A Nuffield Farming Scholarships Trust Report

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Going against the Grain:
why Britain should be embracing and expanding the market for grass-fed meat and dairy

Oliver White

November 2016

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A Nuffield (UK) Farming Scholarships Trust Report

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Date of report: November 2016

Title	**Going against the Grain:** why Britain should be embracing and expanding the market for grass-fed meat and dairy
Scholar	Oliver White
Sponsor	Elizabeth Creak Charitable Trust
Objectives of Study Tour	Objectives of Study Tour • Why grass-fed? Understanding the benefits of producing, consuming and retailing grass-fed meat and dairy • Understanding what is driving the growth of the grass-fed movement around the world • Exploring the potential to grow this market in the UK and how this might be achieved.
Countries Visited	USA and Australia
Messages	• 100% grass-fed. Better for… human health, environmental health and animal health and attracts a price premium • 100% grass-fed offers a possible long term sustainable solution to producing ruminant-derived meat and dairy. We need to produce food, not feed: 'eat less, eat better quality'. • 100% grass-fed has become the antithesis of the industrial food system, with consumers of 100% grass-fed seeking a wholly naturally raised product, free of GMO, hormones and antibiotics • Growing consumer awareness of 100% grass-fed benefits and product demand increasing • Great opportunity for farmers, processors and retailers, adding value to a sector which offers limited product differentiation and value segmentation.

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DISCLAIMER

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

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1. Personal introduction

I am 33 years of age, a graduate in Agricultural Engineering from Harper Adams University and a fourth generation farmer. I am passionate about farming, about grass-fed regenerative agriculture and about farming in harmony with nature.

Inspired by Joel Salatin's book "You Can Farm", in 2010 I began my own journey into farming with 22 acres of permanent pasture. This was the remaining portion of the family farm following my father selling the milking herd in 1991.

Raising 100% grass-fed beef, lamb, pasture-raised chickens and geese, on an extensive, low input grass-based system, in 2011 I launched www.farm2fork.co.uk enabling me to retail my produce online to a nationwide consumer base and to maximise the retail value of my produce. The website also provides my customers with the story behind and an insight into my farm and farming methods.

Figure 1: The author, Oliver White (right) with his hero Joel Salatin, Polyface Farms, Virginia, USA

In 2014 I secured the tenancy of a 125 acre Somerset County Council farm, which presented me with a fantastic opportunity to scale my business and focus on growing and building what I hope will become a long farming career. My ambition is to sustainably increase productivity and diversity on my farm in order to create a viable, rewarding and environmentally-enhancing farming enterprise.

Alongside my farming enterprise I also work part time as Operations Manager for the Hestercombe Gardens Trust. Hestercombe is internationally famous for its 50 acres of grade 1 listed historic gardens spanning over three centuries of garden history and design, which are open to the public and welcome some 90,000 visitors a year. See www.hestercombe.com.

I am proud to have been awarded this Scholarship, as I shall be following in the footsteps of my grandfather, Ronald G P White, who was one of the first recipients of a Nuffield Farming Scholarship in 1949, and am looking forward to sharing the results of my research with Nuffield Farming Scholars, consumers, retailers and the wider farming community.

2. Background to my study objective

A growing number of farmers and consumers around the world has turned to producing and consuming 100% grass-fed meat and dairy, because science has shown that ruminant meat and dairy raised in this way can be better for human health, better for animal health, better for the natural environment, and also provide a greater return for the producer.

> *"The increasing consumption of animal protein is generally considered at odds with Earth's ability to feed its people. The 1 billion tonnes of wheat, barley, oats, rye, maize (corn), sorghum and millet poured annually into livestock troughs could feed some 3.5 billion humans. But such reasoning discounts the health benefits of eating modest amounts of meat and the fact that foraging animals can consume foods that humans cannot eat."*
>
> *Eisler, M. C. et al, 2014. Agriculture: Steps to sustainable livestock. Nature - International Weekly Journal of Science, [Online]. 507/7490, 32-34. Available at:* http://www.nature.com/news/agriculture-steps-to-sustainable-livestock-1.14796

Through this Scholarship I would like to achieve a wider understanding of the opportunities and benefits of a wholly grass-fed farming system that will enable it to become an accepted and significant component of the farming industry and at the same time raise awareness amongst producers, processors, retailers and consumers of the wide range of benefits that accrue from eating 100% grass-fed meat and dairy products.

My Nuffield Farming study would take me on a journey to:

- Understand what is driving the growth of the grass-fed movement around the world
- Understand what the future holds for grass-fed (in a world where livestock production is getting more industrialised)
- Understand the benefits to producing, consuming and retailing grass-fed
- Explore the potential to grow this market in the UK and how this might be achieved.

3. My study tour - where I went and why I chose those countries

I have been acutely aware that the majority of information I was finding about grass-fed originated from the USA, where pioneer farmers, researchers and consumers were leading the change. There was no question that the USA was where I needed to focus my initial studies. I travelled to the USA in October 2015, landing on the west coast in San Francisco for the Savory Institute's international conference 'Artisans of the Grasslands' before spending four weeks travelling east to visit with leading grass-fed enterprises in Colorado, Kansas, Georgia, New York and Virginia; meeting with farmers, retailers, processors, national grass-fed brands, grass-fed breeders and grass-fed educators.

> *"According to data compiled by the Wallace Center of the Winrock Foundation, retail sales of domestically produced grass-fed beef topped $400 million in 2013, compared to less than $5 million in 1998 when only about 100 beef producers were seriously involved in grass-fed beef production. In the past 10 years, the demand for grass-fed beef has grown at an annual rate of 25-30%. Recent consumer research indicates that this pace will not slow down significantly any time in the near future."*
>
> *Source: Allen R. Williams. 2014. Financial analysis shows grass-fed beef is good for producers. Available at: https://mosesorganic.org/farming/farming-topics/livestock/grass-fed-beef-is-good-for-producers/*

While in the USA I came to learn of the huge role that Australia was playing in underpinning the supply shortage of 100% grass-fed beef, such was the extent of consumer demand. So in March/April 2016 I made the trip to Tasmania, the Island State of Australia and considered Australia's 'gourmet island' with its temperate climate, rich fertile soils, clean air and pristine coastal seas producing outstanding seafood, beers, wines, honey, grass-fed meat, dairy products, fruit and vegetables.

Tasmania is promoted as Australia's 'natural' state with almost 45% of its land base in reserves, national parks, and World Heritage sites, while a quarter of its total land area of 68,300 sq km is committed to agriculture. Due to Tasmania's relatively small population of only 515,000 the vast majority of the island's agricultural produce is shipped to mainland Australia and other international markets. Demand for Tasmanian produce is strong, fetching a 7-9% premium over produce grown in other Australian states. To protect Tasmania's brand and identity the Government has placed an indefinite prohibition on GM crops, while hormones and antibiotics are not allowed in the promotion of livestock growth. (*See Brand Tasmania, http://www.brandtasmania.com/*).

I spent four weeks in Tasmania meeting with producers, processors and retailers and learning about the strong external demand for grass-fed beef and lamb and how their products are firmly established in niche markets around the world where quality is more important than price.

I would have liked to have extended my travels further into South America and Europe, but unfortunately I wasn't able to find the additional time and resources needed.

4. Why 100% grass-fed?

For the sake of clarity concerning my study title, and the various terms used in the marketplace when selling what is deemed a more natural product, I will give some definitions below:

GRASS-FED, PASTURE-RAISED and ORGANIC standards

1. The terms "grass-fed" and "pasture-fed" refer to ruminant farm animals: e.g. beef and dairy cattle, sheep, goats and a few other lesser known species such as deer.

2. It means that such livestock have never received any nutrition other than their mothers' milk and pasture (normally grass) or other greens. It specifically precludes the feeding of grain in any form.

3. Pasture can be fed to the animal in the form of hay and silage, although note that silage made from corn (maize) is not acceptable. It is acceptable for the animals to be housed indoors in inclement weather.

4. "Grass-fed" does not apply to pigs and poultry, which need to receive some form of concentrate in their diet. However, such stock can benefit by being given free access to fresh pasture. In that case they are referred to as "pasture-raised".

5. Cattle and sheep can be pasture-raised – because they have spent all their life outdoors – but could nevertheless have been fed grain in some form. Therefore "pasture-raised" is not necessarily the same thing as "grass-fed".

6. Neither grass-fed nor pasture-raised livestock necessarily qualify for organic certification. "Organic" means that only natural fertilisers are used and pesticides severely restricted. Must not be given hormones or antibiotics. Can be fed grain, but only if that grain is produced to organic standards and not of GMO origin. Must be truly free range with access to shelter.

7. The application of generic terms "grass-fed" and "pasture-fed" is not protected by any patenting. Specific marketing brands however have laid down their own standards. The discerning customer – and the farmer/producer - should check these out.

For further information see: https://www.soilassociation.org/

Returning to an all-natural method of grazing boasts a whole host of benefits: from human and animal health, to the regeneration and creation of new eco-systems, replenishment of soil systems and financial gain. Relatively straightforward to implement and with the promise of ensuring a holistic and healthy way to farm, the positives of 100% grass-fed farming far outweigh the negatives.

