



**A Nuffield Farming Scholarships Trust  
Report**

*Award sponsored by*

**The John Oldacre Foundation**

**On Meat:**

**niche production, value adding, ethics  
and its future within cellular agriculture**

**Illtud Dunsford**

**August 2016**

**NUFFIELD  
UK**

## **NUFFIELD FARMING SCHOLARSHIPS TRUST (UK)**

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# A Nuffield (UK) Farming Scholarships Trust Report



Date of report: August 2016

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

Title	On Meat: niche production, value adding, ethics and its future within cellular agriculture			
Scholar	Illtud Llyr Dunsford			
Sponsor	The John Oldacre Foundation			
Objectives of Study Tour	<ul style="list-style-type: none"><li>- Brief review of native pig breeds.</li><li>- Understand the systems present for the retention of genetics and their commercialisation.</li><li>- Exploring traditional production with a concentration on the high end niche of producing money from waste.</li><li>- Questioning the ethics relating to food production.</li><li>- Exploring the far reaches of value adding.</li></ul>			
Countries Visited	UK Netherlands USA	Ireland Belgium Brazil	France Italy China	Germany Hungary
Messages	<ul style="list-style-type: none"><li>- Native breed genetics are key to retaining our bio-diversity and for future hybridisation.</li><li>- There are huge economic opportunities in the production of food from what we consider as animal waste (blood, skin, fat and bone).</li><li>- Though the production of food for 2050 is a current key driver for agriculture, we have to consider 2100 and beyond and the impact we have on our planet.</li><li>- Agriculture needs to be open to alternative food production and embrace the opportunities of bio-technology.</li></ul>			

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*Published by The Nuffield Farming Scholarships Trust  
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## Chapter 1: Introduction

My partner Liesel and I live on our family farm, Felin y Glyn in the verdant Gwendraeth Valley in West Wales. My family have farmed here since parish records exist, for well over 300 years. Although born in Cardiff, I spent every spare minute of my weekends and holidays on the farm.

My early career was as a photographer, initial work experience placements at 14 led me to a degree programme in Documentary Photography from the University of Wales College, Newport, recognised in its field the world over. After graduating, it led to a career in the film industry that spanned the next 9 years. During that period I sourced locations, and worked on logistics and community liaison for over 250 film and television productions. Those productions ranged from low budget zombie flicks with a £40 budget to £350m productions such as Harry Potter and the Deathly Hallows.

Liesel and I moved to the family farm in 2004, living in a static caravan whilst converting a former cowshed, and the wheels were set in motion to find the right path to diversify the farm business. After varying plans, I made the decision in the winter of 2010 to transform the family tradition of producing livestock for our own table into a business. Since 2004 I had been extending the repertoire of products that were produced each winter but in early 2011 with the opportunity of voluntary redundancy from my full time employer, I threw myself into researching wholeheartedly the field of specialist charcuterie production concentrating on the whole supply chain.

A summer school at the Meat Lab at Iowa State University and a Hybu Cig Scholarship looking at the pork supply chain soon followed in 2011, and the first products were sold in December 2011 under the Charcutier Ltd label. Those first items were produced in our home kitchen, but we were soon expanding into an industrial unit, and later in 2014 we converted the former milking parlour on the farm into a bespoke unit which was commissioned in early 2015.

Products are marketed via farmers' markets, events, delis, cafes and restaurants. Charcutier Ltd was named Countryside Alliance, Champion for Wales for Local Produce in 2015, and the BBC Food and Farming Awards Best Producer in 2016.

With research a cornerstone of the work at Charcutier Ltd, I took up the role of Project Manager for the Pedigree Welsh Pig Society to manage their EU funded research programme between 2012-15 and became the inaugural Chair of Slow Food Cymru Wales in late 2015.

In addition to Charcutier Ltd, and as a result of my Nuffield Farming study I recently co-founded the food biotech startup Cellular Agriculture Ltd.



## Chapter 2: Background

There are many people who eat to live. Unabashedly I can say that I live to eat. In an affluent Western society and with a role within food production, both in primary and in value-adding I can honestly say that as a family we eat rather well. Most farming families do; their connection with the provenance of their food is direct, and the connection of field to table is in stark contrast to the prevailing void that generally exists between the farm and the consumer.

My travel has been largely punctuated by experiences that will last with me forever as food memories, whether they were a simple meal of soup, bread and cheese on an organic vegetable farm in Belgium; a boiled tripe dish at a gala dinner in China; traditional churrasco barbecue at a home in Brazil; or sharing blood sausage on the Navajo reservation in Arizona. Food, and the act of breaking bread in a social context, is of huge importance in our own charcuterie business. Our business has been built on strong relationships, connecting with our customers and through welcoming people to our farm. We are not considered conventional business people, often turning work away when it hasn't fitted with our ideals. As I have come to learn, we are considered to be a super niche food business, though we try and cater for as wide a consumer population as possible. The choices that we make in sourcing, husbandry, feed, welfare, and the method of the production of our products label us with immense specificity.

My topic was born as an extension of the work undertaken as Project Manager for the Pedigree Welsh Pig Society and from those choices that we make as a food business. Initial planning had much greater concentration on evaluating pig breeds, looking at other breed societies and how they operate their herd books; but an early visit to an abattoir whilst accompanying an auditor shifted that initial focus onto value added products. Blood collected and discarded from this single abattoir for incineration at a cost of £300 per week would have provided me with enough raw material to produce £30,000 of fresh blood black pudding. This set the initial wheels in motion to concentrate on the utilisation of waste; to look at the production of value added products but specifically those that would fit into the super niche world that I inhabit.

The journey - and this is a word that I will use constantly throughout the narrative of this report - would also offer me the opportunity to understand agriculture better in its many forms. The rise of the commodity has re-defined traditional agriculture across the world, and although small family farmers are much greater in numbers, agriculture as an industry dominates both the price and the choices that we make as consumers for the food that we eat.

The rise in population by 2050, and the need to feed that population, has been a steady drip fed message from all directions for the past few years.





As much as anything my journey was also to explore how we are globally addressing that challenge.



Figure 1: The author Illtud Dunsford and his partner Liesel Taylor



## Chapter 3: My study tour

On returning from the Contemporary Scholars Conference<sup>1</sup> in February 2015 my mind was well and truly blown. I arrived home in a fever, my mind racing, trying to make sense of the two weeks that I had spent with my fellow Nuffield Farming Scholars in London, Brussels and Rheims. I barely slept that first night, I could feel this growing pressure of *thinking*, something I had never experienced before, but something I would soon come to relate to as part of my Nuffield Farming experience time and again. I knew that day that the journey ahead of me would present me with the experiences, the knowledge and the tools to make a difference.

My initial travel itinerary differed greatly to this final list; on the advice of a number of Nuffield Farming Scholars I had outlined a number of conferences as the main milestones of my study, but allowed time around those for visits. Though I kept relatively true to the path, I couldn't have foreseen where this journey would take me.

### **United Kingdom - April 2015**

Pig Breeders Roundtable, University of Kent - this biennial meeting of European pig geneticists provides an open discussion forum for the commercial pig industry. Having found the meeting of immense value in 2013, I chose to make it the first stop of my itinerary.

### **Ireland - May 2015**

Ballymaloe Food & Literature Festival, Ballymaloe, Cork - noted for its culinary heritage, Ballymaloe was initially established as a Country House Hotel, then a restaurant, diversified the farm business to a cookery school, and now additionally hosts an incredible food and literature festival. It provided a base to explore the southern Irish coast, and an opportunity for me to visit a number of passionate companies involved in traditional production of black and white puddings and those who have diversified into more specialist production.

### **USA - June 2015**

Slow Meat Symposium, Denver, Colorado - hosted by a local family I had an incredible insight into the culinary scene in Denver. Though the Slow Meat Symposium was the main draw it allowed me to explore, to drink cowboy coffee, taste the best croissants I've ever eaten and go in search of bison on the high plains.

### **France - June 2015**

The 8th Dry Cured Ham World Congress, Toulouse - my second trip to Toulouse and yet again I didn't manage to visit the famous Marche Victor Hugo. However, I did manage to taste some Toulouse sausage in the town in addition to the widest tasting I have ever done of air dried hams at the Dry Cured Ham Congress. I also managed a trip to see meat maven Kate Hill at her culinary and charcuterie school in Gascony and ate the most delicious melon I have tasted from the market in Nerac.

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<sup>1</sup> The Contemporary Scholars' Conference (CSC) is a 2-week conference organised by Nuffield International for all new Nuffield Farming Scholars, internationally, selected within a given year



### **China - September 2015**

Slow Food Great China Launch / Beijing Design Week, Beijing - invited to speak at the launch of the the Ark of Taste Project in China I spent just over a week as a guest visiting farms, food producers and putting on an immense amount of weight from eating at banquets each evening. A cultural shock and a surreal experience, presenting on the subject of Slow Meat (largely thanks to my visit to Denver earlier that year) and taking part in a procession as part of Beijing Design Week.

### **Italy - October 2015**

Milan Expo / Terra Madre Giovani - We Feed the Planet, Milan - organised by the Slow Food Youth Network I barely scraped into the event on account of age. A melting pot of young minds building an idealist food manifesto for our future.

### **Netherlands & Belgium - October 2015**

First International Symposium on Cultured Meat, Maastricht University - a curve ball of an event in my itinerary. Hosted by Dr Mark Post, the superstar scientist of cellular agriculture, who, thanks to the backing of one of Google's founders proved the concept of cultured meat by producing a burger in his university laboratory.

### **Hungary - November 2015**

The 3rd Fatty Pig Conference, Herceghalom - a biennial super niche scientific conference concentrating wholly on what I would reference as lard-type pigs. Utterly fascinating, the post-communist setting of the University and the wholesome food we were fed (including slaughtering and hot boning a pig in the car park for our supper) made for an utterly memorable conference.

### **Brazil - February 2016**

Nuffield Brazil Tour - unable to attend a Nuffield Global Focus Programme I duly signed on to a most amazing tour of Brazil which took in so many forms of agriculture, renewables and a review of our changing climate.

### **Germany - May 2016**

IFFA, Frankfurt - embracing the Nuffield Farming experience fully and wanting to provide that same gift to others, I made the decision to take our whole team on a trip to the largest international trade fair for the meat processing industry in Frankfurt.

### **USA - June & July 2016**

Three events were the key attractions - the World Pork Expo in Iowa, The Sheep is Life Festival in Arizona and the New Harvest Conference in San Francisco. Four weeks of travelling in total, which included farm visits, factory tours, butchery and processor visits, judging a backyard BBQ competition, visiting the largest AI facility in the world and even a visit to a spaceport!



## Chapter 4: United Kingdom, April 2015

### 4.1. Pig Breeders Roundtable, University of Kent

When asked to describe The Pig Breeders Roundtable - I jokingly said once that it's a kind of *"gentlemanly fight club for animal geneticists. The first rule of pig club is: you do not talk about pig club. The second rule of pig club is; you DO NOT talk about pig club"*. Essentially, it's a biennial meeting largely consisting of European scientists working within breeding and genetics. For the most part, whether working for government or commercial companies, they're competitors, but the Roundtable provides a working environment where papers can be presented to their peers showing a microcosm of what it is that their current study entails. It provides a unique safe environment for discourse and discussion under the understanding that the discussion stays within the confines of the conference, largely due to the commercially sensitive nature of the research.

This was my second visit; both visits were kindly sponsored by the Pedigree Welsh Pig Society<sup>2</sup> and being from a small breed society I was somewhat (again) the anomaly in the room. Seven major genetics companies were present on my first visit, that number had shrunk to five for the second through buy-outs and amalgams. Having experienced the conference previously, I knew the confines of what I would be able to discuss. It was apt as a first event, as this secretive theme would become a commonality in my journey. The Nuffield Farming journey would afford me access to people and places I had never dreamt of meeting, people who would provide open answers, though the phrase Chatham House Rule<sup>3</sup> would become commonplace. In addition to the scientific discourse I had decided to revisit the PBR with one other additional objective; to use it as a network to gain contacts that would provide me with access to the wider commercial pig industry.

However, the key experience that was derived from the PBR was the closing address. It was pitched as somewhat of a puff piece, similar to the lighthearted news story that comes towards the end of the nightly news programme, or at the very least that was how it was perceived by the audience. It concentrated on a piece of work relating to a grouping of native pigs breeds. Over the course of two conferences I had come to fully understand that a younger generation of geneticist held little value in native breeds. Theirs was a drive of commerciality based on the nucleus herds that their companies had developed during the latter half of the 20th Century. This address however was by no means light in its science. It looked at world populations and groupings of pigs based on their genetic makeup, concentrating on the genes that produce the skin and coat colours.

The reaction wholly highlighted the state of commercial genetics when I overheard two members of the audience uttering in disbelief at a North American breed of pig that they'd never heard of, a breed that is relatively commonplace and which I had seen on more than one occasion in the flesh (and had eaten). The presentation was being made by a respected geneticist who had over thirty years' experience of the industry. Speaking at length later, he had worked with considerable numbers of native breeds through his career and expressed the true value of the genetic diversity of these varied breeds. Though the mainstay of his work was in commercial breed development, there was a sense

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<sup>2</sup> <http://www.pedigreewelsh.com>

<sup>3</sup> <https://www.chathamhouse.org/about/chatham-house-rule>



that his continued work with native breeds was marginalised and seen as trite or old fashioned. As disappointed as I felt about the direction of commercial pig genetics, it did invigorate me that those progressive thinkers within the industry held the same values that I did. There was still some hope.



## Chapter 5: Ireland, May 2015

My host during part of my stay in Ireland was Maire, a fellow Nuffield Farming Scholar. We met in Clonakilty, a town famous for the black pudding that bears the same name. We'd arranged to meet at the butcher's shop where it all began. There, Liam, who ran the shop gave a tour and a potted history of how a product they barely made at all when he started as a butcher's boy in the 1980s had now grown into an international brand. Having bought some swag (cool bag, apron, t-shirt and pudding of course), Maire was desperate to show me another shop in town: Supervalu. Supervalu was a chain that I'd seen across Ireland, a chain that I had thought utterly unremarkable at first until I stepped through the doors of the Clonakilty branch. The branches are independently owned but are joined within a network as a buyers' group. Over 90% of the produce from each store is centrally purchased, allowing good discountable purchase power but giving autonomy to each store to purchase a percentage of their stock locally. At face value, the store doesn't seem altogether different to a standard supermarket; merchandising is exceptional with tables and displays aligned as you would expect from an upscale farm shop or food hall. However the sourcing is impeccable: choice, quality, locality, provenance and story above all, were obvious in their buying choices. I'd return to Supervalu countless times over the course of the trip.

### Chapter 5.1: Ballymaloe Literary Festival of Food and Wine, Ballymaloe, Cork

I must have been an arable farmer in a previous life, whenever I see a field of wheat or barley I can honestly say that I can feel my heart skip a beat. There is some strange affinity that links me. On the morning that I arrived at Ballymaloe I found myself sat in my parked car watching the waves of dancing heads as the wind shook the barley. I could have sat there all day. *(See picture on next page).*

I had built my week's visit to Ireland around the Ballymaloe Litfest<sup>4</sup>. Unfortunately it clashed with the Spring Festival at the Royal Welsh Showground so the team at home were under some pressure being short staffed and running the event without me. I had high hopes for Ballymaloe; the three generations of women who have married into the Allen family are the doyenne of Irish culinary life. Their newest event, Litfest had been lauded in 2014 across social media platforms as the place to be. The lineup was a who's who of the culinary world and provided an easy place to meet and speak with a number of people in a short space of time. I had pre-booked a raft of tickets to varying talks and tastings but the very top of my list was a chance to talk to Alice Waters<sup>5</sup>.

