



Sustainability of Pork Production in Malta

Higher National Diploma in Food Preparation and Production Operations

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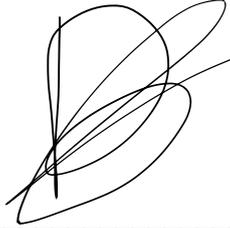
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Pork: An insight to the Production and Sustainability in the Maltese Archipelago

The primary objective of this study was to investigate and research about the local pork industry that is being demolished by the Maltese choice of product. The author will be divulging into the aspects of the production of pork in the Maltese islands, looking into legalities with regards to production. Setting out to conduct a number of numerical studies comparing the local and foreign market and its effects. Customer and consumer decisions were also taken into consideration that there needs to be an awareness and conservation plan for our local, high quality, products. In this assignment it needs to be made clear that the local industry is being kept alive and will continue doing so if we create an awareness, by the Maltese people.

The Authors research will give an insight on the historical progression from 1970 onwards of production, the breeds of pigs used for production, also heightening the 'quality factors' of locally produced pork in relation to imported pork meat, identifying consumer preferences over certain breeds of pork for retail and consumption of locally produce pork meat versus imported pork meat.

A primary factor of my research will focus on the viability and sustainability of locally produced pork meat and how this factor is, will impact the futuristic outlook of pork production in the Maltese Islands.

Acknowledgements:

A thanks goes to my Tutor, Mr. James Attard who has continuously pushed me in doing research and guiding me. Also, to the all who took part in the surveys and interviews conducted. Also a Big thanks to Roderick Vella who is a pioneer in pork research in Malta.

Keywords: Sustainability, Local vs Imported, Pork

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Chapter 1

Introduction

1.1 Introduction

The Pig first of all comes from the Suidae family. This includes the domesticated pig and all of its ancestors. The Eurasian wild boar (*sus scrofa*) first started to evolve in Asia, around 4 million years ago, leading to today where this breed can be found from the northeast of Europe all the way to the southeast of Asia (Live Science, 2016). Pigs have a lot in common with humans as they are able to think and react with their brains, are omnivorous which means they eat both plant and animal food sources, also they have teeth and guts which are used in their daily lives to survive. (Essig, 2015). The pig also has had many different roles in the past, these have differed as some played a part in more religious and social aspects and some played a part in the cultural aspects as we will be seeing later on. In Malta the Pig was a staple in food, it was a vital part of the Maltese diet and this was displayed when the Maltese islands were hit heavily by the African Swine Fever (ASF). After being reintroduced and settled down we can now see a different challenge in the Maltese Pork Industry, one that comes from outside our shores, Imports, which are cheaper in price but also lower in quality.

When it comes to The Pork industry in Malta, which is one of the leading financial sectors locally Benjamin came across multiple challenges. For a first nobody in Malta has done any studies about the industry thus he had to compile a compilation of data. During this study the main question was, Is the production of local Pork Sustainable and if so how? To answer this question Benjamin has done a few interviews with local pig breeders, restaurant owners and chefs and also gone to the national statistics office to get an idea of how many pigs are slaughtered per week. The investigator also looked into the local breeds of pigs and compared them to the consumers preference, in conjunction with the prefer cuts used. An interesting point that was made, was, is there enough local pork to supply all the restaurants that use

pork and if not, what are we doing to ensure a supply? All in all, Benjamin wanted to answer the research question with as much information as well as learn about the local Pork Industry. It has relevance to the Malta Tourism industry as such, as with regards to quality we have some of the best in the world. The perfect Maltese climate and care of Maltese farmers makes it a standard for foreign countries. With regards to Benjamin's Area of studies, it is absolutely vital as it is a big problem that chefs in Malta are facing. Malta and the consumers need to take absolute care of where their produce is coming from.

The rationale of this study was to learn and teach Benjamin about the uses of pork and consumer preferences of Malta. Keeping in Mind that Pork is one of the main staples in the Maltese diet with many Traditional Dishes including it.