4a. Farmer benefits

Grazing-based farming systems typically have lower operating costs, less expensive infrastructure requirements and are less risky, taking a more natural, holistic approach to food production, which can make good economic sense for the farmer in a volatile marketplace.

Feeding pasture to ruminants is a much cheaper source of feed than growing or buying-in cereal-based rations, which can fluctuate widely based on world supply and demand.

Ruminants raised on a natural forage-based diet tend to be healthier requiring little veterinary attention.

100% grass-fed meat and dairy is considered a premium product and commands a higher price vs conventionally produced meat and dairy.

In Europe and in the UK well managed grass-based farming systems qualify for government environmental stewardship scheme grants, which set out to enhance the ecology of the farm and wider countryside. (*The Pasture Fed Livestock Association, http://www.pastureforlife.org/)*

4b. Animal health benefits

Grazing-based systems have a greater potential for delivering higher welfare standards that promote a 'good life'. This provides opportunities for the animals to enjoy a natural diet and an environment which encourages natural behaviour, excellent health, comfort, interest, pleasure and confidence. *(Chris Sutton & Sue Dibb. 2013. Prime Cuts: Valuing the meat we eat. WWF UK & The Food Ethics Council [ONLINE] at: http://assets.wwf.org.uk/downloads/prime_cuts_food_report_feb2013.pdf.*

Ruminants evolved to eat grass exclusively. Feeding them a diet rich in grains raises the acidity in the rumen to dangerous levels (cattle on pasture have a rumen pH of 7, which is neutral), creating health conditions such as acidosis, necessitating medications and antibiotics which then create prime conditions for the existence of E. Coli. (*Bill Kiernan. 2012. GRASS FED VERSUS CORN FED: YOU ARE WHAT YOUR FOOD EATS. [ONLINE] Available at: http://www.globalaginvesting.com/grass-fed-versus-corn-fed-you-are-what-your-food-eats/.)*

Keeping animals at high densities spreads infectious diseases far and fast. The foot-and-mouth virus costs US$5 billion each year in vaccinations and lost production worldwide. The UK foot-and-mouth epidemic in 2001 resulted in the slaughter of 6 million animals. Bovine tuberculosis has cost UK taxpayers alone £500 million (US$830 million) over the past decade — an amount projected to double in the next ten years. Market disruptions and losses are felt across industries including agriculture, transportation and tourism. (*Eisler, M. C. et al, 2014. Agriculture: Steps to sustainable livestock. Nature - International Weekly Journal of Science, [Online]. 507/7490, 32-34. Available at: http://www.nature.com/news/agriculture-steps-to-sustainable-livestock-1.14796)*

4c. Human health benefits

As livestock farming makes continuous strides to industrial intensification, driven by a desire to improve farming efficiencies and productivity, the livestock in these systems are more often than not

being fed a diet which they were not evolutionarily designed to eat; with their natural diet of grasses, grubs and bugs replaced or supplemented with cereal grains, soya and maize corn.

A recent scientific review in the Nutrition Journal concluded that research (spanning three decades) supports the argument that grass-fed meat is better for humans when compared to grain-fed meat. In summary:

- Grass-fed beef (on a g/g fat basis), has a more desirable saturated fatty acid lipid profile.
- Grass-fed beef is higher in total conjugated linoleic acid (CLA), trans-vaccenic acid and Omega 3 fatty acids on a g/g (gram for gram) fat basis. This results in a better Omega-6:Omega-3 ratio that is preferred by the nutritional community. Omega-3 fatty acids, a form of polyunsaturated fats, are the healthy fats typically found in oily fish and linseed oil, the presence of Omega-3 fatty acid counters the commonly held view that red meat is unhealthy. Omega-3 fatty acids are also known to reduce inflammation and help prevent certain chronic diseases such as heart disease and arthritis.
- Grass-fed beef is higher in precursors for Vitamin A and E and cancer fighting antioxidants such as glutathione and superoxide dismutase.
- Grass-fed beef tends to be lower in overall fat content, an important consideration for those consumers interested in decreasing overall fat consumption.
- Grass-fed beef possesses a distinct grass flavour and unique cooking qualities that should be considered when making the transition from grain-fed beef.

It is further noted within the report that in order to maximise the favourable lipid profile and to guarantee the elevated antioxidant content, animals should be finished on 100% grass or pasture-based diets. (*See Daley, C. A. et al, 2010. A review of fatty acid profiles and antioxidant content in grass-fed and grain-fed beef. Online. Nutrition Journal, 10.1186/1475-2891-9-10. Available at:http://nutritionj.biomedcentral.com/articles/10.1186/1475-2891-9-10)*

4d. Environmental and sustainability benefits

The livestock sector accounts for 14.5% of human-induced greenhouse-gas emissions, exceeding that from transportation. However, when other factors are considered, the picture for grassland based livestock production is much more favourable. About 60% of agricultural land worldwide is covered by grasslands, much of it marginal land which could not otherwise grow crops. With ruminants' unique ability to convert high-cellulose plant materials inedible to humans, into high quality meat and dairy that we can eat, sustainably managed grasslands play a major role in maintaining food production as well as fulfilling many crucial ecological functions. These include:

- Increasing biodiversity
- Increasing fertility
- Maintaining ecosystem services
- Improving carbon capture by plants and soil. *(Eisler, M. C. et al, 2014. Agriculture: Steps to sustainable livestock. Nature - International Weekly Journal of Science, [Online]. 507/7490, 32-34. See: http://www.nature.com/news/agriculture-steps-to-sustainable-livestock-1.14796)*

With a worldwide population forecast to grow to 9.7 billion (an increase of 3 billion) by 2050 it is not feasible to continue feeding grains to livestock which could otherwise be fed to humans. (www.un.org/en/development/desa/news/population/2015-report.html). Currently around 70% of the grains used by developed countries are fed to animals. Livestock consume an estimated one-third or more of the world's cereal grain, with 40% of such feed going to ruminants, mainly cattle. *(Food and Agriculture Organization, (FAO), 2003. World agriculture: towards 2015/2030. 1st ed. UK & USA: Earthscan Publications Ltd)*

But it is possible to feed the world from 100% grass-fed ruminants. The United Nations Food & Agriculture Organisation (FAO) has modelled a scenario in 2050 whereby the global environmental impact of livestock production could be mitigated if there was a complete shift towards a grassland-only and zero human-edible concentrate-feed-based production system. The model forecast a reduction in environmental impact to the following levels:

- Greenhouse gas emissions −18%;
- Arable land occupation −26%;
- N-surplus −46%;
- P-surplus −40%;
- Non-renewable energy use −36%,
- Pesticide use intensity −22%,
- Freshwater use −21%,
- Soil erosion potential −12%). *(Schader, C. et al, 2015. Impacts of feeding less food-competing feedstuffs to livestock on global food system sustainability. The Royal Society, [Online]. 12/113. Available at: http://rsif.royalsocietypublishing.org/content/12/113/20150891)*

For an extensive grassland-based livestock production strategy like this to be feasible, human diets will need to become much less meat intensive. We need to eat less, but better quality meat and dairy.

An increasing number of consumers acknowledge these functions and is willing to pay higher prices for foodstuffs produced in grass-based systems. This development may enhance the economic viability of grassland-based dairy and meat production systems compared to grain feeding. *(Christian Schader et al, 2013. SUSTAINABILITY AND ORGANIC LIVESTOCK MODELLING (SOL-m) Impacts of a global upscaling of low-input and organic livestock production Preliminary Results. (FAO) Natural Resources Management and Environment Department [ONLINE] Available at: http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/SOL-m_summary_Final.pdf)*

5. Who is the consumer?

In the current climate where consumers are more concerned with their health, the well-being of the animals that provide the food they eat, and the environmental impact of the farming system used, 100% grass-fed would appear to offer a clear marketing advantage.

Through television and other media it is apparent that the public are very interested in where their food comes from, low 'food miles', the well-being of farmed livestock and the beneficial effects of low impact farming. At the moment these products are still expensive to buy and difficult to source but it doesn't need to be that way.

In my experience there is a growing awareness by the public, followed by an increasing demand for, 100% grass-fed meat and dairy, largely being driven by popular lifestyle diets and wellness programmes. This change in public awareness of the food they eat, its origins, its ecological footprint, and its health benefits is an opportunity for farmers that has not yet been fully exploited.

Meat and dairy from ruminant livestock fed on a natural pasture-based diet has been shown to have a much healthier profile - maybe not that surprising when you consider it is the animal's natural diet.

5a. The ethical and organically-minded consumer

Another growing market in the UK is that of the ethical and organically-minded consumer, with grass-fed produce naturally sharing many of the attributes that a discerning ethical and organically minded consumer would be seeking, namely:

- healthier and more nutritious
- reduced antibiotic use
- reduced or no pesticide use
- better quality
- better taste
- better for the soil and environment
- better for animal welfare

Increasingly people are buying organic, with the young, healthy and socially conscious consumers contributing to the growth. Sales in the UK organic sector grew by 4.9% in 2015, now worth £1.95 billion and claiming a 1.4% share of the food and drink market. This trend is predicted to continue with future growth forecast to continue at 5% in 2016. *(The Soil Association, www.soilassociation.org)*

5b. Hormone, GMO and antibiotic-free

There is a growing concern amongst consumers around the world of the health impacts of eating meat which has been administered Hormone Growth Promoters (HGPs), antibiotics and Genetically Modified Organisms (GMOs).