I had been emailing her assistant for the previous few months and I'd secured a slim slot after one of her talks. Never have I been quite so nervous, her restaurant Chez Panisse and her range of books and cookery books had been introduced to me well over a decade and a half earlier by one of my food mentors: Mathew Parry<sup>6</sup>, a former colleague and now a documentary film producer living in Vancouver. In 2011, Liesel and I had been fortunate enough to experience dining in her restaurant, but also, and maybe more importantly so, to visit the Edible Schoolyard. The Edible Schoolyard project

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<sup>4</sup> <http://www.litfest.ie>

<sup>5</sup> <http://www.chezpanisse.com/about/alice-waters/>

<sup>6</sup> <http://www.mathewparry.com>



had been initiated during the mid nineties. She had approached King Middle School, a local school to her in Berkeley, California, to see whether she could turn a few redundant blocks of wasteland into a garden, an outdoor teaching area and a cooking space, as an extension of the traditional classroom. With some opposition, and with little or no funds the project was born and the lives of a generation of pupils were changed. The single part of the curriculum that caught my imagination was pizza, and indeed it seemed to be the favourite project for the children too. Within their school life they would learn to grow wheat, mill it and produce the dough for the pizza base, they would also grow the tomatoes and herbs to produce the sauce and finally learn to make ricotta cheese in the kitchen classroom. All these elements would amalgamate in their final lesson in the garden when the wood fired oven would be lit and their pizzas cooked.



Figure 2: The view from the car, Ballymaloe Litfest



Figure 3: The Edible Schoolyard, Berkeley, California

The beauty of speaking with Alice was understanding how such a project had come to fruition, but also to talk much more about her method of sourcing for her restaurant. She is oft recognised as being the first to name producers on her menu - something we think of as being commonplace today, providing that traceability and promotion, but during the 1970s when Chez Panisse was a growing institution it was novel and new. Later I came to understand that Chez Panisse as a restaurant, brand and even as a movement, bears little criticism within the culinary industry in North America; that tends to happen when a place becomes an institution. In an era where technological food was booming, a simple restaurant serving the very best in organic and seasonal produce could well have been perceived as being elitist and indeed, it made me question our own business as we set such high standards both in our rearing specification and in our own production.

However, Chez Panisse and the work that surrounds it stands in testament that attaining those high goals can result in long term success and that its power from a small dining room in Berkeley can extend half way around the world to our own farmhouse kitchen. The very key message that I took both from her talk and from our conversation was sourcing. As her business grew, she was acutely aware that in the long term she couldn't rely solely on the bounty of the farmers' market that was held some 200 yards from her restaurant door. Her father, now retired, took it upon himself to find her some suppliers. He drew a 100-mile radius from the restaurant, contacted the local agricultural college and sourced a list of every organic producer within that radius and promptly visited them all.





He found the ideal producer for the restaurant, but felt that Alice needed to make that decision herself so organised a visit to his favourite three farms. She chose the same producer<sup>7</sup>.

It's a nice story so far, but there is little remarkable about that - what she did next is key. She promised to buy everything that the farm produced, and at a fair price. The onus now fell on the kitchen to turn that days' bounty into a unique menu for that day and to turn a profit. In part, this became the success of the restaurant: unbelievably fresh and seasonal food. A famed dessert item is a perfect peach, it is, put simply: a peach on a plate. Is it pretentious? Yes it is, but it's meant to be a nod to the perfection of simple pleasures, something often lost, especially within a fine dining experience.

So how does sourcing connect back to the Edible Schoolyard? Knowing that Chez Panisse were always looking to support local growers, a San Francisco prison garden programme got in touch. Alice promptly visited, meeting some of the gardeners, many of whom were extremely violent repeat offenders who had found a purpose in life through gardening. She supported the programme by buying their produce, but took the model and re-appropriated it into a school garden project, and thus the Edible Schoolyard was born.

Though my chance to talk was initially brief, the small-scale nature of the Ballymaloe Litfest meant I managed another two conversations with Alice (and her sister) during the weekend. It also allowed me to speak briefly with some of the other speakers such as Chef April Bloomfield and author and journalist Joanna Blythman. I also spoke to a number of food producers whom I would visit later that week, most notably Fingal Ferguson of Gubeen who welcomed me to their family farm and took me on a tour of their cheese and charcuterie facilities. However, the brief chat that brought with it the most effect was talking to Patrick Holden of the Sustainable Food Trust.

Although I didn't know Patrick at the time, he lives within the same food community that I do in Mid and West Wales. Known for his longstanding work for the Soil Association, he also farms Bwlchwernen Fawr producing exceptional milk from his Ayrshire herd that is transformed on the farm into delicious Hafod Organic Cheddar. Our specification for the pigs that we use in our production is that they are a British native breed and that they are fed at least one form of waste co-product from the food industry in addition to their standard ration. Those talks with Alice Waters had sparked the idea, and taking inspiration from some of her experiences I tried to apply them myself. We were already taking a small amount of rose-veal from Marcross Farm in the Vale of Glamorgan but Patrick could potentially offer us a product that would meet with the same exacting specification that we used for our pork - native breed Ayrshire bull calves fed on waste food co-products, specifically the whey from their cheese production. It would be late autumn by the time Patrick and I would be able to sit and talk once more, but he too had instilled a spark of an idea in me, in the form of true cost accounting<sup>8</sup>.

## Chapter 5.2: Roscarberry recipes

During my week in Ireland I managed to visit over ten meat production companies. A visit to meet the Allshire family at their farm in Caherbeg hadn't initially been part of my itinerary but Maire, my host, again was adamant that I should visit. Always trust the intuition of a Nuffielder, the odds are stacked

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<sup>7</sup> <http://www.greenstringfarm.com/about>

<sup>8</sup> <http://sustainablefoodtrust.org/projects/true-cost/>



in their favour that they'll be right. In addition to visiting the Litfest, my Irish trip had always been intended as a black pudding trip. I am constantly told by customers that they love black pudding, but once I ask what kind, they respond with a stark blank expression. As with any traditional meat product, there are immense differences regionally and even within a particular region there can be differences from one street to the next. A quote I have often referenced by Hippisley Coxe from their Book of Sausages explains my own experiences perfectly.

*“what we were told in one street, for instance, about mortadelle, would be flatly contradicted in the next. Both sausage-makers would consider themselves right because, in their eyes, that is how mortadelle should be made.”*

Although this speaks of Italy, it is true the world over. As the saying goes, variety is the spice of life, and indeed I could not have envisaged the variation of black puddings I was to taste on my trip.

Roscarberry were the perfect business to visit. Much as our own business, they had started on their farm, building a small unit, then investing heavily in a much larger purpose built space. They predominantly produce sausages, bacon, black and white puddings. Their puddings were what interested me, they differentiated from others that I had tried on the trip, largely due to their unique selling point - a high meat content. The quality was unquestionable and they have been multi gold medal winners for both black and white puddings at European level. They also hold a knighthood of



Figure 4: Black pudding production, Roscarberry Recipes, Ireland



the order of the black pudding - something, along with joining Gorsedd y Beirdd (Bardic Circle)<sup>9</sup> that I now have on my bucket list of things to do.

The family team at Roscarberry is dynamic. Avril the matriarch is a wonderful ambassador for the company and brand, a strong woman and absolutely key both in their social media presence and in a public facing role. She also makes the best fruit loaf I've ever eaten (which contains pork of course), sadly she won't part with the recipe. Willie, her husband, commands the farm and processing space. It was his ambition that drove the growth in the company and his planning of the production unit has provided an envious position for their two hard working boys, William and Maurice, to take the business to the next level.

My visit to Roscarberry was too short. After a tour of the farm and facility I joined Willie in the delivery van for a run; he wanted to show me one of their local stockists. Cue my second visit to Supervalu in Clon. Whilst eating an enormous sandwich from the store he told me the extent of their trade, and the market access they now had to the Supervalu chain. In stocking local producers, Supervalu had instigated an academy for producers looking to take a growth step. It would allow those producers to grow and provide access to sell to the Supervalu chain across Ireland. Immensely impressed, and more than a little jealous that we didn't have something similar, I explained the leap from small scale production in the UK to the scale of supplying the major retailers.

Willie had kindly arranged a visit for me to the co-operatively owned Staunton Foods - a nearby abattoir processing in the region of 6,500 pigs per week. After Supervalu I have to admit I was more than envious of the retail opportunities afforded to food companies in the area. It was a running theme, each producer I met had a ready market and what seemed to be a set process for companies to succeed. As a producer utilising pork in Wales, where the recorded slaughterings for all of 2013 amounted to 32,000<sup>10</sup> I was again growing green with envy as the key issue time and again in the growth of our business has been a strong supply chain. The pork processed at the Staunton facility may not fit our current specification, nonetheless, the facility existed to process, and with such numbers there would be breeders and rearers to partner with.

A few days later, I found an example of just that, managed by the team at nearby Gubbeen with their project - <http://www.ourpiggycoop.com>. Their online site provides their specification for processing, the price that they pay and allows small scale producers to book in pigs through an online system to provide the processing facility at Gubbeen. As our business grows, the natural way for us to facilitate our own business would be to adopt something similar.

I knew having met Willie that I needed more time to learn both about their process, and also their schedule. I vowed to return, and I did a few weeks later, donning my whites and apron to join with the black pudding and white pudding production. Later in the year we returned the favour with both Willie and his youngest Maurice returning to produce with us.

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<sup>9</sup> <https://en.wikipedia.org/wiki/Gorsedd>

<sup>10</sup> Little Book of Meat Facts, Hybu Cig Cymru, 2014



### Chapter 5.3: Dawn Meats

My final day in Ireland was arranged by another Nuffield Farming Scholar - Joe Burke, Sector Manager for Beef and Livestock with Bord Bia, the Irish Food Board. He suggested a visit to meet Paul Nolan, Group Development Manager based at the Dawn Meats' beef plant in Waterford. As a business we are connected with the local Dawn plant here in West Wales, having provided a number of training days for them on carcass utilisation. In the whole scheme of things we're an utterly minute business in comparison. When considering pork weight pigs we average the equivalent of around 12 to 16 per week; they process over 10,000 pigs, 10,000 cattle and 15,000 sheep per week in Ireland alone.

It's always with a certain level of trepidation that I enter any large abattoirs. My experience at Stauntons that same week was excellent, our local abattoir kills less than a 100 pigs per week and you always imagine that big equals bad. Often that couldn't be further from the truth. The lairage at Stauntons was spotlessly clean, enrichment toys hung from the ceiling and calming misters kept stress levels down. Equally I was utterly impressed by the Dawn Meats plant, the cutting lines in particular, with considerable automation in packing, boxing and labelling – it was a joy to behold. The stark truth of animal protein is that few want to work directly in connection with the meat. We have found this a reality in our own business when facing the challenges of finding local employees.

As Paul took me around the plant, I was impressed with the quality of the beasts hanging in the numerous carcass halls. Many were cull dairy cattle, grass-fed, rich with yellow fat, with well developed dark meat and incredible marbling. In an utterly different market context these could reach a premium on the counters of London food halls. Here, they were destined for the lower end of the market as comminuted<sup>11</sup> products and destined for fast food chains such as McDonalds. Continuing the tour, the final stop was the rendering facility. Each waste product had its value, and when processing on such a large scale the utilisation of the whole animal is absolutely key. It's the dirtiest, smelliest spot of any plant, but it's where the profit lies.

Finishing the tour, Paul asked whether I had any spare time? I had an evening ferry to catch but had a few hours to kill. He picked up the phone and called his cousin James at their family butcher's shop, Nolan's of Kilcullen. Drawing a quick map I was off on a mad dash north towards Dublin to experience my final afternoon of Irish hospitality.

### Chapter 5.4: Nolan's of Kilcullen.

A visit to Nolan's proved to be another of those unexpected highlights. The family business was established in 1886 and the shop has been recognised countless times with their window display akin to a trophy cabinet of major European awards. The key to the success of the business? Service. The owner, James Nolan, manned the counter, knew the names and the shopping habits of all his customers as did his staff. The store was open, clean, airy and light and inviting, immense attention to detail had been made in designing and stocking the counters with products. Both the shop and the abattoir and processing facility behind the store had seen considerable investment. What seemed to be a small butcher's shop in a sleepy town was anything but.

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<sup>11</sup> Broken down into particles



Whilst touring the processing space I learnt that loyalty was key. Most staff members had worked within the business for over 10 years, many having spent their whole careers there. They were invested in the business, and took utter pride in the produce that they made. Visiting the sausage production space, I saw fresh black pudding was being fished from the boiling kettle. Quite possibly one of the best of the trip - made from fresh beef blood and considerably less firm than the cereal heavy puddings made by Clonakilty. The freshness reminded me of the French *boudin noir*, and the secret came from collecting the blood freshly and making the pudding within 20 minutes of kill. Quality like that is hard to find.



Figure 5: Touring the Nolan's of Kilcullen facility

Earlier in the week I had made a pilgrimage to the English Market in Cork. I had found a book about its history at the small Ballymaloe Shop, and each food business recommended that I visit. It's known for a number of traditional offal products, specifically drisheen, tripe and trotters. Items that I was happy to try, but not ones that I had filled the cool box with. I made my last few purchases at Nolan's and set off on a course for home.

In beautiful late afternoon sunshine I drove towards the ferry to make the slow evening return leg to Wales. I was on a high; my first 'proper' Nuffield Farming trip had been an unmitigated success and I was eager to put in place some of the production methods I had seen. I had a long journey and around three hours to sleep before I'd be loading our vans back at home ready for the next day's markets. At that very moment it didn't faze me, if the rest of the journey was going to be like this, it would be amazing.



## Chapter 6: USA, June 2015

I was sat on the floor of a tightly packed meeting room at the Lingoto, the former Winter Olympic venue in Turin during autumn 2014 when I first heard the term Slow Meat. I had joined a group who were largely North American who were launching a new campaign on the ethics of meat production during the biennial Terra Madre<sup>12</sup> celebration. The real sense of the occasion from the American contingent was: there's not anyone doing it worse in agriculture than us, but through small-scale campaigns targeting the mass public, this group of farmers, educators and NGOs were trying to drive a change. What struck me, were the key campaigns that were extremely populist in their nature, specifically targeting sporting events and the tradition of tail-gating.

Tail-gating<sup>13</sup> for the uninitiated is the practice of parking your pick-up truck in the parking lot of a major sporting arena, dropping the tailgate and grilling some meat accompanied by copious amounts of beer. Though sport is the focal draw, it's often secondary to the social interaction of the meal. In an attempt to highlight the ethical choices that could be made in purchasing the burgers, franks and meat cuts the Slow Food Movement had launched two specific campaigns: Nose to Tail-gating and Cleaner Wieners where farmers and producers would set up their own tailgate party inviting the public to try their produce. I was utterly intrigued by the way in which they were engaging with the public: I needed to hear more.

### Chapter 6.1: Slow Meat Symposium

Nearly a year later I had made my way (via three long flights) to the mile-high city of Denver, Colorado to attend the Slow Meat Symposium<sup>14</sup>. I arrived utterly sleep deprived driving a few short miles to my host family's home - I was ready for bed. My host had other plans; he was headed out to an arthouse cinema to see a silent French film and suggested I join. I had already learnt that a crucial part of a Nuffield Farming Scholarship was to say yes to opportunities. I tried my utmost to stay awake but Victor was utterly gracious when we got to disseminate what we'd seen as I'd missed large chunks of the film thanks to some snoozing. There may well have been a gargantuan snore at one point, as I think I may have awoken myself. Undeterred, he suggested late night tacos, but that I could stay awake for.

