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Can Regenerative Agriculture improve the health and welfare of livestock?

Written by:

Claire Whittle NSch

April 2025

A NUFFIELD FARMING SCHOLARSHIPS REPORT

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Date of report: February 2025

NUFFIELD Farming Scholarships

"Leading positive change in agriculture. Inspiring passion and potential in people."

Title	Can Regenerative Agriculture improve the health and welfare of livestock?
Scholar	Claire Whittle
Sponsor	McDonalds UK & Ireland
Objectives of Study Tour	To understand how regenerative agriculture impacts on health and welfare of livestock. To understand the effects of a changing climate on farm resilience
Countries Visited	United Kingdom USA Australia
Messages	• Management of livestock remains the most vital determinant of positive health and welfare outcomes. Good husbandry, observation and attention to detail, are key attributes of a good stockperson. • Freedom to express natural behaviour and giving livestock a 'life worth living' must become the baseline of good welfare practice. • Understanding the root cause of disease can help identify bottlenecks to health and welfare in any livestock system. • Landscape design is as fundamental to livestock welfare as housing design and long-term, sustainable farm planning for a changing climate is crucial. Breeding has role to play here too. • Regenerative agriculture can not only improve livestock health and welfare - it has the potential to improve the health of entire ecosystems on a global scale. Government policy and the supply chain must support farm businesses to move towards a regenerative future.

EXECUTIVE SUMMARY

In the face of growing climate concerns and environmental degradation, the UK livestock industry is facing increasing scrutiny for both its ethical and environmental impacts. As food systems have become more industrialised globally there have been increasing concerns over the health and welfare of livestock as animals are often pushed to their physical and psychological limits in the name of efficiency and progress.

Living on a planet of finite resources with an expanding human population is a very real concern when it comes to food availability. Scaling-up production has been seen as the only viable solution to ensure the world does not go hungry. This, combined with the ready availability of ammonia-based fertilisers- a legacy of the post-world war munitions industry- alongside increased use of pesticides and fossil fuels has driven intensification worldwide. The world now produces more than enough food for its growing population but politics ensures it does not reach those that need it most. Intensification has also come at a huge environmental cost. In a conventional food system where land degradation, river contamination, poor air quality, nature depletion and a heavy reliance on fossil fuels and other chemical inputs are considered normal, it is unsurprising that farming, human health and the planet have reached a crisis point.

Regenerative agriculture offers an alternative solution. It aims to improve degraded soils, biodiversity and climate resilience by farming as close to nature as possible and to make farming businesses both more profitable and productive whilst reducing the need for external inputs.

This study was undertaken to understand if regenerative agriculture can improve the health and welfare of livestock.

As part of this project, I visited the USA where there are several ongoing long-term studies on regenerative agriculture. I also visited Australia where an increasingly hostile climate is forcing change to more resilient farming methods. I also travelled throughout the UK mainland to visit farmers who are adopting regenerative practices in different ways.

Although management of livestock is the most vital determinant of health and welfare within any farming system, animals that are walking a metabolic knife-edge due to high levels of production in intensive systems are more likely to require interventions. Understanding the root cause of disease can help producers to identify bottlenecks on their farms. Focussing on positive health and welfare outcomes alongside levels of disease is imperative here, as are sound and ethical breeding decisions. Observation and an open mindset are key attributes of a good stockperson.

Landscape design is as fundamental to livestock welfare as housing design and long-term, sustainable farm planning for a changing climate is crucial to ensure that health and welfare remains a priority in regenerative systems where animals are used as a tool to improve soil health.

Regenerative agriculture can not only improve livestock health and welfare - but it also has the potential to improve the health of entire ecosystems on a global scale. It is therefore, on the entire industry from policy to the supply chain to support a move to a more sustainable, regenerative future.

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The opinions expressed in this report are those of the author alone and not necessarily those of the Nuffield Farming Scholarships Trust, of the author's sponsor, or of any other sponsoring body.

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CHAPTER 1: INTRODUCTION

I grew up in and around Liverpool in a very urban environment. Weekends were often spent walking in Wales with my dad or on the beach with Mum and is probably why I grew up with such a love for the countryside and nature.

At school - unlike a lot of my peers, I picked subjects I was good at, not really knowing what I wanted to be when I grew up. However, after a short stint at university in Leeds I realised that my future was definitely not in modern languages.