100% grass-fed is viewed by consumers as a naturally raised product, and producers whose animals are certified as reared in this way are able to access market premiums.

Consumers of grass-fed are more willing to pay a premium than non-grass-fed beef purchasers.

"63% indicate a willingness to pay a 5% premium, while 12% are willing to pay more than a 10% premium. This premium is for factors including grass-fed; no added hormones; antibiotic free; free range; natural; organic; sustainably raised; raised per animal welfare guidelines." (Source: *Meat & LIvestock Australia, www.mla.com.au)*

5c. The health conscious consumer - Paleo, Weston A Price

One of the fastest growing markets in the UK for naturally reared 100% grass-fed meat is to the paleolithic diet community (also called the paleo diet, caveman diet or stone-age diet).

The Paleo diet is based upon eating wholesome, contemporary foods from the food groups our hunter-gatherer ancestors would have thrived on during the Paleolithic era, the time period from about 2.6 million years ago to the beginning of the agricultural revolution, about 10,000 years ago. These foods include fresh meats (preferably grass-produced or free-ranging beef, pork, lamb, poultry, and game meat), fish, seafood, fresh fruits, vegetables, seeds, nuts, and healthful oils (olive, coconut, avocado, macadamia, walnut and flaxseed). Dairy products, cereal grains, legumes, refined sugars and processed foods were not part of our ancestral menu. (*The Paleo Diet, http://thepaleodiet.com/)*

The Paleo community have put the term 'grass-fed' on the menu and work hard to seek the natural foods which are permitted within the diet. In response to this, books, shops, forums and 'experts' have popped up on and offline to satisfy this demand. This movement has gone viral worldwide and shows no signs of slowing down.

Another important group which advocates a similar 'natural' diet is the Weston A. Price Foundation. (*realfooddaily.blogpost.com*). Founded in 1999, the Foundation disseminates the research of nutrition pioneer Dr Weston Price, a dentist who in the 1930s identified that isolated 'primitive' tribal peoples had better teeth and general health than people living in developed industrialised countries. *(*www.allyourstrength.com/*).* He travelled the world researching the diets of the longest lived and healthiest peoples to establish the parameters of human health and determine the optimum characteristics of human diets. Dr. Price's research demonstrated that humans achieve perfect physical form and perfect health only when they consume nutrient-dense whole foods which include meats and fats from wild or pastured animals, raw dairy products, whole grains and foods preserved by fermentation.). Today the Foundation promotes these traditional diets in books, conferences, online and via local chapters (clubs) throughout the world.

5d. The Foodie

The term 'Foodie' incorporates those individuals who just appreciate great food, and seek new food experiences from the most delectable ingredients with a great supporting story. These individuals are likely to support local and short supply chains, provenance, welfare, and fair trade.

6. The global market

Production levels of 100% grass-fed meat and dairy vary massively across the world. Despite an awareness of the overall benefits from this system of farming, the UK has been reluctant to move forward at any pace within this system. The USA, Australia, Uruguay and parts of Europe have realised the opportunity and potential that 100% grass-fed systems offer, and have been at the forefront of a grass-fed "revolution" on which the UK has so far failed to capitalise.

6a. USA

The greatest consumer demand for certified 100% grass-fed is being seen in the USA, fuelled by consumers concerned with how animals are being treated in factory farms and feedlots, who want to lower their environmental footprint and are seeking healthier alternatives.

As a consequence sales of grass-fed and organic beef are rising rapidly. A decade ago, there were only about 50 grass-fed cattle operations left in the USA. Now there are thousands. The sector has experienced exponential growth over the past 15 years and shows no signs of slowing down. Retail sales of domestically produced grass-fed beef in the USA topped $400 million in 2013, compared to less than $5 million in 1998, with the demand for grass-fed beef growing at an annual rate of 25-30% over the past 10 years. (*Allen R. Williams. 2014. Financial analysis shows grass-fed beef is good for producers. Available at: https://mosesorganic.org/farming/farming-topics/livestock/grass-fed-beef-is-good-for-producers/)*

> *"The market share in the U.S. for grass-fed beef now totals about 7%. However, this is a combination of both domestically produced product and imported product. In 2015, there were about 225,000 head of grass-fed beef harvested in the U.S. with a retail value exceeding $550 million. Another $2 billion+ of grass-fed beef was imported into the U.S. from Australia, New Zealand, and South America."* (Allen R. Williams. 2015. Grass Fed Beef Delivery. Available at: https://grassfedexchange.com/blog/grass-fed-beef-delivery)

The huge volume of grass-fed beef being imported into the USA is largely due to it being cheaper to grass-finish in the producer countries than to finish on grain. The beef market in the USA is set up for the grain-finishing of animals, resulting in significantly less grass-fed producers compared to conventional producers in the USA. However, this may not be the case for ever, as the grass-fed sector is the only growing segment of the USA beef industry as a whole. (www.consumersrecommend.net)

6b. Australia

Australian land is relatively cheap and plentiful with most only suitable for grazing livestock. As a result, 70% of all Australian cattle are 100% grass-fed. Australian grass-fed cattle operations are large

enough to provide them with the economy of scale that reduces slaughtering and shipping costs and makes their product cheaper in both domestic and export markets.

Australia is home to approximately 29 million cattle; that's more than Australia's human population, so exporting beef is big and important business. In fact, 74% of Australian beef production was exported in 2014, making Australia the third largest beef exporter in the world.

Figure 2: Cattle grazing, Granville Farm, Tasmania

The USA is Australia's largest and most valuable export market for beef, with volumes in 2015 reaching 415,000 tonnes, valued around $3.2 billion AUD. Grass-fed beef continues to make up the majority of Australian beef sent to the USA. (*Meat & LIvestock Australia,* *www.mla.com.au))*

6c. Uruguay

Uruguay is renowned for producing some of the finest beef in the world. They raise their cattle outside in natural conditions. The climate is mild, the land fertile and water is abundant. In fact, they have the perfect environmental conditions for producing naturally raised grass-fed meat. *(*www.uruguaymeat.gub.uy

With an increasing demand for food safety, traceability, animal welfare and environmental sustainability in the meat industry and international markets, Uruguay saw an opportunity to capitalise on their natural production systems. In 2001 the Instituto Nacional de Carnes, Uruguay's Meat Institute, created the Certified Natural Meat Program of Uruguay (CNMPU), with the aim of increasing consumer confidence in meat products from Uruguay, while differentiating and adding value to the Uruguayan Beef and Lamb sector. (www.globalgap.org)

Uruguay is Bovine Spongiform Encephalopathy (BSE) and Foot and Mouth Disease (FMD) free, and they maintain this by banning imports of live animals and/or genetic material from countries affected by FMD or other exotic diseases. The freedom from these diseases has allowed Uruguay to export raw meat products to other countries. (www.onpasture.com)

The CNMPU follows a strict production and processing scheme (*see Appendix 15c at end of this report),* accredited by independent international certification bodies and certifies the entire meat production process all the way through to packing and labelling. (www.globalgap.org)

Uruguay was one of the first countries in the world to be able to trace individual animals back to their origins (www.agmrc.org) and now they are developing processing plant layouts capable of tracing each individual cut in the deboning line back to the animal it came from. This, coupled with the fact that Uruguay is also classified in the lowest possible risk category for BSE, makes Uruguayan beef very attractive to consumers. (www.onpasture.com*)*

Uruguay has been very successful in positioning its product to meet all those qualities demanded by discerning consumers, the sales of which now equate to a quarter of merchandise exports from Uruguay, shipping to over 80 countries. (Instituto Nacional de Carnes (Uruguayan Meat Institute), *(http://www.inac.gub.uy/)*

Figure 3: Certified Natural Beef, Uruguay

7. The market opportunities (case studies)

My travels as part of this research project led me to many of the 100% grass-fed trailblazers across the USA and Australia. Their approaches have led to incredibly successful business models with a focus on best quality, wholly natural and ethical produce. The way in which they farm and their regenerative ideals have formed the basis of many of the methods and processes I have since implemented on my farm in the UK.

7a. Producers

7a.i. JaKo, Kansas USA - the grass-fed opportunity for the small scale farmer

JaKo Farm was founded by Ken and Judy King. They are the third generation to live on the family farm, supported by their three children Daniel (now the farm manager alongside his wife Robyn), Kendra (who looks after marketing and communications part time) and David (IT support also on part time basis). Their farm spans some 300 acres alongside the Arkansas river near Hutchinson, Kansas.

The family is committed to producing the highest quality food using no artificial or chemical inputs of any kind. (www.jakofarm.com). *"It's not some new idea or latest fad, it's the old-fashioned way — the way our grandparents used to eat, before chemicals, preservatives, and subsequent medical problems came into the picture."*

Figure 4: Ken King, JaKo Farm, Kansas, USA

They raise cattle, chickens, pigs and sheep on pasture in an extensive, low stock, wholly natural farming system to produce an impressive range of products, namely 100% grass-fed raw milk, butter, cheese, yoghurt, cream, beef and lamb. They also produce pasture-raised chicken (see Appendix 15a),

eggs and pork, and have developed a range of skin care products which are tallow-based and made from all-grass beef and lamb fat raised on their farm.