Chapter 2

Literature Review

2.1 History

Back in ancient times the world's diet was mainly based on vegetables and plant-based foods from which the land they were living in could provide for them. Unlike the rest of the world the Romans had a lot of money and as the empire grew so did the availability to farming. As they had a lot of money and wealth, they ate a lot of meat-based foods, especially the Pig. This was such a staple that even in hard climates of desert like North Africa they were able to breed pigs for food. (Essig, 2015) The pig was easily domesticated, this meant that the pig was left to freely go around the households and villages, scavenging for any food it could find. The Romans liked the pigs as they would clear scrub and undergrowth. It was also very good when cooked or cured from snout to tail making this a prize animal.

In the recipe books of Apicius we can see that at the time of the Romans the pig was already being used and flavors altered. Two examples of these recipes found are, a fig fattened liver marinated in caul fat and grilled and pig stomach stuffed with brains, raw eggs, pine nuts, peppercorns and ginger. These two examples are already indications that to the opposite of today, the pig was totally being used. In Malta we find a lot of wastages as discussed later during the long essay. Also in the recipe book we can find a pork belly with scored skin which would be marinated for days with spices then roasted, this would then be eaten with bread and sauced. This is very similar to what today we call a pulled pork sandwich.

2.2 Anatomy Of the Pork

As said before the pig comes from the Suidae Family, these include 8 Genera and 16 Species. A pig consists of a solid body, flat snout, small eyes and large ears. Amongst the 16 species we can find, Wild Boars, domestic pigs, pygmy hogs and warthogs. Naturally they eat roots, seeds and tubers. The Snout is the specialised part of the pig which can help it find its food in the wild. The pig is then equipped with a set of teeth which aid it in grinding and crushing the food that it finds. The pig has nine glands which control many functions as described on pigsite.com. Pigs also can suffer from muscle disease and symptoms differ accordingly.

There are 3 different groups of muscles, these are:

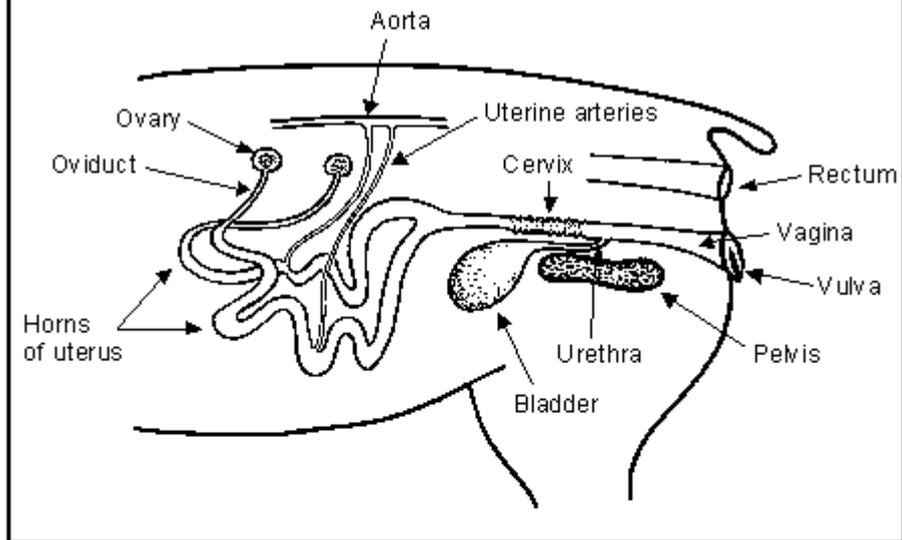
- A. Involuntary or smooth muscles – Digestive, genital systems and blood vessel walls
- B. Cardiac Muscles – the Heart
- C. Voluntary and skeletal muscles – The main muscle mass forming the skeletal system