In much the same way as the Nuffield Farming network, the Slow Food Movement<sup>15</sup> provided me with a number of beds and sofas to sleep upon during my journey. Victor, an architect and his wife Giga were my hosts for the week. They also had a second visitor for the conference: Stephan Gordon, a photographer and food writer from Los Angeles. Giga was a founder of the Denver School Garden Program<sup>16</sup>, which has since become the pilot for the nationwide School Garden Program in the US. Giga took immense pleasure in showing me two of their gardens. They were impeccable hosts; Victor and I bonded as coffee snobs and he introduced me to Cowboy Coffee. A throwback to the old process

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<sup>12</sup> <http://www.terramadre.info/en/>

<sup>13</sup> [https://en.wikipedia.org/wiki/Tailgate\\_party](https://en.wikipedia.org/wiki/Tailgate_party)

<sup>14</sup> <https://www.slowfoodusa.org/slow-meat-2015>

<sup>15</sup> <http://www.slowfood.com>

<sup>16</sup> <https://dug.org/denver-school-garden-coalition/>



of boiling the grounds in the water but presented with utter hipster pretension<sup>17</sup>. Alongside the coffee I had what I consider to be the very best croissants I have ever tasted<sup>18</sup> - it now stands as the yardstick for all future pastry consumption.

Slow Meat as a conference was split into a series of events which to my mind worked immensely well. There was a traditional conference setting, a series of bookable activities and a public fair which included stalls, street food, tastings and the heaviest downpour of rain I have ever experienced (and that says quite something coming from Wales).

In much the same way that Ballymaloe had provided an easy space for me to speak with a great number of people, the Slow Meat Symposium did exactly the same. Farmers rearing native breeds, small processors and butchers, organisations such as the Livestock Conservancy, Heritage Foods USA and the American Grassfed Association were all present. My target though was to speak with one person in particular: Dr Temple Grandin.



Figure 6: Dr Temple Grandin speaking at the Slow Meat Fair

During the fair she was presenting a short talk on animal welfare within slaughtering facilities in the US. Never have I seen an audience so utterly enthralled by a speaker, especially considering the subject and that many of the audience were members of the general public. Later, after the talk, and after acquiring a signed copy of one of her books I managed to speak with her directly. I specifically

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<sup>17</sup> <http://sprudge.com/in-colorado-delicious-meticulously-brewed-boiled-coffee-boxcar-62617.html>

<sup>18</sup> <http://www.babettesbakery.com>



wanted to know her opinion on pigs - I had some questions on stress at point of slaughter but she soon turned the subject to breeding.

In her opinion, an overemphasis on breeding for specific traits was resulting in problems within many livestock breeds, problems that could heighten stress at point of slaughter. Stress was generally derived from long transportation, poor human handling, fighting on-farm or at the abattoir, and even through climatic and environmental stress during storms and poor weather. She advocated stunning and captive bolt over CO<sub>2</sub> chambers as varying pig breeds had different reactions based on their genetic differences. Using the example of Pietrain, which is acknowledged as having the halothane stress gene, the chemical difference in the resulting meat would differ greatly from a low stress animal such as a Yorkshire/Large White.

She touched on the ethics of eating meat, but admitted that genetically she could not be a vegan. She advocated better welfare, though installing her methods and systems was only successful to a point: stockmanship, handling and human execution was where there was always failure. Listening to her speak I could only marvel at her description of the human condition, her autism laid bare and without prejudice how cruel we are as a race. Though Dr Grandin spoke specifically of the cruelty that we as humans can impose on animals, her observations were wider, and could be termed to describe how we treat each other as humans

In discussing pork in particular, she spoke of the advantages of heritage pork breeds. Over-selection of traits had resulted not only in behavioural changes but breeding within the US had largely been carried out in isolation, without looking outward at how other cultures had hybridised. She utilised the term of “bad becoming normal” time and again when referencing the selection of breeding traits. Flavour and tenderness had both been sacrificed in the name of efficiency. She advocated native breeds in particular, for docility and eating quality. The pork of her childhood differed greatly to modern commodity production; it was succulent, and you could cut a chop with your fork.

Speaking with Dr Grandin was an immense privilege, her insight and experiences and perspective were a joy to hear, but my day was far from over. I can honestly say that I’ve never had a day with quite so many tasting revelations, I was in for a sensory overload. I had booked onto a number of blind tasting events, but somehow found my way into the prep kitchen and got to taste a considerable number of dishes for events I hadn’t paid for. Bob Perry from the University of Kentucky took me under his wing and fed me products that he’d produced from a breed comparison study<sup>19</sup>. Thanks to Bob, Josiah Lockhart of Lockhart Family Farm<sup>20</sup> and the blind tasting panels, in one short afternoon I managed to taste products from all the native North American breeds I had wanted to study.

Blind tasting was an utter revelation. I had signed up for a Breeds and Brews pairing, looking at rare breeds and a second event of Cured Meat, Artisan Cheese and Craft Beer. The cured meat tasting was the highlight; put before me was a plate of varying charcuterie. We knew nothing of them, we had tasting notes and an amiable host in food author Jeff Roberts<sup>21</sup>. As a seasoned taster and producer I was pretty confident I could breeze through the plate. How wrong I was. It had been pitched as a plate of ‘world charcuterie’. Unknown to us the audience they had all been produced in the USA. There was

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<sup>19</sup> <https://dhn-hes.ca.uky.edu/content/heritage-hog-carcass-yields>

<sup>20</sup> <http://www.lockhartfamilyfarm.com>

<sup>21</sup> <http://www.chelseagreen.com/events?person=8500>





a great variety. For fear of the producers ever reading this report I won't copy verbatim my tasting notes. What I will say though is, to this day, I swear that the first ham that we ate, a mild nutty prosciutto from Black River Meats in Vermont, is indistinguishable from the delicate hams of Northern Italy. Truth be told, I still think it was an Italian ham they served us.



Figure 7: Bob Perry from the University of Kentucky overseeing the tasting prep

Of the selection, two items did truly stand out - a 36-month aged ham produced by Bob Perry from a Hereford pig<sup>22</sup> as part of his breed comparison project (and yes, they look just like the cattle breed sharing the same red and white pigmentation). Billed as a prosciutto, I thought it did its provenance a dis-service, it reminded me so of the excellent country hams found both here in West Wales but also across the European continent and the Southern States of the US. Rich, salty, robustly porky, with an immense depth of flavour. The second product was an nduja, a traditional Calabrian highly spiced soft salami produced in Chicago by Nduja Artisans,<sup>23</sup> a producer I would later meet and visit.

My final tasting before departing for dinner was an Edwards Country Ham, produced since 1926 in Surry, Virginia. I tried both their cooked ham and their Surryano (another country ham masquerading as prosciutto), both of which derive from the old Virginian tradition of producing cured meats from peanut fed pigs. The Surryano remains as one of the few products left which retains this tradition,

<sup>22</sup> <https://livestockconservancy.org/index.php/heritage/internal/hereford>

<sup>23</sup> <https://www.ndujaartisans.com>



which can be traced back commercially to 1779 with the production of Smithfield Ham, produced some 18 miles from Edwards.

## Chapter 6.2: Life cycle, Boulder Lamb

The day prior to the fair I had joined a group of delegates in a small, cramped mini bus that was severely lacking in air conditioning. Sweating profusely does not, as I have found, ingratiate you with one's fellow travellers. However, we muddled through an hour's journey to arrive at Boulder Lamb<sup>24</sup>, a small farm near the town of Longmont, Colorado. I had signed up to Life Cycle, a breakout session from the main symposium, to take a farm tour and witness an on-farm slaughter. Our host, was Adam Danforth<sup>25</sup>, a James Beard award winning author of two volumes on slaughtering and butchering. We have his books in our library here at home. They are by far the best illustrated books of their kind. Crisply clear, descriptive photographs guide you through the process of cutting beef, poultry, rabbit, lamb, goat and pork. We use them both in staff training and when we run cutting courses, and are a staple of our course reading lists.

Adam is renowned within the world of meat geekery. He has carved a unique niche for himself, and it seems he is constantly travelling the world, demonstrating home-kill techniques and basic butchery. To my mind he epitomises the hipster butcher. Clad in a box-fresh white wife-beater, jeans and a pair of Adidas daps, he had hair that Gavin Henson would have been proud of. Whilst the meat groupies that I have in the business are dominantly male and are most definitely card carrying CAMRA members, I can say with utter envy that nearly 70% of the audience were swooning women.

I was interested in seeing who would be attending the event and to see what I could learn. Our business has evolved from the longstanding family tradition of rearing livestock and producing meat for our own table. The on-farm slaughter has been an annual event in my calendar since childhood, and my role has evolved as I graduated from plucking turkeys at Christmas to the handling of whole beef carcasses, and ultimately a whole business based upon that tradition. The farm kill was always an occasion; it would involve multiple generations within the family, neighbours and friends would attend, and though at times sombre and respectful, it would largely be a jovial and social event. For us as a rural community, we took the process for granted, we were connected to our food and thought little more of what we were doing.

The day had been pitched as an opportunity to '*undertake the most powerful experience we can have to reconnect with our food*'. We were a diverse group, mainly foodies rather than producers. We all shuffled nervously as the livestock trailer was reversed up to an old wooden barn. Although I was an old hand at these type of events, never had I experienced both theatre and reverence on this scale surrounding the death of an animal. Adam entered the trailer and as the shot of the captive bolt rang out, a hushed silence fell amongst the group. The throat was stuck and the shoulder pumped to release the blood. At this point a lady broke the silence describing in emotional hushed tones that she found it a vulnerable experience.

Adam continued with his work, tapping the eyeball to check for life before proceeding with a traditional fist technique to remove the hide. Stood beside me for much of the morning was a quiet,

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<sup>24</sup> <http://www.boulderlamb.com>

<sup>25</sup> <http://www.adamdanforth.com>



giant of a man, Franco Lee; a member of the Navajo Churro Sheep Presidia<sup>26</sup> - a group of farmers, breeders, weavers, cooks and chefs who uphold the 400-year tradition surrounding the Churro sheep breed. Though Apache, he worked on the Navajo reservation as the Head of Culinary Development at Dine College, an educational institution founded in the late 60s to teach Navajo traditions. We started to compare notes on our own process and method; a little tutting ensued when Adam brought out a compressor to needle point blow the hide from the meat. Across from us a German veterinarian described the commercial process he was familiar with in the abattoirs that he inspected. He wasn't a fan of the compressor technique as it had an effect on meat quality. Quietly, it gave validation to both our tuttings.



Figure 8: Adam Danforth post lamb sticking

The carcass was lifted, hung, and volunteers were called to continue with the evisceration process. The cavity was opened, the eviscerate removed and pluck detached. Removing the lung, Adam asked for a volunteer. Foolishly I stepped forward and was tasked with the job of re-inflating it. I had never done so before, I blew as hard as I could into the wind pipe, I can still taste that stark iron flavour of the fresh blood. Initially I thought it was a frivolous gimmick, but it proved worthwhile allowing much better inspection means for disease. On the topic of offal I questioned the use of some of the items that we discard. Spleen in particular can be bitter and we never use it, though Adam described it as a

<sup>26</sup> <http://www.fondazioneSlowFood.com/en/slow-food-presidia/navajo-churro-sheep/>



general offal, and suggested dicing or mincing, flash frying and serving on toast. Additionally, unless requested by a customer, the brains are also thrown. A suggestion was made to blend the brain with hot stock to make a brain foam. This carcass was destined to be roasted whole, so the tools were packed and we moved on to lunch.

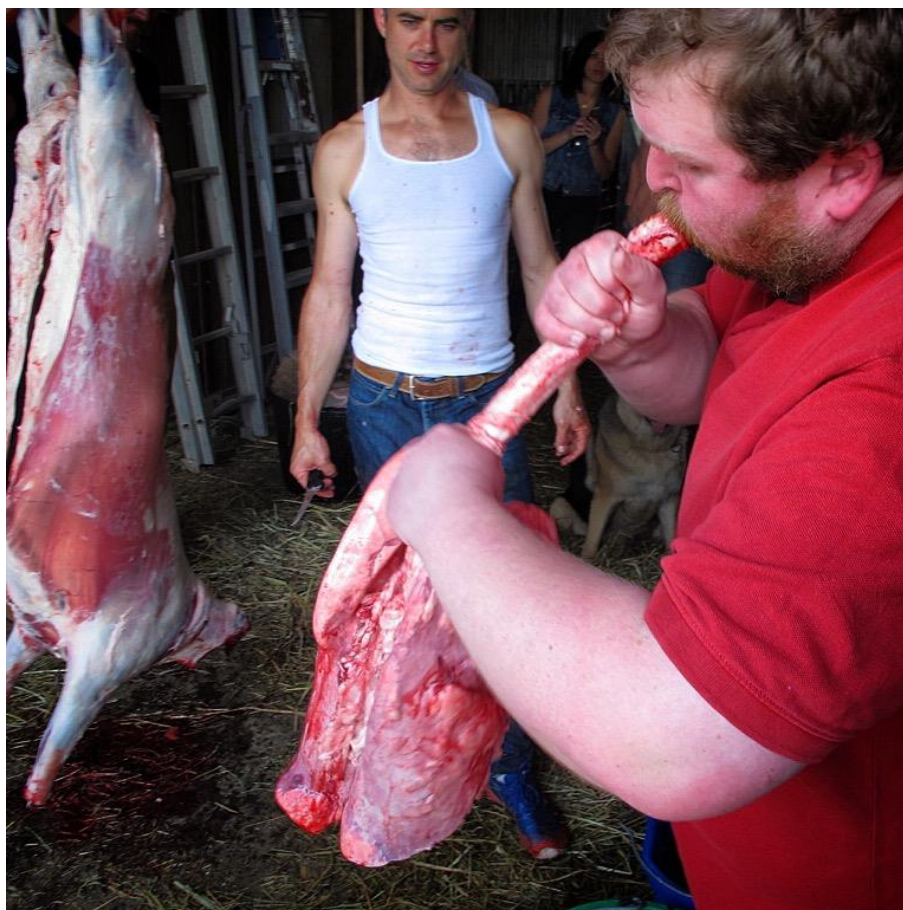


Figure 9: The author inflating the lungs

On the farm, one thing that was of particular interest was a triple compost heap. Here in the UK a condition of home slaughter is the removal of waste by a licensed carrier. Here they utilised a composting system for their eviscerate, hides and animal waste. They turn the heaps daily by tractor, with the waste from their mutton and beef carcasses composting within a month. They sought to be as sustainable as possible. At one time they were sending hides to their local tannery for curing at a cost of \$150 per hide. They soon stopped when they realised that commercially tanned hides were available on ebay for \$45 and there was barely a market for their product.

Speaking during lunch with the mini bus driver, the day had brought back some memories for him of his childhood in Mexico. He eulogised the crisp, crunchy chicharones his grandmother would make on slaughter day when they would kill a pig: little cubes of seasoned unctuous belly pork, topped with rind and deep fried until crisp. For those of a certain age, the mention of slaughter day is a unifying experience; when I speak about our business I often hear recounted tales of social gatherings that are now merely distant food memories from childhood.



We all boarded that little hot bus back to Denver, quickly realised that the windows could actually be opened and basked in the cooling breeze of that late afternoon. We were largely silent, tired from the hot sun, full from lunch (lamb of course), but reflective about our day.

Like many of the group, I had signed up to varying dinner events. I was headed to The Source, a market place of food vendors and restaurants for a dinner curated by Austin, Texas based Little Herds<sup>27</sup>. As the sticker on my chest proclaimed ... My name is Illtud ... and I ate a bug! I ate quite a few as the night progressed, consuming a tasting menu that included a range of insects as part of each dish. Should you ever get the chance, I can wholeheartedly recommend the cricket salad.

### Chapter 6.3: Plains Conservation Centre

While I was in Boulder with Adam, another group was meeting the bison at the Plains Conservation Centre<sup>28</sup>. The following day I managed to catch up with Katie Miller, the Holistic Management Director at their booth at the Slow Meat fair. I mentioned my dismay at not being able to make the event and to my delight she suggested a time later in the week to pay them a visit. The Centre itself has been operational since 1949, they're a non-profit that run an educational programme concentrating on prairie conservation and the eco-history of the region. The centre stretches to nearly 9,000 acres in total, and was at one time completely rural, but as the urban sprawl of Denver encroached, a parcel of land was sold for commercial development securing an endowment for the future of the organisation.