From then until my early twenties I worked mainly in the hospitality and retail sectors in Liverpool City Centre before deciding to go back to college and ultimately undertaking an undergraduate degree in Veterinary Science at Liverpool University at the age of 24.

With the sole intention of becoming a small animal vet I did not anticipate that a dairy placement in my first year of vet school with an incredible farm manager could possibly change my mind. But now, after 10 years in the profession as a farm veterinary surgeon, I can honestly say it was the right choice.

A further Postgraduate Certificate in Conservation Medicine in 2019 consolidated my belief that healthy livestock are a vital part of a healthy farm ecosystem.

The author, Claire Whittle searching for dung beetles at a dairy farm in Shropshire. *Source: author's own*

CHAPTER 2: BACKGROUND TO MY STUDY SUBJECT

As our food systems have become more industrialised there has been increasing concern over the health and welfare of livestock within these systems. From broiler chickens to intensively housed cattle and pigs, the livestock industry is coming under increasing scrutiny for both its ethical and environmental impacts.

As a veterinary surgeon who has exposure to a variety of farming systems I can honestly say that I have seen good and poor examples of both intensive and extensive farming systems. But what I wanted to understand was, if regenerative agriculture proposed it could improve the health of soils and ecosystems, was it also able to improve the health and welfare of the livestock within those systems?

As a vet interested in conservation I became interested in regenerative agriculture and the benefits these farming principles can bring in terms of increasing biodiversity, enhancing ecosystems and improving soils. However I could not find information about the actual benefits to livestock in terms of health and welfare. Indeed, many advocates of regenerative agriculture report the use of reduced antibiotic usage and veterinary intervention.

I understood from my postgraduate studies in Conservation Medicine that biodiversity decreases rates of disease transmission. So, could farming alongside nature provide the answer? Does plant biodiversity impact on livestock health? Do animals perform better in natural systems with less inputs? Should we be farming for profit rather than yield?

Ultimately, if these principles improve animal health and welfare, adopting some of them can only bring about change for the better and may make better financial and environmental sense. By understanding regenerative farming systems better, I believe this will give me the skills to advise farmers on how to produce animals in a more sustainable way which will benefit the land and their business.

It will also further fuel my desire to improve the consumer perception of farming and the benefits of livestock in ecosystems. I grew up in a city and have family and friends from that background. With recent research of the negative impact of conventional farming methods on climate change and the 'vegan movement' I've found myself having to increasingly defend the industry I work in and love. Defending the high welfare standards of British farming has always come easy in comparison to the environmental impacts. I want to balance the scales!

I hope British farming can become the environmental blueprint for farming the world over. I believe this is possible and, with the introduction of the new Environmental Land Management Scheme (ELMS), farmers will be paid fairly in future for providing ecosystem services and not just for yield or land area. This

should see many more landowners adopting more environmentally friendly practices.

CHAPTER 3: MY STUDY TOUR

I visited the following countries during my study tour.

Where	Comments
UK – Northern Tour August 2021	Due to the effects of Covid-19 and travel abroad limited, my first visits took me across the North of England and into Scotland. I visited livestock, arable and other farming enterprises. I also undertook Holistic Management training at this time.
UK - Southern Tour October 2021	I visited a diverse range of farming businesses from research facilities to bull breeding farms, a farm-to-fork butchery and a mobile dairy farm.
United States July/August 2022	I undertook a 3-day immersive course into Regenerative Agriculture and business diversification in Virginia. I visited a variety of farming enterprises including Community Assisted Agriculture (CSA) schemes and farm shops. I also visited the Rodale Institute to learn about their long-term regenerative arable studies and a grass-fed, regenerative dairy co-operative.
Australia October 2022	I visited several businesses from farms to restaurants to better understand how severe weather and climate changes are forcing change to more resilient farming methods in many farm businesses

CHAPTER 4: DEFINING REGENERATIVE AGRICULTURE

Although it was not the focus of this report, intensive agriculture's impact upon the earth cannot be understated. In a system where land degradation, river contamination, poor air quality and a heavy reliance on fossil fuels are considered normal, I wanted to understand if there was another way.

There are many and varied definitions of regenerative agriculture but for the purposes of this report I will use Groundswell Agriculture's which is:

> "*Any form of farming, food or fibre which at the same time improves the environment. It is a direction of travel, not an absolute. "*

For me, it means farming as close to nature as possible. In nature, cattle, sheep and chickens are part of an ecosystem with a whole host of plants, animals, birds and insects that rely on them and which they in turn, rely on.