Figure 5: JaKo farm honesty shop, open 24/7, Kansas, USA

Figure 6: Moving laying hens to fresh pasture, JaKo Farm, Kansas, USA

All the produce is raised and harvested seasonally, fresh frozen and marketed through their on-farm shop; they neither wholesale nor sell online. Their shop is 2 hours from the nearest city, (in a sleepy part of provincial Kansas and 6 miles down a dirt road). Unmanned and open 24/7, it attracts health and welfare conscious consumers from far and wide, while generating an impressive annual gross

turnover of $400,000 USD (40% of these sales are derived from dairy product sales; that's $160,000 USD from milking 23 cows once a day!)

JaKo Farm proves that there is a strong and growing demand for high welfare 100% grass-fed and pasture raised products.

My visit to JaKo was truly inspiring. They understood the value in everything that they produced and let nothing go to waste; they enjoyed their work and maintained an enviable family and community life balance. They have shown me how a small farm can not only be viable, but rewarding both financially and philosophically.

JaKo was to me the poster pin-up of what a small farm could and should be.

7a.ii. White Oak Pastures, Georgia USA - the grass-fed opportunity for the large scale farmer

"*The Harris family has raised cattle on the same South Georgia farm for five generations. Stewardship of the land and respect for our livestock are among the most important lessons that we pass from parent to child*," explained Will Harris.

Will Harris runs White Oak Pastures alongside his daughters Jodi and Jenni, continuing their story of 150 years of family farming. Will was a commodity beef producer until 1995 when he made the decision to return, full circle, to a production system that was *"better for the environment, for our animals, and for the people who eat these meats*".

Will had witnessed the post war growth in chemical farming, the centralisation of the beef markets and the damage being done to the soils and environment by current extractive farming methods. Feeling disenchanted, Will decided to reinstitute the multi-species rotational grazing practices of his forefathers and built abattoirs on the farm to slaughter his animals. This marked the beginning of a 20-year journey which Will has taken towards sustainable land stewardship and humane animal stockmanship, with a commitment to the welfare of his animals, environmental sustainability, and locally produced food. (www.ff2u.us)

The adoption of the multi species rotational grazing model, referred to as the 'Serengeti Grazing Model' allows for large ruminants to be followed by small ruminants which are then followed by birds, encouraging the animals to express their natural behaviour while also building fertility and biodiversity back into his farming system - recreating as far as possible in a farm environment a natural living ecosystem.

Stretching over 2400 acres of pastures, the animals at White Oak Pastures roam freely, never confined to a crate or a cage (one of Will's principal rules and something which makes White Oak Pastures particularly unique). Living outside all day and all night, the animals are protected by 12 Great Pyrenees dogs. The Harris family raise organic pastured chicken, duck, goose, turkey, guinea fowl, eggs, pigs and rabbits; as well as organic 100% grass-fed cattle, sheep and goats.

White Oak Pastures slaughters approximately 2000 chickens and 180 head of cattle a week on farm in the purpose built red meat and poultry abattoir and butchery, while providing employment for 120

people - the second largest employer in the county. The farm is run as a zero-waste operation composting all animal remains for use as organic fertilisers on the pastures.

Figure 7: Will Harris standing proudly amongst his Iberian pigs, White Oak Pastures, Georgia, USA

Figure 8: Grass-fed cattle, White Oak Pastures, Georgia, USA

All produce is home branded as 'White Oak Pastures' and marketed and sold to Whole Foods Market and other east coast retailers, as well as direct to the consumer through their farm shop, restaurant and website. White Oak Pastures' annual gross sales in 2015 totalled $28,000,000 USD.

Figure 9: Pasture-raised broilers, White Oak Pastures, Georgia, USA

Figure 10: Predator protection. Great Pyrenees dog guarding the laying hens, White Oak Pastures, Georgia, USA

White Oak Pastures provides a beacon of light to those who believe in the production of 'real' food - They are an example of how it can be done at scale, proving that a return to more holistic farming practices can not only be viable but rewarding. As most farmers strive for scale, productivity, simplicity and efficiency in their business, White Oak Pastures strives for something which is more wholesome and nourishing to the land, the animals, the consumer and the community; they seek diversity, farm extensively with few machines and lots of people, building a complex, vertically integrated and successful business. They are growing a community, breathing life into a sleepy town and putting Bluffton, Georgia, firmly back on the map.

Figure 11: Collecting pasture-raised eggs, White Oak Pastures, Georgia, USA

7a.iii. Western Plains, Tasmania - the grass-fed opportunity for the wholesale farmer

John Bruce and his family run a beef farm - 'Western Plains' - adjacent to the town of Stanley on one of Tasmania's most northerly peninsulas. Western Plains, the home farm, was purchased by the Stanleys in 1975 and originally formed part of the Royal Charter land grant to the Van Diemen's Land Company in 1826. In 1798 the peninsula was noted during Bass and Flinders's circumnavigation of Tasmania, for having the existing native pasture necessary to graze settlers' sheep and cattle, as most of northwest Tasmania was heavily forested at that time. The farm has been expanded over the years and now incorporates five adjacent properties with their farm now totalling 1457 acres (583 ha), 1308 (523ha) of which is suitable for grazing with 149 acres (60 ha) reserved for wildlife. Average annual rainfall for the property is 32" (810mm).

The farming operation consists of approximately 1120 head of cattle, of which 330 are brood cows. The cattle are rotationally grazed to ensure they have access to clean fresh pasture every 2-4 days, with the length of the rotation determined by monitoring the leaf emergence rate of the ryegrass plants, which varies throughout the year with soil temperature and rainfall. 40 ha of dryland and irrigated lucerne/alfalfa is used to supplement summer production (the Tasmanian dormant season).

Cattle are finished at 18-24 months at a dressed carcass weight of between 220-400kg. The cattle are sold under contract to processor Greenham Tasmania where the beef is marketed worldwide under the Cape Grim 'Never Ever' beef brand.

For cattle to qualify for sale under this brand they need to be 100% grass-fed, antibiotic free, GMO free and HGP free. The cattle must also meet Meat Standards Australia (MSA) grade (see Appendix 15b). Producers are also encouraged to conform to the USA Global Animal Partnership (GAP) Standards, enabling their beef to be sold into the American market.

Northwest Tasmania's clean air, clean water and high quality pastures ensures that beef from Western Plains is consistently excellent, healthy, nutritious and flavoursome.

At Western Plains, the Bruce family's aim is to profitably produce clean and natural grass-fed beef for customers requiring high quality MSA-graded product, while also protecting the unique natural values of their family-owned and managed beef farm.

Figure 12: Young cattle at Western Plains, Tasmania, Australia

7b. Processors and brands

7b.i. Greenhams, Tasmania, Australia - Cape Grim Beef

When Peter Greenham Jr took over Greenham's newly acquired beef processing plant in Smithton, a prime dairy region in Northwest Tasmania, in 2002, the company's initial plans were to slaughter cull cows and bull beef only, for processing and selling as trim into export markets. This model had proved very successful in their plant in Victoria. However, Peter Greenham Jr soon learned of the quality and quantity of prime 'grass-fed' beef which was being produced in the region and saw a gap in the market for a premium beef brand which capitalised on the many existing qualities found in the Tasmanian beef that he had uncovered.

It was consistently succulent, tender, tasty, 100% grass-fed British breed beef, raised extensively on lush fertile pastures and without the routine use of antibiotics and HGP. HGPs are banned in Tasmania but not in the rest of Australia, where their use is commonplace. The Tasmanian Northwest also had an abundance of rain and the cleanest recorded air in the world (measured at the Cape Grim monitoring station), providing this region of Tasmania with the perfect conditions to grow great grass and 100% grass-fed beef. These unique qualities became the founding principles of the 'Cape Grim' Never Ever beef brand, which was officially launched in 2007. (www.greenham.com.au)

Cape Grim 'Never Ever' beef program protocol:

- 100% grass-fed - for life
- Hormone free
- Antibiotic free
- GMO free
- Never confined to a feedlot
- British breed beef only
- Naturally marbled for maximum juiciness and flavour
- Graded to four and five star MSA tenderness grades

Sales and Marketing

Grenham's Tasmania currently slaughter 2500 head per week, year-round, in their Smithton plant, with 65-70% of the carcasses meeting the strict 'Cape Grim' standards. 30% of this will be sold into domestic markets, where orders are predominantly for 'prime cuts'; the remaining 70%, which is predominantly 'trim', is supplied to 30 international markets and growing. This includes Japan, Korea, Thailand, China, Singapore, Hong Kong, Russia, Nepal, South Africa, Seychelles, USA and the Maldives. (www.capegrimbeef.com.au)

Figure 13: 100% grass-fed 'Cape Grim' Never Ever beef being packaged at the Greenham's processing plant, Tasmania, Australia

'Cape Grim' beef commands a premium from markets that recognise the quality and assurances that the brand provides, enabling Greenham's to pass a premium back to their producers for meeting the 'Cape Grim' standards.