I was interested in two things in particular: Denver, with its quintessential Western architecture had awoken some long-forgotten childhood dream; and having tasted a range of bison burgers, slim jims and jerky during the trip, I wanted to see some of these beasts in the flesh. The second reason, and a far more reasoned one for a Nuffield Farming Scholar, was to understand a little more about the holistic principles of Alan Savory<sup>29</sup>. The Centre forms part of the Savory Institute's network, and is a recognised Savory hub. Alan Savory is often seen as a controversial ecologist, with his holistic management system often criticised by mainstream scientists.

Driving out with Katie in one of the centre's pickups we headed from the educational base to a swathe of land at West Bijou Creek. It amounts to some 8,000 acres and is home to their Grasslands Stewardship Project. The aim is to holistically manage the area of grassland utilising a large herd of migratory herbivores (bison in this case) to return the ecological health of the degraded grassland. They are essentially mimicking the natural migratory pattern that these animals would have held prior to the introduction of white settlers to North America.

I was already familiar with the use of mob grazing, where long grass is intensively grazed, trampled and left to rapidly regenerate. However, Katie explained that the rationale behind mob grazing had more to do with the efficiency of grass growth than the complete holistic view that they undertook. The primary reasoning for 'bunched grazing' was not for maximum growth, but for the growth or reintroduction of natural species and for soil health.

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<sup>27</sup> <http://www.littleherds.org>

<sup>28</sup> <https://plainscenter.org>

<sup>29</sup> <http://savory.global>



All forms of rotational grazing were viewed in the same light as mob. They preferred to utilise a system called 'plan grazing' which, through recording growth results, utilised insight into recovery time of both soil and the native rich species, with average grassland recovery taking around 45 days. There was a fine balance, it seemed, when utilising this intensive grazing: should there be too much grazing the root systems would be exhausted during regeneration. Equally if an area wasn't sufficiently grazed or if selective grazing had happened it could equally be detrimental providing an imbalance of species. This selectiveness was described as 'buffet eating' where livestock would graze their favourite plants. Intense bunching meant that animals would have to eat what was available.

To encourage the regeneration of native species, keyline ploughing was also used to break the crust of the earth, resulting in a flush of new vegetation often with proliferation of native species that had lain dormant for years. They utilised the correct ploughing topography (ploughing around a hill, not up it) for best results. Essentially, the bison themselves were seen purely as a tool for land management and the meat produced was realised as a profitable by-product rather than the principal product.



Figure 10: The bison in the distance

It seems that the day I visited the bison were not interested in meeting me! We drove for nearly three hours. Each time we spotted the herd we were unable to get near, each time we moved so did they. It felt like an elaborate game of cat and mouse, each move we made they somehow found another further less accessible spot. The lack of phone signal, the constant rattle of the pickup, the occasional



clonk of a stone hitting the axle did nothing to appease any fears when Katie explained their fencing expansion programme. 15 miles of fencing is to be installed, but it would be largely a visual deterrent as a bison could run through a brick wall: perhaps meeting them up close wasn't such a good idea!

As we finally called it quits and turned back along the valley, the closest I got to a bison was a baked slowly rotting carcass. It seems even in a conservation area without natural predators, bison can't escape lightning!



## Chapter 7: France, June 2015

When I started Charcutier Ltd, our specialist meat business, back in 2011, it had been with one sole intention, to produce air dried ham. I had been brought up curing hams in the traditional regional Welsh pre-refrigeration method and the hams, sides of bacon and gammons were a familiar sight, hanging from the farmhouse ceiling. Our hams were what I would term true country hams, much the same as those that I had experienced during my time at Slow Meat in Denver, and in countless countries across Europe. This was peasant fare, robustly strong in its porkyness and salt and a million miles away from the delicate nutty hams of Italy or the refined hams of Spain.

During the early planning stages of the business it became self evident that in order to build a business with a profitable economy of scale there would need to be a minimum investment of nearly €2m in a ham facility alone. When taking into consideration the type of animal needed to produce those hams - in the region of 12-18months of age - and the subsequent curing and maturation period of anything from 12-72 months it became plainly obvious that a startup that wouldn't realise any return for up to 7 years wasn't feasible at all. We decided to concentrate on producing meat products that were equally scientifically complicated but would have a need for considerably smaller investment. This has allowed us to progress with the research needed from a livestock, meat quality and process perspective to produce hams of equally refined qualities to those of our cousins on the continent. With this in mind, it was with a great level of excitement that I packed my bag in expectation of my trip to the 8th Dry Cured Ham World Congress<sup>30</sup>.

### Chapter 7.1: The 8th Dry Cured Ham World Congress, Toulouse

The trip didn't start well. My city centre hotel, sited a few hundred yards from the conference venue, had double booked. My inadequate French proved testing to the poor receptionist but having drawn a rudimentary map I understood that there was a place reserved for me in a sister hotel a few metro stops away in what can only be politely described as a characterful area. The refund of over half the hotel price was telling. I vowed not to stay out late, my linguistic skills had proven good enough to get me there, but I doubt they could talk me out of a late night street encounter. The following morning I was up early, the neighbourhood looked considerably better basked in early sunshine and, according to the receptionist, it was around a mile and a half walk to the conference. I headed in the right direction, found a popular boulangerie and grabbed a croissant and a sharp delicious black coffee, karma restored.

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<sup>30</sup> <http://www.cmjs15.com/en/>





The conference was being held in what could only be described as an unsymmetrical, shrunken, modern, industrial, glass effigy to the Arc de Triomphe, an utter marvel of regional French architecture. We were in the top of the arch, with a balcony overlooking the railway station. Coffee, as with all conferences, bordered on the undrinkable and they'd provided a selection of evil tasting sweets to accompany it. It boded well for a good conference. Being in France, we had the traditional welcome - the President of the region, the Mayor of Toulouse, the President of the Organising Committee and finally the President of the Scientific Committee: each said their piece. Slowly losing the will to live and over an hour late we progressed to the introductory address.

With the formalities out of the way, what was to unfold was one of the most interesting conferences that I have ever attended. It encompassed the gamut of the supply chain that I had spent the past five years researching. I was quickly regretting not attending in 2011 and 2013, and was already making a mental note to book for 2017. The earliest sessions concentrated on the genetic selection for optimised carcass traits in heavy pigs and progressed to papers on feed studies, the influence of breed lines combined with crude protein content, and the effect of feed on intramuscular fat and the fat composition. I was in heaven.

The main speakers were derived from the heartland of ham production in France, Italy and Spain, and it soon became apparent that an unspoken class system existed with the Spanish residing highest, and the peripheral countries of Eastern Europe, Scandinavia and North America residing towards the bottom. As one of two Brits in attendance, I don't think we even registered on the scale. The truly fascinating thing for me, was the approach that each country had for the subject. The Spanish quite obviously funded considerably more scientific research than anyone else, they held their purebred Iberian pigs with the utmost respect and they had a distinct drive towards quality production. The Italians were considerably more commercial, opting predominantly for white pigs - hybrids, Italian Landrace and Italian Large White. Their approach was technological, carcass CT scanning, automated ultrasound scanning of the trimmed legs and regulated saltings based on these scans; they were taking ham production from the artisan to precision curing. The French took a middle road. They had a wealth of bio-diversity in their pig breeds, and were utterly proud of the regional provenance of such pigs as the Gascon Bigorre and the Basque Kintoa. Their approach was conceptual, drawing on technological work utilised in the aerospace industry and creating 3D predictive models for ham curing.

Looking back at my exhausting notes (2 full notebooks) I could easily write 10,000 words on this conference alone; much of those topics would probably bore a speculative reader as the papers were so industry specific - the *en vogue* topic was the voluntary EU ban on castration from 2018 and its possible effect on non PGI and PDO products (which would later be echoed again at the Fatty Pig Conference in Hungary). However, two key facets of the meeting for me involved much more tactful sessions - the first related to an academic study looking at the flavour profiles of Serrano hams based on the slicing technique of the 'ham sommelier'.

On stage we had Silvia Garcia Reinado and her protegee Sergio Bellido Garcia demonstrating the three techniques of ham slicing - the traditional, the pico and the serraje. The traditional was cut long and perpendicular, it provided a sealed slice, with very little oleic acid. It delayed the taste of salt, but the cut had to be straight without imperfection. Next came the pico - an angled, peaked cut used mainly in the hotel and catering trade as it gives a better slice appearance. It produces a much saltier flavour, but should the ham be low on salt a slight sawing action breaks the texture and increases the salted



flavour. Last and by no means least was the most difficult cut, the serraje, utilising a straight sawing motion which provided the most pleasant constant salty flavour, the abrasions through the sawing motion breaking through the texture to increase flavour.

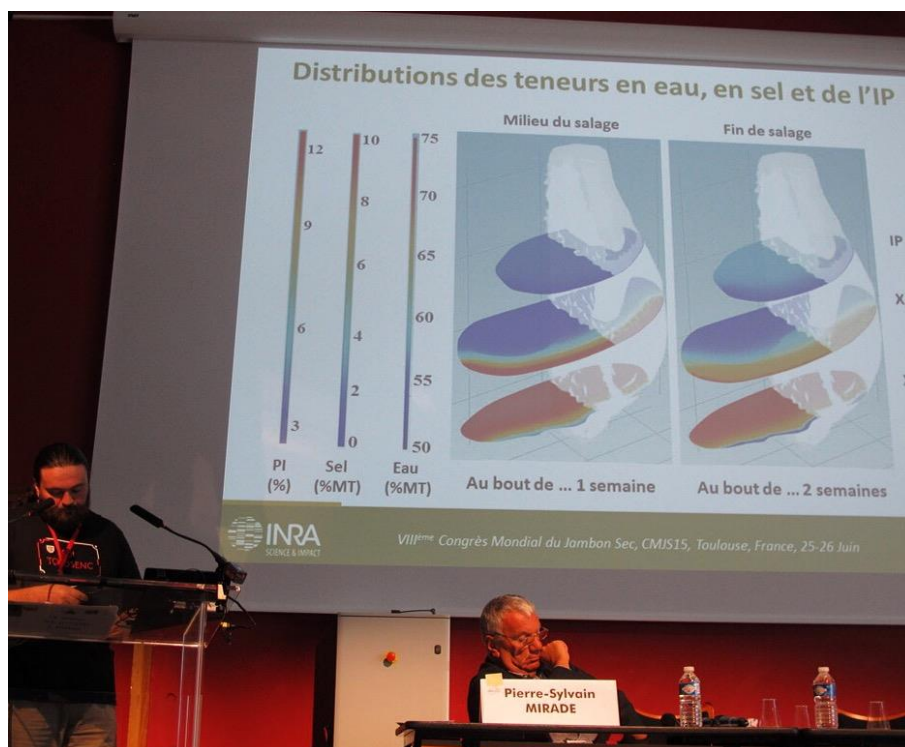


Figure 11: 3D predictive modelling of ham curing

As delightful as it was to watch, hear (and taste), there was a scientific background to this demonstration. Such is the dedication to the perfection of ham that the two had been working with Prof. Emiliano de Pedro Sanz of the University of Cordoba, Spain on analysing ham tasting. Utilising male and female slicers, both left and right handed and cutting in the three traditional ways, a panel of trained tasters had reviewed the human differences from one slicer to the next. The conclusion of this long study? There is no significant difference between the human way of cutting.

The session proved thrilling, informative, an absolute piece of theatre but ultimately anti-climactic. However, what followed provided the best finale possible for such a conference - *degustation de jambon sec* i.e the ham tasting. The main exhibition area which had held a raft of scientific papers/posters for the past few days had been cleared. Two tables running the length of the room were set with nearly 30 different hams to be tasted. Each ham had a banner bearing its name above it - allowing you to sweep the aisles in a blind tasting if you so wished.

I made my initial sweep, noting hams of distinction, and returning for a second sweep to eliminate my favourites. My notebook quickly filled with tasting notes: a mixture of good - sweet, nutty, delicate, porky, aromatic, deeply porky and the bad - rancid, overly smoked, chewy. It proved hard to make a decision on a favourite, I had narrowed it to two, and returned to see what they were. In pole position was a French ham, produced from the Noir de Bigorre pig, a traditional regional black pig from



Gascony which had been cured and matured in one of the cooperative ham houses in the Pyrenees. Earlier that year it had won the best product award at the Salon International de l'Agriculture in Paris.

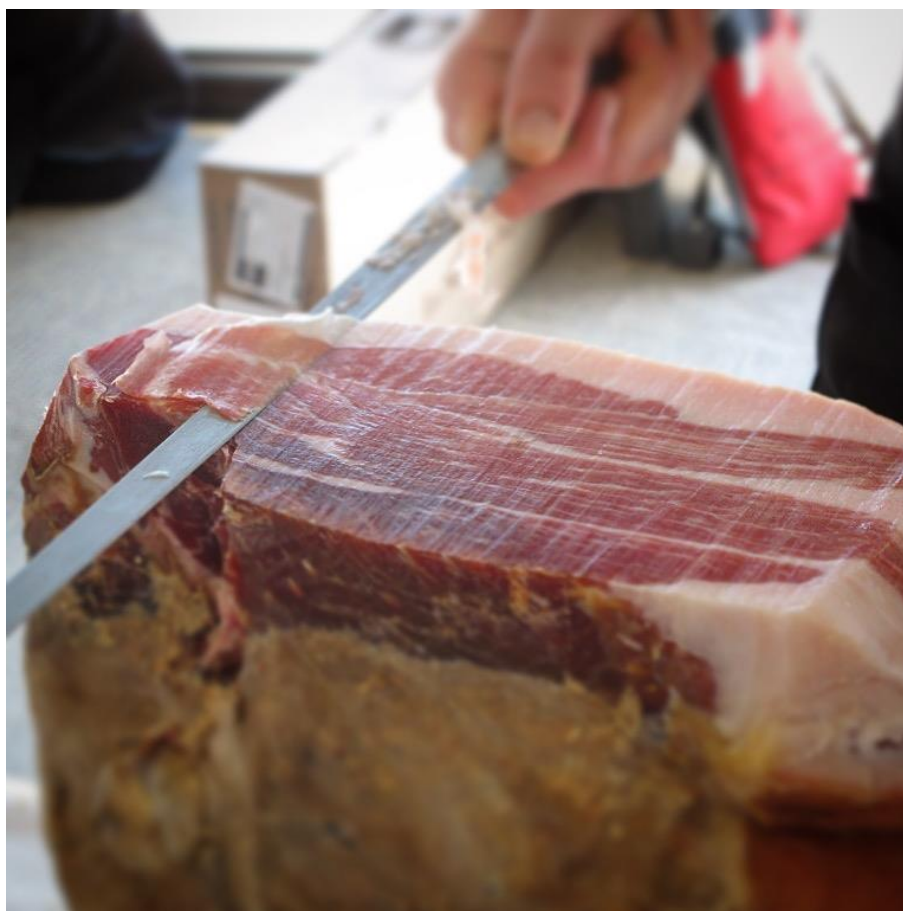


Figure 12: Degustation de jambon sec

Coming a very close second was a famed Spanish ham deriving from the town of Jabugo in the Huelva province. Produced from purebred Iberian pigs (*pata negra*), it had been finished on acorns from the holm oaks of the mountainous dehesa. These pigs would have had a finished weight in the region of 170kg, with a high percentage of fat (often up to 50%). The legs would have been cured and matured for up to 30 months before coming ready.

Full of ham, I set off to meet Kate Hill, an old friend and a charcuterie guru who runs immersive professional courses from her canal-side culinary school at Camont, Gascony.<sup>31</sup> She was hosting three international students (with a clutch of Michelin stars) and we sat down to dinner to discuss my ham revelations. It was to be another step in my continued research for our own ham production. Having met the breed rep for the Noir de Bigorre earlier in the day, and the owner of the ham house who had produced the most delicious of hams, I vowed to return to see the process first hand.