One of the major contentions surrounding regenerative agriculture is that it lacks a defined definition, both nationally and at a global scale, which means it cannot be standardised. But for me, and many of the farms I visited – this is where the magic happens!

Regenerative agriculture is a dynamic concept that understands every farm is its own ecosystem, with its own unique challenges ranging from latitude and longitude to geology, soil type, elevation, climate, rainfall, historical land use and individual farm context i.e. what the business aiming to achieve. It understands that a 'one-size-fits-all' approach to farm management does not work.

Working in a large dairy practice, I don't think of fully housed, high-yielding cows as being part of an ecosystem. For a cow to yield 70 litres of milk a day, she is walking a metabolic knife-edge, and is going to require inputs outside of what is naturally available on that farm. Concentrate feeds, fertility hormones, veterinary and medicine inputs, labour and bedding to name a few - and within that environment, through no fault of her own, she becomes totally self-serving.

And so, can regenerative agriculture, where livestock naturally form part of an ecosystem improve not only our natural environment, but also that of the livestock within it?

CHAPTER 5: DEFINING LIVESTOCK HEALTH AND WELFARE

5.1 The current picture

The World Health Organisation describes health in humans as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity which encompasses both health and welfare aspects."

To ensure the health of livestock, parameters for livestock in UK agriculture are monitored by schemes such as Red Tractor (England) and Farm Assured Welsh Livestock (FAWL) with supermarket contracts and organic systems having their own set of standards. Health in farming systems is usually defined by the absence of disease. As an example, in dairy herds, farmers must collate the number of cases of lameness, mastitis and mortality on an annual basis (see Fig. 1 for an example template). There are further voluntary accreditation schemes for animal health such as CHeCS which helps farmers to control or eradicate infectious diseases.

Clinical Mastitis						
No. of cases total		**No. of cases Per 100 cows***			**Comments**	
Lameness						
No. of cases total		**No. of cases Per 100 cows***			**Comments**	
Mobility Scoring *Score 2 and 3 cows* *(impaired and severely impaired mobility)*	**Date** **Date** **Date**		**No Scored** **No Scored** **No Scored**		**No impaired** **No impaired** **No impaired**	
Culling Rate	**Total**		**No. of cases Per 100 cows***			
Involuntary Culls	**Total**		**No. of cases Per 100 cows***			

Fig 1. Red Tractor template for collation of animal health parameters

Animal welfare as described by the World Organisation for Animal Health (WOAH) is "the physical and mental state of an animal in relation to the conditions in which it lives and dies."

Welfare is therefore, no doubt improved in livestock when physical health issues are addressed, although the theme of welfare as the 'psychological' perspective of an animal is far less discussed. The drive for higher yields at lower costs means

animals are pushed to their physiological limits, but the tightly controlled systems in which these animals operate likely have psychological impacts. WOAH rightly states that animal welfare is "complex and multi-faceted with scientific, ethical, economic, cultural, social, religious and political dimensions." In the UK, we consider ourselves to have some of the highest animal welfare standards in the world, but what do we mean when we say that? We should remain cautious of overstating our position in a diverse global system.

Alongside many animal health organisations, such as the UK Royal Society for the Prevention of Cruelty to Animals (RSPCA) and its American counterpart (ASPCA), WOAH's guiding principles for welfare in terrestrial animals utilises the 'Five Freedoms' model to describe our society's expectations for the conditions that animals should experience when under human control. The Five Freedoms were developed in response to a 1965 UK government report on livestock husbandry and formalised in 1979, by the UK Farm Animal Welfare Council (FAWC). These freedoms can be found in Fig 2.

5.2 The Five Domains of Animal welfare

The Five Domains model was introduced in 1994 by Professor David Mellor and Dr. Cam Reid, as a framework that allows for a distinction to be made between the physical factors that affect an animal's welfare and the mental state of the animal arising from these factors. I have laid the 'Freedoms' and 'Domains' out side-by side in the following table (Fig 2.)

