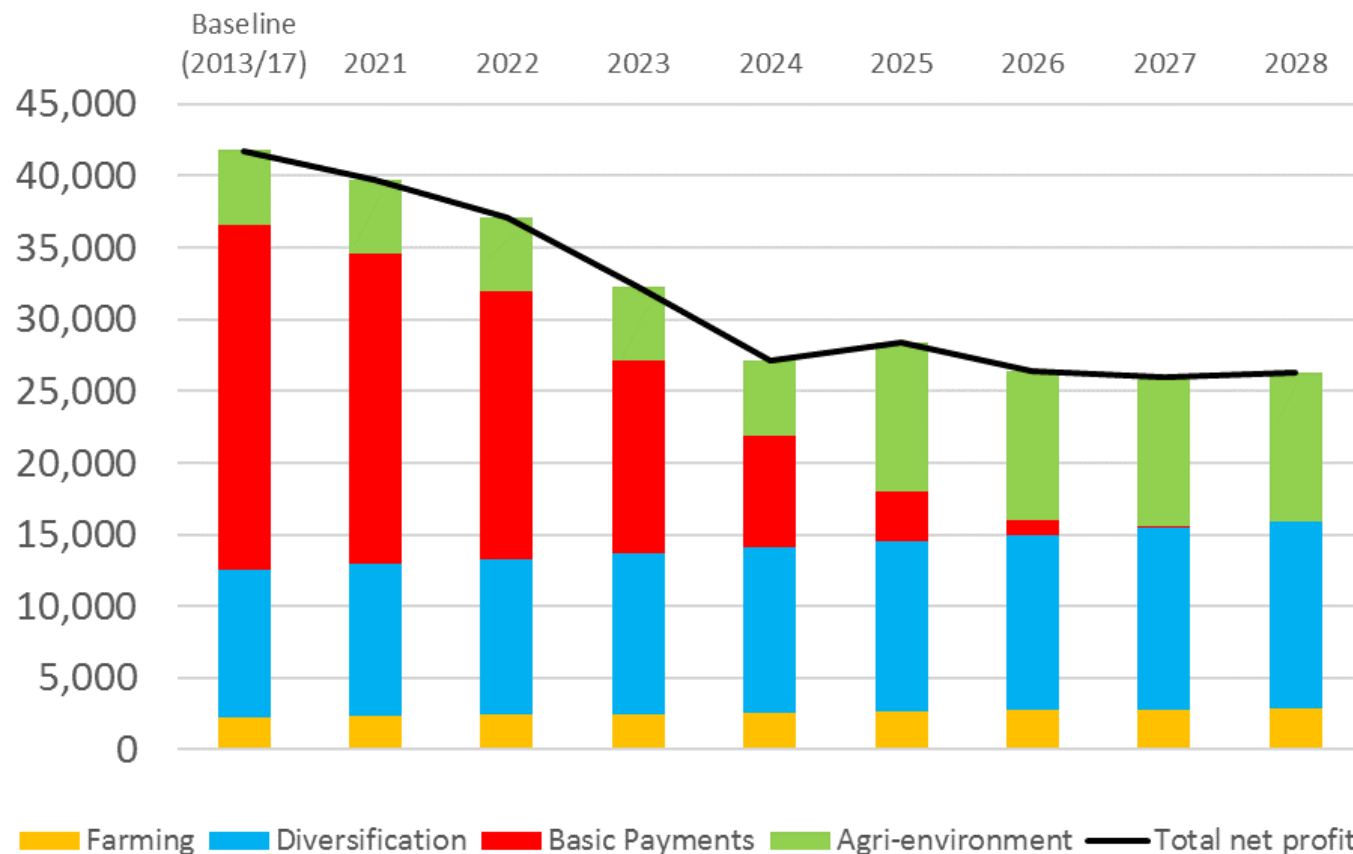


BREXIT: FUTURE TRADE DEALS?



WHAT DOES CHANGE LOOK LIKE – END OF CAP

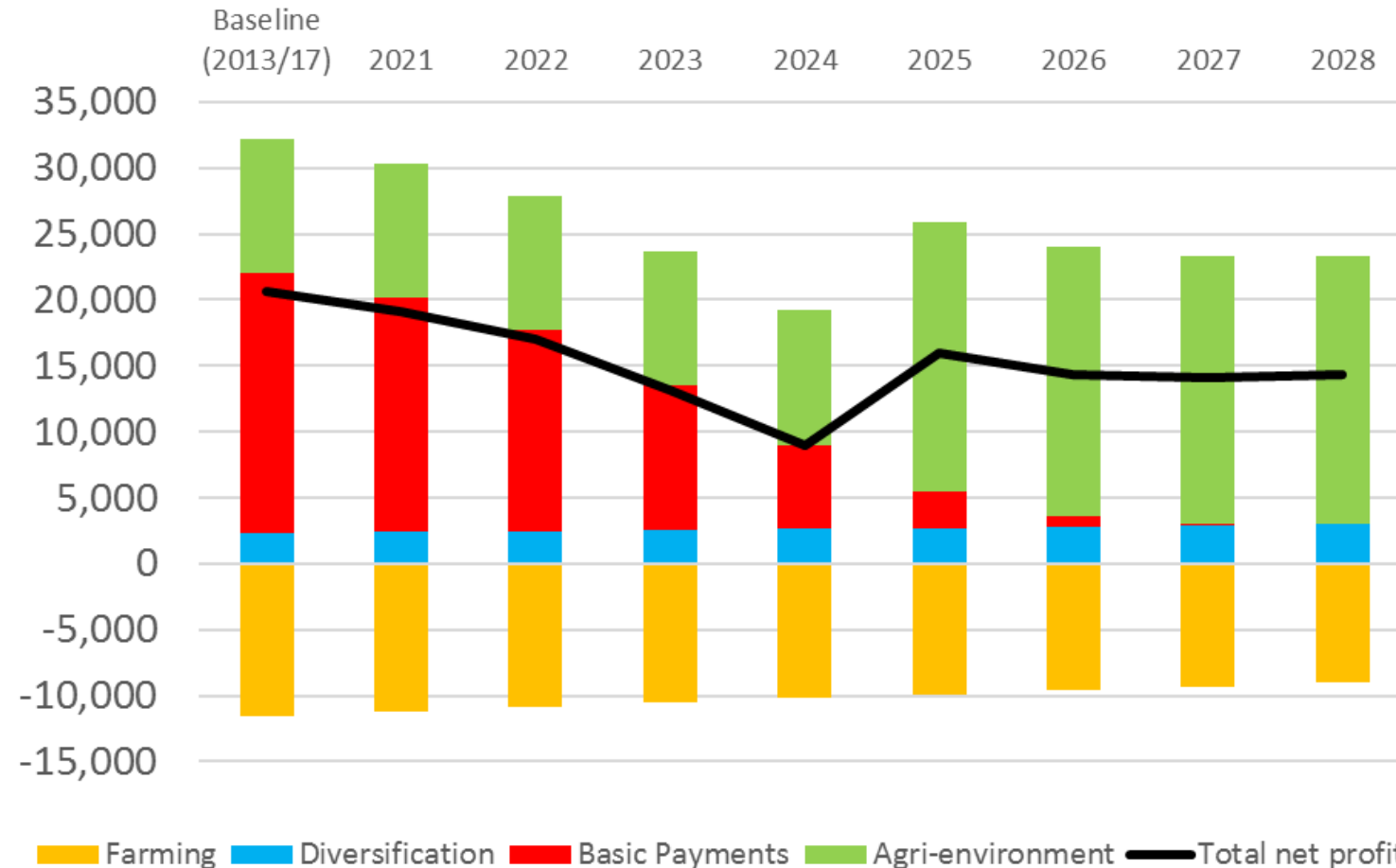
NET PROFIT FROM ALL ACTIVITIES



ALL
FARMS
Average
England
£/farm

WHAT DOES CHANGE LOOK LIKE – END OF CAP

NET PROFIT FROM ALL ACTIVITIES



GRAZING
LIVESTOCK
(LFA)
FARMS
Average
England
£/farm

WHAT DOES CHANGE LOOK LIKE - CONSUMER TRENDS

BEYOND BURGER®



BEYOND MEAT: \$5.2bn

BEEF BURGER

¼ LB US BEEF BURGER



VS

M&S JV WITH INFARM

VERTICAL
FARMING

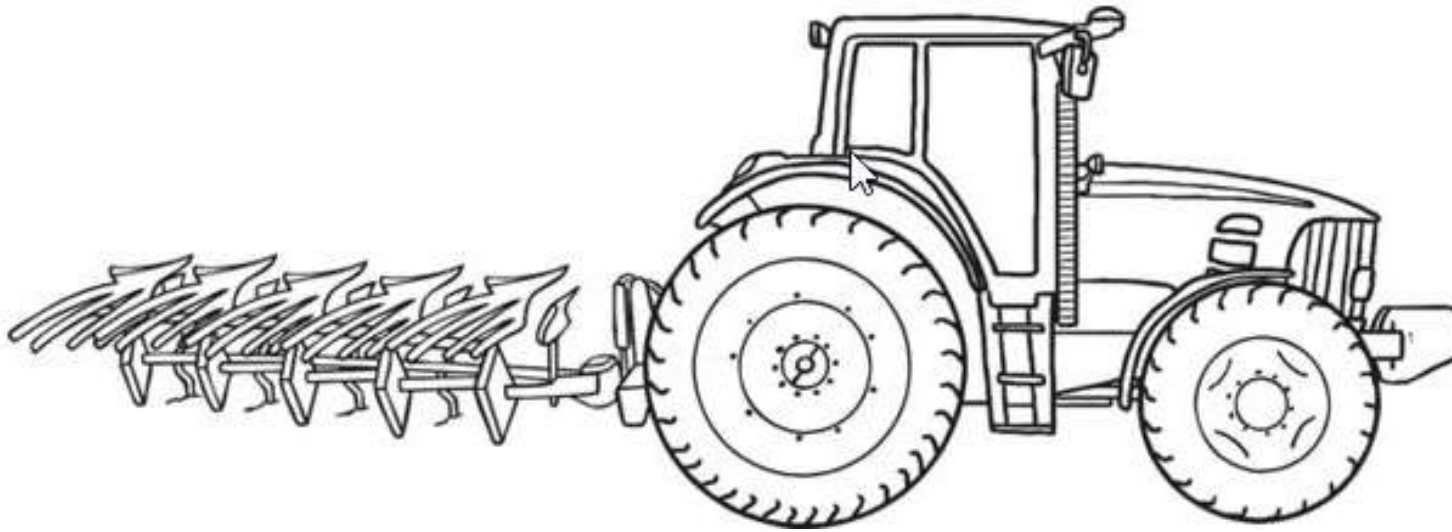


WHAT DOES CHANGE LOOK LIKE - CLIMATE CHANGE

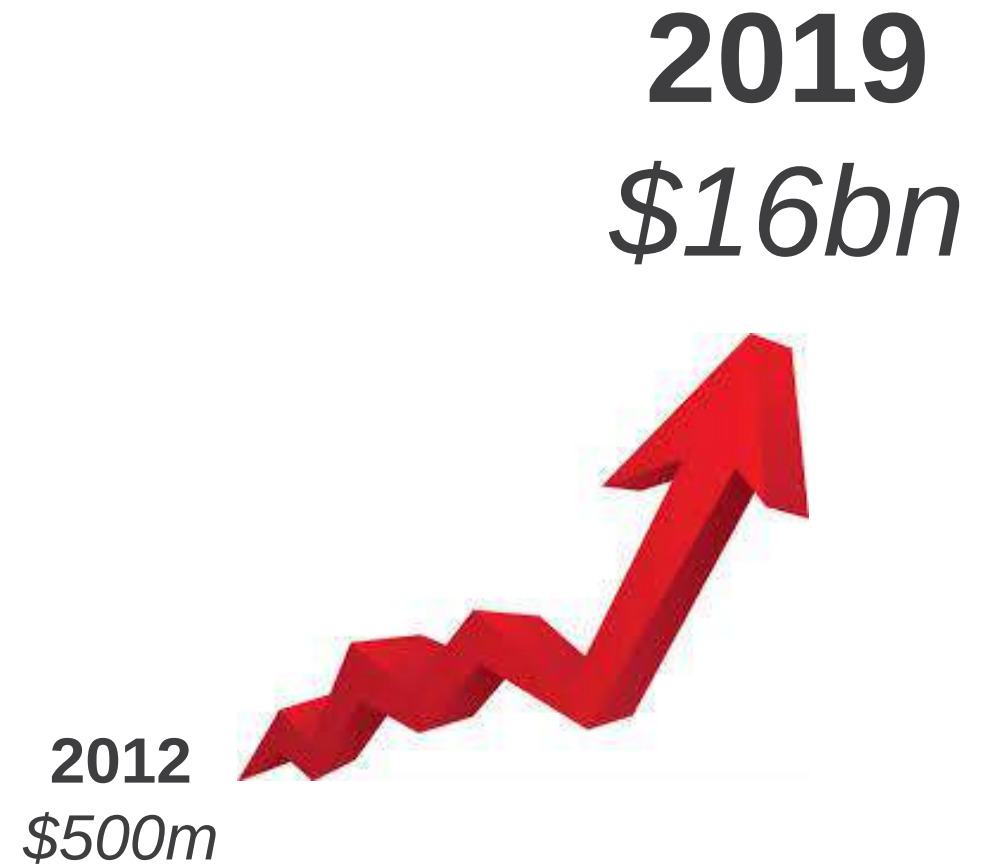
- Net Zero by 2050 now legally binding
- 13% tree cover up to 19%
- Annual planting 9,000 to 40,000 hrs
- Double farmland trees and hedgerows
- 1.2m hrs of bioenergy crops



CLIMATE CHANGE: **THREATS**



WHAT DOES CHANGE LOOK LIKE - AGRI-TECH



ELMS – where are we going?

BPS money will be reduced in stages from 2021-2027

ELMS 'Test and Trials' have started

Pilot 2021

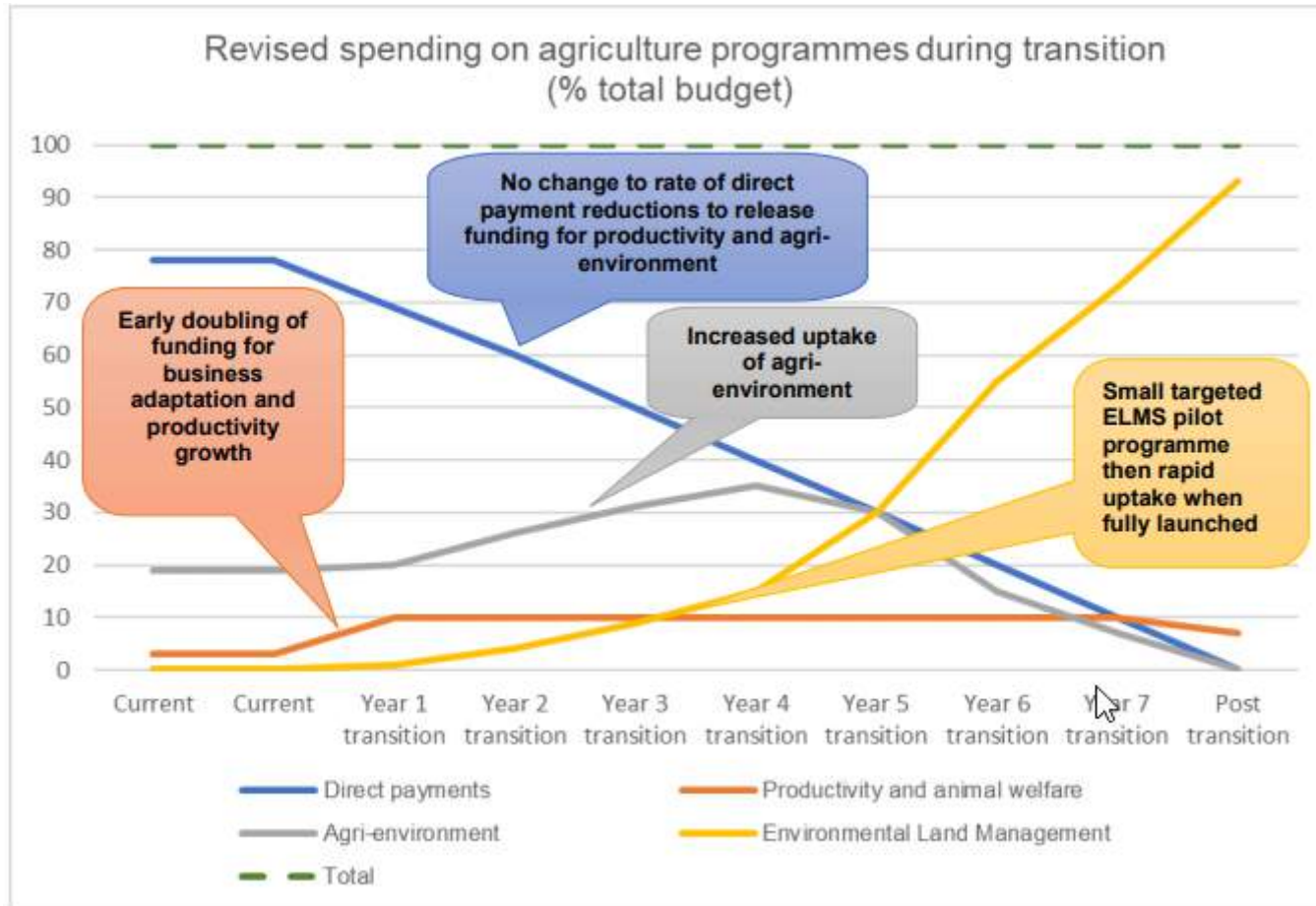
Launch, end of 2024

Investment in animal health and welfare

Investment in agricultural productivity



TRANSITION – CLA recommendations



Policy Briefing Ensuring the agricultural transition delivers for farming, forestry and the environment England August 2019

INTRODUCTION

This policy briefing analyses the transition from where we are now, with an industry heavily reliant on EU subsidy, to the more dynamic and targeted vision of the future. It is based on an analysis of the policy indications from Defra and the agricultural transition as proposed in the Agriculture Bill.