Greenham's currently source beef from 1400 farms in Tasmania.

In Greenham's view the consumer drivers for their products are as follows:

1. 100% grass-fed and free-range
2. Hormone, GMO and antibiotic free
3. Meets Meat Standards Australia (MSA) grading standards for eating quality (see Appendix 15b.i.).

'Cape Grim' producers

The many farmers I visited during my time in Tasmania were all very proud to supply Greenham's under the 'Cape Grim' brand, knowing they were responsible for producing what many believe to be the 'best grass-fed beef in the world'. They valued the relationship they had with Greenham's and felt the market for their beef was relatively secure and the price they received fair.

Farms wishing to supply 'Cape Grim' beef are independently inspected annually against 'Cape Grim' standards; farmers can also opt to be inspected to stricter standards set by some of Greenham's export customers. Customers reaching these high standards will receive a further premium. One such standard is the USA Global Animal Partnership (GAP) animal welfare programme, a strict standard placed by some of the high-end USA retailers.

Figure 14: Proud supplier of 'Cape Grim' beef, Tasmania, Australia

Although meat treated with antibiotics is not permitted within the 'Cape Grim' programme, the use of antibiotics to treat illness is encouraged, as part of good welfare practice, by Greenham's and animals treated will not lose any premium. These animals are to be identified with a red ear tag marked 'treated' and a declaration to this effect is to be made when the animal is sent to slaughter. These animals are then sold into a different beef programme which permits use of antibiotics. This approach ensures good animal welfare practices are adopted and encourages farmers to be honest about any treatment given to their animals. Use of vaccines is not excluded from this programme.

It is also worth noting that there is no requirement to meet organic standards within this brand, nor do Greenham's have an organic certified grass-fed beef brand on offer. This is because there is no

critical mass of producers in Tasmania who are producing to full organic standards and therefore not sufficient product to make an 'organic grass-fed' brand viable.

What does the future hold for 'Cape Grim' beef?

The market for 100% grass-fed is still very much in its infancy, but for Greenham's it happens to be their fastest growing, with new markets opening up all the time. Demand for 100% grass-fed beef is being driven by a growing consumer awareness of the benefits of grass-fed as well as from consumers concerned with the health and integrity of the food they are eating who seek a natural, hormone-, GMO- and antibiotic-free alternative that is 100% traceable all the way back to the farm.

7b.ii. Maple Hill Creamery, New York State

Seeking the good life, in 2004 Tim and Laura Joseph bought a farm and, with no background or experience in agriculture, began milking 64 cows. Although starting out as conventional dairy farmers and supplementing their cattle with grain, their interest in organic farming grew and, when the economics weren't stacking up to buy organic certified grains, they decided to transition their cows to a 100% grass-fed diet. Not long after the transition they noticed the health of their cattle vastly improve.

Figure 15: Oliver White (left) with Tim Joseph, Maple Hill Creamery, New York, USA

Determined to make the business viable and support the family without the need for an off farm job, Tim began experimenting with 100% grass-fed yoghurt recipes in the farmhouse kitchen, later opening 'Maple Hill Creamery' in 2009 with a range of 100% grass-fed yoghurts. "*The 100% grass-fed philosophy began to catch on with conscious consumers and the business grew*". Other similarly minded producers joined to meet the growing demand but it soon became clear that they were outgrowing the creamery. In 2012 the Josephs sold the farm and bought a larger facility in Stuyvesant, NY, where they are based today.

Maple Hill Creamery now has a pool of seventy small farms, committed to producing (third party certified) 100% grass-fed milk, attracted by a premium price and the company's commitment to the 100% grass-fed vision and mission to be "*better for cows, better for farmers, better for the earth, and better for you*."

With the product range expanding to include drinking yoghurt, Greek yoghurt, kefir, and raw milk cheese, Maple Hill Creamery has become one of the fastest-growing national dairy brands in the USA, with its products now stocked in over 6,000 retail outlets across the USA, including Whole Foods Market, Target, Walmart, Safeway, and thousands of independent grocers and speciality retailers.

(Souce: This is Maple Hill: how this family owned dairy brand is taking 100% grass-fed to the next level". PR Newswire, July 20 2016 issue)

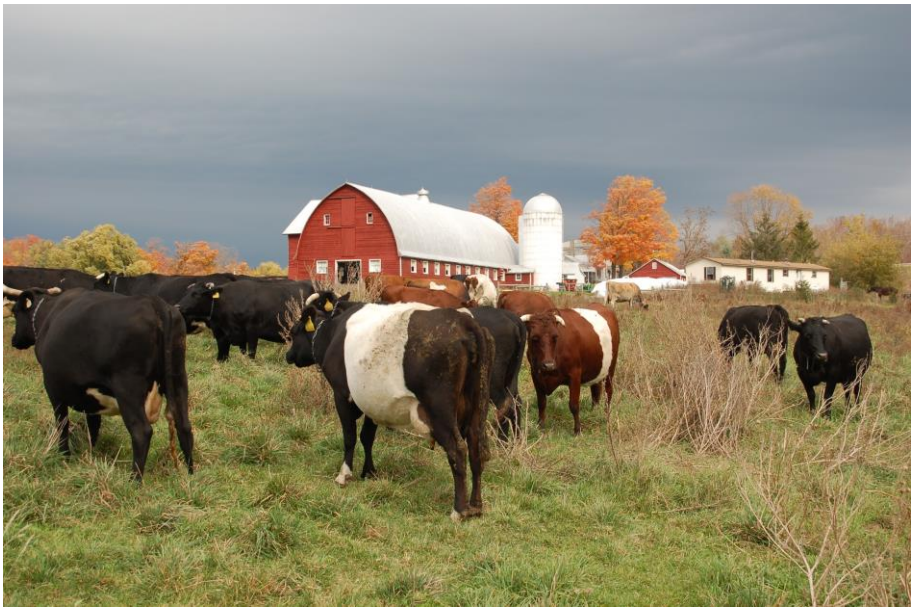

Figure 16: Dharma Lea Farm, Maple Hill Creamery founding supplier, New York, USA

Maple Hill Creamery challenges conventional thinking that you can't produce milk with "just grass." They are committed to growing a community of regenerative grass farmers and demonstrating how 100% grass-fed dairy is the "new" organic by benefiting the cows, consumers, the farmers and the land.

Figure 17: Manufacturing 'Creamline' Yoghurt, Maple Hill Creamery, New York, USA

7c. Retailers and restaurants

While grass-fed produce may be seen as a niche in markets like the USA, demand for grass-fed beef has been growing at an annual rate of 25-30% over the past 10 years. With consumer research indicating that this pace will not slow down, grass-fed retailers and restaurants are springing up everywhere. (www.moseorganic.org*)*

7c.i. Whole Foods Market, USA - national retail chain

The largest retailer of certified grass-fed produce in the USA, Whole Foods is a national supermarket chain with a 'mission' to sell only the highest quality natural and organic products available. This is underpinned by their 'core values' which include advancing environmental stewardship, creating win-win supplier partnerships, promoting healthy eating education and supporting local communities.

Now with over 400 stores nationwide, Whole Foods sells locally sourced grass-fed produce in all its stores. Whole Foods Market is leading the way in bringing grass-fed products to a national consumer base and providing many partnership opportunities for producers around the country.

But they don't make it easy. Whole Foods have an incredibly strict product sourcing policy with their baseline requirements for meat producers being some of the strictest anywhere including:

- Animals must never receive antibiotics. Sick animals must get treatment, but meat from antibiotic-treated animals cannot be sold to Whole Foods Market.
- Added hormones are prohibited.
- Whole Foods animal welfare standards must be met.
- No animal by-products are allowed in feed, including feather meal and rendered fat.
- No crates, cages or tethers are permitted during the animal's daily life. This includes, but is not limited to gestation crates and farrowing stalls for sows, and individual hutches or tethers for veal calves.
- All ruminants, including beef cattle, bison, sheep and goats, must spend at least two-thirds of their life on pasture. Time in a feedlot cannot be more than one-third of the animal's life. Grass-fed beef, bison and lamb: The animal must have had continuous access to pasture during the growing season, and cannot be fed grain or grain by-products.
- Meat from cloned animals is not permitted at Whole Foods Market.
- Verification must be provided for:
    - A clear traceability audit system that tracks herds or flocks from each farm through slaughter.
    - A comprehensive recall program.
    - Full disclosure of management practices and feed rations.
    - A robust internal audit program to monitor compliance with our standards, as well as with governmental regulations and the producer's own protocols. *(Whole Foods Market, http://www.wholefoodsmarket.com/)*

Whole Foods Market is growing from strength to strength with plans to continue opening stores both domestically and overseas, responding to the growing number of consumers that want to know where their food comes from and what goes into it.