The Five Freedoms	The Five Domains
Freedom from hunger or thirst by ready access to fresh water and a diet to maintain full health and vigour.	Nutrition - giving sufficient, balanced, varied, and clean food and water.
Freedom from discomfort by providing an appropriate environment and comfortable resting area.	Environment - comfort through temperature, substrate, space, air, odour, noise, and predictability.
Freedom from pain, injury or disease by prevention or rapid diagnosis and treatment.	Health - enabling good health through the absence of disease, injury, impairment with a good fitness level.
Freedom to express natural behaviour	Behaviour - providing varied, novel, and engaging enrichment through sensory inputs, exploration, foraging, bonding, playing, retreating, and others
Freedom from fear and distress by ensuring conditions and treatment which avoid mental suffering.	Mental state - the animal should benefit from predominantly positive states, e.g., pleasure or comfort, while reducing negative states such as fear, frustration, hunger, pain, or boredom

Fig 2. The Five Freedoms and corresponding Domains

The Animal Welfare Act 2006 is the principal law relating to animal welfare, protecting all vertebrate animals, and is the responsibility of any owner/keeper of animals from pets to farmed livestock.

5.3 A Life worth Living.

In 2016, Mellor suggested that a move towards a 'life worth living' should be considered, to minimise negative experiences and at the same time to provide the animals with opportunities to have positive experiences. He introduced a 'Quality of Life' Scale which can be seen below (Fig 3).

Category	Description
A good life	The balance of salient positive and negative experiences is strongly positive. Achieved by full compliance with best practice advice well above the minimum requirements of codes of practice or welfare
A life worth living	The balance of salient positive and negative experiences is favourable, but less so. Achieved by full compliance with the minimum requirements of code of practice or welfare that include elements which promote some positive experiences
Point of balance	The neutral point where salient positive and negative experiences are equally balanced
A life worth avoiding	The balance of salient positive and negative experiences is unfavourable, but can be remedied rapidly by veterinary treatment or a change in husbandry practices
A life not worth living	The balance of salient positive and negative experiences is strongly negative and cannot be remedied rapidly so that euthanasia is the only humane alternative

Fig 3. The Quality of Life Framework, Mellor et al. 2016

This study also concluded that 'during the 30 years since animal welfare emerged as a legitimate area of scientific study no universally endorsed definition of it has emerged'. Although the Five Freedoms model seems to be the most widely accepted, Mellor also added that 'ideas evolve in animal welfare science, as in all other disciplines, so that current definitions will inevitably need to be revised or replaced at some later date.'

Although most of these freedoms could be achieved by all farming systems to some extent - proponents of regenerative agriculture systems state that the 'freedom to express natural behaviour' can only truly occur when livestock have access to their natural environment. This does, however, bring its own issues – such as subjection to the vagaries of the weather and predation.

5.4 Redefining health and welfare – a life that is as natural and fulfilled as possible

In July 2022, I visited Polyface Farms in Virginia. Joel Salatin summed up some of the ethical debates around animal welfare when he stated that, yes, we are more than capable of providing a risk-free life for livestock – but is it ethical? He asked me: "What is the pigness of a pig or the chickenness of a chicken?" Take an intensive poultry system, where a chicken is vaccinated for most infectious diseases, has all the food it could need, access to water, shelter, a temperature-controlled environment but never feels the sun on its back.

Author with Joel Salatin of Polyface Farms

Pigs at Polyface Farm in a forest environment. One of their natural habitats.

When the 'Quality of Life' (QoL) framework is brought in – it does ask a question of some of our most intensive livestock systems in the UK. What is the QoL for a bird reared in an intensive housed system, designed for efficiency, with genetics that focus on rapid growth at the expense of mobility? Is 'enrichment' sufficient in these environments? Or should every animal have the right to feel the sun on its back? To choose. Would a person want to live in a completely risk-free environment all the time? Would you rather choose to climb a tree with a risk you may fall from it, than never be given the chance to climb a tree? Chickens are, in fact descended from jungle fowl. How far have we removed them from a natural life?

As vets, we are always careful not to anthropomorphise animals but, if we are not to, it seems appropriate that if we are to exploit them for our own gain, that it

should be our responsibility to provide them with as natural and fulfilled a life as we can. To give them 'a life worth living'.

5.5 : Understanding the root cause of health and welfare issues

As vets, we are taught to try and identify the root cause of problems but only ever within the confines of the management system itself. Clare Hill, who was director of FAI farms at the time, taught me to think further than that.