A new context for farming and land management

Farming and the wider rural economy are entering a period of significant change, perhaps the biggest since the UK entered the Common Agricultural Policy (CAP) almost 50 years ago. The UK's departure from the European Union (EU), and the new trading relations this will bring, creates both opportunities and risks for the agriculture sector. Meanwhile, the Agriculture Bill and a new system of productivity support and payment for public goods will redefine the way government supports farming, leaving behind the acreage-based direct payments of the CAP which many businesses, especially those in less favoured areas, depend on and which can make up more than 90% of Farm Business Income (i.e. profit).

These changes come alongside new expectations and perceptions about what the countryside is for. While sustainable food production remains at its core, there is more focus on environmental delivery and the wellbeing benefits from living in and visiting rural areas.

CLA's vision for the future of public support

The CLA has long supported the principle of public payments for public goods and welcomes the ambition to create a new type of relationship between government and land managers. The development of new publicly funded environmental markets and rewards for other public goods can work to complement a thriving agriculture and forestry sector. Based on these principles, the CLA published a Food, Farming and Environment policy in 2016¹ and the Land Management Contract in 2018² that highlighted the need for actions from government, industry and individual businesses to deliver:

- A profitable farming and forestry sector;
- A new publicly funded market for the provision of a broad range of public goods;
- Resilient rural businesses and communities.

An effective agricultural transition

A vision only makes sense if accompanied by a roadmap showing how to reach the end goal. The Agriculture Bill sets out how the agricultural transition will work. Direct payments will be phased out over a seven year period, and an Environmental Land Management Systems (ELMS) for the payment for public goods introduced following a pilot. Many of the CLA's ideas have already been incorporated into the transition period. It is longer than originally envisaged and includes provision for financial assistance to boost productivity growth and maintain high standards of animal health and welfare, and environmental delivery. But there are still significant risks to businesses, productivity and the environment if the transition regime is not designed correctly. This paper sets out recommendations to avoid or mitigate these risks.

¹ https://www.cla.org.uk/sites/default/files/HowTo_LMC_Doc1.pdf

² <https://www.cla.org.uk/sites/default/files/CLA-Land-Management-Contract-May-2018.pdf>

COUNTRYSIDE STEWARDSHIP

Countryside Stewardship (CS) will be the mainstay of environmental delivery for at least the next 5 years until ELMS is fully available.

THE GOVE GUARANTEE



FUTURE OPPORTUNITIES

FUTURE OPPORTUNITIES

PUBLIC AND PRIVATE INVESTMENT IN THE ENVIRONMENT

- ELMS
- Environmental Net Gain through the planning system (**£1.5bn**)
- Eco system services
- Carbon offsetting – will be required for Net Zero

FUTURE OPPORTUNITIES - CONNECTIVITY



Single rural network
95% by 2025

£530m operators + **£500m** government



Full fibre **2025**
Outside In strategy

£5bn for 20% hardest to reach



NATIONAL FOOD STRATEGY



NATIONAL FOOD STRATEGY

The first major review of our
food system in 75 years

MOST POPULAR CURRENT FORMS OF DIVERSIFICATION

Ranking	1	2	3	4	5	6
Type of Diversification	Letting Buildings for Non-Farming Use	Renewable Energy	Sport and Recreation	Processing/ Retailing of Farm Produce	Other	Tourist Accommodation and Catering
Number of farms	23,400	12,800	7,300	5,200	5,000	3,300
% of all farms ⁴	41	23	13	9	9	6
Average income (turnover) from the diversification (£/farm)	£24,700	£13,700	£14,100	£23,400	£14,500	£20,200
Average net profit from the diversification (£/farm)	£17,400	£4,400	£3,000	£9,700	£4,200	£6,900
Net profit as a % of income	70	32	21	41	29	34

FUNDING AT 100 YEAR LOWS

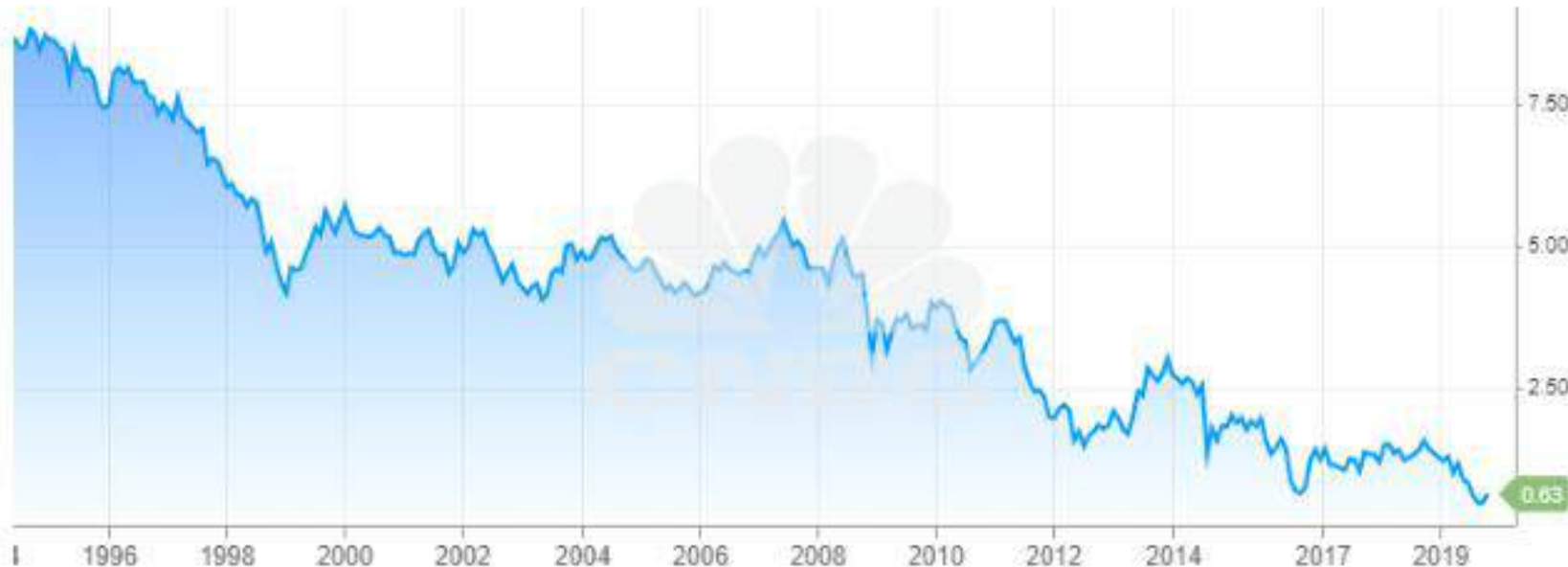
British 10 Year Gilt (UK10Y-GB:United Kingdom)

undefined

Close | 11:39:07 AM GMT

0.633 -0.053 (0.00%)

ALL



- UK Base Rates – 0.75%
- 30 year Gilt – 1.1%

THANK YOU

16 Belgrave Square

London SW1X 8PQ

Tel 020 7235 0511

Fax 020 7235 4696

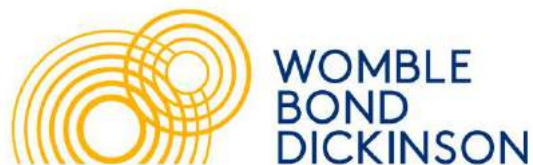
Email mail@cla.org.uk

Website www.cla.org.uk



NORTHERN FARMING CONFERENCE 2019

“Sweating the Assets”





Northern
Farming
Conference
2019 "Sweating the
Assets"



Leading innovation for the livestock sector

Lyndsay Chapman

6 November 2019

 @CIELivestock1

 Centre for Innovation Excellence in Livestock

www.CIELivestock.co.uk

Northern Farming Conference 6 November 2019



Outline

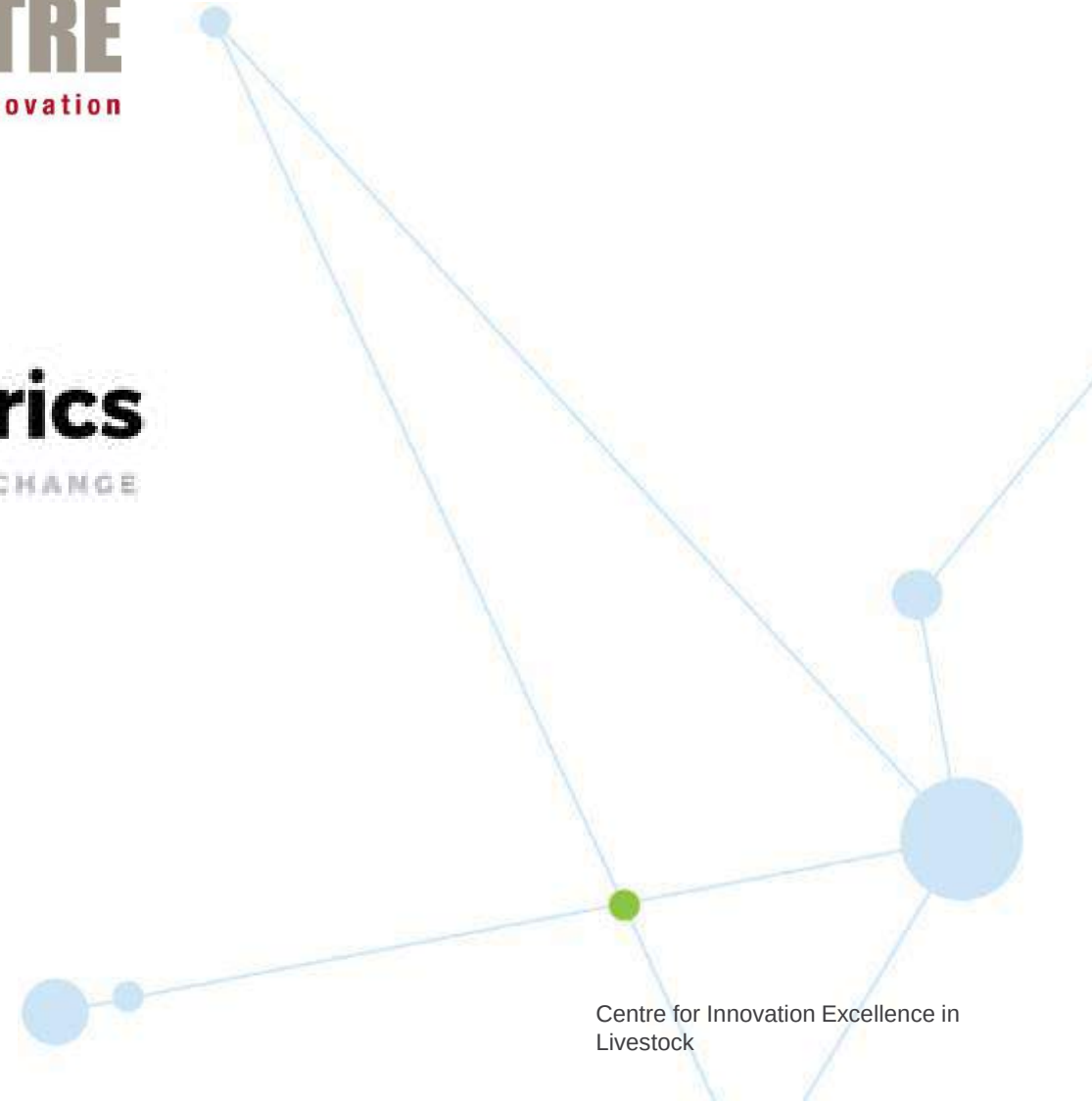
- Introduction
- The family of Agri-Tech Centres
- CIEL and what we do
- Conference challenges - Sweating the assets
 - How to progress and take control of your business
 - What the future may hold and planning for this with ongoing uncertainty

CIEL – Who we are



Centre for Innovation Excellence in
Livestock

The family of Agri-Tech Centres



Centre for Innovation Excellence in Livestock

UK Agri-Tech Centres of Innovation



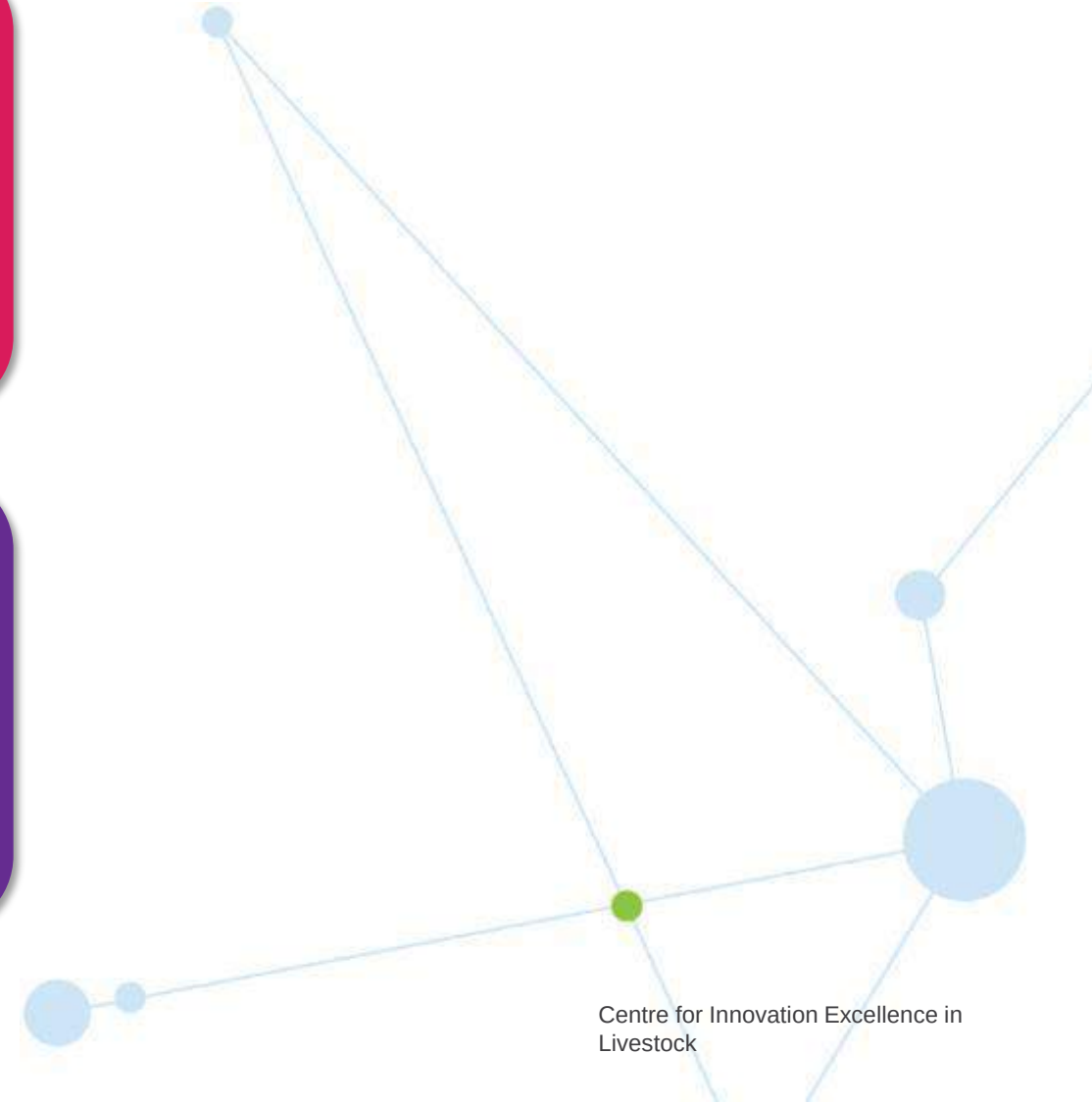
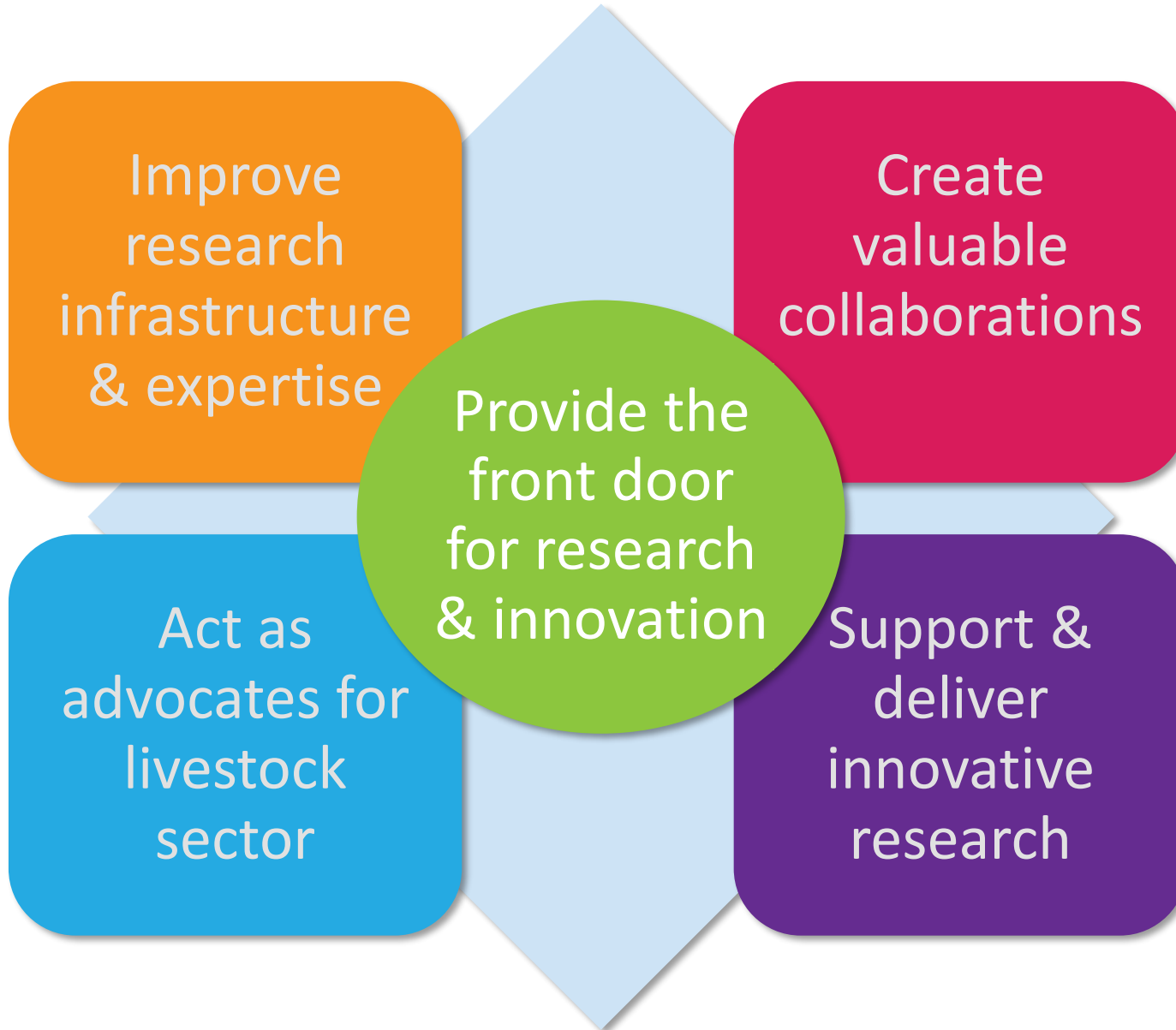
THE AGRI-TECH CENTRES OF AGRICULTURAL INNOVATION