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<sup>31</sup> <http://www.kitchen-at-camont.com>



## Chapter 8: Italy, October 2015

### 8.1: Milan Expo/Terra Madre Giovani - We Feed the Planet, Milan

Feeling rather overwhelmed by the cultural experience of spending two weeks in China, I flew from Beijing to Milan to visit the Milan Expo and to take part in the Slow Food Movement's Youth Network<sup>32</sup> event, Terra Madre Giovani. My first stop in the airport was the cafe and, for €1, I could get a delicious strong cup of espresso and a quality one at that; I also craved bread and cheese, having had little or none in China, and was suitably rewarded. The Italians revere their food culture and even in those places where we in Britain would expect expensive, sanitised and mass produced fare, the Italians would expect nothing less than quality.

I had witnessed this, at its height during autumn 2014 when visiting the bi-annual Salone del Gusto<sup>33</sup> festival held in Turin. It is quite possibly the largest food festival in the world, and the pinnacle of the Slow Food Movement calendar. In addition to the food, incredible tasting workshops, panels, symposiums and discussions are held concurrently. Described as being akin to the food Olympics, it also features a much smaller event called Terra Madre where specialist producers from the organisation's 150 member countries showcase their regional food culture.

Taking some of the themes from the traditional Terra Madre, the Youth Network of the movement had decided to hold their own version to coincide with the Milan Expo. Renting an empty warehouse space on the periphery of the city centre, 2,500 young people descended on the City for an intense programme of talks and discussions which would culminate in a march at the Milan Expo and the presentation of an open letter<sup>34</sup>.

We weren't delegates, but co-producers, complicit in the political act of eating, and our work for the week was a manifesto; a collective new vision for food. My father's side of the family were miners: socialists and communists and the language was familiar to me and was wholly re-affirmed with the fire and brimstone of the address from Carlo Petrini, founder of the Slow Food movement.

I have to admit it was with some trepidation that I then approached the event, but the organised debates and panels proved fascinating. A session on animal welfare provided me with the contact with a German producer who bred the traditional Schwäbisch-Hällische pig from South West Germany. It's a breed derived from the early 19th Century when the local landrace was cross bred with the Chinese Meishan pig. I had been tracking the progress of the breed online. European funding had been successful in commercialising the breed in its region but also in publicising the products made of the pig, utilising a traditional provisions market to provide ready market access to the public. As a breed society they had good saturation online and on social media platforms, and I had seen exhibitions and displays at varying conferences around the world. What utterly shocked me from our conversations was the size of the herd; with only 300 sows it was considerably smaller in size than I had imagined. I was fast realising that the technical work that we had done with our own native Pedigree Welsh Pig

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<sup>32</sup> <http://www.slowfoodyouthnetwork.org>

<sup>33</sup> <http://www.salonedelgusto.com>

<sup>34</sup> <https://feedingtheplanet.atavist.com/foodcrisis>





vending system. Thankfully we were successful and we sat outdoors in a very civilised European manner plotting our collaboration.

In May I had suggested the idea of utilising the bull calves from Patrick's dairy herd of Ayrshire cattle in our charcuterie production. Following our specification for the production of pigs, we were looking to utilise a waste co-product that could be incorporated into the feed regime, and with an on-farm dairy producing Hafod Organic Cheese, they seemed the obvious choice. Re-visiting the idea, I explained to Patrick how we operated with other producers. We shared our cost information with our collaborators, and equally the producers would share with us. It made the farmers that we worked with much more aware of their cost of production and we would then offer a premium per animal above that cost guaranteeing profitability. As the evening drew on, a price was set and it was decided that on my return to Wales, Nick the farm manager at Bwlchwernen Fawr and I would set out our specification for the first test animal.



Figure 14: The pumpkin

My good fortune in being hosted by amazing people continued: I was homed for my duration in Milan by Patrizia and Gianmaria Caccia. I had been partnered with them through a voluntary online system set up by Slow Food. It proved the most memorable part of my stay. They provided me with a realist view on the consumer understanding of food, purchasing, sourcing and an introduction to true Italian food culture. The day I arrived, propped up in the kitchen with a chair of its own, was a huge pumpkin.



Gianmaria had grown it on his allotment on the outskirts of Milan. Taking great care, he had brought it home on the bus (with its own seat) and for the next three days I would eat the most delicious pumpkin dishes of my life. The pinnacle of my eating experience was pumpkin ravioli in sage butter. As I sit and write, it evokes such emotional food memories that I close my eyes and shake my head in utter disbelief of the pleasure of simple food.

Enthralled with the premise of Terra Madre Giovani, each evening I would discuss with them what I had learnt. As I battled with the intellectualisation of food each day, Patrizia and her husband were a welcome realist relief. On leaving Milan, my mind felt a little more clear, more open and ready to be challenged.



## Chapter 9: Netherlands October 2015

### Chapter 9.1: First International Symposium on Cultured Meat, Maastricht University

With the chime of socialism still ringing in my ears I embarked on what was to be a turning point in my journey. Since becoming part of the Nuffield Farming family, one term in particular had been mentioned in hushed, yet hallowed terms; the Nuffield Moment. I had learnt so much already, and had taken to thinking that the term was a collective for the learning experience. That is, until I went to Maastricht.

Having kept abreast of some advances in the field of what was originally termed in vitro meat I made a last minute decision to include a trip to Maastricht University to the First International Symposium on Cultured Meat. I viewed it with some scepticism, but also with a healthy dose of intrigue, placing the field of study at the very periphery of what I would term to be value-adding. Joining me with equal scepticism was fellow Australian Scholar Michael Craig.

Cultured meat, in its most basic definition is meat that has been produced from cells derived from animals, but grown in a controlled environment rather than produced from livestock. The current process is largely on a small scale and laboratory based. However, companies across the world are working on upscaling, using technology derived from both bio-medicine and the more traditional food industry. Comparisons can easily be made with equipment used in fermentation such as in the production of beer or plant-based proteins like Quorn.

Prior to the conference I had given little thought to the actual process; the sterile use of the terms “lab grown” and “synthetic” and the pervasive scientific nature of the language associated had clouded my perception of what the product was. That same language prevails, but the opportunities or the possibilities of the technology are plainly obvious. As a business that aims for whole carcass utilisation, I have oft remarked that we are more in the business of waste management than anything else; utilising our knowledge of process to maximise the potential profitability of each part of the animal, and giving the animal the respect of using every single part. The quotation that struck it home for me most, derived from a piece written in 1931 by Winston Churchill<sup>35</sup>. In looking to the future he imagined:

*“We shall escape the absurdity of growing a whole chicken in order to eat the breast or wing, by growing these parts separately under a suitable medium.”*

Winston Churchill, Fifty Years Hence, The Strand Magazine, December 1931.

Speaking at dinner with a Dutch meat scientist, it was clear that cultured meat in its basic form can be chemically analysed as being meat. However, meat as we think of it in a traditional sense, is a complex mixture of meat, fat, blood and a range of connective tissues. When speaking of cultured meat, I came to understand that in its inception it is purely the meat component, uncoloured and unflavoured. Dr Mark Post, who hosted the conference, had in 2013 produced a proof of concept, cooking a cultured beef burger in London before an audience and a tasting panel<sup>36</sup>. The burger was coloured with

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<sup>35</sup> <http://teachingamericanhistory.org/library/document/fifty-years-hence/>

<sup>36</sup> <http://www.mumc.nl/en/mumc-content/view/4439>





beetroot juice and though favourable, was a starting point in the production of an alternative to traditionally raised meat.



Figure 15: The First International Symposium on Cultured Meat

Though an industry in infancy, the realistic long term possibilities and its attractions are far ranging. Its effect on livestock production can be seen as both an opportunity and a threat. There were two schools of thought - the first sought to utilise a donor herd, where sample biopsies would be taken from the animals to provide cells for growth. Utilising every cell from a herd of around 40,000 pigs annually would provide sufficient resource to feed the whole world. The second system would utilise immortal cell lines, cells that would be initially extracted from livestock but would provide the basis for a population of cells based on that initial extraction. No future extraction would be needed, negating the need for any more livestock.

The cautionary and preferred option would be the first. Though by no means a complete alternative to traditional agriculture, there are synergies and opportunities for smaller scale farmers to increase the quality of their work, by reducing their workload and increasing their profitability. There is potential for smaller density livestock populations on farms which would result in higher animal welfare and would impact environmentally: lower land stocking density, reduce emissions, decrease soil erosion and reduce the impact on natural biodiversity of farmland. There would also be opportunities for the retention of the biodiversity of livestock breeds, with the onus on the production



of cells as opposed to feed conversion, vigour and productivity; the use of more native and pedigree breeds would be as profitable as crossbreds and hybrids.

The key factors however would be the issues of climate change, food poverty and food waste. Though the available figures are highly contestable surrounding the environmental impact of livestock production, I was fortunate enough to sit next to Dr Hanna Tuomisto at dinner and had the opportunity to discuss her work. Having trained in Agroecology, she had largely focused on the environmental impact of traditional agriculture. However she had formed comparisons with cultured meat production publishing a series of papers<sup>37 38 39</sup> which had highlighted its sustainability.

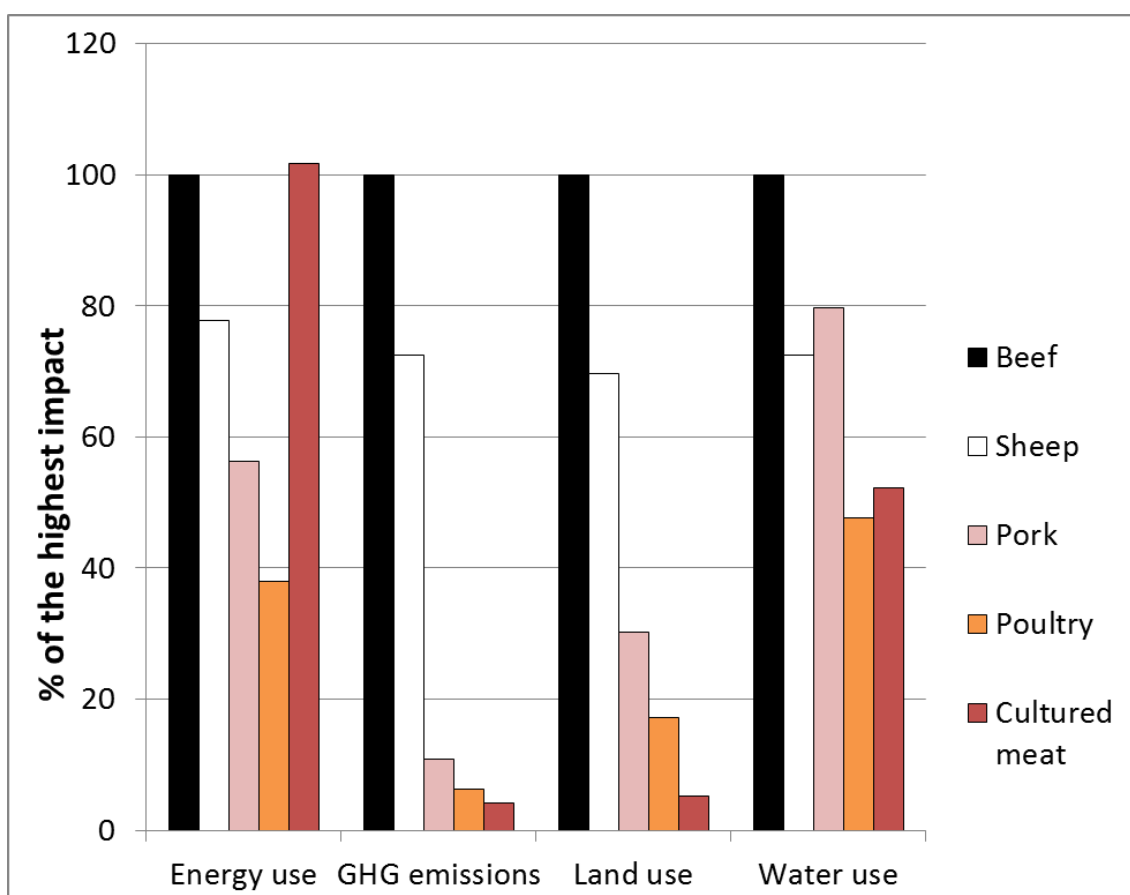


Figure 16: Comparison of environmental impacts of cultured meat with European livestock meat<sup>40</sup>

<sup>37</sup> <http://pubs.acs.org/doi/abs/10.1021/es200130u>

<sup>38</sup>

[https://www.researchgate.net/publication/255179690\\_Could\\_cultured\\_meat\\_reduce\\_environmental\\_impact\\_of\\_agriculture\\_in\\_Europe](https://www.researchgate.net/publication/255179690_Could_cultured_meat_reduce_environmental_impact_of_agriculture_in_Europe)

<sup>39</sup> <http://lcacenter.org/lcafood2014/papers/132.pdf>

<sup>40</sup> <http://lcacenter.org/lcafood2014/papers/132.pdf>

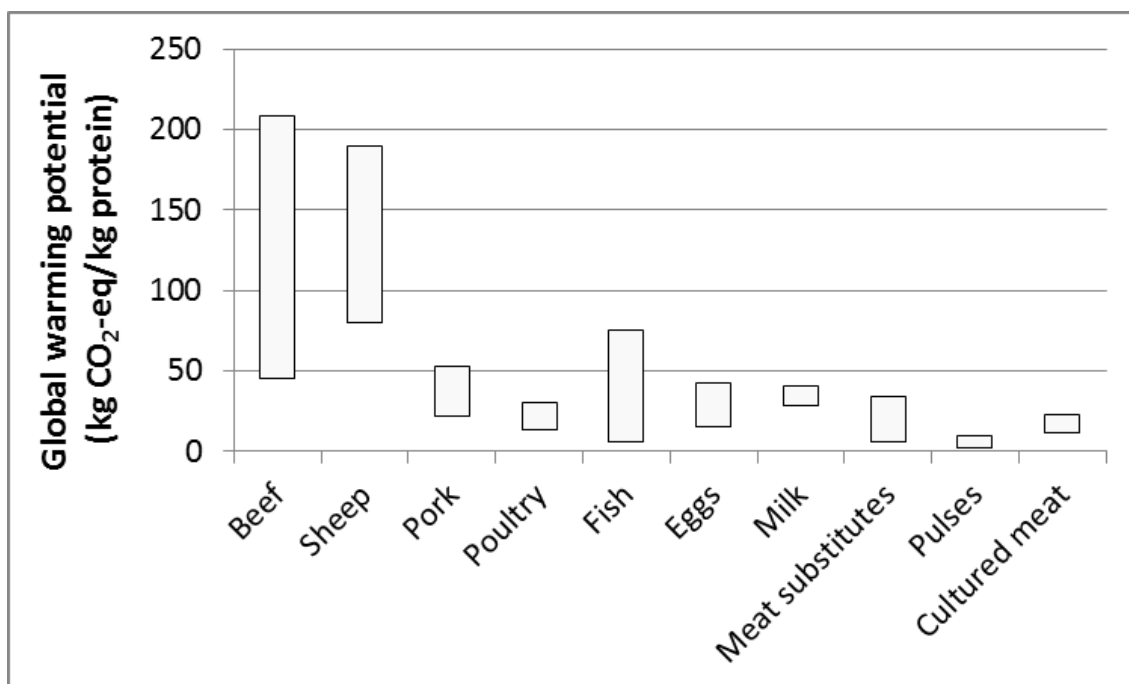


Figure 17: Comparison of GHG emissions of cultured meat with animal and plant based protein sources. 42

With the predicted increase in population by 2050, the intense pressure on agriculture to provide for a growing population has been a constant theme while travelling. Without the power to predict the speed at which the technology of culturing meat could be commercialised, it could prove a worthy addition in the agricultural arsenal. We may yet develop the sustainable tools to feed both this world and the next. It may also prove to be the obvious choice for the production of foods in a new world, whether through space exploration or through planet colonisation. Whilst considered science fiction, there is little in its way to becoming science fact.