A sow (female pig) can give birth to 7-12 piglets. This can happen twice a year the pregnancy period is about 114 days. The picture below (figure 1) shows the reproductive system of a pig. As can be seen most of the pig's anatomy is very similar to a human's, so much so that heart valves can be transplanted to humans (Lev, 2015) and clinical studies have shown also human lungs being transplanted to pigs. (Essig, 2015)

GLANDS AND HORMONE PRODUCTION	
GLANDS	FUNCTION
Adrenal	These are attached to the kidney surface. Their hormones control growth, sugar metabolism, kidney function and stress.
Hypothalamus	Found at the base of the brain. The main controlling gland. Its hormones control most body functions and all the other glands, together with sexual activity.
Ovaries	Produce the female hormones; estrogen and progesterone.
Pancreas	Located in a fold of the duodenum. Produces insulin to control sugar metabolism.
Parathyroid	Located near the thyroid glands in the neck. Control calcium and phosphorus deposition.
Pituitary	Found at the base of the brain. Hormones control growth, reproduction, lactation and stress.
Placenta	Afterbirth membranes that covers the fetus Maintains pregnancy and produce female hormones.
Testicles	Produce the male hormone testosterone.
Thyroid	Controls metabolism and growth.

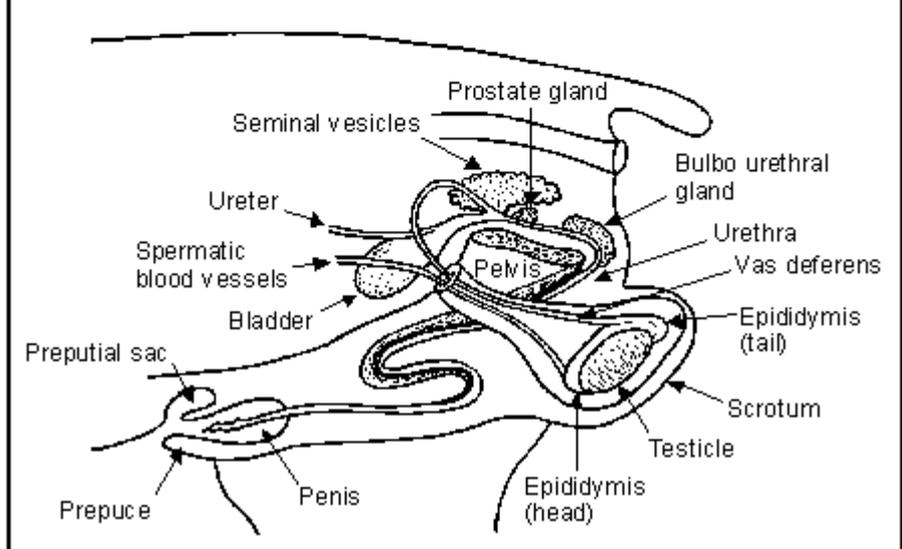
Figure 1

THE REPRODUCTIVE TRACT OF THE SOW



(Fig.1-5)

THE REPRODUCTIVE TRACT OF THE BOAR



2.3 Processing of Pork

Since Pork contains a higher percentage of saturated fat it doesn't have a very long shelf life, A carcass starts to deteriorate under the influence of enzymes oxygen and light, this can be bad on one hand but also good as it may improve texture as well as improve flavour by concentrating it due to the reduction in water. (Lamb, 2014)

Two fundamental processes and earliest cooking methods which were Curing, and smoking were used as preservation, we still use them today. Curing which is very common with pork today is the method in which most or all of the moisture is taken out of the meat. Commonly salt is used to do this as it creates a dry environment which is beneficial for a certain good mould. This mould is called Halophiles, it protects meats and reveals flavour. Water is drawn out of the meat by a process called osmosis. This process works by salt being very concentrated on the outside but hardly any salt on the inside of the meat. Naturally nature tries to balance these out allowing the salt to enter and water to be drawn out. The salt also increases the acidity and lowers the pH which both degenerate bacteria. Halophiles are responsible in producing lactic acid which protects the meat from pathogenic bacteria.