The Agri-Tech Centres are a unique collaboration between Government, academia and industry to drive greater efficiency, resilience and wealth across the agrifood sector.

A £90m investment from the UK's strategic innovation agency (Innovate UK) is enabling the Centres to harness leading UK research and expertise as well as build new infrastructures and innovation.



CIEL – What we do



World-leading Livestock Research & Innovation Network



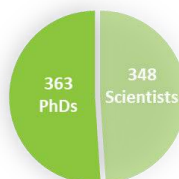
Academic Partners 12

Nationwide network of leading livestock research institutions



Researchers ~

700
Collaborative network tackling the grand challenges facing the livestock industry



Industry Members ~ 60

Covering all aspects of livestock supply chains from pre-farmgate, processors & retailers to animal health & SME innovators



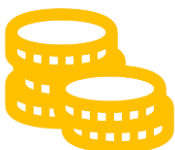
Government Partners Multi-departmental

Working across UK Government including BEIS, UKRI, InnovateUK, Defra, DFID, DIT, DHSC



Investment £70M

Greatest joint investment in livestock research capability in a generation



Facilities 26

Capital investment in new or enhanced research facilities nationwide for all livestock species



Livestock >30,000

Multiple research populations across UK at our research farms



Beef Cattle
> 1,500



Dairy Cows
>3,000



Sheep
>6,500



Pigs
>7,500



Poultry
>12,500



Projects £28M

Total value of current projects being managed & in pipeline



- 1 Innovative Industry Partners
- 2 Leading Livestock Researchers
- 3 A Voice within Government
- 4 Investment and Ideas



Climate Smart Food Systems

Resource Efficiency | Precision Nutrition | Health Diagnostics | AMR | Farm Decision Support Tools | Food Integrity | Gene Technology

Connecting industry & research to tackle grand challenges facing the UK livestock industry

CIEL'S INDUSTRY PARTNERS



Areas of Investment in New Research Capability



- ▶ Animal nutrition – precision feeding & novel diets
- ▶ Forage efficiency
- ▶ Environmental impact
- ▶ Genetics and breeding
- ▶ Animal housing
- ▶ Diagnostics
- ▶ Epidemiology
- ▶ Behaviour studies – advanced imaging & monitoring



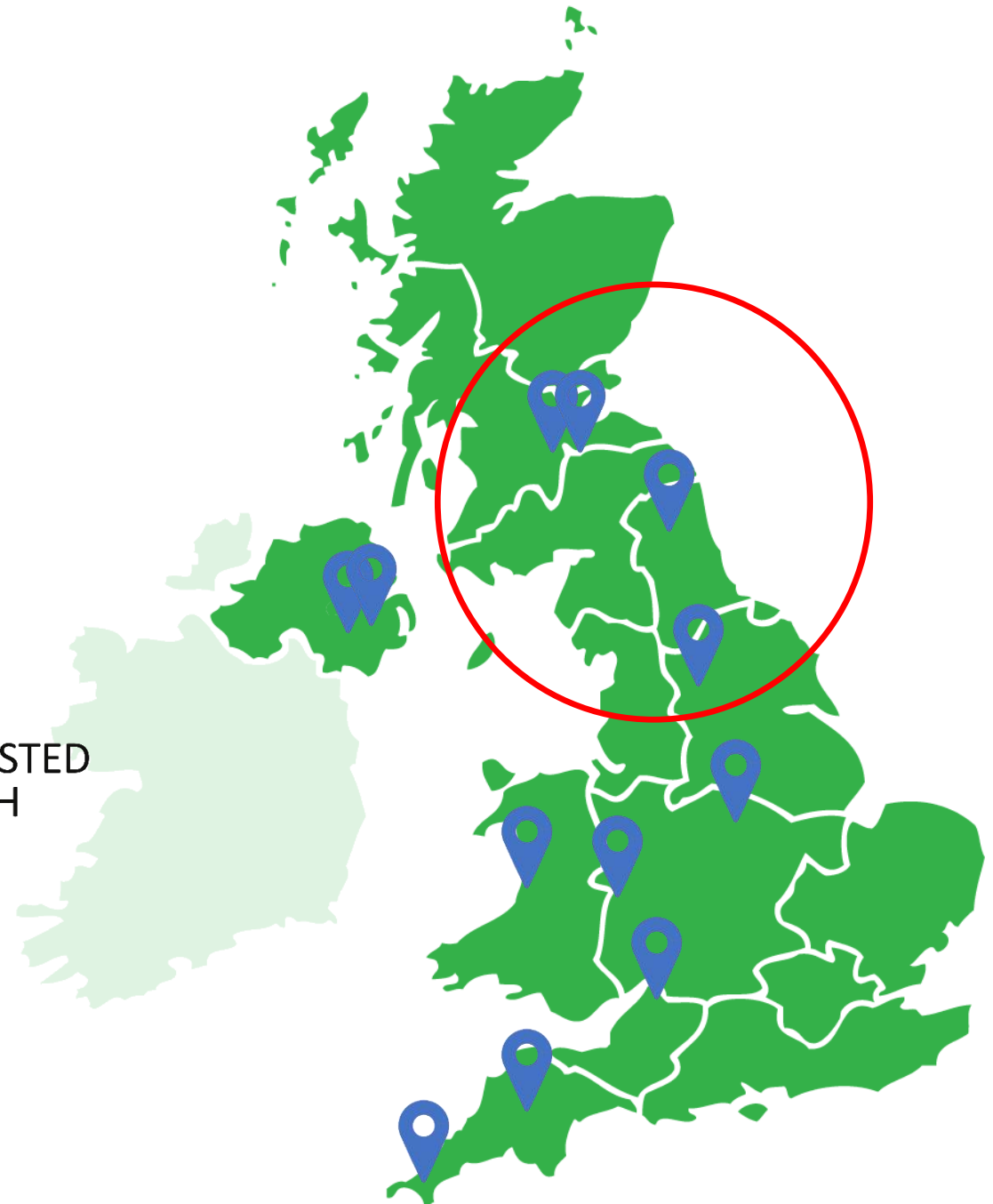
Working with Academia



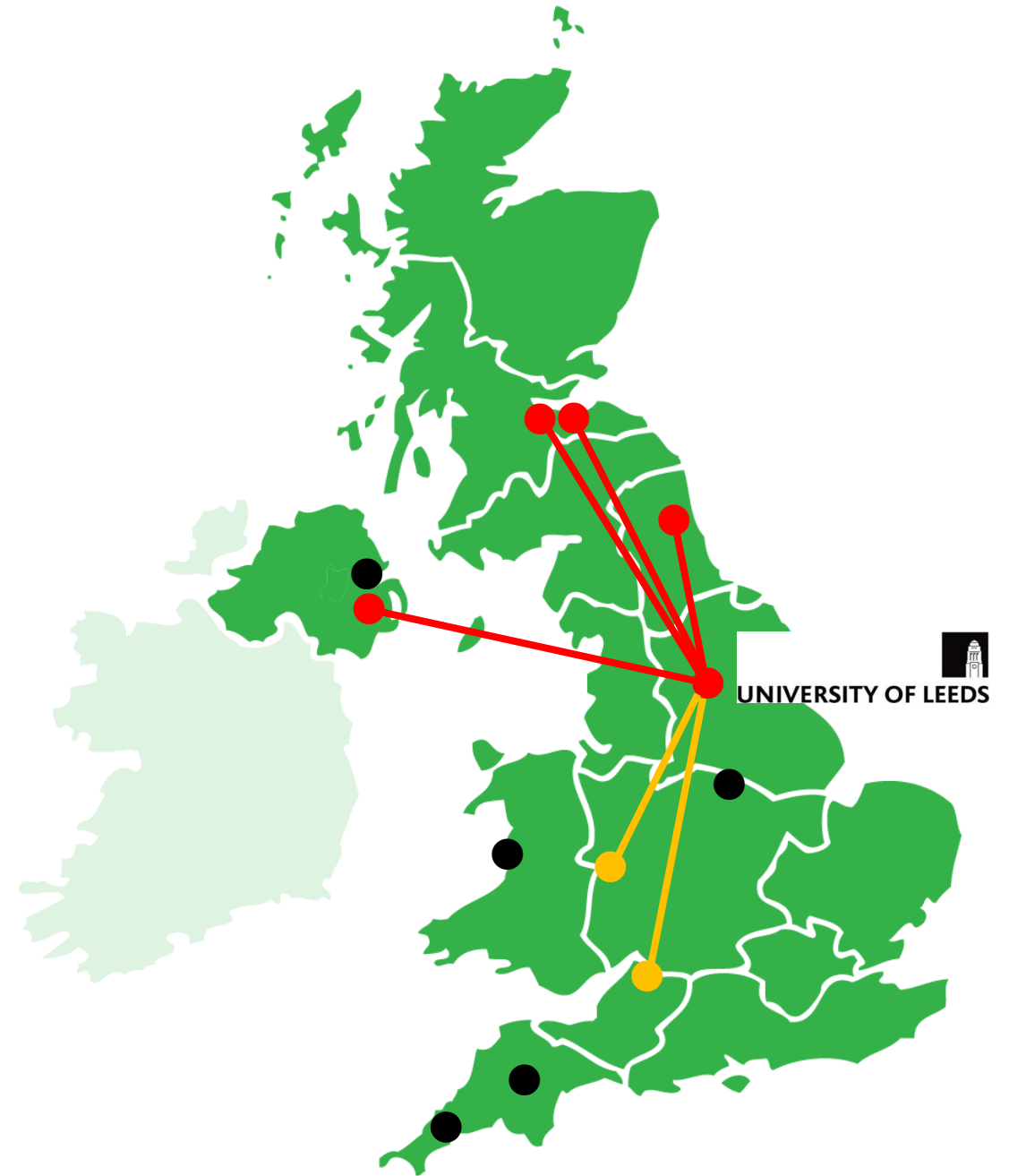
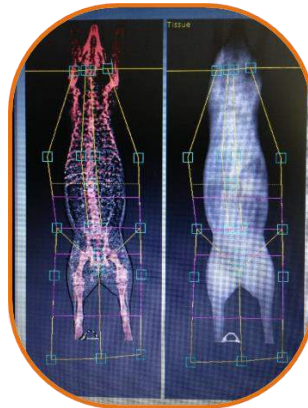
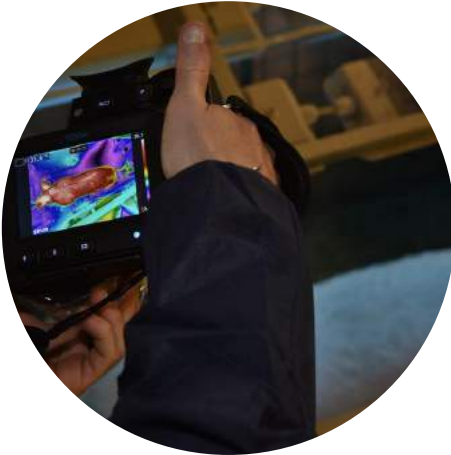
ROTHAMSTED
RESEARCH



THE CORNWALL COLLEGE GROUP



Example: Pigs



CIEL National Pig Facility – Opening 28 November





CIEL Farm Grazing Platform – Beef & Sheep



ROTHAMSTED
RESEARCH

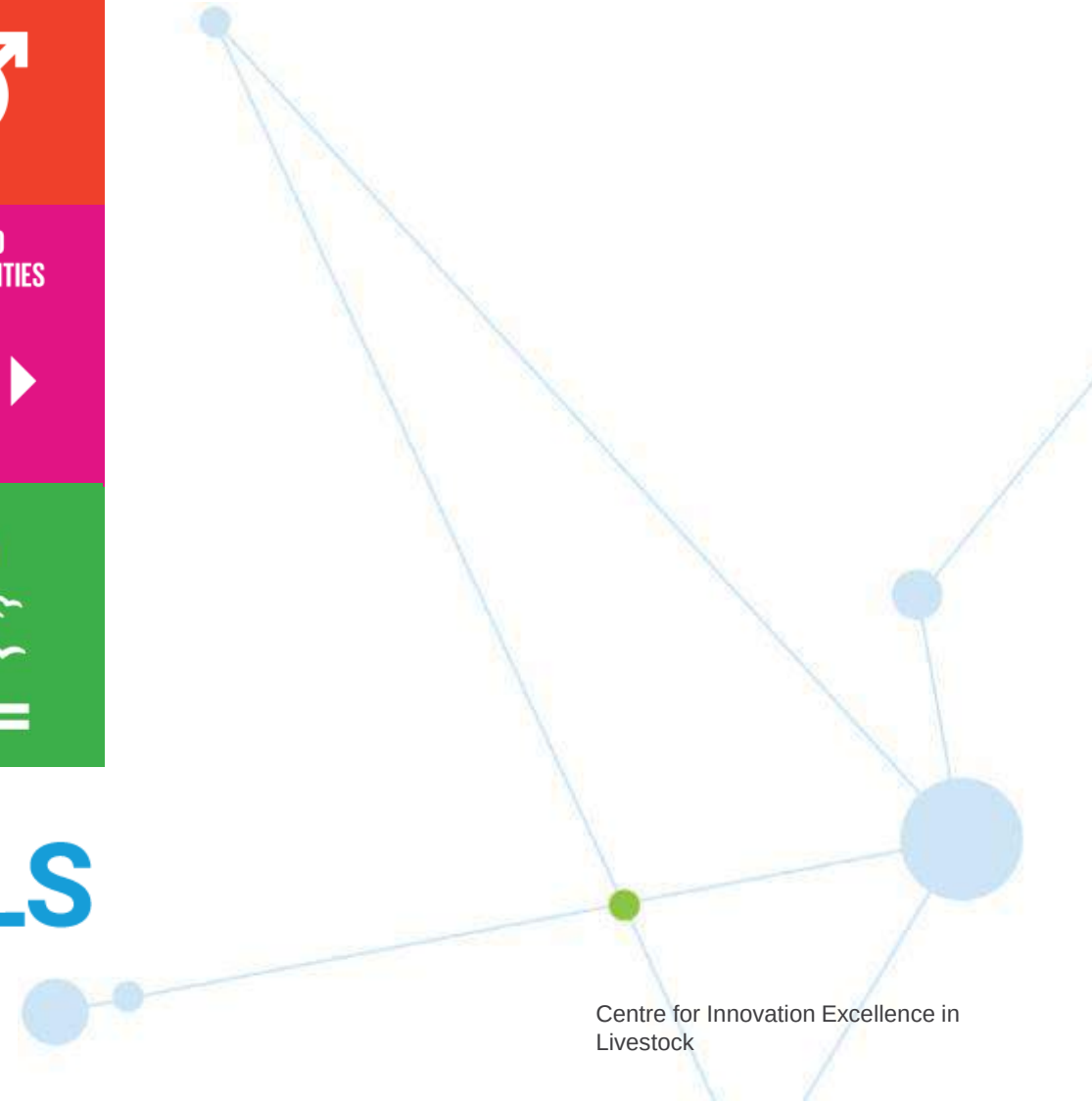


Sweating the assets

- How to progress and take control of your business
- What future may hold and planning with ongoing uncertainty



Start at a Global Level: UN Sustainable Development Goals



UN Sustainable Development Goals – most relevant to food and farming



**SUSTAINABLE
DEVELOPMENT GOALS**

<https://www.un.org/sustainabledevelopment/>

How?