There was an additional dimension to the conference. In addition to a largely scientific audience there was a proliferation of philanthropists, venture capitalists and altruists each with their own invested agenda in the possibilities of the industry. New Harvest<sup>41</sup>, a US charity whose descriptor at the time<sup>42</sup> described the organisation as *a charity advancing technologies to sustainably and affordably feed a growing global population* was featured heavily during the course of the conference. It was apparent that a North American dimension, with its roots within both a vegan lobby and Silicon Valley were deeply engaged with the subject.

Before leaving I had the chance to speak with Dr Marianne Ellis from Bath University, a chemical engineer from the bio-medical industry. We soon realised that we shared an optimism for the opportunities for traditional agriculture in the UK and the utilisation of the diverse biodiversity of our traditional native breeds. We planned to speak more in the UK.

My Nuffield Farming journey would have been worthless without the support of those at home. There are the practical issues of keeping a business going, finding additional labour for the physical jobs. But what isn't mentioned is the emotional support. The counter balance and the calming voice of reason

<sup>41</sup> <http://www.new-harvest.org>

<sup>42</sup> <http://web.archive.org/web/20151015041814/http://www.new-harvest.org/>



in my life is my partner Liesel - I say partner; we've been together for sixteen years and engaged for nine of those and still not married. Having not heard from me for three days, she knew something was wrong.

At the time she was sending me a frantic text, I was sat on a bench in the centre of the Belgian University town of Leuven - eating the most delicious fries which had been cooked in beef dripping - contemplating veganism. Like a dieter who promises that the evening blow-out meal before the diet starts will be the last of its kind, I didn't hold up much hope that I would be turning vegan. However, having come from an agricultural background, raised in a tradition where I was at the heart of the rearing and processing of our own animals, I had never stopped and questioned the consumption of meat.

Michael my fellow Scholar had put pen to paper of his own opinion<sup>43</sup> of the conference. I was a bewildered mess of a man. I sat in that square for the best part of the day, my head aching from the pressure of thinking. I was a man anguished by a moral dilemma. How could I, an advocate of traditional farming practices, heritage recipes and processing methods, be even contemplating this new world. The interest of Silicon Valley dollar vilified my doubts on whether the idea had potential. This new industry could amount to billions of dollars annually. I struggled with the idea and what my place would be within that world. Five nose bleeds later, the pressure in my head was alleviating, I had texted home to say that I was safe, and I had experienced my Nuffield moment: well, the first at least.

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<sup>43</sup> <http://www.beefcentral.com/news/cultured-meat-unnatural-and-weird-maybe-but-industry-cant-ignore-it/>



## Chapter 10: Brazil, February 2016

### Nuffield Brazil Tour

As I sat to edit my Brazilian chapter, I was irked by something that I'd read on social media that morning. Livia Firth, the Creative Director of Eco Age (a sustainability consultancy) posted a meme<sup>44</sup> relating to deforestation.

Firth, recognised by the UN for her work within sustainability in the fashion industry and an Oxfam Global Ambassador, has a considerable platform<sup>45</sup>. My journey through Brazil would polarise my own personal feelings relating to the effect that the livestock industry globally is having on deforestation across South America. However, what had annoyed me were the short sharp statements taken out of context - they can be damaging both to the agenda they pursue and to the sustainable agricultural perspective. Digging a little further<sup>46</sup> I found that the figures derive from a passage from an



Figure 18: Instagram meme.

article<sup>47</sup> published in 1986 and relate directly to the production of beef due to de-forestation in Central America during that period. It bears no relation to the varying holistic systems or even the traditional pastoral systems that are predominant here in the UK and elsewhere.

The statistic however has a true bearing on what I learnt during my trip to Brazil. I had joined the Global Focus Program Brazil group for a few days while they were in the UK, and within a few short minutes it had made me realise that the level of discussion had not stopped at the CSC but had continued, seemingly honed and intensified. As we returned to the minibus post farm visit each member of the group had his opportunity to describe their own opinion of what they'd seen, each person had their strength and an incredible dissemination unfolded. Unable to travel on a Global Focus Program (a programme organised by Nuffield International which New Scholars may join) during my Scholarship, I chose to book onto the tour of Brazil organised by Sally Thompson from Nuffield Brazil, hoping for that same intensity of discussion.

We congregated as a group in a plush Airbnb in the sprawling metropolis of Sao Paulo. We were a mixed group of international farmers spanning over six decades in age, all a little sleep-deprived yet excited at the anticipated journey. The lounge was deftly turned into a makeshift speaking venue and a bedsheet was utilised as a screen for a projector. Prof Marco Conejero of the agribusiness

<sup>44</sup> [https://en.wikipedia.org/wiki/Internet\\_meme](https://en.wikipedia.org/wiki/Internet_meme)

<sup>45</sup> 38,900 followers on Instagram on 07/08/16

<sup>46</sup> <http://skeptics.stackexchange.com/questions/32779/one-year-without-beef-saves-3432-trees>

<sup>47</sup>

[https://repository.si.edu/bitstream/handle/10088/17671/serc\\_Uhl\\_Parker\\_1986\\_Bioscience\\_36\\_642.pdf?sequence=1&isAllowed=y](https://repository.si.edu/bitstream/handle/10088/17671/serc_Uhl_Parker_1986_Bioscience_36_642.pdf?sequence=1&isAllowed=y)



consultancy Stracta provided us with a breakdown of Brazilian agriculture. Few of us who were new to the country were prepared for the enormity of the country, both geographically and in its agricultural outputs and exports. The nature of its production, commodity agriculture, makes its business vulnerable to global trends but also provides it with the opportune wealth that mass scale agriculture can provide. Agri-business is the leading industry in Brazil followed by mining and the automotive industry. Agriculture is perceived as a prosperous, respected career path and provides prospecting opportunity for those willing to be pioneers in the new frontiers of Brazil.



Figure 19: Planning our trip while in Sao Paulo

Our three-week tour followed the historical development of the country - the highly colonised European South, the expansive soya fields of the mid region of Mato Grosso, the frontier lands of Bahia, ending with a trip to Amazonia in the north. It proved one of the most emotional experiences of my Nuffield Farming journey. The visits and the experience were astounding, and would never have been possible had I planned a journey myself. Visits were diverse, ranging from poultry abattoirs to hydroelectric plants, large scale soya farms to small scale dairy, and everything in between. The key element, as I had hoped, was the discussion, the dissemination and the chat on the cramped, warm, mini-bus.



## Chapter 10.1: Copagril

A few key sites stand out in my memory - in the Southern State of Paraná in particular was an agricultural Co-operative called Copagril. We visited one of their poultry processing facilities and one of their feed mills. It was an impressive integrated system, their cooperative members produced the grain and soya for their mills, feed rations were produced for other members rearing chickens and pigs, which would eventually be processed in their facilities, sold at their stores, wholesaled or exported. They retained their supply chain, utilising the margin at every step of the way.



Figure 20: The bright clean lines of the rendering plant

I was immensely impressed with their poultry processing facility, one of the biggest of its kind in the country. They had largely mechanised the cutting lines, and were processing in excess of 170,000 birds a day. The plant was ten years old, and utterly modern, especially when combating waste. The most interesting part of the plant for me was their rendering plant. Rendering is usually relegated to some dark, damp, warm, and smelly corner of a production facility. This stood in stark contrast. It had been built by a firm from New Zealand in partnership with Copagril, processing 200 tonnes per day of poultry render. It produced two products, a dried powdered meal and a secondary grade oil. The oil was either sold to be used as a constituent of bio-fuel, or to be used with the meal in their own feed mill for inclusion in future feed rations.



Figure 21: Rendered chicken meal

At the time I hadn't really comprehended its use: it was only the following day that I grasped the life cycle of chicken, eating chicken, eating chicken. On visiting the feed mill that day, while discussing rations in the on-site laboratory, they produced a small sack of the render. I popped my finger in it, smelt it, and tasted a small amount. It was delicious, it was akin to the best chicken stock that I had ever tasted (though this had included feathers and eviscerant, which I don't tend to include in my own recipe). Although the waste could have been utilised as composting material, the render facility was able to make better use of the nutrients from the waste by utilising the protein. The inclusion of the oil and meal in a ration provided an equivalent protein level to that provided by soya.

The feeding of animal products to animals in the EU has long since been illegal (since 2001) due to its links with BSE. However, having seen the rendering plant, and understood its process, I had no issue in eating the 'stock' knowing that it was completely sterile. As an exporter to 50 countries, 2.1% of them in the UK, products from Copagril can circumnavigate legislation as they are producing outside the EU. Putting aside any moral issues, it was one of the first of our Brazilian visits that proved how integration and innovation within retained supply chain put Brazil on a pedestal within commodity agriculture. It called into question for me that, if a co-operative membership organisation was this efficient in Brazil, what role does the UK have within global agricultural commodity, and whether we could even compete?





## Chapter 10.2: Bom Futuro

One of my motives in visiting Brazil was to learn more about soya production. My grandfather wouldn't have recognised soya as part of a feed ration during his lifetime but, today, it is commonplace. Although it provides high yielding protein, it can provide difficulties within processing as its fatty acid balance differs from more traditional protein sources. While studying at the Meat Laboratory at Iowa State University in 2011, I first came to learn of the effect that soya could have on the quality of pork. Pigs fed on waste soya from the bi-ethanol industry in Iowa were producing much softer pork; it proved harder to process, made a product that had poorer eating qualities and had a significantly shorter shelf life. After returning from Iowa, we changed our focus at home in our own feed regime, utilising field beans, peas or rapeseed meal where possible as a replacement, and moving to a barley based finishing diet.

Our initial change to non-soya was not a moral choice, it was purely to do with quality. Over the past five years we have looked specifically at fat quality, utilising the laboratories at Swansea University through the Welsh Institute of Sustainable Environments to test the fatty acid profiles of varying breeds fed varying diets. We sourced samples from across the UK, took samples from our own farm and collaborated with the Pedigree Welsh Pig Society to increase the size of the project. Our motivation was purely to get the right feed, for the right fat both for our standard processing but also, long-term for our air dried ham aspirations.



Figure 22: Crop storage and worker housing, Bom Futuro



Soya, however, is the elephant in the room of livestock production. So, where better to visit than Bom Futuro<sup>48</sup>; the largest soya bean farm in the world. We found ourselves driving to the farm, and for 20 minutes it seemed that we had driven through the same field, - not surprising when they crop in excess of 500,000 acres of soya per year. The farm sits in the heartland of **Big Soya** production in the Mato Grosso region. This is a region deforested during the 1970s and 80s mainly for beef production, but which is quickly being re-appropriated to cropping. Cropping currently composes of just 10% of the area; however approximately 27% of land area is pasture, much of which is degraded brush and is continually being converted.

Though big business, Bom Futuro is a multi-generational independent family business. Government investment in developing land during the late 1970s brought the family to the region, true pioneers who forged a new industry. A business, though best known for soya, has evolved and includes cropping, seed production, livestock, fish, forestry and renewables. Employing over 5,000 workers, they supply housing, food, schooling and even have an onsite church and cinema. I can honestly say that every member on our bus was staggered by numbers and the sheer scale of their project. A simple walk through one of their machinery sheds turned a number of our group into giddy little excited boys.

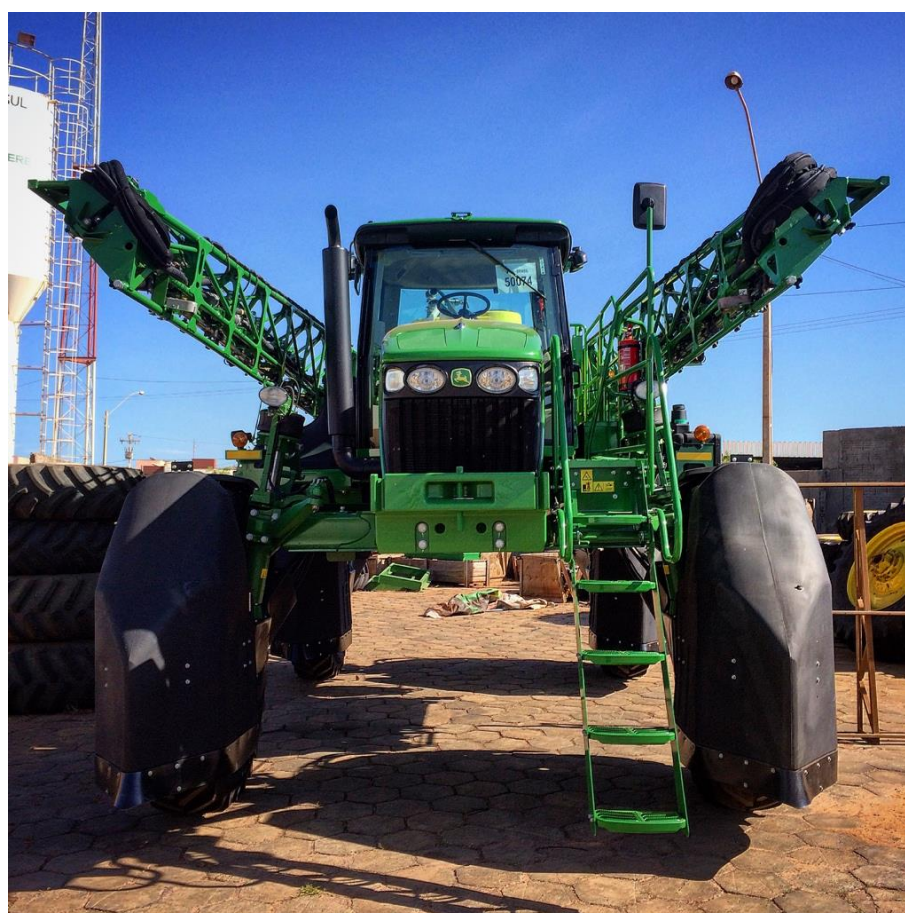


Figure 23: A shiny new John Deere crop sprayer

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<sup>48</sup> <http://www.bomfuturo.com.br>



The production of soya in Brazil is extremely competitive on a global scale, though yield per acre isn't as high as it is in some other countries, the sheer acreage provides an economy of scale. Cutting edge mechanisation provides mass efficiencies - John Deere for instance launch many of their new models in Brazil first, due to the size of the market for machinery. The climate also allows for two, if not three crops a year in a rotation of soya, cotton and/or corn, making the production value of the land area considerably greater. Once the crop is harvested, their potential profitability is huge; the major drawback, and what eats away at that margin, is the logistical route to port. In the case of Bom Futuro, they have invested in 450 of their own trucks. For a country where everyone seemed to have a smartphone and whose tractors were the envy of every farmer on our bus, their transportation network was Dickensian - dirt roads were common, the tarmac roads that existed were poorly maintained and there was rarely a dual carriageway. The closest port is a day's drive and well over 1200 km from Bom Futuro.



Figure 24: The fish processing plant at Bom Futuro

As we toured the farm, we witnessed their business evolution - seed storage, a milling plant, eucalyptus plantation, fish ponds, fish processing plant and a small beef lot. Though the farm wasn't polished in the way we had seen with Copagrill, they were following the same path: incorporating more of the supply chain, adding value to retain those margins and exporting the finished goods, rather than purely selling a base commodity. I was staggered, impressed by the enormity but one thing at the back of my mind was eating away at the experience. A mere 50 years ago, those expansive fields of soya



would have been dense cerrado, forested savanna with its own ecosystem and biome, now gone forever.