A mould which was also beneficial is Penicillium. This is very important in the improvement of flavour. As well this mould seals the meat so that no other bacteria can go in, it also since it consumes oxygen to live it doesn't allow oxidisation to happen as quickly and finally it forms a layer between natural light and the fat, if these two are exposed to each other it turns the fat rancid. Pigs were bred during the World Wars for there fat also. This is a product which has multiple uses and pork fat is actually clinically proven to be healthier than the trans-fat vegetable oils which we can commonly find today. (cooks info, 2016)

“Malta currently slaughters about 1,600 pigs per week. This is a significant reduction from the 2,400 which used to be slaughtered weekly just a few years ago, although local pork consumption has not reduced. The difference has simply been replaced by lower-quality imported meat products.” (K.I.M, 2010)

2.4 Pigs Breeds

The most interesting and biggest question in which Benjamin wants to fulfil with the help of this project is, what are the Maltese consumer preferences? The Breeds which can be found in Malta are Landrace, Large White, Pietrain and White Duroc. These breeds are highly efficient pigs that satisfy the Maltese customer wants. They consist of Pink skin and lean meat. Every country has its own preferred breeds as can be seen for example in Spain where they prefer black skins and a fattier, more marbled, meat.

Because of the high demands, local breeding companies have modified slightly these breeds, and this has brought along new names, as trade names, these are Meidam, Volante, Titan and PG700. With so many importations, which Benjamin is also looking to the statistics to give an exact amount of importation figures, are we ready to reduce quality over quantity? The imported meats which are injected with water to increase their price per kilo means lower quality which unfortunately is something that is being accepted. The Maltese should be celebrating the golden produce that comes from the land and make the most of it. Using all the knowledge and farming skills that the Maltese farmers have learnt and the science that has been incorporated.

With the Access of being in the European union it also has never been easier to import and export meats. By sending farmers abroad to learn to use new technology to help them achieve an even better-quality meat in less time. It helps address the issue of sustainability by teaching them to effectively manage their farm. With over 160 farms in malta and gozo carrying a big 6000 pig herd of breeding sorrows (the female pigs), and 420 boars which are the males, Maltese farmers have to keep up with the good hygiene and make sure the health of their pigs is top notch.

The pig Industry is a very important one also, it is one of the most important economic sectors. It is the biggest player in the food sector to be more specific having a large range of items suited to the Maltese and it relies heavy on other sectors to keep it going such as the processors and retailers. (Thesis Roderick Vella 2016)