- Investing in new infrastructure to support innovation
- Finding new ways to feed a growing population with less resources & minimising impact on environment
- Ensuring food produced is safe, nutritious, traceable & high quality
- Helping those who produce our food do so profitably and sustainably

Connecting industry with research to tackle key challenges facing livestock production



Anti-Microbial Resistance

Gene Technology

Food Integrity

Farm Decision
Support Tools

Health
Diagnostics

Resource Efficiency

Precision Nutrition



Climate Smart Food Systems

Proving innovative ideas will work | Helping investment in research go further | Delivering solutions

Centre for Innovation Excellence in
Livestock

Northern Farming Conference



Sweating the assets

- How to progress and take control of your business

In your business:

- What future may hold and planning with ongoing uncertainty
- Clarity on your market & customer requirements
- What is the ideal system – vs where are you?
- Measurement & data aggregation / sharing
- Identification of trends & routes to optimisation
- Improved understanding
- Collaborative learning
- Deliver change to improve efficiency & reduce variability
- *Constantly challenge & be curious*
- *Recognise your strengths & reward success – bring your team with you*



Northern Farming Conference

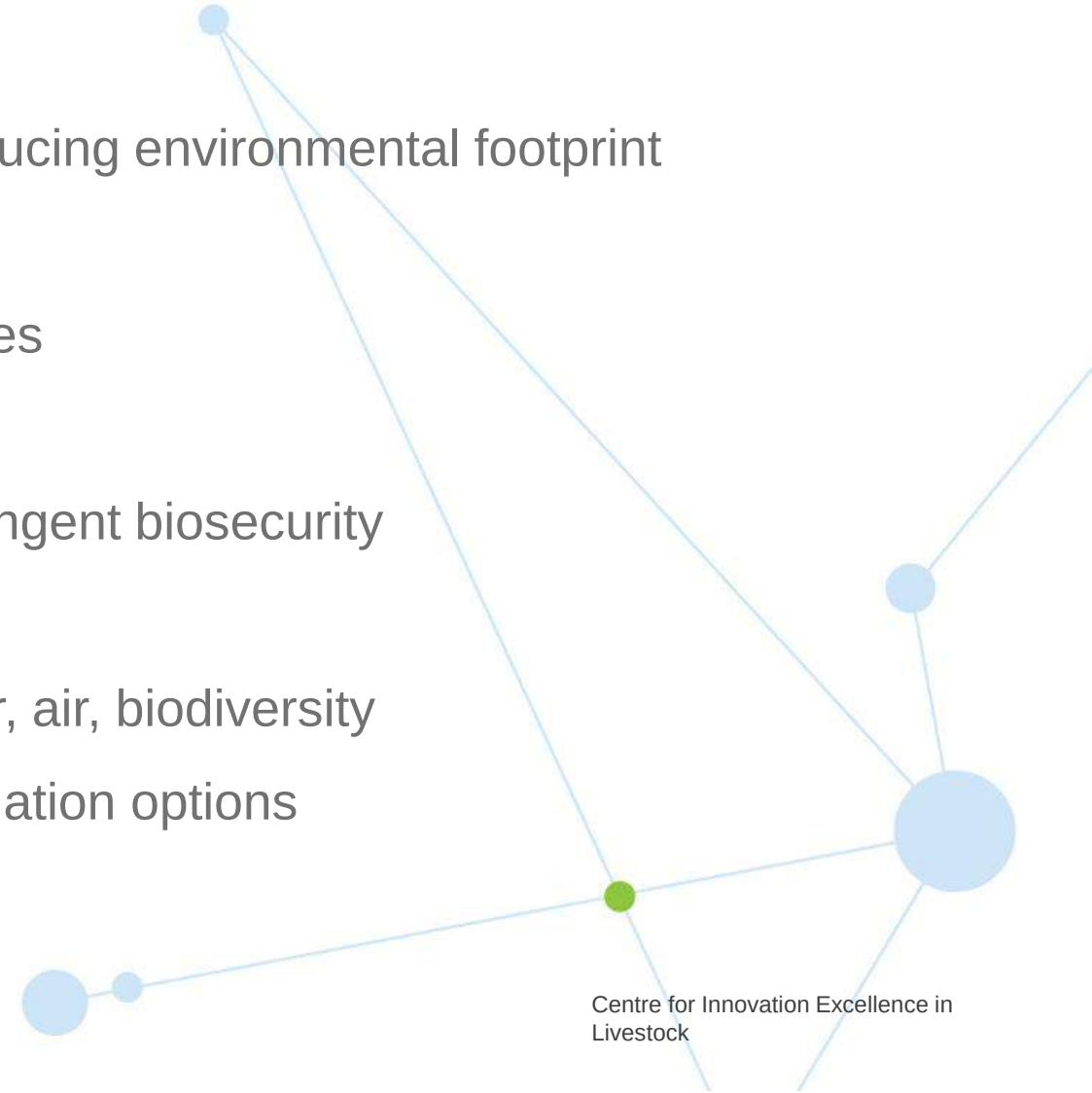


Sweating the assets

- How to progress and take control of your business

What future may hold and planning with ongoing uncertainty
New ways to get more from existing assets, whilst reducing environmental footprint

- Precision farming technologies
 - Reliable, accessible tools to manage businesses
 - Remote sensing for livestock in real time
- Health strategies to reduce disease incidence / stringent biosecurity
- Climate smart systems
 - Management of natural resources – soil, water, air, biodiversity
 - Carbon footprint – understand measure & mitigation options
- Add value to waste streams
- Attract talented, enthusiastic people into agrifood



Summary



Uncertainty is the enemy of business - but

Food & farming is important – to feed population, support economy, manage countryside & help solve major challenges

CIEL & Agri-Tech Centres

- Want to drive greater efficiency, resilience & wealth for agrifood sector
- Work to join up industry, academia & government
- Provide world class research capabilities & collaborations to help industry find solutions

Businesses can thrive if

- Adopt data driven solutions to use assets to best advantage





Any questions?

Thank you

www.CIELivestock.co.uk | enquiries@cielivestock.co.uk | 
Excellence in Livestock

@CIELivestock1 |  Centre for Innovation

Assessing the importance of loafing space

Aim: Evaluate impact of cow loafing space allocation on health, behaviour and milk production





'Increase production'

CIEL is working with a range of academic and industry partners to harness the best of current science and align it to industry needs.

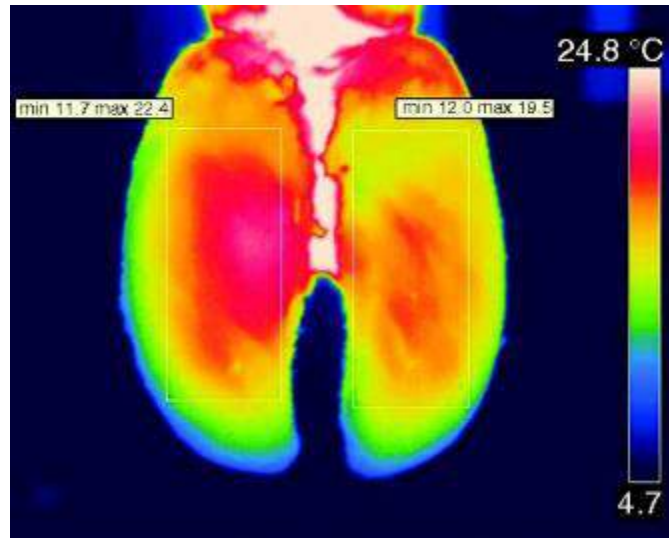
“The project has been shaped to bring together industry, academic and commercial players across the beef industry to deliver a nutritional model that will enable beef farmers to increase production efficiency, reduce feed cost and improve the environmental impact of beef production”



CIEL Case Study

Predicting lameness

Aim: To use multiple information streams to predict the onset of lameness earlier



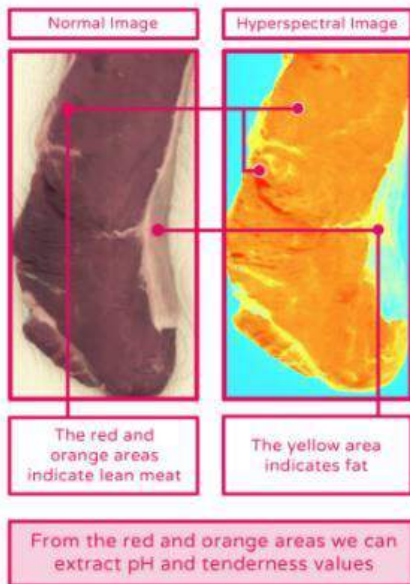
CIEL Case Study

Refining Lamb quality assessment

Aim: Address variability in carcass yield to improve the efficiency of processing and help farmers target premium grades

Approach: Review methods used internationally and test likely method for value adds

Use of DEXA scanning & hyperspectral imaging (HSI) to predict meat eating qualities



CIEL Case Study

Improving grassland management and productivity

Aim: Enabling farmers to plan ahead and make informed decisions on pasture utilisation to make the most of their grassland

Approach: to establish a GB-wide network of farms monitoring and measuring growth & quality of pasture, sharing data and benchmarking performance

GrassCheck^{GB}



CIEL Case Study

Developing ultra-low cost, pen-side diagnostics to detect diseases swiftly and accurately in the 'bush'

Aim: Helping farmers in Africa to act quickly and limit disease spread, supporting livelihoods and pastoral communities' health & nutrition

Approach: Development of a pen-side prototype for early detection of two livestock diseases highly prevalent in sub-Saharan Africa

Biotangents

sidai
TUNZA MIFUGO YAKO



NORTHERN FARMING CONFERENCE 2019

“SWEATING THE ASSETS”



Northern Farming Conference



ASSETS

1. Climate change impacts on agriculture in the UK
2. Index related evidence and trends
3. An innovative insurance solution

Rupert Wailes-Fairbairn – Industry specialist Lycetts

THE CHALLENGE

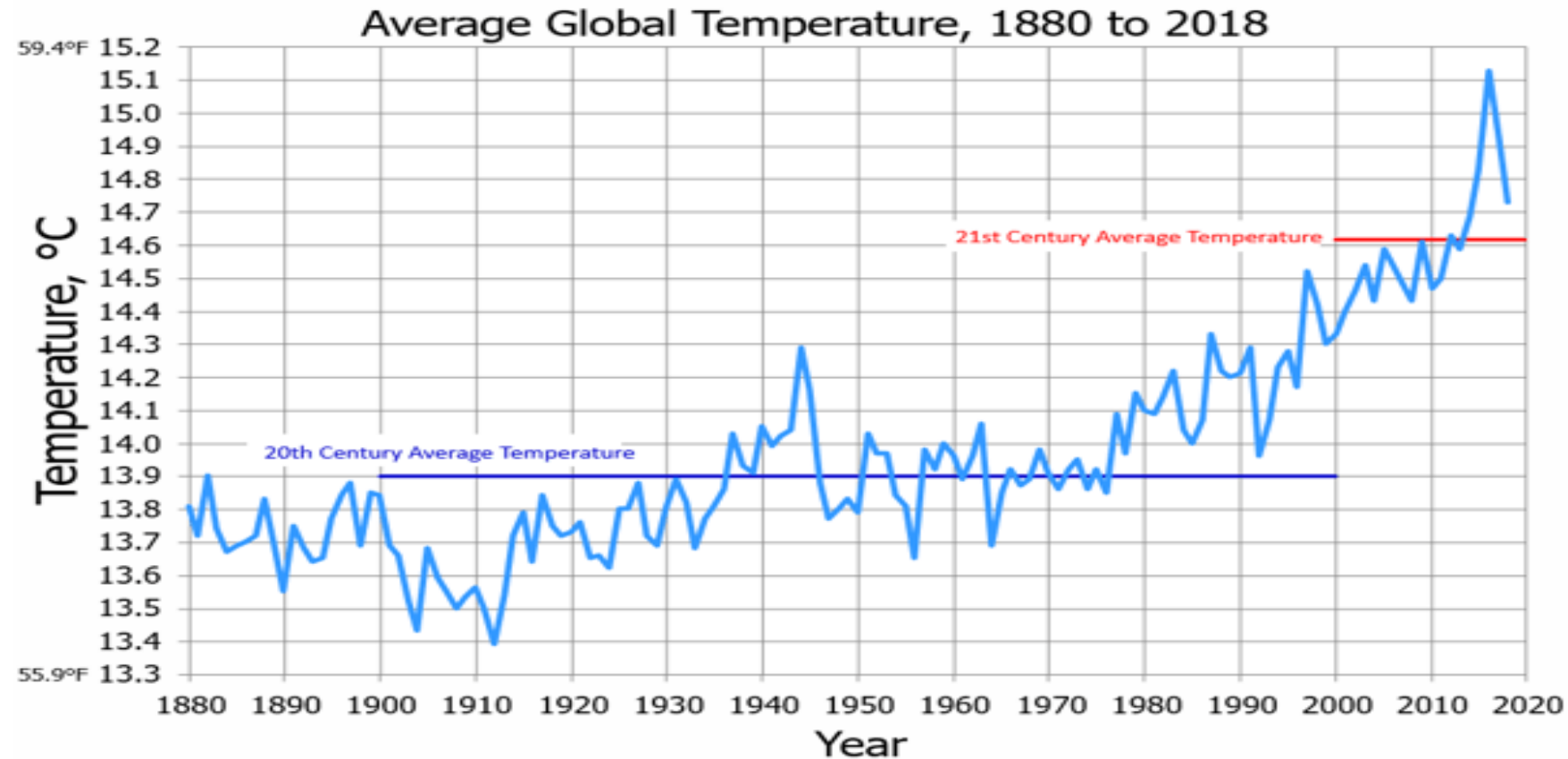
1. Volatile weather is becoming increasingly unpredictable and more frequent which is impacting on farm revenues year on year.
2. DEFRA estimate that 80% of farms would be unprofitable without the BPS which is likely to disappear post Brexit.

Climate change impacts on agriculture.



GLOBAL MEAN TEMPERATURE

Over the past 22 years we have seen 20 of the warmest years on record.



Source: NOAA National Climatic Data Center, <http://www.ncdc.noaa.gov/cag/timeseries/global>

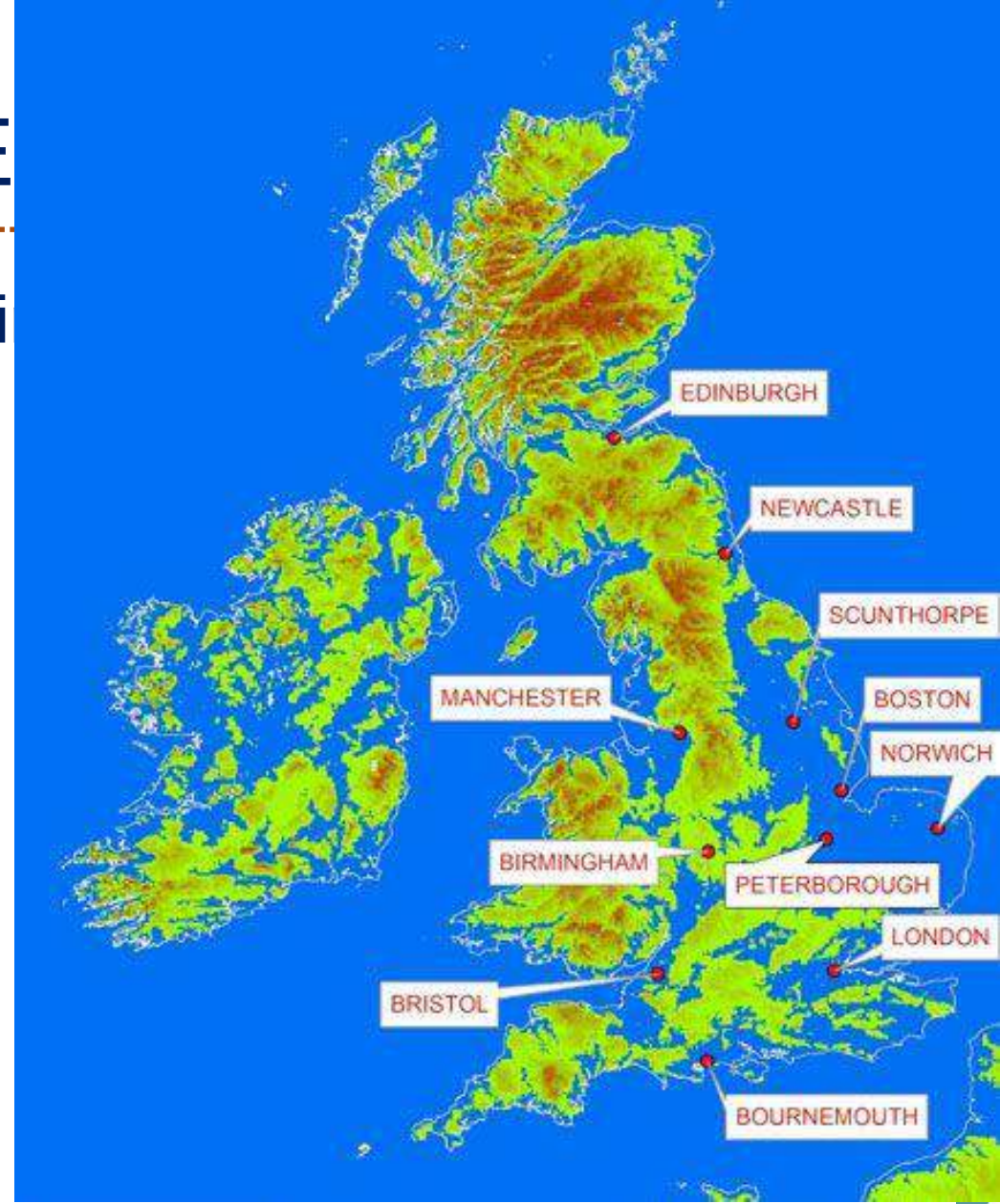
CLIMATE CHANGE PUBLICITY

In the last 12 months there has been a dramatic increase in the amount of publicity around climate change and its impact on the world. This has led to groups and individuals protesting in different ways as a call to action.