Figure 18: Retailing 100% grass-fed at Whole Foods Market, California, USA

7c.ii. U.S. Wellness Meats, USA - online retailer

U.S. Wellness Meats was founded in 2000 by lifelong farmer John Wood after realising that there was a growing number of USA consumers who were beginning to understand the health benefits of CLA and Omega 3s from grass-fed meats. It is a family-owned business which specialises in the raising and retailing of grass-fed meats from carefully selected family farms, including their own, which support their ethos of farming sustainably and humanely.

The U.S. Wellness Meats website and marketing focuses on the human health benefits of consuming grass-fed produce, tapping into an avid market of health, athletic and paleo-conscious consumers searching for the cleanest foods. U.S. Wellness Meats engage with their customers via an e-newsletter on health sent out twice a week to over 90,000 subscribers. Coupled with social media this is their primary marketing tool.

U.S. Wellness Meats sells grass-fed and pasture-raised beef, pork, bison, lamb, rabbit, poultry, bones, broth, fats and organ meats as well as whey protein and raw milk cheese. It ships 35,000lbs (15,875kg) of grass-fed meat products each week to all 50 states, with California, Florida and New York being their biggest customer centres.

7c.iii. Burger Lounge, USA - national restaurant chain

Burger Lounge, home of the "The Original Grass-Fed Burger", is one of a growing number of restaurants and fast-food chains in the USA which, in response to a growing consumer demand for healthier, cleaner and more responsibly produced ingredients, launched a restaurant brand which emphasises their strong ethical sourcing policies, producing a menu of mostly organic ingredients and grass-fed patties that "*appeals to health conscious diners, vegetarians, salad lovers and those simply hankering for a great hamburger*".

Burger Lounge was founded in 2007 and now boasts 21 restaurants across the USA with over 750 employees. The restaurant represents a new take on fast-food outlets that puts food integrity and a 'less is more' philosophy at the top of their agenda. They are trying to change the way people think about and experience food. Burger Lounge cares about where their ingredients come from, choosing to partner with farmers and suppliers whose practices emphasise quality and responsibility. This represents a fresh take on an industry that has long suffered from over-processed, unhealthy choices.

"A great burger should not only taste great, it should utilise healthy ingredients sourced from sustainable environments."

Each Burger Lounge burger is made from 100% grass-fed beef that's sourced from two family ranches, where the cattle are free to roam and graze. Burger Lounge beef is certified 100% grass-fed, free from HGPs and antibiotics.

7d. Certification bodies

Consumers often look for assurance marks to understand what level of welfare has been met during production of farmed goods. There are many certification bodies that all require stringent levels of welfare, diet regulations and antibiotic use in animals, and they help to ascertain the criteria to achieve these specific certifications. Retailers partner up with certification bodies to ensure their supply chain is traceable and meets high standards.

7d.i. American Grassfed Association (AGA), USA

Established in 2003, the goal of the association is to promote the grass-fed industry through government relations, research, marketing and education. Initially the priority of the association was to establish a legal definition of grass-fed and to implement a labelling programme to help producers receive a premium for products meeting the definition. The United States Department of Agriculture (USDA) introduced their definition in 2006, and AGA's producers and board decided to develop a more stringent standard. The AGA certification program and standards were introduced in 2009.

Figure 19: Certified American Grassfed, AGA's own certification mark
Source: http://www.americangrassfed.org/

"AGA defines grass-fed animals as those that have eaten nothing but grass and forage from weaning to harvest, have not been raised in confinement, and have never been fed antibiotics or growth hormones. In addition, all AGA-Certified Producers are American family farms and their livestock is born and raised in the USA."

The standards were developed by a team of animal scientists, vets and farmers and concentrate on four main areas of production:

- Diet — Animals are fed only grass and forage from weaning until harvest.
- Confinement — Animals are raised on pasture without confinement to feedlots.
- Antibiotics and hormones — Animals are never treated with antibiotics or growth hormones.
- Origin — All animals are born and raised on American family farms.

AGA's standards apply to ruminant animals only — beef, bison, goat, lamb and sheep.

AGA-Certified producers are audited annually by independent, third parties to ensure continuing compliance with the standards. Only AGA-Certified members are permitted to use the AGA logo, trademark, or other identifying marks on their packaging, marketing materials, or web sites.

AGA-Certified Producers must ensure they:

- Employ a sustainable approach to farm/ranch management designed to enhance land, water, and air quality.
- Use the highest standards of animal husbandry in their grazing programs to support humane treatment and welfare of their animals.
- Adhere to standards as developed and revised periodically by AGA. (*The American Grassfed Association, http://www.americangrassfed.org/)*

7d.ii. The Pasturefed cattle assurance system (PCAS), Australia

Figure 20: Certified Pasturefed, Source: http://www.pcaspasturefed.com.au/

Following an increasing demand from consumers wanting proof that products have been produced as claimed, Cattle Council of Australia, with support from Meat & Livestock Australia (MLA), developed a voluntary assurance programme that enables the industry to prove claims made about grass-fed production methods in Australia.

The PCAS was developed in consultation with stakeholders, retailers and processors to govern the on-farm feed requirements, traceability of cattle and pre-slaughter handling practices, all of which influence eating quality. In addition, producers can opt to be certified as 'free from' antibiotics and hormone growth promotants (HGPs), catering for markets who are more sensitive to treatments applied to meat animals.

(*The Pasturefed Cattle Assurance System, http://www.pcaspasturefed.com.au/)*

8. Practical considerations of implementing grass-fed systems

Like any system, there are many considerations to take into account when setting up and running a 100% grass-fed farm. However, the benefits of this practice are far-reaching and can help to regenerate depleted soil structures, create bio-diverse eco systems and encourage a holistic and healthy future - not only on a local scale, but on a global one.

8a. Seasonality

One of the biggest challenges facing producers of 100% grass-fed is the inherent seasonality in the production system (as finishing/milking quality grass and other forage crops are not available to graze year-round in the UK). However, consumers will expect to be able to access the product year-round. This supply issue can be answered in a number of ways:

- Accept seasonality: In my own business we accept that 100% grass-fed products are a seasonal food and do not offer these products for sale during the dormant (non growing) season. The gap in UK supply could be filled by the sale of 100% grass-fed products sourced from other countries, such as Australia with its opposing growing season.
- Supply frozen: Supply the product frozen, naturally preserving the meat for consumption out of season. This practice is not widely supported by consumers in the UK. This is partly due to supermarkets promoting the supply of fresh product year-round, which consumers have now come to expect, and partly because consumers are of the notion that the consumption of frozen products is somehow inferior to the product in its fresh state. However, a recent study by the Frozen Food Foundation partnered with the University of California-Davis compared the nutrient content of frozen fruits and vegetables with their fresh counterparts and found that "*frozen fruits and vegetables are nutritionally superior or equal to their fresh counterparts*". Could this also be true for meat? (Frozen Food Foundation, http://www.frozenfoodfacts.org/)
- Fatten/finish/milk off stored forages: It is possible to produce meat and dairy off stored forages (of sufficient energy), enabling farmers in the UK to continue to supply during the dormant season. However, in doing this, farmers will need to be very careful not to develop off flavours in their meat and dairy as a result of the diet which the animals have been fed. Silage in particular is known to taint the flavour.

8b. Variance in taste

Grass-fed meat can vary in taste due to a number of different reasons, including carcass finish, which means that producers need to be particularly careful about how they feed and finish their livestock. Consumers rate the taste of grass-fed beef as one of its best attributes according to the Mintel report: 'On a scale of 1 to 10, with 10 being the most important, consumers rated the attributes "grass-fed" at 7.2, "environmental impact" at 7.5, "hormone/antibiotic free" 7.9, and "taste" 8.7.'

Grass-fed beef production typically has a favourable environmental impact and is generally hormone- and antibiotic-free. However, there can be wide variations in the taste of grass-fed beef. Since taste

was the most highly rated of the four attributes, it is important that grass-fed beef producers pay particular attention to factors that can create off flavours. Well finished, high quality grass-fed beef typically produces an outstanding robust beef flavour that many chefs and consumers prefer. (*Allen R. Williams. 2014. Financial analysis shows grass-fed beef is good for producers. Available at: https://mosesorganic.org/farming/farming-topics/livestock/grass-fed-beef-is-good-for-producers/.)*

8c. Direct retailing opportunities

Many of the leading producers I met during my study were also choosing to retail their 100% grass-fed produce directly to the consumer, providing the producer with a greater margin for their product and a more stable income free from the volatility and uncertainty of the commodity markets. This was clearly a growing trend amongst producers, as more and more consumers seek to connect with their food, their producers and its provenance.

Figure 21: Direct selling at Markegard Family Grass-Fed, California, USA

8d. Planned grazing

One of the resonating messages from producers of 100% grass-fed is the importance of properly managed grassland and livestock. The effective production of meat and dairy from grass is an art, not a science, and when done well has the ability to not only produce dairy and meat efficiently, but also build the whole farm ecology and sequester carbon back into the soil. The use of Holistic Planned Grazing™, similarly mob and time-controlled grazing, along with low stress livestock handling techniques, were all practised to good effect.

Figure 22: Holistic Planned Grazing™ in practice at Polyface Farm, Virginia, USA

9. Discussion

Grass-fed has become the latest good news story. It's an opportunity for agriculture globally and particularly one which we should be capitalising on in the UK.