Clare leading a discussion around chicken welfare at Planton Farm

Clare had undertaken regenerative agriculture training a few years earlier and had transformed the high-input beef and sheep farm to a fully pasture-based, adaptive grazing system. Medicines use and veterinary inputs had reduced drastically, reflecting overall better health and welfare and the farm business was profitable.

How Clare tackled disease issues on the farm was refreshing. Disease problems were titled "Red Flags' and tackling them involved understanding the root cause of the problem.

As an example, Clare identified an ongoing issue with New Forest eye in cattle. Reducing the reliance on chemical parasiticides in the livestock was a crucial part of the farm's transition to regenerative farming. All licensed parasiticides are known to be detrimental to soil fauna, with knock-on effects on the food chain and a cause of environmental contamination. Clare realised that the heavy use of antiparasitic medication in the sheep flock was having a hugely detrimental effect on dung beetles, nature's own parasite control and other dung life including native fly parasites. These fly parasites remove the top of nuisance fly eggs, lay their own eggs inside them and greatly reduce nuisance fly numbers. However, as a fly, they are also detrimentally affected by chemical fly products. This, combined with resistance to many worming products in their sheep flock, made Clare realise that removing the sheep flock from their system was the only long-term option.

Cattle grazing long swards at FAI Farms in June 2022

I find it frustrating as a vet that it can often feel like I am putting sticking plasters over problems rather than getting to the bottom of them.

What if the root cause of calves getting pneumonia is not that the ventilation in sheds isn't good enough, but rather that calves should never have been put in sheds at all? What if the rise in eye infections or gutworm problems is not just because there are more nuisance flies or worms, but that the very products we use, the chemical antiparasitics kill our natural antiparasitics - the wonderful dung beetles, the parasitic wasps, the myriad of other insects in a dung ecosystem? The unintended consequence of using these products is that we then need to use more of these products. The only winner on the chemical control treadmill is the pharmaceutical industry. And we are lining their pockets.

CHAPTER 7: REGENERATING FOR RESILIENCE

7.1 Landscape design for livestock health and welfare

Travelling in Australia brought the question of landscape design for animal welfare into sharp focus. Erosion gullies are a common sight due to overgrazing, high rainfall and low levels of vegetation.

I met Martin Royds of Jillamatong Farm in 2022. Martin farms in the Southern Tablelands of New South Wales, Australia.

Martin's lightbulb moment came during a drought as he watched topsoil blowing off the land. And, when the rain did come, most of it ran straight off the land via the severe erosion gully that had formed in the centre of his farm.

Holistic management training at this point was vital to improve the ecological and economic health of his farm. Martin started his transition towards resilience by building a weir in the gulley to hold water on the land. As a result of this Martin no longer faces drought problems.

The erosion gully at Jillamatong has been transformed into a chain of ponds.
Photo credit: soils4life.org.au

Martin had a consistent problem with flies in the summer months whilst grazing the lower pastures on the farm. This made him reliant on chemical parasiticides or he would have issues with mastitis and eye infections which were his largest antibiotic inputs.

On hearing that flies hated wind, Martin changed his entire farm layout to farm 'in the vertical' rather than horizontally. He divided his 12 paddocks into over 50 and ran them lengthwise up the side of the slopes surrounding his farm instead

of along the contours. Cows could now move to the top into the wind to avoid flies if they wanted to. Martin also observed that cattle grazed the higher parts of the farm later in the day, where it was both cooler in summer and warmer in winter. This ability to express natural behaviour is an important welfare concern and Martin could see this in action. Also, by allowing his cattle access to different altitudes, he reduced overall fly worry and subsequent disease.

There was an uplift in biodiversity, as the cows brought seed and nutrients from the lower valley up to the top of the hill. He also no longer required antibiotics.

Cattle moving up the hillside at Jillamatong. *Photo credit: soils4life.org.au*

7.2 Breeding for resilience in a changing physical and economic climate

Charles Massy, author of 'The Call of the Reed Warbler' also farms in NSW. Charles was also implementing long-term farm planning mimicking natural savannah landscapes for his Merino sheep, produced mainly for their wool.

Charles also considered breeding to reduce inputs and improve welfare and with a team of geneticists is responsible for selectively breeding Soft Rolling Skin (SRS) Merino sheep which do not require mulesing.