SEA LEVEL RISE

Predicted map of the UK i

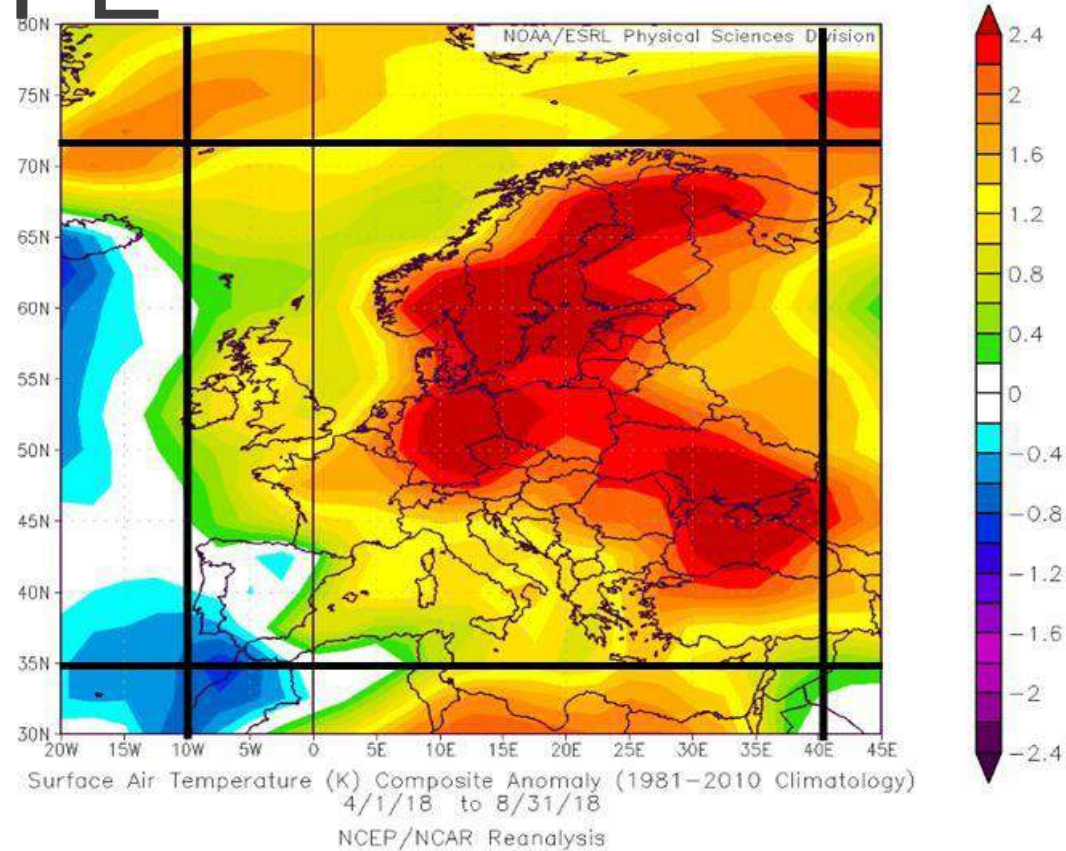


2018: EXTREME HEAT AND DROUGHT IN LARGE PARTS OF EUROPE



DROUGHT IN LARGE PARTS OF EUROPE

Mean temperature April - August 2018 much hotter than reference period 1981-2010



Source: NOAA/ESRL, Physical Sciences Division, based on NCEP/NCAR reanalysis

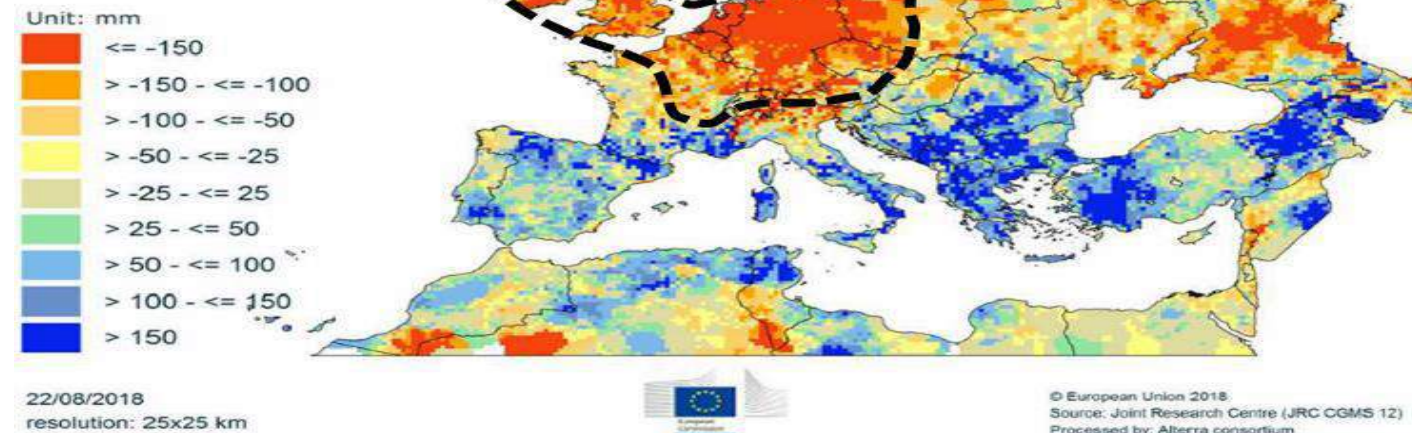
Anomaly **+1.5°C** averaged over box is by far the largest since the beginning of this data source in 1948

2018: extreme heat and drought in large parts of Europe

Soils much too dry missing rainfall and high evapotranspiration

CLIMATIC WATER BALANCE Cumulated values

Anomaly of climatic
water balance
May – August 2018
relative to long-term mean

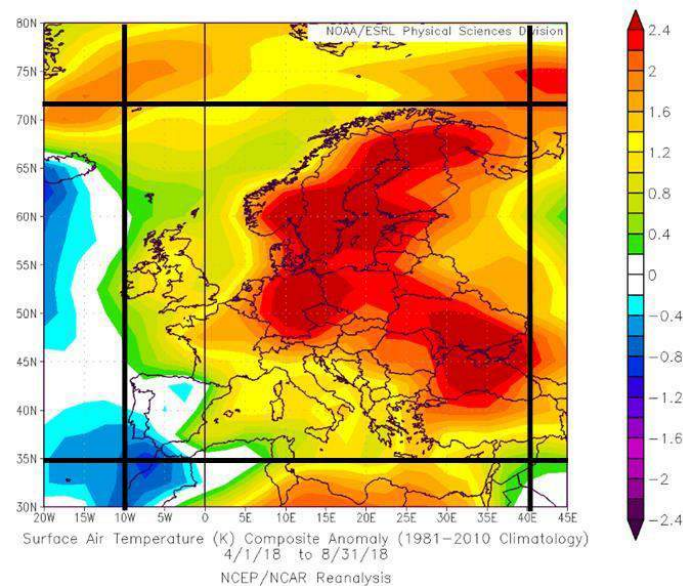


Source: JRC Mars Bulletin, Crop monitoring in Europe, August 2018

Agricultural losses (yield loss) for Europe: Overall losses: € 3.3bn

2018 : extreme heat and drought in large parts of Europe present an even more worrying picture when combined – ***hotter and drier***

Mean temperature April - August 2018
much hotter than reference period 1981-2010

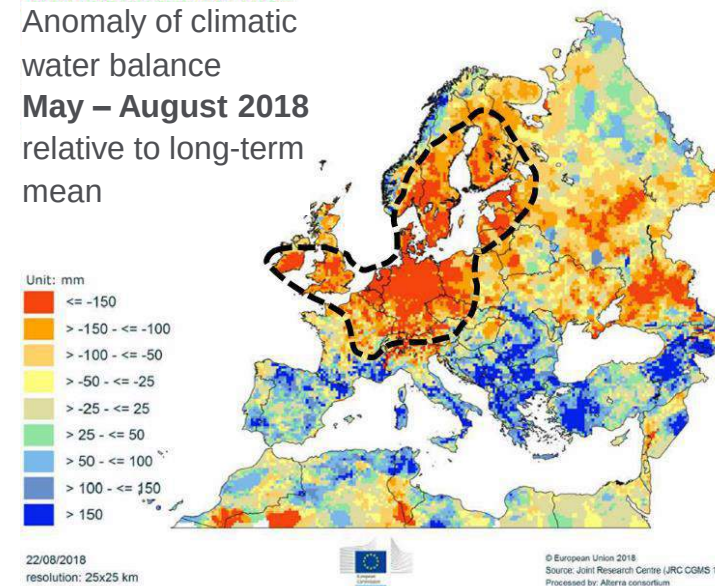


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THE MECHANISM THAT LED TO THE 2018 HEAT

- Periods of **heat** without rainfall lead to:
 - a **deficit** of **water vapour pressure** in the air which
 - affects the processes in the soil and plants to **evaporate** and **transpire** water vapour into the air to fill the deficit (increased evapotranspiration).

THE MECHANISM THAT LED TO THE 2018 HEAT

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 - a **deficit** of **water vapour pressure** in the air
 - and
 - affects the processes in the soil and plants to **evaporate** and **transpire** water vapour into the air to fill the deficit (increased evapotranspiration).
- This in turn leads to sustained periods of high temperature resulting in drying up of soils.
- In heat waves, it is associated soil dryness which is the biggest cause of damage according to latest research.

SO WHAT CAN
LYCETTS DO TO
PROTECT
FARMERS?

CROP SHORTFALL INSURANCE (CSI) - BACKGROUND

- The World Bank has highlighted the benefits of CSI insurance in parts of the world that are vulnerable to extreme weather and climate related catastrophes.

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 - Farming is profitable over time but looking at individual years, volatility within the industry is higher than most other sectors of the UK economy. This volatility makes it harder for farmers to plan, reduces long-term investment and makes businesses difficult to sustain.
 - We must also make sure farmers have access to the tools they need to manage year-to-year income volatility.
 - Insurance can reduce the financial costs to a farmer following a crop failure.

Innovative insurance solutions: Crop Shortfall Insurance (CSI)

Parametric insurance:

A new approach to insurance

How does
it work?



Parametric insurance
is based on the use of
a parameter



that is correlated to the
client's damages or
financial losses



to create the
most
relevant cover



CSI – WHY IS IT NEEDED?

Arable farming profitability is under pressure due to:

- Cereal/OSR yields having plateaued due to the withdrawal of certain crop protection products, e.g. some triazoles/lack of new novel chemistry being registered. The GM debate is a good example of this.
- Crop yields in competitor markets such as North American and Eastern Europe are rising faster relative to Europe.
- Volatile weather patterns. Climate change; The Met Office forecast that a weather 1:100 event will become a 1:50 year event in the next 25 years.

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- Brexit. The basic payment scheme (pillar 1 support) is expected to half in value over the next 5 years. BPS accounts for approximately 80% of farm profitability. Although environmental schemes (pillar 2 support) will become more prevalent should the debate for “public support for public goods” prevail, the cost of participating eats into a significant amount of the income produced.
- Medium term forecast increase in interest rates.



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- Brexit. The basic payment scheme (pillar 1 support) is expected to half in value over the next 5 years. BPS accounts for approximately 80% of farm profitability. Although environmental schemes (pillar 2 support) will become more prevalent should the debate for “public support for public goods” prevail, the cost of participating eats into a significant amount of the income produced.
-  Fast increase in interest rates.

Farming businesses will not be able to carry the trading losses that historically they have been able to do, to the same extent.

CSI– OVERVIEW

- Uses algorithmic modelling to calculate the pay-out in the event of a claim.
- The model aims to closely mirror the actual damage on the ground and enables rapid claims settlement as no inspection of the damage is required to assess the claim.
- CSI does not indemnify the pure loss, but the contract agrees to make a payment upon the occurrence of a triggering event which is a natural event which may precipitate a loss.

CSI– OVERVIEW

- Uses algorithmic modelling to calculate the pay-out in the event of a claim.
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- CSI does not indemnify the pure loss, but the contract agrees to make a payment upon the occurrence of a triggering event which is a natural event which may precipitate a loss.
- Our CSI protects a farm dependent on the **variation in average yield** of the region that the farm is in for that year, **relative to the regional yields from the last 8 years**.
- Crop Area (can be lower than the actual harvested area but not higher)
- Expected yield t/ha (with a max 30% deviation from official yield)
- Forecast price £/ton (with a max 30% deviation from current price)
- Yield data is independently collected from DEFRA statistics that are provisionally produced in October and finalised in December of each year.



CROP SHORTFALL INSURANCE (CSI)

Pays out based on a pre-determined basis for losses
resulting from:

- Drought, Windstorm, Frost, Excessive Rainfall
- Plant Diseases and Pests
- Excessive Heat Wave
- Hail and Flood



CSI REGIONS

England

- North East
- North West & Merseyside
- Yorkshire & The Humber
- East Midlands
- West Midlands
- Eastern

1 region in Wales

1 region in Scotland

CSI BASIS OF CALCULATION FOR HARVEST 2020

Our CSI protects a farm dependent on the **variation** in **average yield** of the region that the farm is in for that year, **relative to the regional yields from the last 8 years**.

Crops covered:

Quotation Window:

Winter oil seed rape

01.01.19 – 30.09.19

Winter barley

01.01.19 – 31.10.19

Winter wheat

01.01.19 – 30.11.19

Spring barley

01.01.19 – 28.01.20

COLLECTION OF INDIVIDUAL FARM DATA REQUIRED

- Location
- Crop area ha
- Expected yield t/ha

st price £/ton



Premium based on standard 10% deductible (balance between price paid/trading risk). 15% deductible can be chosen.

THE FIGURES BEHIND CSI

		2011	2012	2013	2014	2015	2016	2017	2018	Annual average variation in yield per HA over last 8 years	Yield diff (over 8 years) as %
Winter Wheat	North East	8.06	6.36	6.53	8.15	9.05	7.76	8.24	7.86	12.05%	42.3%
	Yorkshire & The Humber	8.14	6.90	7.35	8.41	9.35	7.86	8.64	7.87	11.92%	35.5%
Winter Barley	North East	6.40	5.83	5.80	6.92	7.55	6.69	6.94	7.20	7.97%	30.2%
	Yorkshire & The Humber	6.73	6.81	6.65	7.56	8.34	6.76	7.41	7.32	8.44%	25.4%
Spring Barley	North East	5.19	4.43	4.91	5.63	6.20	5.62	5.47	5.04	9.93%	27.1%
	Yorkshire & The Humber	5.54	5.14	5.80	5.54	6.51	6.02	5.97	5.28	8.78%	26.7%
Winter Oilseed Rape	North East	3.95	2.95	2.66	3.70	4.31	3.01	3.91	3.65	21.93%	62.0%
	Yorkshire & The Humber	4.32	3.45	2.96	3.84	4.24	3.21	4.22	3.63	20.16%	45.9%

THE FIGURES BEHIND CSI-18 44% SHORTFALL

Crop	Spot Price (£ / t)	Insured Crop Price (£ / t)	Insured Hectares (ha)	Expected Yield (t / ha)	Reference Yield (t / ha)	Value of Exp. Prod. (£)	Total Costs (£ / t)
Spring Barley	138.0	165.0	40.0	6.10	5.44	40,260	2.22
Winter Barley	118.0	135.0	70.0	7.30	6.72	68,985	1.74
Winter Oilseed Rape	310.0	330.0	80.0	3.90	3.52	102,960	8.08
Winter Wheat	133.0	155.0	200.0	9.40	7.84	291,400	2.41

Value of Expected Production	503,605
Deductible	50,361
Policy Limit	125,901
Total Costs	8,476

Actual 2020 Harvest-18.44% Deviation	(£)	(% TSI)
Value of Expected Production	503,605	100.00
Deductible	50,361	10.00
Total Value of Deviation	-92,883	-18.44

Payout 42,522

Crop	Reference Yield (t / ha)	Actual Yield (t / ha)	Deviation (% Reference Yield)
Spring Barley	5.44	4.50	-17.35
Winter Barley	6.72	5.90	-12.25
Winter Oilseed Rape	3.52	2.70	-23.27
Winter Wheat	7.84	6.40	-18.35

THE FIGURES BEHIND CSI- 29.72% SHORTFALL

Spring Barley	40,260	5.44	3.80	-30.21	-12,163
Winter Barley	68,985	6.72	4.70	-30.10	-20,763
Winter Oilseed Rape	102,960	3.52	2.50	-28.96	-29,814
Winter Wheat	291,400	7.84	5.50	-29.84	-86,940

Value of Expected Production	503,605
Deductible	50,361
Policy Limit	125,901
Total Costs	8,476

Value of Expected Production	503,605	100.00
Deductible	50,361	10.00
Total Value of Deviation	-149,680	-29.72

Payout

99,319

Crop	Reference Yield (t / ha)	Actual Yield (t / ha)	Deviation (% Reference Yield)
Spring Barley	5.44	3.80	-30.21
Winter Barley	6.72	4.70	-30.10
Winter Oilseed Rape	3.52	2.50	-28.96
Winter Wheat	7.84	5.50	-29.84

CSI - CONCLUSION

- All farms, regardless of how well they are managed, are affected by annual variations in yield beyond the control of the business.
- Excess rainfall, soil moisture deficit, soil temperature, solar radiation.
- The variation of yield on farm in any one year is closely correlated to the variation in regional yield in any one year.