Consumers

The fast-paced growth of the grass-fed sector in the USA has been driven by an awakening of consumers who are disenchanted with the industrial food system as we know it and are seeking to reconnect with real food. These consumers are choosing to support ethical, sustainable and high welfare production systems, producing healthy and nutrient-dense foods which are also free of GMOs, HGPs and antibiotics.

Consumers in the USA are voting with their feet and buying grass-fed products in their droves. Producers have struggled to keep up with demand with grass-fed beef, which is commanding a 7% share of the total beef market with a value in excess of $2.55 billion USD in 2015. Compare this to the UK organic beef sector which received just 3.3% of the market share in 2014-2015.

We are seeing fear drive change in the USA and that is where the challenge lies in developing the market here in the UK. The majority of British consumers are not overly concerned by UK agricultural practices: they apparently trust the system, or just don't care enough to question it. We have laws governing the labelling of products on the supermarket shelves, HGP use is banned and sub-therapeutic antibiotic use restricted. Animal welfare standards in the UK are considered high and the industry does not receive much bad press to the contrary, with large scale feedlots and super-sized dairies not yet common sights in the British countryside. The British consumer is instead making the assumption that their meat and dairy is already produced entirely off pasture, an image cleverly portrayed by the big retailers and brands. This may be true to some extent; however, only when the ruminants have had a 100% grass-fed diet do we see the all of the health benefits in the meat, dairy, the animal and the environment - a practice still rare in the UK. Explaining this subtle but significant difference to the average UK consumer will be challenging; in order to recruit consumers, the marketing of 100% grass-fed will need to focus heavily on the health benefits, welfare benefits, environmental benefits and taste qualities.

Producers and the environment

I met with some truly inspirational grass-fed producers. They were passionate, enthusiastic, and farming in this way made complete and utter sense to them. They were working in synergy with the seasons and with nature, with minimal intervention or inputs (chemical or medical) and producing a healthy and nutritious product which the consumer valued. In doing this they were at the same time regenerating their soils and habitats for wildlife. These farmers weren't complaining about commodity prices or bad weather. In fact the opposite was true. These farmers were solution-focussed and boasting of the financial and ecological merits of their chosen farming system.

I visited the leading practitioners in this industry who respected the complexity of nature and were able to take a step back and consider the ecology of the 'whole' farm and focus on building a resilient farming system. For many producers this centred around planned rotational grazing and often included a pastured poultry enterprise as part of a multi-species grazing model, harnessing a natural

symbiosis between the species and recreating as far as possible in a farm environment a natural living ecosystem. This stacking of enterprises increases the productivity of their farms and builds soil fertility, whilst reducing parasite pressure on the pastures.

The climates varied considerably in the countries and farms that I visited, with producers facing summer droughts, long cold winters and extreme rainfall events. In all cases seasonality was embraced with animals being born in the spring and fattened/milked off summer pastures.

The supply chain and marketplace

Grass-fed products are being sold in national stores, market stalls, on-farm shops and online shops.

Retailers are cashing in, with all the big supermarket chains in the USA selling a grass-fed range. Even fast food joints are responding to the demand and moving to menus featuring grass-fed and antibiotic, HGP and GMO free ingredients.

I believe there is a gap in the marketplace for retailers and processors to develop a 100% grass-fed premium brand for meat and dairy. With an established supply chain, sales of 100% grass-fed meat and dairy have the potential to take a significant market share of both domestic and export sales: that is if UK trends continue to follow the success of 100% grass-fed in other countries such as the USA and Australia. As part of the development of this brand, processors and retailers should consider adopting carcass grading standards which also consider eating quality, as it is 'taste' which consumers voted the number one attribute when making their purchasing decision.

The supply will initially be met by farmers following 100% grass-fed principles selling their produce direct from the farm into small local retail outlets, farm shops, butchers and online.

For 100% grass-fed products to be stocked by the major retailers will require a combination of having a critical mass of producers who are able to provide retailers and processors with a year-round product supply, and a critical mass of consumers demanding the product.

The term 'grass-fed' is currently being exploited in the UK by retailers and producers who are looking to cash in on this growing consumer demand. It is only when the ruminants are 100% grass-fed do we really see all of the benefits. To protect the integrity of the product, meat and dairy should be sourced from 'certified' 100% grass-fed producers to provide quality assurances, provenance and production standard guarantees. The Pasture Fed Livestock Association in the UK is already up and running and able to provide these assurances as well as being able to offer retailers a QR (Quick Response) code traceability scheme providing retail consumers the opportunity to scan their purchase and trace their meat or dairy product back to the farm and the farmer. Consumers are often confused by mixed marketing messages when it comes to food, for example the meaning of 'organic'. Despite most consumers being aware that it must be better than its conventionally produced counterpart, industrial agriculture has found ways to make conventional systems fit organic parameters, so the true meaning of organic becomes blurred.

On the contrary, 100% grass-fed has a 'clean' and clear image, portraying a naturalism which consumers can immediately connect with - when I've explained the benefits of grass-fed to my customers they often respond "*well that makes sense*". It becomes glaringly obvious to them that an animal that has feasted on its natural diet and enjoyed the good life is going to be healthier, happier and tastier. Grass-fed sells itself.

A well finished, high quality grass-fed beef carcass typically produces an outstanding robust beef flavour that many chefs and consumers prefer. However, eating differences between grass-fed and grain-fed should be observed and explained to consumers. Grass-fed is leaner with less marbling, and can't tolerate being cooked at very high temperatures. The proper finishing of grass-fed cattle is required to prevent off flavours from occurring in the meat - off flavours would quickly damage product reputation.

The greatest challenge for producers, processors and retailers will be the overcoming or acceptance of the inherent seasonality of the product. The best meat and dairy is harvested from lush growing pastures, making out-of-season production difficult to maintain in terms of volume and quality. This could be overcome by the industry through the supply of frozen product out of season, or grass-fed products could be sourced from another country from the southern hemisphere, such as Australia or New Zealand.

I believe 100% grass-fed to be a great opportunity for farmers, processors and retailers, adding value to a sector which offers little product differentiation and value segmentation.

Direct retailing

Many of the best farms that I visited on my travels took the responsibility of marketing their grass-fed produce into their own hands. I believe in order to help grow this market in the UK we need to do the same.

I've witnessed the value in farmers direct retailing and discovered the huge array of products which can be produced off grass, namely:

- Dairy - for milk, butter, cheese and cream
- Beef and lamb
- Pastured chicken, duck, goose, turkey, guinea fowl, eggs, pigs and rabbits
- Skin care products made from the product of grass-fed stock

All of these successful farms have trust from their customers, gained from various ventures from this method of direct retailing: opening their farms to the public, being honest and open about how they operate, and embracing a holistic approach.

> Grass-fed livestock production provides a viable, long-term, sustainable solution to producing ruminant meat and dairy. As we face a worldwide population increase of 3 billion by 2050, farmers and consumers can help regenerate environmental health, human health and even food supplies by producing and eating less but better quality meat and dairy.

10. Conclusions

1. You are what you eat eats. We should not only be concerned about what we eat, but what our food eats as well.

2. 100% grass-fed is better for human health, environmental health and animal health. It has become the antithesis of the industrial food system, with consumers of 100% grass-fed seeking a wholly naturally raised product.

3. Grass-fed livestock production provides a long term sustainable solution to producing ruminant meat and dairy.

4. The health and environmental benefits of producing and eating 100% grass-fed products are widely understood in countries such as the USA and Australia and demand is growing in the UK.

5. There is a future global opportunity in supplying grass-fed beef but the greatest opportunity for the whole supply chain will be in developing a growing domestic market here in the UK.

6. Create a market differentiation in the UK for 100% grass-fed meat and dairy from ruminants (guaranteed by certification) to provide farmers with a premium for their produce.

11. Recommendations

1. Produce food not feed: - the FAO is recommending that we 'eat less, eat better quality'. 100% grass-fed provides a sustainable solution to the production of ruminant meat and dairy when raised on marginal land or within a mixed farming system.

2. Raise awareness: - we must find ways to educate the consumer on the benefits of producing and consuming 100% grass-fed meat and dairy. These could be through farm visits, cultural media and retail strategies.

3. Close the gap in the market: - opportunities for retailers, processors and farmers to develop a supply chain for 100% grass-fed, with a potential for this market to take a significant share of sales in the medium term.

4. Develop a premium brand: developing market differentiation in the UK for 100% grass-fed meat and dairy from ruminants will provide farmers with a premium for their produce.

5. Ensure product integrity: - adoption of 100% grass-fed certification standards to provide quality assurances, provenance and production standards guarantees. The term 'grass-fed' is currently being exploited by retailers and producers who are looking to cash in on this growing consumer demand. It is only when the ruminants are 100% grass-fed that we see all of the benefits.

6. Capitalise on our natural assets: - much of the UK is perfectly suited for raising ruminants from pasture.

7. Adopt a combined approach: - a critical mass of certified 100% grass-fed ruminant meat and dairy farmers are needed to enable the launch of a national 100% grass-fed brand.