BREED TYPE	ORIGIN	DINSTINCT FEATURES	IDEAL FOR
BERKSHIRE	ENGLAND	1. BLACK BODY 2. EARS SHORT & ERACT 3. WHITE FEET & TAIL 4. WHITE SPOT ON THE HEAD	HIGH QUALITY PORK,TENDER, JUICY & FLAVOURFULL
DUROC	UNITED STATES	1. SOLID RED IN COLOUR 2.EAR CARRIAGE DOWN 3. WIDELY USED AS A SIRE BREED	PRODUCES VERY LEAN MEAT EXTREMELY HIGH QUALITY PORK PRODUCTS
CHESTER WHITE	UNITED STATES	1. SOLID WHITE IN COLOUR 2. SMALL DOWNWARD POINTED EARS	WIDLEY KNOWN FOR PROLIFICACY AND MOTHERING ABILITY
HAMPSHIRE	ENGLAND	1. BLACK IN COLOUR 2. CHARATERISTIC WHITE BELT STARTING FROM BEHIND THE NECK AND EXTENDING ACROSS THE BACK 3. UPRIGHT EARS	A POPULAR TERMINAL SIRE & FOR THE LEAN MUSCULAR CARCASSES
LANDRACE	EUROPE	1. WHITE IN COLOUR 2. LONG DROPPING EARS 3. EARS COVER A PORTION OF THE EYES	POPULAR FOR THEIR MOTHERING ABILITY AND PROLIFICACY BUT ALSO SELECTED FOR LEANESS AND MUSCLE
PIETRAIN	BELGIUM	1. PREDOMINANTLY WHITE WITH BLACK SPOTS	EXTREMELY LEAN CARCASSES WITH LARGE VOLUME OF MUSCLE USED MAINLY AS A TERMINAL SIRE BREED THROUGHOUT EUROPE
MEISHAN	CHINA	1. PREDOMINANTLY BLACK 2. LARGE EARS 3. WRINKLED SKIN 4. FAT AND SLOW GROWING	THEY ARE VERY RESISTANT TO DISEASE CAUSING ORGANISIMS. IMPORTANT MODEL FOR IMPROVING REPRODUCTION CAPACITY OF THE MODERN PIG. VERY GOOD PORK QUALITY.
YORKSHIRE (LARGE WHITE)	ENGLAND	1. ENTIRLEY WHITE 2. ERECTED EARS 3. MODERATE IN SIZE	RECOGNIZED WORLDWIDE AS THE MOTHER BREED DUE TO THEIR PROLIFICACY AND MOTHERING ABILITY.

Figure 2. Breeds

2.5 Process Of Breeding and Slaughter

This can be split up into two different sections as explained by Dr.Frendo, these are the Breeding & Growing stages. These stages are then split up into phases as explained below. The process in which is followed locally is as listed below;

Breeding Stage

Phase 1: Breeding

Over here locally we can see the breeding of two types, The **Dam lines** which are Large White bred with Landrace and **Sire Lines** which are bred with Large White, Pietrain and Duroc. The Female pigs which are known as sows have a pregnancy period of 116days or there about. The breeding process can happen in two ways, the natural way, by means of using a boar. Or else by artificial insemination, which is commonly used her in Malta. This involves putting the pigs into stalls, which is safe for the pig, and then the 5-day process begins. During the 5 days the pigs are well taken care of with food and water and protection from other animals as the boar can get quite rough.

Phase 2: Pregnancy Testing

Using real time ultrasounds the sows are all tested at 4 weeks. At 3 weeks they could use a boar whom walks up and down the stalls, if the boar stops the sow would look and point ears at the boar, this mean that the sow is not pregnant.

Phase 3: Loose Housing

This could mean many different things, in Malta one producer allows for the pregnant sows to be put in a pen with a straw bedding, usually up to 20 in one pen. 3 other producers said they allow for the pregnant sows to be in an open pen which is muddy but still safe for them here about 30 fit in each pen and the other 2 producers have very big pens which can hold up to 50-100 pregnant sows. These are all very good options and having seen them I can guarantee that in Malta we take great care of our livestock.

Phase 4: Care of the Pigs

When the sows are pregnant it is very important to give them all their nutritional needs from feed. This is very important for all the pigs but when they are pregnant, they need special attention regarding nutrition because of the growing liver and obviously the fetal pig. The General Manager of the Association, whom is also the vet for all pigs in Malta, together with his helping veterinary assistants, make sure all this is done. The doctor decides what vaccines are needed and at what times, this is beneficial for not only the sow but also the litter inside.

Growing Stage

Phase 1: Birth

This phase begins with Birth, over here the pregnant sows which are near giving birth are moved to smaller individual pens which are called piglet protection pens.. These pens consist of a slight compartment to separate the sow from the piglets. This protects them from being squashed by the sow while feeding as well as allowing for individual care to the sow and piglets.

Phase 2: Weaning Pools

At about 3-5 weeks the piglets are taken from the sows and put into weaning pools. These are large pens that protect the piglets and have extra care given to them. Before entering the pool the piglets have their tails clipped to eliminate the cannibalism between them as this could create infections throughout the farm, ultimately killing a lot of them.