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- Excess rainfall, soil moisture deficit, soil temperature, solar radiation.
- The variation of yield on farm in any one year is closely correlated to the variation in regional yield in any one year.
- Some of the advantages of CSI as opposed to traditional/indemnity based products are:
 - Fast claims settlement process in December following harvest
 - Cost efficient - no loss adjustment
 - Easy to administer
 - No need for the individual farm claims history



CONCLUSION

Yields are becoming increasingly volatile and climate change is accelerating. CSI can help protect your business in these challenging times.



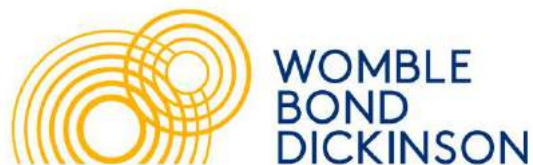
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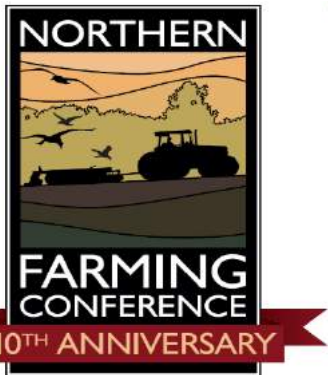
NORTHERN FARMING CONFERENCE 2019

“Sweating the Assets”



Afternoon Chairman

Harry Chrisp, Partner, Gibson & Co, Hexham



Northern Farming
Conference 2019
Sweating the Assets



We make farming more productive through practical, hassle-free drone automation and Ai software



Jack Wrangham // Founder // jack@droneag.farm // 07305 998304

Drone Ag

Hardware, Training and Software

1

2015

Mainly Hardware sales
DJI Partner

2

2016-2017

Hardware & Training
LANTRA, BASIS

3

2018-2019

Training & Software
Skippy Scout

Customers

syngenta



Drones in AgriTech

We're passed all the drone 'hype' now, and the agricultural drones market is predicted to grow fast...



AGRITECH DRONES ON THE GARTNER HYPE CYCLE

Agricultural Drones Market

graph source: Grand View Research Agriculture Drone Market Analysis 2017



500million

\$ Market in 2018

4billion

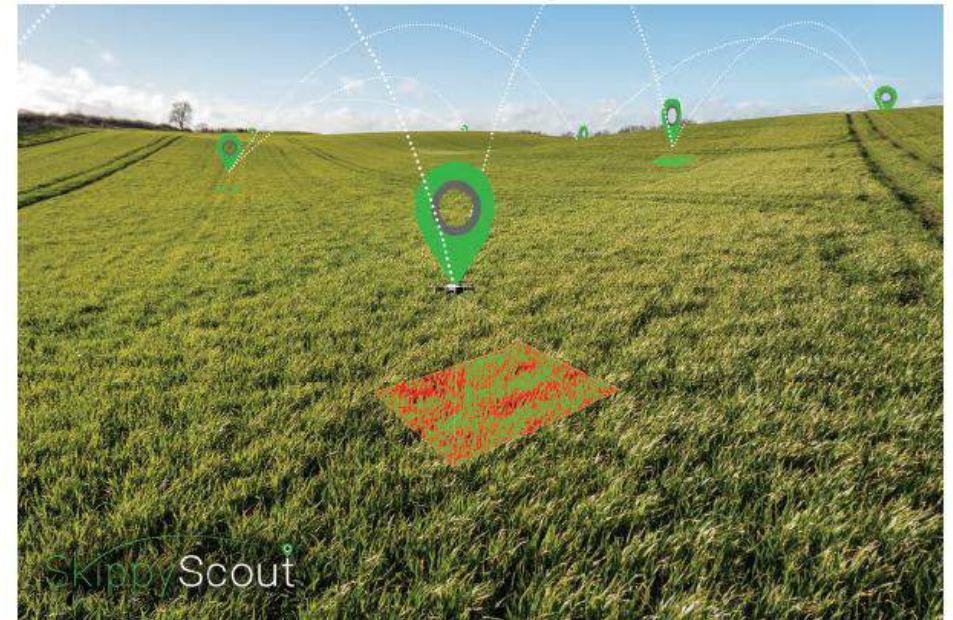
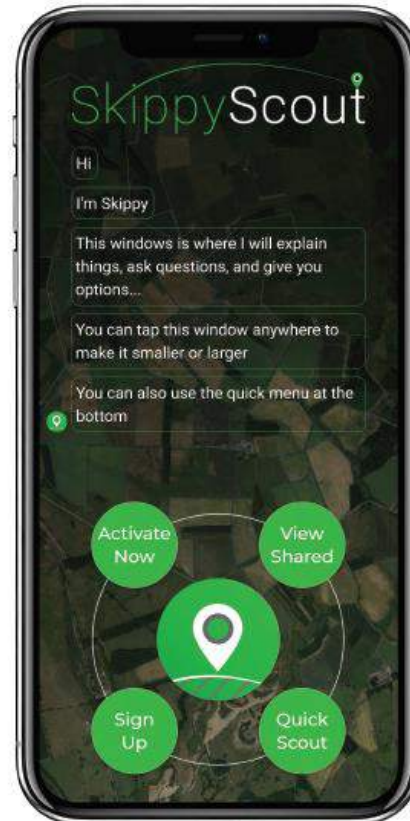
\$ Market by 2024

Our Solution: Meet Skippy

Fast, Leaf Level Data Collection >> Optimised Management of Crops

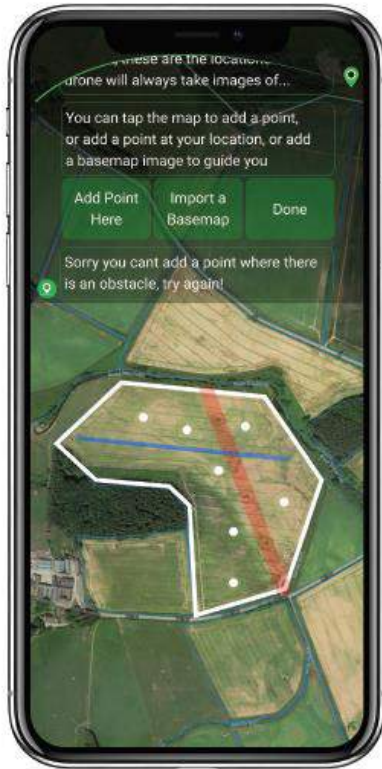
Skippy Scout is an easy to use app that automates crop data collection using drones, and interprets it using AI. Leaf-level management optimises the whole growing cycle.

- ⬆ Yields
- ⬆ Costs
- ⬆ Chemicals



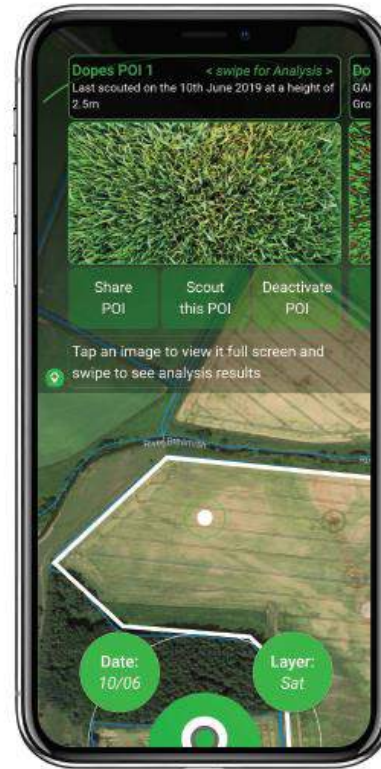
There is nothing like this currently available

How it Works



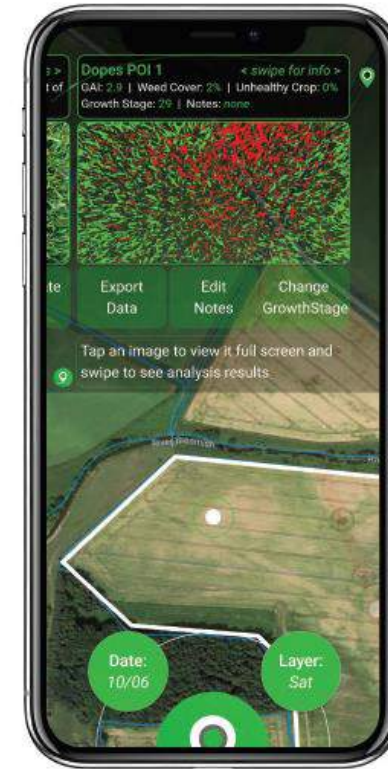
1

SKIPPY FLIES YOUR DRONE TO MULTIPLE LOCATIONS ACROSS A FIELD



2

AT EACH POINT, THE DRONE DESCENDS AND CAPTURES SUPER HI-RES IMAGERY



3

OUR AI THEN USES THIS DATA TO PROVIDE UNIQUE, LEAF-LEVEL INSIGHTS

Real-time information in unrivaled detail allows farmers to:

- Make more informed, targeted decisions faster than ever before
- Increase yields by managing disease, pests and nutrition with this information
- Reduce chemical usage and soil compaction by targeting scouting and spraying, instead of whole field coverage.

Traction

2016-2018 ->

£460k turnover to date

Hardware & Training focus

2700 -> 20k website visits

Software Pivot

Training & Software focus

Skippy Scout platform

Over 200 users signed up,
worldwide

Crowdfunding

Target achieved in May 2019

with many farming investors



Companies Using Skippy Scout:

syngenta

HUTCHINSONS
Crop Production Specialists

Harper Adams University

McCreath Simpson & Prentice
Your partners in forward

Drone-based Spraying

Its coming, It works, Its Not legal yet

Trials Underway

Drift studies with water
Bio-nutrients on OSR

Potential Uses

Bracken control
Highly targeted application in crops

Worldwide

20K+ used in China/Japan
Also Switzerland



Future

Drone mapping
Drone sprayer swarms



Summary

Working with other technology, drones help to form the solution



Agriculture Needs Change

Increase Yields
Decrease Costs & Chemical Use
AgriTech is the Answer



Skippy Optimises Crop Management

Real Time & Leaf-Level
It works NOW
Drones in AG growing fast



We're Growing

With a successful
crowdfunding round
behind us.

Our Goal

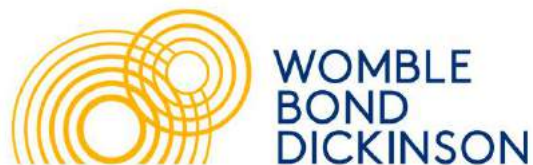
Worldwide by 2025
30,000 + Users

The Skippy Farm Ai will provide practical, automated 'big data' collection, interpretation and delivery on the farm.

Automated drones will guide automated ground machinery and drone sprayers to target specific areas of fields at exactly the right time, reducing costs and chemical use, maximising yields, minimising soil damage and optimizing fuel efficiency.

NORTHERN FARMING CONFERENCE 2019

“Sweating the Assets”



Bob Middleton
CSF Programme Manager
Natural England

Making the most of Catchment Sensitive Farming



**A clear solution
for farmers**
CATCHMENT SENSITIVE FARMING

*Working together with farmers for a
healthy environment*

Project Partners



CSF
Partners'
Group

Catchment Sensitive Farming

- Established in 2006.
- **Works with farmers in England to reduce diffuse pollution from agriculture: air and water**
- Uses advice and incentives to drive voluntary action.
- CSF is a measure for **Water Framework Directive** and **National Emissions Ceiling Directive**.

CSF is targeted to priority catchments and farms based on pollution risk.

- 102k km² targeted
- We deliver advice directly and via private sector advisers.
- Incentives through Countryside Stewardship – capital works and land management.

- CSF is funded by Defra, Rural Development Programme for England and partner (Water Co) contributions.

We have 102 experienced, dedicated CSF Officers in catchments.

- They focus on farmer engagement and technical advice.
- They are supported through a comprehensive training programme.

CSF has a comprehensive evidence programme.

- This demonstrates the impact and success of CSF.

- CSF includes over 30 formal partnerships and many informal ways of working with partners.
- Local work is guided by farmer liaison groups



Project Partners



Working together with farmers for a healthy environment



**A clear solution
for farmers**

CATCHMENT SENSITIVE FARMING

The farms we've
worked with
cover over

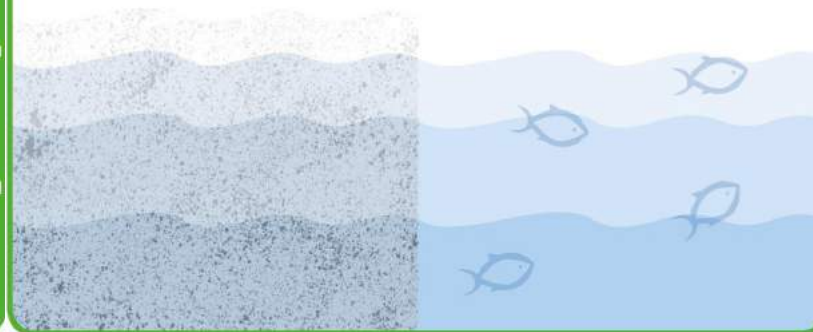
1/3
of England



We've delivered advice to nearly
20,000 farm holdings



Our work has contributed to a
34% reduction
in pesticides in our rivers



4-8 X greater
pollution reduction

from agri-environment scheme
farms that also implemented
CSF advice



Farmers have invested more than
£182m on farm
infrastructure



as a result
of our work



Engaged more than
1,170 next generation farmers



through the
Great Farm Challenge



**A clear solution
for farmers**

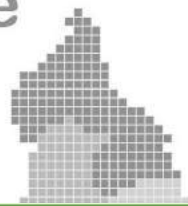
CATCHMENT SENSITIVE FARMING

*Working together with farmers for a
healthy environment*

Project Partners



The farms we've worked with cover over



1/ of

Helped farmers take
70,000 positive actions
to reduce pollution



We've delivered advice to nearly
20,000 farm holdings

Our work has contributed to a
34% reduction
in pesticides in our rivers



92% farmer satisfaction

for our
one-to-one advice



as a result
of our work

through the
Great Farm Challenge



**A clear solution
for farmers**

CATCHMENT SENSITIVE FARMING

*Working together with farmers for a
healthy environment*

Project Partners



Improving farm performance

- Minimise overhead costs
- Set goals and budgets
- Compare yourself with others and gather information
- Understand the market
- Focus on detail
- Have a mindset for change and innovation
- Continually improve people management
- Specialise