8. Focus on taste: - introduction of carcass grading standards which also consider eating quality will help shift farmers towards native breeds, known to be more tender, and a wholly grass-fed diet. Consumers voted 'taste' as the number one attribute when making their purchase decision.

9. Encourage farmers to lead the movement: - many of the best farms that I visited on my travels took the responsibility of marketing their grass-fed produce into their own hands. I believe in order to help grow this market in the UK we need to do the same.

10. Expand the range: - to include pasture-raised poultry, eggs and pork.

12. After my study tour

Through my Nuffield Farming journey I have had an amazing opportunity to meet and visit with the forerunners within this sector. I have gained insight, ideas, solutions and, more importantly, I have experienced the success of businesses which have capitalised on this opportunity and that has given me the confidence to move forward with my ideas and aspirations for my own farm business.

Since completing my Nuffield Farming travels, I have begun to make developments within the farm business.

Figure 23: Farm2Fork, my own business, in Somerset

I have launched a new online shop that will allow me to increase my range and diversity of products, maximising the retail value for my produce, whilst also improving the design of the site to make the shopping experience more convenient to the consumer.

I intend to open an unmanned, 24/7, member-only, on-farm honesty shop selling fresh frozen meat and poultry 'by the cut'.

I will expand my enterprises with the introduction of more pastured poultry species reared seasonally.

I will market the grass-fed ethos and my products to raise awareness of health, environmental and welfare benefits.

Continue developing 'open' farm days, which help the public understand how their food is produced and, using this, to help further educate consumers.

13. Executive summary

A growing concern from consumers about the health credentials of the food they eat, a desire to understand where it comes from and a global need for sustainable farming practices, has seen demand for certified 100% grass-fed products across the USA grow at an annual rate of 25-30%. Science has shown 100% grass-fed ruminant meat and dairy to be healthier for humans, animals and the environment. Despite this increase in the US market, the UK is still trying to understand the benefits of grass-fed: indeed, many UK farmers believe we are too far down the industrialised path to turn back the clock.

The aim of my report was to determine what drives the growth of the grass-fed movement around the world, what the future holds for ruminant meat and dairy production, to better understand the benefits of producing, consuming and retailing grass-fed, and to ultimately realise the potential of growing this market in the UK.

I travelled across the USA and Australia, as these countries demonstrate a strong grass-fed production history and the market in both countries is huge. I visited producers, retailers and processors advocating 100% grass-fed farming methods to discover the potential that these methods could offer in the UK in terms of soil regeneration, human and animal health benefits and a sustainable method of feeding the human population.

Although we are perfectly suited for raising ruminants in terms of climate, the model which has been successfully implemented across USA and Australia still remains largely untapped in the UK.

As consumer demand increases for healthy foods, low 'food miles', and improved animal welfare, this demand has the ability to drive future farming practices in the UK.

My findings show that with a focus on stronger marketing techniques, particularly in the area of health and environmental benefits, together with a collective of farmers to drive forward and promote grass-fed ideals, the grass-fed movement has the potential to thrive in the UK.

We must ensure product integrity with the adoption of carcass grading standards that consider eating quality, and certification marks for 100% grass-fed meat. Developing market differentiation in the UK for 100% grass-fed meat and dairy will provide farmers with a premium.

There are many opportunities for farmers and consumers open to the UK by using these grass-fed methods, and much is to be gained in terms of increasing biodiversity and soil fertility.

Consumers need to be encouraged to eat less but better quality meat and dairy products. Grass-fed producers must raise awareness through farm visits and retail strategies. We must capitalise on our natural assets as much of the UK could be used for this method of farming, and a critical mass of certified 100% grass-fed ruminant meat and dairy farmers is needed to enable the launch of a national 100% grass-fed brand.

Oliver White
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15. Appendices

15a. Pasture-raised poultry

Further opportunities exist for farmers to include the integration of pasture-raised poultry into their operation. Both poultry and eggs are also shown to benefit nutritionally from a diet rich in pasture and provide livestock producers with an additional income from their farm.

Pasture-raised is the process of sustainably raising poultry directly on green pasture in a humane and environmentally enhancing way. The model has been developed over the last twenty years having been reintroduced by Joel Salatin at Polyface Farm, Virginia. The model allows the birds to receive a significant amount of pasture as feed and takes inspiration from systems used up until the 1950s, before large confinement operations began. The birds in this system are kept on fresh pasture in mobile pens, and often moved daily, allowing the birds to be raised in a cleaner and healthier environment.

Figure 24: 'Egg-mobile' on skids, Polyface Farm, Virginia, USA

Pasture-raised poultry is also gaining popularity with farmers wishing to increase pasture fertility. Pasture-raised poultry is well suited for incorporation within a multi-species planned rotational grazing model, whereby large ruminants are followed by small ruminants which are then followed by birds, recreating as far as possible in a farm environment a natural living ecosystem. This stacking of enterprises increases the productivity of their farms, builds soil fertility, whilst reducing parasite pressure on the pastures.

Figure 25: 'Enterprise stacking' pasture-raised egg layers following cattle at Polyface Farm, Virginia, USA

Figure 26: Gail Fuller with mobile pasture-raised broiler pens at Fuller Farms, Kansas, USA

Pasture-raised poultry is not limited to chickens, but can include turkeys, geese, ducks and guinea fowl.

The pasture-raised poultry movement has found great support among consumers in the USA due to the high quality and superior flavour of the poultry and eggs and demand for such products is growing.

The American Pastured Poultry Producers' Association (APPPA) has been formed in the USA to promote pastured poultry. The APPPA's world vision is to see pastured poultry adopted as the model for environmentally, emotionally, and economically sensible poultry production. This vision includes

decentralized food systems, farmstead-sized processing, and as much interaction as possible between producer and consumer. (American Pastured Poultry Producers Association, http://apppa.org/).

15b. Meat Standards Australia (MSA) grading system

In Australia, the adoption of the Meat Standards Australia (MSA) carcass grading system allows processors the opportunity to guarantee the eating quality of the meat.

Figure 27: MSA Carcass grading at the Greenhams processing plant, Tasmania, Australia

This grading standard was developed by Meat & Livestock Australia to improve the eating quality of red meat (beef and sheep). The MSA standards are based on the results from circa 700,000 consumer taste tests by over 100,000 consumers from nine countries and considers all factors which affect eating quality all the way from the field to the table.

This method of grading carcasses is significantly more advanced than the Europ grid system found in the UK, which grades cattle based on muscle conformation and fat cover only, a system which has had the effect of driving producers towards the production of high input double muscled animals which fetch the highest premiums. No consideration is given to the animal's ultimate eating quality - a quality which one would consider to be of prime importance to the consumer. Consequently, animals of this phenotype require supplementary grain feeding in order to meet the higher metabolic requirements of the animal.

15b.i. How carcasses are graded under the Australian system

Each carcass is identified with a carcass ticket and the following information is recorded in the Data Capture Unit:

- Body number and lot number – cattle from individual vendors will be kept in separate lots
- Carcass weight – important in determining weight for maturity
- Sex – male or female
- Tropical breed content– the hump height is also measured to guarantee the most accurate eating quality grade
- Hanging method – determined as being either Achilles hang or tenderstretch
- Hormonal growth promotants– will affect MSA score obtained for different muscles
- Ossification – measured to determine carcase maturity
- Marbling – using both the MSA and AUS-MEAT measurement systems

- Rib fat – a minimum of 3mm is required, measured at the AUS-MEAT standard site. Overall fat cover is also assessed including any hide puller damage
- pH and temperature – pH is measured using a pH meter and must be below 5.71. Temperature should be below 12˚C according to AUS-MEAT standards
- Meat colour – recorded using AUS-MEAT standard meat colour chips. Meat colours in the range of 1B to 3 are accepted depending on the abattoir or brand specification

Other measurements that do not impact on eating quality can be taken at the customer's request, including:

- Eye muscle area (EMA) – measured in square cm using an AUS-MEAT grid
- Fat colour – recorded using AUS-MEAT chips from 0 (white) to 9 (yellow)

If the carcass meets all MSA and company specifications, it is eligible to have cuts packed and sold as MSA. *(Source: Meat & LIvestock Australia, www.mla.com.au)*

15c. CNMPU Certification guarantees

CNMPU Certification (Certified National Meat Program of Uruguay) guarantees the following:

- Source verification of animals and products. All cattle can be fully traced from ranch to harvest, fabrication and packaging. Identification of animals is by means of individual plastic ear tags.
- No hormones used. No growth hormones of any kind or equivalent growth promotants have ever been administered to the animals. These are prohibited in the country by national law since 1984.
- Not fed antibiotics. No sub-therapeutic antibiotics have been fed or administered as a supplement in feed or water for the purpose of growth promotion.
- No animal proteins in feed. The animals have never been fed proteins of animal origin except maternal milk. The use of animal proteins in feed is prohibited in the country by national law since 1996.
- Grass fed. All animals in the program have been grown, raised and fattened on a grass diet. Restricted supplementation levels are accepted to support grazing.
- Animals never confined. Animals have never been confined to yards or feedlots at any time in their lives, and are raised grazing in open pastures year round. *(Source: Instituto Nacional de Carnes (Uruguayan Meat Institute), http://www.inac.gub.uy/)*

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