### Chapter 10.3: Agropecaria Jacarezinho

Moving northwards but staying within the cerrado biome, we visited Agropecaria Jacarezinho<sup>49</sup> an estate of 45,000 hectares of mixed un-improved and improved pasture. Driving to the centre of the farm provided a unique view of the landscape, a mix of native cerrado woodland, deforested land that had returned to brush, de-graded pastureland and improved lush grassland. The estate provided grazing for 22,000 head of cattle; they had an extensive genomic breeding programme and were partnered with an abattoir and processor for an integrated supply chain. Though I was much impressed by their genomic selection, two things in particular stood out from the visit. The first, was utilisation. We were touring a highly successful cattle ranch but in much the same way as I had witnessed at the Grasslands Project near Denver, the rearing of livestock wasn't the primary financial purpose of the farm, it was, once more a land management project. Where it differed was the end goal, the value of improved grassland was 250% the value of unimproved. Meat, once more, was a profitable by-product of this improvement but the sale of the improved agricultural land would essentially be the driving financial force.



Figure 25: Nelore breed cattle at Agropecaria Jacarezinho

<sup>49</sup> <http://www.agrojacarezinho.com.br>



More importantly for me was a conversation with the owner Ian Hill, a British expatriate who had been in Brazil for over thirty years. A serial entrepreneur and investor, he also owned significant sugar cane plantations in the South of Brazil and a stake in a bio-ethanol processing plant. When quizzed by our group, and asked what the biggest threat to his current business would be, he answered quickly and definitively: cultured meat. I was floored. It was an unexpected answer.

Over lunch I had the opportunity to dig a little deeper. I drew from the conversation that the threat didn't relate wholly to beef production but to land value. The conversion of pasture and degraded land to soya was pushing beef production north. Though degraded lands were plentiful, legal ownership and Government corruption played as key risk factors in investing in more. Deforestation in Amazonia persisted, primarily for livestock production, but largely driven by the pressures of soya. However, for a serial entrepreneur and investor to be so openly talking of culture meat, my interest was well and truly piqued.

#### Chapter 10.4: Amazonia

The final leg of the tour was the part I had been looking forward to the most. Flying in through broken cloud, beneath us was a sea of green, the landscape below was dense primary rainforest for as far as the eye could see. We were headed to the port town of Santarem set at the confluence of the Tapajos and Amazon rivers. Our welcome was bizarre, our tour of the Cargill port had been cancelled at short notice, we were confined to our hotel for a short period whilst the local authorities were contacted. We were released, allowed to take a boat ride and a short fishing trip but news travels fast and by the time we returned the whole town was already aware of the gringos who were creating a stir in town.

The following morning we were all summoned *en masse* to meet with the local Mayor's office and the municipality's agricultural office. Feeling like a group of naughty schoolchildren we were seated in the main meeting room and asked to explain the purpose of our trip. What started as a guarded meeting, soon flowed as they realised we were there as an agricultural group interested in the dynamic of the area rather than being there as an environmental group. The previous evening I had done some quick googling<sup>50</sup> and found that the Cargill port that we had intended to visit had been built illegally and without the appropriate environmental permits. It seems from these reports that the very office we were sat in was complicit in the plan, with the port having been built on land owned by the municipality. As dialogue progressed my fears were alleviated somewhat that we would be afforded free movement; however, it put me on the back foot on the subject of environmentalism.

Though agriculture had a long history in the area, including large scale rubber plantations owned by the Ford Motor Company at Fordlandia and Belterra during the early 20th Century, industrialised cropping had a relatively short history dating to 1988. Within the Para region, 62,000ha were now set aside to soya, with much of that land derived from clear felling of rainforest or from the re-appropriation of degraded pasture. Beef cattle at 5m head, was still the leading agricultural industry in the region with much of the pasture stemming from historic deforestation. These deforested lands had been farmed or cropped for two seasons and abandoned once their initial nutrient high potential had been utilised. In some cases they had been retained as poor pasture with low stocking densities of 0.5 cows per ha. There was little scope to improve the land with fertiliser being expensive and

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<sup>50</sup> <http://www.greenpeace.org/international/en/press/releases/cargill-s-controversial-soya-s/>



access to finance being extremely limited in the area. This provided a vicious cycle where additional illegal deforestation made for a far more prosperous proposition than making the available land work.



Figure 26: First sight of the Amazon

With the area's proximity to port, the transference of land to soya was growing apace. Degraded land that once farmed coconut, peppercorns and chillies, and abandoned pasture which had now re-vegetated, amassed to around 600,000ha in total for the region. A more concentrated policing of forested land and the promise of prosperity drew proven farmers from areas such as Mato Grosso bringing with them both finance and technology. However, as we realised ourselves, on visiting a nearby soya producer, all roads are not paved with gold. As a group we walked out into the field and, with forest flanking us on all sides, we dug a hole. Our resident soil tester Gerjan Snippe, an organic brassica producer from the Netherlands passed judgement: **the soil is dead.**

Environmental laws across Brazil are set to protect deforestation; each region has a specific area percentage of land that is to be kept for conservation. In the Amazon, the percentage number is at its highest: any agricultural land should retain 80% untouched with just 20% deforested for commercial purposes. Each farm, wherever in Brazil that we visited, spoke of this ruling, though rarely did we see the land that was to be kept. Annual satellite images are produced to monitor the level of conservation though there is little policing. When I raised the issue of policing with the Ministry of Agriculture in the capital Brasilia, my question was initially met with silence and then deflected with an explanation



of the legislation. Whilst driving during our last few days on dirt roads through forested lands, we passed areas that had recently undergone **slash and burn** deforestation. The dank smell of burnt wood hung heavy, and stumps still smouldered. Even in outlying populated areas any level of policing seemed non-existent.



Figure 27: “the soil is dead”

Our final excursion of the trip was a rainforest walk. We travelled to a small village on the banks of the Tapajos where the indigenous people managed a living through tourism. They could live in harmony with the forest, utilising the forest for their livelihood, and acquire some food and building materials without damaging its precious eco system. We walked from the village, through secondary forest into the denser primary forest with our guide providing us with information on the natural flora and fauna. The villagers made an additional income making traditional jewellery from dried and dyed seeds from the forest and small rubber goods extracted from the trees in the forest.

Returning that evening we sat for our final dinner as a group. We discussed our trip, our experiences and its lasting legacy. The emotion of the day hit me, feeling like a soft townie amongst this group of farmers I realised I had experienced my second Nuffield moment. I would never consider protein production in the same manner again. The reality of the pressure of feeding the 9bn by 2050 was becoming ever greater. Though traditional agriculture held some of the answer, it was becoming



clearly obvious that if we followed that path alone, our planet, and its resource might survive 2050, but not for the generation of 11.2b projected for 2100.



**Figure 28: Looking out from the primary rainforest to the Tapajos river, Amazonia**

On returning home, I sought out how, in a charitable sense, I would be able to make a difference. I came across Cool Earth<sup>51</sup>, a charity founded by businessman and philanthropist Johan Eliasch and Labour MP Frank Field. Working across the globe within various rainforest communities, the charity enables the indigenous and native peoples to remain within the forest providing the support needed to make the forest itself profitable without the need to cut it down. Deforestation is a global issue, its impact is global and the reality is that any protein production that we support, even adding milk to our tea, becomes of itself an environmental act. By simply making the forest more profitable than the alternative afforded by deforestation seems to me to be the most obvious answer.

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<sup>51</sup> <https://www.coolearth.org>





## Chapter 11: USA, June and July 2016

My US trip was to be the *magnum opus* of my Nuffield Farming study tour. However, having won the BBC Food and Farming Awards for Best Producer in April, we'd seen our sales skyrocket; taking six weeks to travel at a key growth period in the business wasn't an option. There were two events in particular that I was desperate to attend so I changed the diary, cut a swathe from the itinerary and concentrated on the key visits I could get under my belt.

### Chapter 11.1 World Pork Expo, Des Moines, Iowa

For three years I had tried to fit in a visit to the World Pork Expo<sup>52</sup>. It's an annual event held at the State Showgrounds in Des Moines, Iowa, and the largest event of its kind in the world. The British Pig Association<sup>53</sup> send an annual delegation and in previous years I'd completed the UK Trade and Invest forms to take up funding having never realised the ambition. Those in the pig industry and a host of Nuffield Farming Scholars had recommended it to me - it was an absolute must for my Nuffield Farming journey.



Figure 29: Junior showing classes of Duroc pigs, The World Pork Expo

<sup>52</sup> <https://www.worldpork.org>

<sup>53</sup> <http://www.britishpigs.org.uk>



My t-shirt and flat-cap stood in complete contrast with the sea of checked flannel and cowboy hats as I sat ring-side in the dead humidity of the lowan summer. The Expo's livestock show was an absolute delight - over 5500 entries set within beautiful brick built barns. I spent a happy morning watching the junior classes, marvelling at the extent of the sheer numbers of young people participating with pride. I felt utterly at home, wandering the aisles between the pens, watching the social interaction between breeders and their make-shift camps of folding chairs, kettles balanced on boxes and field kitchens of biscuits, crisps and pop. Though I've never held an ambition to show, it's a world that I am more than familiar with and I was at ease. For now.

The Expo was to be a key turning point, or at the very least it asserted my growing change of view of livestock production. We forget too easily here in the UK that we're at the very forefront of animal welfare worldwide. Though I'm used to visiting intensive pig and poultry systems, it was still somewhat of a shock when entering the largest exhibition hall. The first sight was of a large model of a pig imprisoned in a crate. Systems that have not been seen for well over a decade on our European shores are still commonplace the world over.



Figure 30: Concentrated animal feeding operation crate

Feeling despondent amid the weighty galvanised steel and plastic exhibits I made an exit for lunch. I joined the lengthiest queue of the event; the sign promised me a free feed and there was a BBQ involved. Every commercial stall, like at every good Ag show, put on a bit of a spread for their customers; there seemed to be two choices BBQ or BBQ. BBQ is big in Iowa, though the origins of BBQ



are from considerably further south. The state, with its big population of pigs, has embraced the porcine pleasure of low and slow cooking. My free lunch was a disappointment, the BBQ flaccid, grey and tasteless, it did nothing to brighten my mood.

I wandered the back alleys behind the stalls checking out the big rigs, smokers, trailers and food trucks. I was in familiar territory - markets, events, pop-ups; they're our bread and butter as a business. I stopped to speak with the cooks, and was fed exceptional tidbits as I went - pork ribs, beef brisket, burnt ends. We spoke about technique, woods, the crisp bark of the meat and the red halo of the smoke-ringed briskets. There was passion, I could see the familiar tiredness, their cracked hands were filled with the dark soot from smoking; these were my people. I felt at home, but there was an elephant in the room once more. This was a culture less familiar to me; a culture that is making inroads here in the UK, the culture of Meat! Meat! Meat!



Figure 31: BBQ rig at the World Pork Expo

We may be livestock producers and processors, but having concentrated on quality and the sustainability of production, we've always held the mantra of buying less, but buying better. BBQ, especially in a modern context, with its allure of pile-it-high protein, sits at the opposite end of the spectrum. Meat is expensive, and though cheaper cuts are utilised, welfare and provenance are usually forsaken in the name of profit. BBQ and traditional country meat products had always been a planned focus for this trip. Its tradition is one of utilisation, their history is derived from the native



peoples and slavery, and grew in popularity from roadside shacks to inexpensive community events both for church and politics.

Feeling at a loss and having circumnavigated the Expo site twice I felt it was time to depart. I went in search of wifi, finding it in a nearby Target Superstore. Smartphones are invaluable things in our modern world. I would have been at a loss without it, though, granted, I'd be considerably richer were it not for the amount spent on international data plans. Within Target I bought a coffee at a small Starbucks and took my seat. I pinged a message home, I was in a head-spin. I needed guidance, and there was only one person I could turn to: my partner Liesel. In a splurge of verbal diarrhoea I explained the gamut of emotional feelings I had felt that day at the Expo. Questions on ethics, welfare, the true cost of food, environmental impact... the list was endless.

I was experiencing a third Nuffield moment.

Three hours later I had walked the store, bought a \$10 shirt, walked every food aisle twice photographing the packaging for most of the meat products, debated over the ethics of what to eat for dinner (organic fruit and water) and returned to my seat for a second coffee. I had two further days of Expo on the itinerary and no place to stay for the evening. Remembering a quote from a Bill Bryson book I booked a motel and decided to drive forty miles south to the county town of Pella.

*"I used to like Pella when I was little because many of the residents used to put little windmills in their front yards, which made it kind of interesting. I wouldn't say it made it outstandingly interesting, but you learned from an early age to take what pleasures you could find on any trips across Iowa."*

Bill Bryson, *The Lost Continent*



Figure 32: Pella, Iowa



Pella, with its small-town streets, independent business and homely nature provided the right environment for my ethics questioning. Feeling at a complete and utter loss, I decided to utilise my remaining time in the Des Moines environs better. Shunning the Pork Expo, I booked a tour to visit the John Deere Factory to see their cotton picker production line - a number of which machines I had seen on my Brazilian trip. Having shortened my overall US trip, I was missing a planned visit to the Toyota factory in Kentucky and so this was acting as a replacement. The key thing I wanted to see was the-just-in-time production utilised within manufacturing and the lean methodologies that were pioneered by Toyota and had become industry standard. I wasn't disappointed; as a John Deere devotee there was little chance of disappointment (I had made a trip to their world headquarters earlier in the week). We were taken on a small passenger carriage towed by a retiree on a small John Deere mower. With a downturn in global sales, the workforce had been cut but it allowed us closer access to see each line and its function and the utilisation of efficient processing on a more skeletal crewing.

I returned to Pella for a second night with a day of gluttony ahead. I was headed to see Herb and Katherine Eckhouse of La Quercia, long time internet friends and arguably the best prosciutto producers in the US.

## Chapter 11.2 Applestone Meats, Hudson Valley, New York

There are historic moments in life when you remember exactly where you were when something happened; for me the morning of June 23rd, 2016 will always be one of those. The morning of Brexit will be instilled in my mind forever. I awoke in a silver bullet airstream in the Hudson Valley in upstate New York. It was a serene scene; from the confines of my comfortable bed the dappled sunshine shone through the trees providing patterned shade across the floor. Through the screen door I could see chickens pecking in the yard, my world was the epitome of calm. I had gone to bed the previous evening with the Remain campaign leading. I hadn't dreamt that the result would have changed by my waking. To say that I was devastated at the result, would have been an understatement. Initial thoughts were to emigrate to Canada. I was only a few hours' drive away, I had family and friends there, a small part of me just wanted to drive.

I will forever hold a debt of gratitude to my hosts Jessica and Joshua Applestone for their support and calming words that morning. I dearly hope that I will never have to return that favour #voteHillary.

Josh was another internet friend, someone I had messaged on and off since 2012. I had his book on the shelf above my desk and though I was an ocean away I was utterly aware of the part he had played in driving the whole-carcass butchery movement in the United States. To his credit there is even a website dedicated to The Josh Applestone Effect<sup>54</sup>. He'd be devastated reading this, but with his mutton chop moustache and tattoos he could easily be cast as the original hipster butcher (cool, before he made it cool). I could see some amazing synergies between Jessica and Josh both in their business and their home life that were mirrored in my own life with Liesel. That evening I texted her - I think I've found the American us.

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<sup>54</sup> <https://uploads.knightlab.com/storymapjs/902d0c4c2d2306beba4b7df917e08db3/josh-applestone/index.html>



They sold their Fleishers<sup>55</sup> butchery shops in Brooklyn and the Hudson Valley a few years ago. Josh had embarked on his own new venture The Applestone Meat Co<sup>56</sup>. Having served customers over-counter for years, he had opted for a concept that was utterly different - vending. Hiring a roadside unit, kitting it as a production facility and installing two vending machines that were accessible 24/7 was his new concept. With barely any marketing he was already turning over a healthy turnover. Press from the likes of the Wall Street Journal<sup>57</sup> helps, but a huge billboard and a decent amount of passing traffic helps too. Vending machines are often a theme of Nuffield Farming presentations; however they are usually for milk and eggs, it's rare to see what Josh has termed (and trademarked) a Meat-o-Mat.