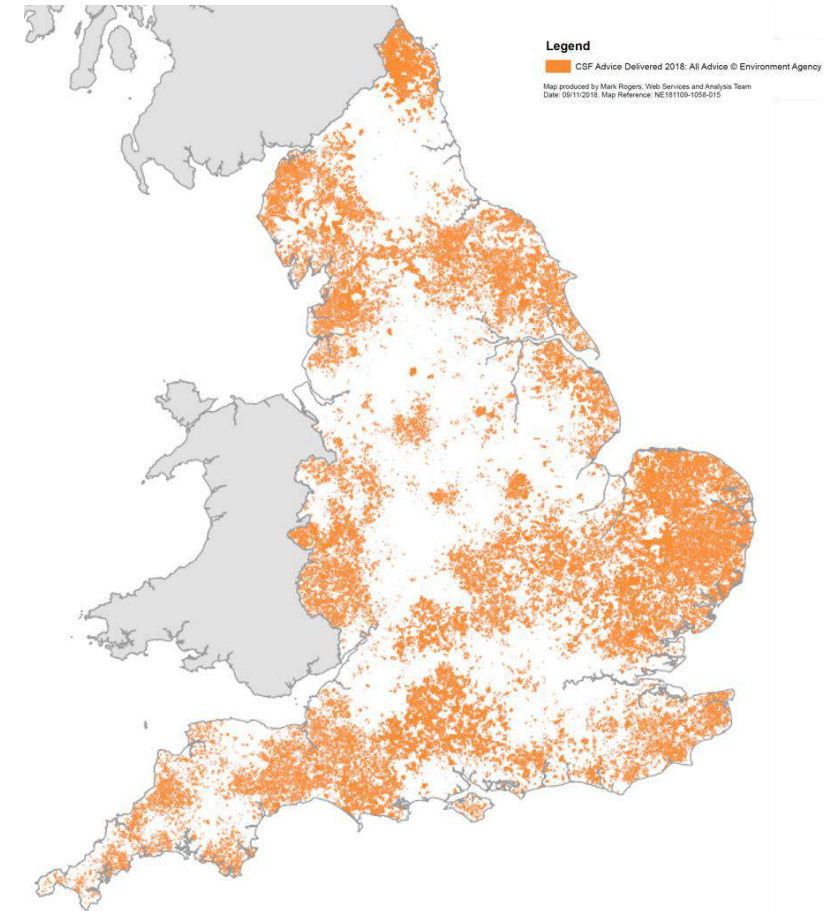
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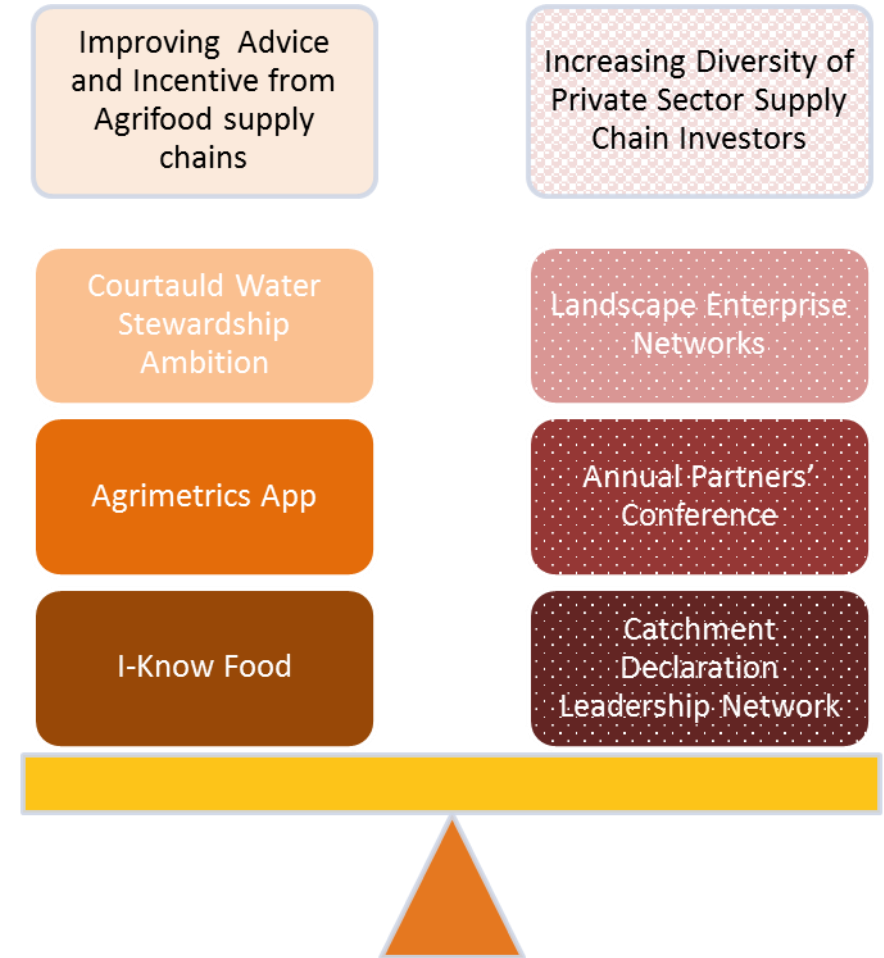
CSF: maximising effectiveness

- Improved ways to assist farmers
 - Better incentives
 - Better advice and more flexible products
- Staff
 - Training and development
- Helping more farmers
 - Wider scale and scope
 - Broader approach
- Research into delivery
 - Knowledge sharing



CSF: maximising effectiveness

- Working with a wider range of partners in new ways:
 - Water Companies
 - Supply Chain companies
 - Related sectors – forestry,



Future proofing

- How do we sustain change and adaptation – future proofing advice
- We have many of the tools – need to increase scale, scope and ambition.
- Increased advisory capacity
- Supporting flexibility and adaptability
 - Recognise long term nature of change
- Embedded business and environmental efficiency is critical
- We all need to ‘sweat the assets’



CSF – Working Together



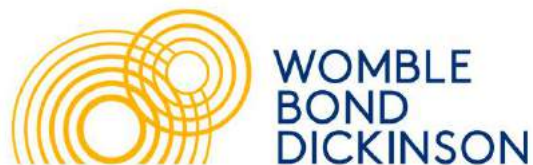
Working together with farmers for a healthy environment

Project Partners



NORTHERN FARMING CONFERENCE 2019

“Sweating the Assets”



Northern Farming Conference

Powering Pasture and the Relevance of Red Meat in the 21st Century

06 November 2019

Alex Brewster



The MacRobert Trust



2012 a challenging year.....



ROTMELL FARM: AT A GLANCE

Run by
Alastair
and Alex
Brewster

986ha
140ha improved
pasture/
120ha rough grazing

100
Aberdeen
Angus cows

800
Blackface
ewes

For more
information about the
QMS Grazing groups
please visit:
[www.qmscotland.co.uk/
grazing-groups](http://www.qmscotland.co.uk/grazing-groups)



Image: John Brock

He pointed out that a relatively productive pasture will use approximately 1200kg/ha of nitrogen and the vast majority of that comes naturally from the soil. Clover can fix 50 to 200kg/ha of nitrogen per year but will only do so when it has to. This could be a real challenge for any Scottish farmers who think that if they do not fertilise grass then it will not grow.

John was encouraged by the pasture on most of the farms he has seen in Scotland, and particularly at Rotmell where the clover swards were impressive. He said: "The Scottish soils seem to have less organic matter which makes a difference to the clover, but on the whole the pastures are fine. It is the management which is important."

Alex runs 800 Blackface ewes and 100 commercial Aberdeen Angus cows on 986 ha at Rotmell. The farm is all LFA, with around 140ha of improved pasture and 120ha of rough grazing.

"Market prices are beyond our control, so we have to become more efficient at producing kg of liveweight from grass."

Although he has experimented with rotational grazing for a couple of years, since joining the grazing group in July 2014, Alex has picked up a lot of ideas from the meetings. He said: "It is good to get the feedback from other farmers who are genuinely trying to cut costs. The market prices are beyond our control, so we have to become more efficient at producing kg of liveweight from grass."

One of the ideas grazing group host Alex Brewster is putting into practice this year is to run his 50 spring calving cows and heifers as one batch with two bulls. He hopes this will improve conception rates and shorten the calving period, while helping with grass management. He operates a three ha paddock rotational grazing system and explained: "The ewes with twins are a priority in the summer and they get first shot at the grass for 48 hours, eating the best of the leaf and clover. Then the big mob of cows come in and clean up for up to 48 hours, before the field is left for 21 days until grass growth is 8 to 10cm or 2500kg/ha DM.

"The theory is that we are using stock to manage the grass while increasing production at the same time. Ryegrass and clover want to reproduce, so we are using stock to control the growth. We try to graze between 1500 and 2500kg/ha DM. If it gets to more than 2700kg/ha DM then it needs to be kept for silage, as it has lost its full grazing potential."

He is currently using electric fencing for his paddocks but is planning something more permanent this year. "It may seem like a lot of work moving stock every two days but it takes no longer to walk them through a gate into the next field than it would to check them," said Alex.

Michael said that managing grass is as much of a skill as stockmanship. He said: "Parallel to all grazing group meetings, we like to see step-by-step changes in how the rotational grazing is developing. We are definitely seeing that at Rotmell."

Alex agreed, saying: "As farmers, we are guilty of concentrating on stock and we do not give enough consideration to what the stock eats." He is heading to New Zealand for a couple of months in January to see for himself how grass is managed on the other side of the world.

"I believe that subsidies are on their way out, and in order to grow the business I need the tools to do it," said Alex. "Fertiliser and concentrate feed are very expensive, and lamb and beef prices are beyond our control, so the only way forward I can see is to be technically able and produce meat from grass."♦

Paddock rotational grazing system



Sheep are grazed for **2 days** then cattle are grazed for **2 days**. The field is then left for **21 days** until grass growth is **8 to 10cm** or **2500kg/ha DM**

BETTER PASTURE MANAGEMENT CAN DOUBLE PRODUCTION

Managing grass, and in particular white clover, was the theme of a QMS Grazing Group meeting held on **Alastair and Alex Brewster's** Rotmell Farm at Dunkeld earlier in the summer.

Several local farmers attended this fourth meeting of the Perthshire group and Michael Blanche, QMS Knowledge Transfer Specialist, said he was pleased with the commitment farmers are showing to the group.

"The aim of the grazing groups is to increase kg of liveweight produced per hectare through better utilisation of grass," said Michael.

"The theory is that farmers can double production over average set-stocking systems through better pasture management and, through the grazing groups, we are setting out to prove this."

There are six grazing groups in Scotland – from Tain in the north to Glenluce in the south – and they are now at a stage where benchmarking is starting to mean something.

Michael added: "We are developing cost of production figures meeting by meeting and measuring soil temperatures and grass growth in order to make comparisons.

"Everyone can see that grass growth is less than last year. However, we have measured it and we have grown less than 70% of the grass we grew last year.

"That is over a tonne of dry matter per hectare as of June 1st. Over three years, we will be able to build a picture of growth trends and costs of production. Knowing this information is one step; the real leap is how we fit our grazing systems to make the most of these growth curves and hence reduce production costs."

New Zealand pasture researcher John Brock spoke to the meeting about white clover. He said it underpins New Zealand pastoral agriculture, with research showing 60% of white clover in the diet is optimum for animal production.

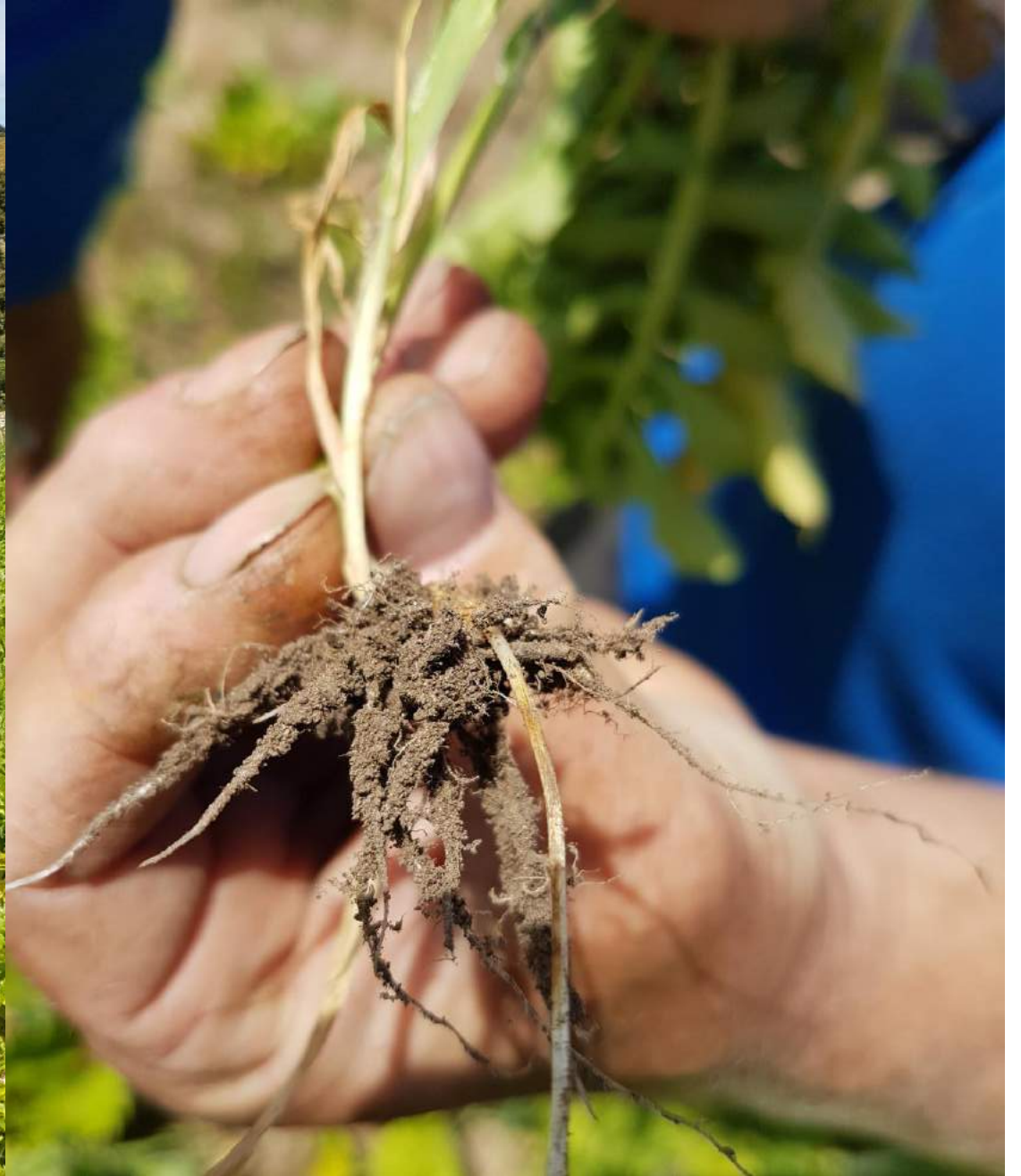
"There is no doubt that those present will have left the meeting with a better understanding of how to establish and manage white clover, and one of the key messages from John was that clover will only fix nitrogen if natural soil nitrogen is low, so there is no point in over-fertilising with bagged fertiliser.



It is Never too Late to Start to Change



Diversity of Natural Seed Bank



Feeding the Biota



Ewes in Tune with their Environment



Outstanding Eating Quality with Health Benefits - Omega 3



Built the Infrastructure to Increase Stocking Density and Driven Down Root Systems
Increased Soil Biota and Increased Resilience