Merino sheep have loose, wrinkly skin and are much more susceptible to flystrike than other breeds. Mulesing is a surgical procedure where the skin around the tail area of Merinos is removed with a pair of shears. Once the wound has healed the skin becomes tight around the tail. Little wool grows there due to scarring, which reduces urine and faeces build-up attracting blowfly, which causes flystrike. The practice is considered both inhumane and unethical due to the open wounds that are created.

The author and Charles Massy examine a fleece from one of his SRS Merino sheep

SRS Merino sheep do not require mulesing, but also, parasiticide use and therefore, the environmental impact of sheep farming is also drastically reduced.

Rob Havard of Phepson Angus near Worcester in the UK also considers breeding important in a regenerative system. He maintains that animals must be adapted to the system in which they operate. His breeding programme focusses on having robust, well-structured animals that can perform in an outdoor system. He argues that fertility is the most important indicator for profitability and that begins with a cow that is problem-free, grass efficient, long-lived and has a marketable calf every year. Rob only breeds from cows that get pregnant again within 60 days of calving to maximise on fertility improvements from generation to generation. Any animals that require any level of veterinary intervention are not maintained within the herd.

Rob Havard with his herd of Angus cattle in Worcestershire

Other breeding principles I came across on my travels were looking at reducing external inputs. For example, the use of Easycare sheep in regenerative systems in the UK where wool is a by-product. These sheep lose their fleece in the summer reducing the need for parasiticide use. Also Exlana sheep, where Tim White is focusing on breeding for resistance to parasitic worms, sound feet and teeth and reduced disease burden.

Selective breeding is used in all the above systems and is something that should be carefully considered for health and welfare in the UK, where the future of our herds/flocks will be impacted by climate change and therefore, how well animals perform in managed systems.

The 'right animal for the system' should be a major determinant in farmed landscapes.

7.3 Regenerative agriculture and business resilience

A highlight of my UK Nuffield travels was visiting Leigh and Neil Heseltine in the Yorkshire Dales. Neil was historically a prize-winning Swaledale breeder and proud of it. But his high-input business came at a high price with bought-in feed, fertiliser, labour and veterinary and medicine costs. Also his sheep, being selective grazers were steadily grazing out valuable species in the floristically diverse, calcareous grassland.

In 2003 Leigh and Neil joined the Limestone Country Beef project which aimed to restore this habitat to a favourable condition by encouraging appropriate land management practices. To do this, they established a herd of hardy Belted Galloways. Large herbivores were originally responsible for creating and maintaining the mosaic of habitats in the species-rich pastures of Malham tarn and as the years passed, Leigh and Neil began to see the return of nature where the cows were grazing, outwintered, with no inputs.

An example of diverse calcareous grassland at Leigh and Neil's farm

Neil Heseltine with his herd of Belted Galloways on a very foggy day!

This, compared to their conventional sheep system made them start to question their farming methods and in 2012 they took a deep dive into their farm finances. That year, in their intensively managed sheep flock, their profit was just 0.7% of their turnover. However, with the cattle their profit was 50%. The costs for the sheep flock were eye-wateringly high and yet, the cows had not received a single medical intervention or other input. If that's not an argument in favour of regenerating the land for livestock health, I'm not sure what is!

CHAPTER 8: DISCUSSION

My travels caused me to reflect on the very basics of animal health and welfare. About the value of a good stockperson and how their observations, attention to detail and husbandry practices remain at the forefront of positive health and welfare outcomes in any farmed system. In my opinion, what sets the best apart is not how well they anthropomorphise animals, but how they try to see things from their perspective and to change practices accordingly. Not just doing things because 'that is the way they have always been done'. An open mindset is crucial here. They understand that a reduced dependence on antibiotics and antiparasitics not only benefits their livestock, but also the environment.

Freedom to express natural behaviour is also a key component driving positive health and welfare outcomes and it is imperative that 'a life worth living' becomes the baseline standard for every livestock farm.

Farmers that understood the root cause of disease within their management system were pushing the boundaries in terms of what constituted exceptional welfare on their farms. It enabled them to see beyond the system itself and utilise a 'birds eye view' of their practices. Utilising the 'red flag' system helped them to identify bottlenecks to health and welfare and act on them accordingly.