Figure 33: The Meat-o-Mat, The Applestone Meat Company

Josh was to provide me with a second memorable moment. As we headed home for supper one night, he demonstrated how the machine worked. We bought some supplies, stopped in the grocery store for a few additions and got back to his place to fire up the grill. I'm always a little wary of terminology - a hot dog in a British context is a sausage in a bun, in a North American context it's what we might term a frankfurter in a bun - North American franks however are a different beast to the sometimes flaccid European cousin. They're generally more highly spiced, often all-beef, and pack a greater punch of snap and that burst of animal fats. We make all-beef franks, I have always been proud of them - I had learnt at Iowa State University in 2011 and honed the craft from tending the bowl chopper for

<sup>55</sup> <https://www.fleishers.com>

<sup>56</sup> <https://applestonemeat.com>

<sup>57</sup> <http://www.wsj.com/articles/the-meat-o-mats-artisanal-chops-1459469026>



Graham Waddington at Native Breeds Charcuterie in Gloucestershire. On tasting the creation that Josh produces I realised I had some way to go to reach that perfection. I had tasted the best hot dog, EVER.

### Chapter 11.3 New Harvest Conference, San Francisco

We travelled in silence back to our rented Airbnb apartment, my hands trembled lightly, partly in shock, partly through adrenaline. Marianne and I, whom I had met at the Cultured Meat conference in Maastricht, had travelled together to San Francisco to attend the New Harvest Conference on Cellular Agriculture. Earlier in the year we had incorporated a company, Cellular Agriculture Ltd. Though it lies dormant, it had been formed with the intention of pioneering the production of food through bio-technology. We had an idea, an embryo of a business plan, and had joked that we were going to San Francisco to get some venture capital. After a series of meetings, though we had not discussed terms, and nothing was signed, a figure had been discussed and with an affirmative fist bump we knew we had met the people who would allow us to set on our path to prove our concept.

Though our interest lies specifically in developing cultured meat products, it falls within the wider realm of cellular agriculture: a field of emerging disruptive technologies that brings together agriculture in its traditional sense with cutting edge bio-technology largely derived from the bio-medicine industry.

After meeting in Maastricht, Marianne had visited our farm, we had talked briefly about the possibility of providing donor cells from some of our livestock for some of the work that was being done on culturing meat at Bath University. On touring our production facility, she could see the synergy between her process engineering of cultured meat and our own process flow of meat products. We had the start of an idea, and she tasked her Masters degree students with a Design Project taking details from our own production and costing the upscale of technology to a commercial level. We were gaining momentum.

New Harvest, a charity established in 2004 to further research within the field of the production of agricultural produce through cell cultures, offered funding and our charcuterie business Charcutier Ltd became an industry partner with Bath University to provide a PhD in Chemical Engineering. Meanwhile, a group of five of us had been tasked by a senior advisor at No.10 Downing Street to draft a policy on alternative proteins which would include plant analogues, insects, and all forms of cellular agriculture. Life was taking on a fast-paced, surreal tint.

And so, I found myself on my very last Nuffield Farming trip headed to San Francisco. New Harvest were planning their first large scale conference and drawing on the hub of altruistic activity that emanates from the Bay bubble; there was no better place to host it. In her opening address Isha Datar, CEO of New Harvest, drew a comparison of Cellular Agriculture with the computer industry; though computers were invented in 1946, it took until 1962 for the field of Computer Science to be recognised, it took considerably longer for the advent of home computing, and longer yet for the smartphone revolution.

Earlier in the year I had been a panellist at the Grantham Centre for Sustainable Futures, Sheffield University, speaking on red meat and sustainability. A fellow panellist - the Business Development Manager for Quorn - had drawn equal comparison in food terms. Quorn is a cellular agriculture



product, using fermenting technology similar to the brewing industry. A mycoprotein is fermented and further processed to produce the meat substitute. This mycoprotein<sup>58</sup> component of Quorn was derived from fungi found in a compost heap in 1963. It then took over twenty years of development for the process to be accepted and approved by MAFF in 1985 as a food product. Quorn is now fully recognised and accepted as a food product, with unquestioned and clean brand values, and with sporting multi-Olympic gold medal winning runner Mo Farah as the face of their marketing campaigns.

Other examples of cellular agriculture that are now commonplace include the production of insulin for the bio-medicine industry and rennet for the cheese industry. Cellular agriculture it seems, is by no means a new field, but a field that is being re-packaged and reinvigorated by the re-appropriation of the developments within bio medicine and food science.

The field is growing immensely; panellists, delegates and exhibitors at the conference included a raft of companies who are looking at a range of products. They are predominantly developing products that are specifically animal derived: Gelzen (gelatine), Modern Meadow (leather), Muufri/Perfect Day (milk), Spiber (spider silk), Pembient (rhino horn) and Sothic (horseshoe crab blood) and span a range of applications, both food, clothing and also medicine. Dubbed as the next era of fermentation, cultured meat it seems is still held as the holy grail of products with its complexity of production.

Though some see cellular agriculture as the answer to the provision of agricultural product in response to factory farming, others, more pragmatic, see it as part of the answer to tackle the need to feed, clothe and heal the planet. There are considerable opportunities but also serious considerations to be taken with regards to the threat cellular agriculture could pose to traditional agriculture. As one of the few farmers and meat processors in the audience, it was plainly obvious that there was little understanding of traditional agriculture in whichever form - intensive, extensive, holistic, sustainable et al. Though a negative, this can be corrected and can also provide opportunity.

An increase in cellular agricultural production will see a shift from land-based production to manufacture, but there is nothing stopping farmers diversifying and taking ownership of that process. We may yet develop the sustainable tools to feed both this world and the next.



Figure 34: Exhibition, New Harvest Conference

<sup>58</sup> [http://www.mycoprotein.org/assets/alf\\_t\\_v2\\_2.pdf](http://www.mycoprotein.org/assets/alf_t_v2_2.pdf)





## Chapter 12: Conclusions

My Nuffield Farming journey has been a transformative experience. Although already well-travelled, Nuffield provided me with a differing world view, a world which brought my personal ethics into question. Though invested in the ideal of real food, I looked further to the question of feeding the planet.

**On native breeds:** I still hold the same opinion, that the naturally evolved bio-diversity of both livestock and plant breeds hold the key to any future food production. They have already provided the genetic building blocks for developed or hybridised breeds, and the wealth of their genetic diversity still holds that same resource for the future.

**On food waste:** there are huge opportunities for the production of products from the waste generated within the meat industry. Though there is financial opportunity in producing from waste, there is also an environmental responsibility. We also have a responsibility to connect with the consumer to reduce the food products that are wasted and not consumed.

**On personal ethics:** my Nuffield Farming journey has made me question my own values. It's made me question the production and consumption of meat, it has made me question my own business. I am no longer what could be termed a meathead, but a conscientious omnivore. It has also made me question the sustainable choices that I make in my day to day life.

**On climate change:** the most emotional aspect of the journey relates to my visit to Amazonia. Deforestation may well be only one single contributory aspect that relates to climate change but it was something I experienced first hand. It is a global issue and until we can make deforestation uneconomical, the reality is that it will persist.

**On value-adding:** though it sits at the very periphery of what I would have perceived as meat production, opportunities within cellular agriculture will be a reality within a few short years. The development of the industry is inevitable. It is the choice of the agricultural world whether it choose to partner, invest or not.

**On feeding the planet:** my world outlook has always been progressive, and I have held the view that there was a place for everything within our agricultural system; I still hold that view. However, the intensification of large scale agriculture alone will not feed us, it will be a balance of small family owned farms, industrial scale farming and a new stream of technologies.

By 2050, 2bn more people will equate to 2bn more brains to consider the solutions for the future.



## Chapter 13: Recommendations

1. Food needs to be re-valued. Consumers need to be re-connected to how food is produced in all its guises. We as farmers hold some of that responsibility.
2. If our society was more aware of how food was produced there would be a greater level of compassion both for the farmer, the land and the environment.
3. We need to teach children how to grow and cook food.
4. Greed/cash/money drives too much of the agricultural industry. There needs to be an increased level of effective altruism.
5. Deep work is needed on the subject of true cost accounting to fully understand the life cycle impact of our agricultural product.
6. As an extension, we need to consider post-2050 and whether our current production systems will have an impact on soil, production, the natural environment and climate change.
7. Post-Brexit, funding is essential for the retention of our natural biodiversity. This includes structured, academic and commercial projects for livestock breeds and also conservation funding for our natural environment.
8. Government needs to be open to new technology. In the case of cellular agriculture this means both in funding research and also in providing assistance for a regulatory pathway.
9. We should all donate more to charities such as Cool Earth <https://www.coolearth.org>.



## Chapter 14: After my study tour

Although my travelling period as a Nuffield Farming Scholar has drawn to a close, it has by no means put an end to my plans for further travel. The journey has reinvigorated some projects that lay largely dormant and provided new opportunities in other areas.

The main effect has been the re-consideration of our whole farm plan and the planned development of a new build for 2017 that will include a new farm office, studio space, library, teaching space and a dedicated on-farm retail shop for both our meat products and a range that will derive from products produced on the farm.

With an increase in production, we have rationalised the output of our charcuterie business with a streamlined product list for the future. Additionally, we are looking to work more on new product development and training rather than production, in order to maximise profitability. During the course of the Scholarship two additional full time job positions have been created in our meat business and a further two part-time positions have been created on the farm.

One of the key outcomes of the journey has been the inception of our whey-fed rose veal project with Bwlchwernen Farm/Hafod Organic Cheese. We are now taking every bull calf that the farm produces and will soon look to increase the project with an additional farm partner. We have also highlighted a further three farms to work with for the production of native breed cattle within our production.

On the topic of the use of food waste, we are currently working with a restaurant and farm visited in upstate New York on a pop-up restaurant project for the Spring of 2017. Animals that would otherwise have little or no value such as dairy bull calves and male chicks from the laying industry will be kept, fed on waste co-products from the food industry and served at a pop up in London.

From 600 applications made during 2016, Charcutier Ltd is one of only two producers successful in their application to trade at the historic Borough Market, London. Trading will commence in autumn 2016 and will provide a link, a platform and a space to host farmers, butchers and processors from across the globe.

Continuing with the development of our air dried ham project, a visit is planned this autumn to some of the specialist ham houses of the Bayonne region. This will coincide with a visit to Limoges with a butcher from Chicago to visit the annual offal festival. We also plan to visit the 9th Dry Cured Ham Congress which will be held in 2017. Additional trips to visit super niche value adding in Italy have been proposed for 2017.

In response to the work instigated through visiting Downing Street, my co-authors and I have founded Cultivate; a British based body to discuss the developments within the field of cellular agriculture. Additionally, a complete business plan is currently being produced for Cellular Agriculture Ltd to secure seed funding for further research and development into the production of cultured meat.

### Illtud Dunsford



## Chapter 15: Executive Summary

Countries visited: UK, Ireland, France, Belgium, Netherlands, Hungary, Germany, Italy, China, Brazil, USA.

Native livestock breeds provide the genetic building blocks of our modern developed and hybridised livestock industry but are oft sadly relegated to a second tier within commercial agriculture. Due to their slow growth and often lower yields, shorter supply chains are needed with high value-adding products to compensate and gain a sufficient margin. However, these breeds hold a value, even if it is not deemed economic. They are an intrinsic part of vernacular food culture, often forming the centre point of traditional and heritage food products, both in indigenous communities and modern society. The genetic diversity of these breeds may yet prove to be of greater value, providing the source material once more to breed efficient livestock.

The inspiration for this study arose from work undertaken as Project Manager for the Pedigree Welsh Pig Society, which included feed trials with Harper Adams University, a series of taste panels, DNA mapping of the breed with Aberystwyth University and an EU Protected Food Name application for Traditionally Reared Pedigree Welsh Pork. The work on the project was intertwined with our own farm diversification charcuterie business, Charcutier Ltd. Our long term goal has always been the production of high value, air dried hams in the Southern European tradition. Understanding the specifics of breed and husbandry to that purpose was also a key driver for the study.

The itinerary of travel centred largely around major international conferences spreading a wide gamut of specialisations within the livestock and meat industry. Native pig breeds across Europe, North America and Asia were reviewed both on-farm but also through researching industrial processing, the production of traditional products, niche value adding and through the tasting of produce. Though super-niche products were to be the focus initially, the management of waste and the profitability of waste also became a key focus area, specifically looking at the use of blood, fat, skin and bone in food production.

Unbeknownst to me, the remit of my study would spread wider, pushing the boundaries of my initial scope to include the new field of cellular agriculture. Opportunities emerging from bio-medicine and the use of bio technologies for the production of food, specifically cultured meat would provide a new focus and would substantially change the course of my final visits.

Food security, and the drive for increased food production by 2050 also became a central focus to my study. Looking to understand the multifaceted range of food production I visited many businesses that lay outside of my own field, taking the opportunity to visit South America to see soya and beef production. It was to be a transformative experience which made me challenge my personal views. Climate change, food waste and the ethical choices that we make in the consumption of food became the clear message of this trip. They had a huge role to play in the lifestyle choices I have made since completing my Nuffield Farming journey, and in the future choices that I have in our own business and our new bio-tech startup Cellular Agriculture Ltd.



## Chapter 16: Acknowledgments and Thanks

Thanks to the Nuffield Farming Scholarships Trust for entrusting me with a place within the Nuffield Farming Family, and to the John Oldacre Foundation for funding my Scholarship, providing me with the opportunity and for allowing me the freedom to explore.

Thanks to Slow Food International and the Pedigree Welsh Pig Society for their additional financial and in-kind support.

Thanks to my partner Liesel, for being utterly awesome, for her patience in every crazy idea that I have and for her unfaltering support in allowing me to follow where my passions have taken me. My only regret is that we have not shared more of this journey together.

Thanks to my parents and family, for all their help and support. Thank you for keeping things going while I was away and for allowing me this opportunity.

Thanks to the team at home who worked all those extra hours to plug an Illtud-shaped gap in production. In just over 18 months, you've grown as a group of people, realised your own potential and are a stronger, more accomplished team for it. In everything that we do as a business, it is a team effort.

Thanks also to our customers, service hasn't always been as smooth as we'd hoped with all this travel but you've supported us through it. We're very lucky to have you.

The people I met on this journey are far too numerous to list, for fear of forgetting or offending I won't attempt to be comprehensive. However, I do need to thank some very special individuals who welcomed me into their homes, provided me a comfortable place to sleep, for sharing their stories and for welcoming me to break bread at their tables.

Thanks to fellow scholar Andy for providing that first bed night away on my Nuffield Farming journey and for welcoming me to the birthday meal down at the pub. To Maire, another Scholar, for her hospitality during my Irish trip, you treated me like family and gave me a warm glimpse into Irish farming life. I'm indebted too for your introduction to the Allshire family at Caherbeg Pork/Roscarberry Recipes. To the whole Allshire family, I owe an immense debt of gratitude for your transparency and honesty and for showing me the ropes. To Fingal at Gubbeen, thank you for the tour, it's inspirational what you've built as a family, I hope I can repay the hospitality one day. To Kate and Steph Hill, for my second visit to that most magical spots of French soil – Camont - thanks for the welcome at a tough time for you both.

Thanks to my two Slow Food host families in Denver and Milan, those were by far the most memorable home visits, keep those pictures of food coming, I'll be back again to see you one day. A huge thanks to the bundle of positive energy that is Sally Thompson, you're doing amazing things for Nuffield in Brazil, we're lucky to have you. Thanks to Franco Lee, for being an utter rock star, thanks for inviting me to Sheep is Life and for taking me foraging, one day I hope I can repay the favour. A special thanks to Joshua and Jessica Applestone not only for their hospitality but for looking after a distraught Brit on the morning of Brexit. Thanks to Megan Larmer for being an awesome dinner date, thanks for hosting, for taking me to the co-op and for the hot dogs and the season finale of Game of Thrones.



Finally, a thank you to the Cultivate group and to Richard Parr for bringing us together and for setting out our course.