The Soil Food Web

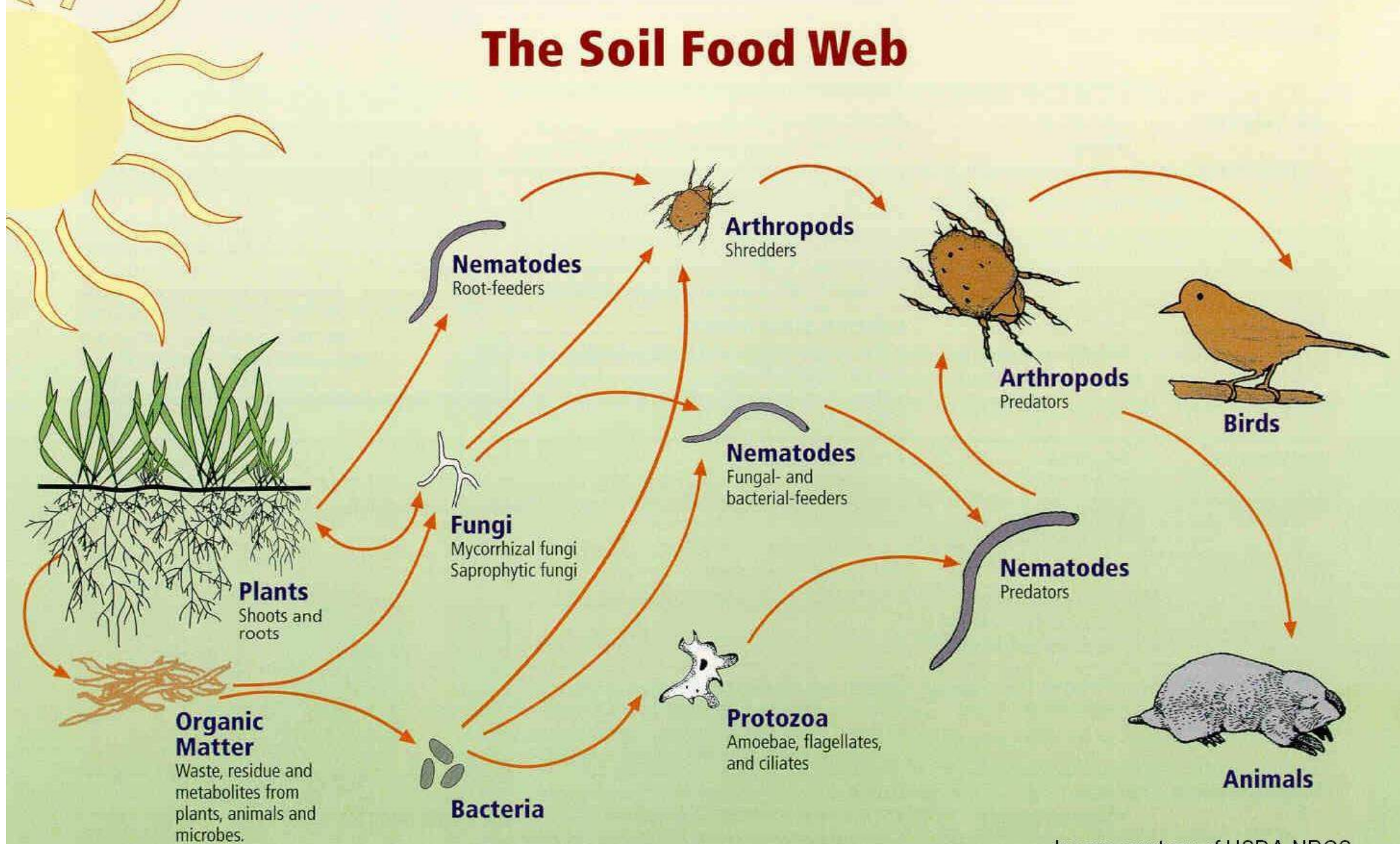
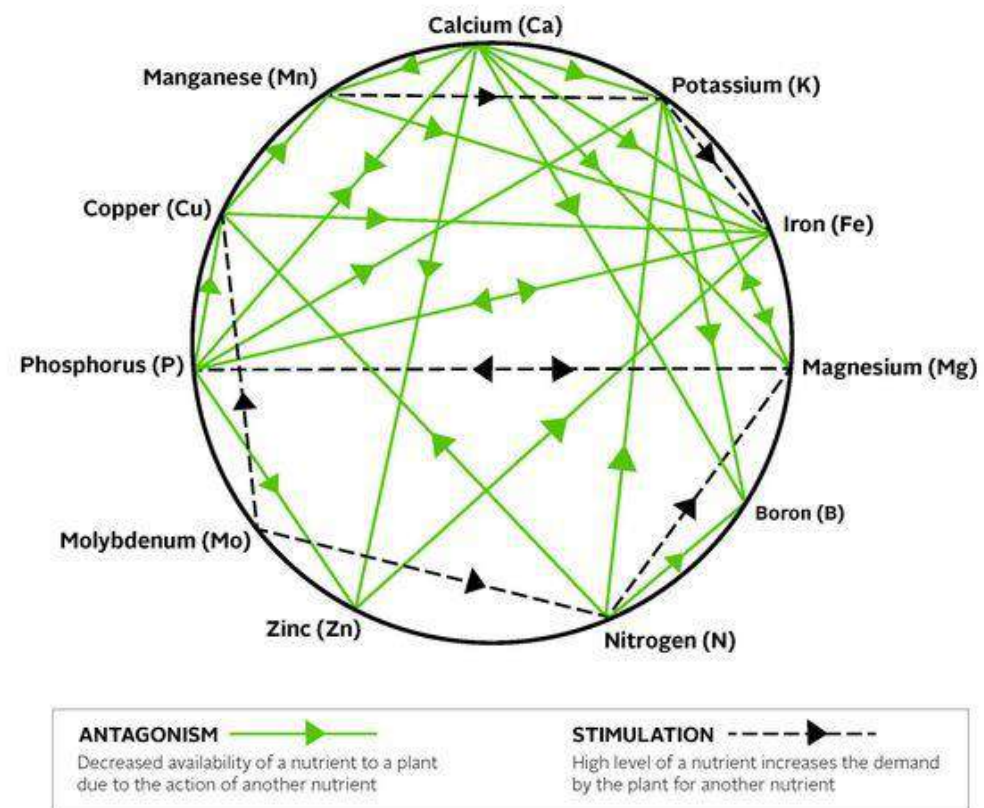
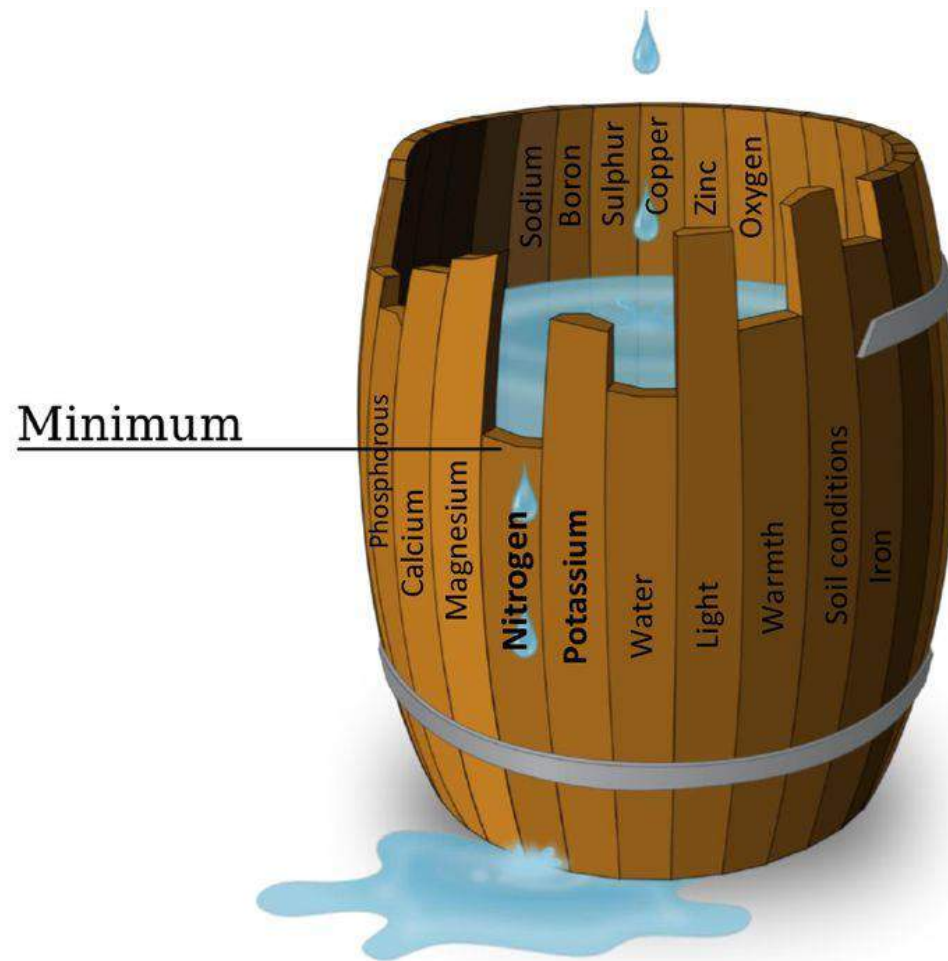


Image courtesy of USDA-NRCS



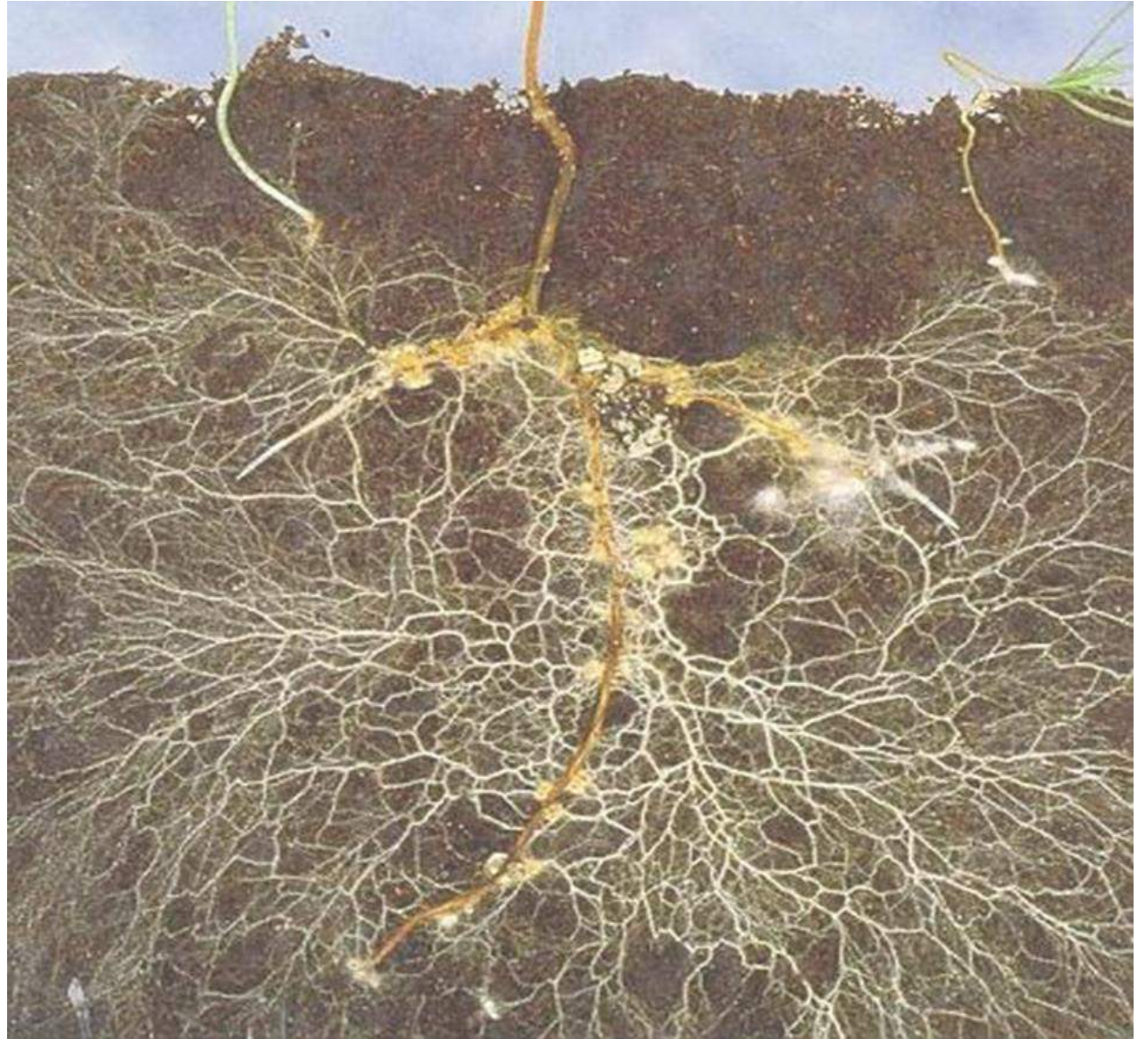
DO YOU ALL UNDERSTAND THIS?

Farming is an Ecosystems Management Business

- Mineral
- Water
- Air
- SOM

Farming is a Biological Business

- Soil Biota
- Fungi
- Nutrient transfer



Build Photosynthetic Capacity

Build Photosynthetic Rate

Solar Energy into Biological
Energy

Feeding the Biota

Increasing Feed Value



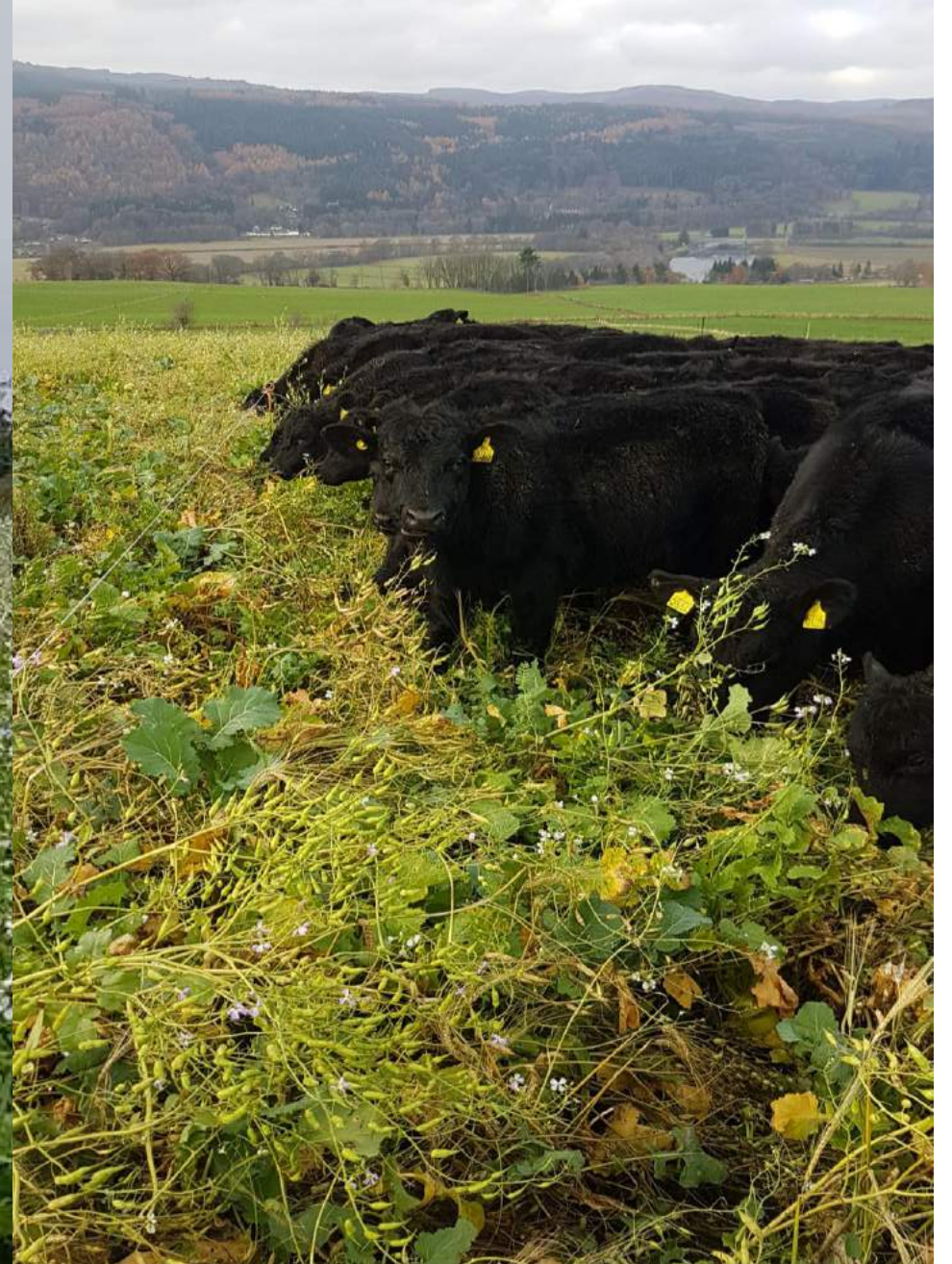
1% increase in SOM 225T W/HA

1% Increase in SOM £1800
Available minerals

80 Ton Atmospheric N above
every Ha

And Oxygen is our by product

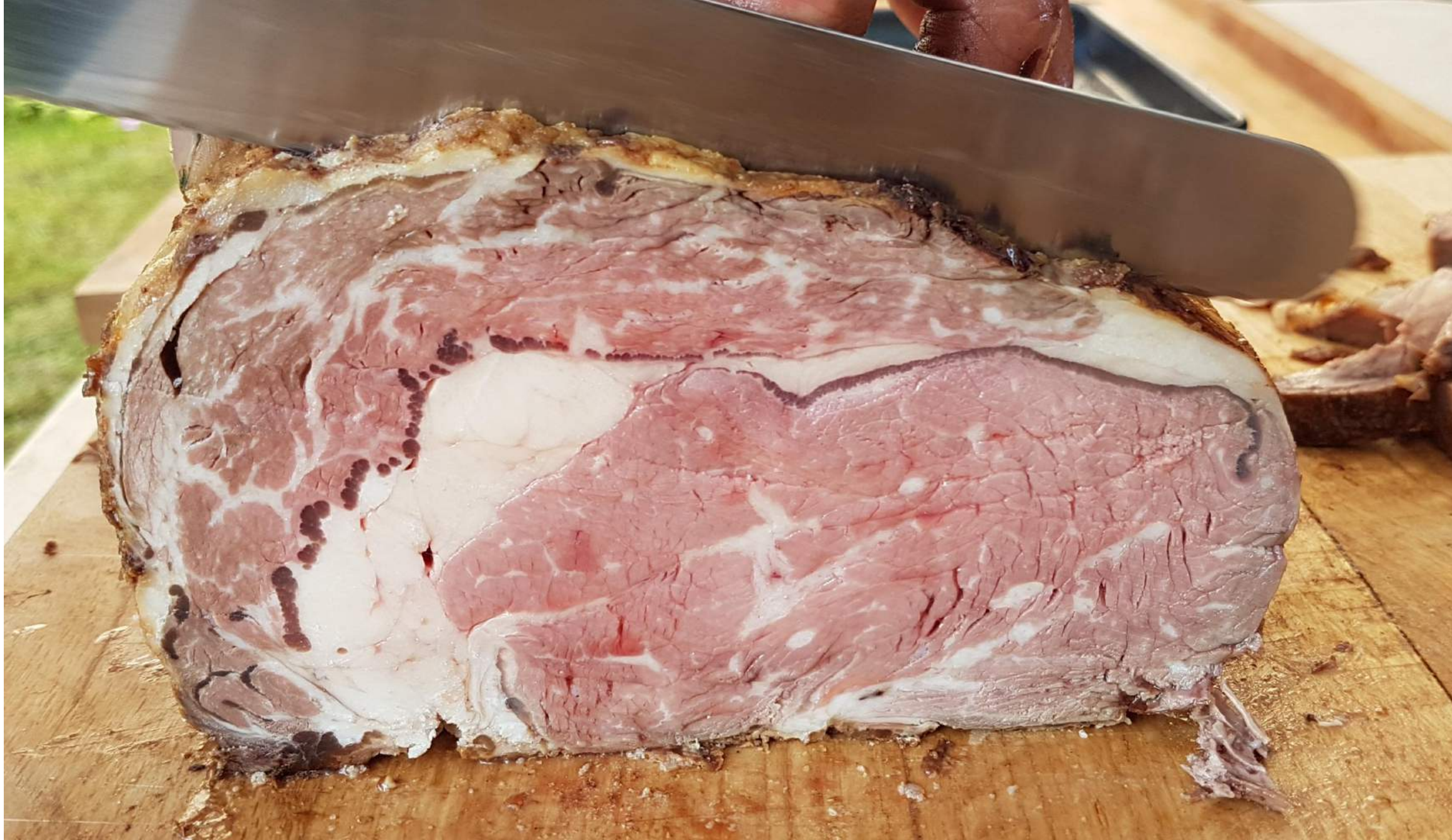




Increased Diversity – with Animals that are in Tune with their Environment



The Creator or the Saviour for Global Warming!



The Future is Bright

-

The Future is Diverse

-

The Future is Green



I'm Sweating the Asset – Are YOU!