My travels made me realise that we are very good at designing sheds for livestock but forget that many of them spend over half their lives outside. I watched a future Met Office weather forecast for July 2050 and it is hot. Plausible weather conditions see temperatures above 35°c for two weeks in a row or longer. At these temperatures, in cattle alone, feed intakes drop 20-50%. Fertility is negatively affected, the ability to fight disease is reduced and heifers born to heat stressed dams have reduced milk yield potential for up to three generations (Journal of Dairy Science, 2024). So how do we design adaptive grazing systems that allow animals to flow through farms on hot days, utilising tree cover, wood pasture and hedgerows to avoid heat stress? If we need trees to reach maturity by 2050 to provide shelter, shade and alternative fodder options, we need to be planting them now! Landscape design is fundamental to livestock welfare and must be considered.

Regenerative agriculture can not only improve livestock health and welfare - but it also has the potential to improve the health of entire ecosystems on a global scale through its avoidance of chemical products, bought-in feedstuffs and land degradation. Government policy and the supply chain must support farm businesses to move towards a regenerative future.

CHAPTER 9: RECOMMENDATIONS

- Management of livestock remains the most vital determinant of positive health and welfare outcomes. Good husbandry, observation and attention to detail, are key attributes of a good stockperson.

- Freedom to express natural behaviour and giving livestock a life worth living must become the baseline of good welfare practice.

- Understanding the root cause of disease can help identify bottlenecks to health and welfare in any farmed system.

- Landscape design is as fundamental to livestock welfare as housing design and long-term, sustainable farm planning for a changing climate is crucial. Breeding has a role to play here too.

- Regenerative agriculture can not only improve livestock health and welfare – it has the potential to improve the health of entire ecosystems, on a global scale. Government policy and the supply chain must support farm businesses to move towards a regenerative future.

CHAPTER 10: AFTER MY STUDY TOUR

With my travels over and convinced of the benefits of regenerative agriculture and more aware of the conflicts from an animal welfare perspective, I set up my own veterinary consultancy business – The Regenerative Vet. I now work with private clients across the UK to help them achieve their goals of farming with less inputs, without compromising health and welfare.

Since returning home, I have run several workshops in conjunction with the Woodland Trust on landscape design for livestock farmers. I have also worked on similar projects with suppliers such as Yeo Valley, First Milk and Lidl.

As the lead vet for the 'Dung Beetles for Farmers' team, my interest in farming with nature and reducing parasiticide usage means I am often travelling across the UK, speaking to farmer groups through schemes such as Pasture for Life or via online webinars for the Nature Friendly Farming Network. I also work with veterinary students on a regular basis to teach them about how we might facilitate farming with less inputs.

I have recently taken over the management of a 230-acre upland farm in Northeast Wales. My intention is to farm it as close to nature as possible. To make it a climate-resilient, circular, community farm. To never use any kind of chemical parasiticide, herbicide or fungicide on my livestock or the land. I truly believe this is possible.

What if I can make the farm a blueprint for farming without inputs? Nuffield Farming has given me the confidence to ask these kinds of questions, to stick my head above the parapet and stand up for what I believe in. To push myself out of my comfort zone. Which brings me to the question:

Should healthy animals even need vets?

The answer to that question could put me out of a job. But does it mean it doesn't need asking? It's not always easy to question yourself, your business or the industry. But when supermarkets and the supply chain continue to focus solely on high yields at low cost, it puts farmers, farm businesses and the planet at risk. It is on the entire industry, from government policy to banking organisations to support the move towards a more regenerative future. And it is up to us, as farmers, advisers and custodians of the land, to not just consider the health and welfare of our livestock or our crops but to consider the health and welfare of nature in every decision that we make. So that future generations can continue to farm. So that they too, can have a life worth living.

CHAPTER 11: ACKNOWLEDGEMENT AND THANKS

There are not enough words to express my gratitude to everybody who made this journey possible.

To Nuffield Farming and my sponsors McDonalds UK & Ireland, thank you for the opportunity.

To every single farmer, researcher and adviser that I have met over these few short years. Thank you, for opening up my world to the incredible potential of agriculture to make this fragile world a better one. If only we can change our mindset.

Patrick Whitefield articulated my thoughts brilliantly when he talked in his book *The Earth Care Manual* about whether we can save this horribly broken world? That, if we think about it too much, it's overwhelming, seems impossible and ultimately, relies on so many things outside of our control that we could never know. But also, that the question of whether we can save the world is the wrong one. The question should be:

How do you choose to live your life?

And the answer, is that I choose to live my life being part of the solution, not a part of the problem.

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