Phase 3 : Growing and Pre-sale

After the weaning stage the pigs could either be moved or kept where they are, in Malta because of space they all leave the pigs in the weaning pools to grow older. At this point the vet changes the amount and different types of food according to the growth of the pigs. They are then kept there until they reach the weight needed for sale.

Slaughter

Locally pigs are slaughtered at between 65-90kg for fresh pork products, these could include bacon and other value-added processed products. When reaching slaughter weight the pigs are taken to the slaughter house in Marsa. Over here the slaughter house has come a long way. 10 years ago the farmers would be able to drive up to the point where the animals would be killed then would want the pig to be put back on the truck to go to their own farms. This was a giant concern for the health authorities as they learnt that this causes great cross contamination. Having said this over the past 10 years many things have changed. The farmer

now drives up to a pen, the pigs are let out onto straw bedding and are allowed to rest. This stage is called the resting period. Scientifically it is proven that any animal before slaughter must go through this resting phase, it allows the animal to relax and once killed not go into rigormortis in turn you end up with tough meat. After the animals have relaxed, they are lead 5 at a time on a lift, they are then lowered into a chamber where they are gassed. This makes the pigs go to sleep and once this is done, they are brought up again and the throats are slit to be allowed to bleed out. This is done on hangars. At this point is the first lost opportunity as explained in the discussion about Mazzit, which is Maltese for blood pudding. The blood at this point is all thrown away. The pig then moves on to a quick heat flash to take off the hair from the carcass. The carcass is then finally passed over by a manual labourer with a blow torch. At this point the pig is moved further down the line to a butchery were the glands and internals are all taken out and discarded, except the liver. The carcass is then put in the frigide and later processed.

This whole process takes approximately 25 mins in total.

Chapter 3

Methodology

3.1 Methodology

To answer the very question, is Pork meat sustainable in Malta, the investigator needed to conduct research in the industry itself. Beginning with a list of people that were needed to fulfil this. A great help and the most obvious one to turn to be the “Pig breeders Co-operative Society LTD”, choosing this society because it straight away could answer the big questions and doubts. The society keeps track of imports, exports and also acts as a voice for all the breeders. This makes the society, the hub, in which every week a meeting is held between the 5 main producers in Malta. During the time of research, the interviewer intends to visit and write notes of the meeting. This is one of the main points of research having the accessibility to all, or most of the problems whilst also being able to be freely available to many statistics and information.

To follow this research and compare findings Benjamin will conduct a survey in which he would collect consumer feedback about the pork available in Malta. This would not only take a look at customer preferences but also costs and availability. With the long essay being based upon the sustainability it will be focusing more on the producers whom have to take care of this mostly. Having said this an awareness must be created by the public also.

Keeping the Maltese pork industry alive is thoroughly based upon everyone working together and helping out. The meeting with the general manager and also with the producers would hopefully uncover much of what is needed, in virtually, making this a leading sector.

Surveys and Interviews have been chosen for this as they target the people needed. Although there isn't much information about the subject in Malta there is a common knowledge that our produce is under threat by foreign imports. Statistical research proved this as out of the

12.5million kilos of pork bought by the Maltese consumers 65% is imported. This was said by Dr. Frenzo of the Pig breeders Co-operative Society when asked how much pork is consumed per year. He also brought up a very interesting point when talking about the EU funds provided. EU funds which are available to the Maltese pig producers, of which there are 150, are also available to the importers of foreign pork making this a battle that can never be won for Maltese farmers. The foreign Market is much bigger and can obviously produce much more but that left a very big question, why can't we get different breeds to Malta? This would allow us to be much more proficient in our production.

3.2 Discussion and Recommendations

Throughout the interviews this was asked to the producers, with all of them saying nearly the same sentence, the demand for different pork meat in Malta is not there, they would only consider it if the demand grew allowing for bigger farms having more pigs and breeds.

Currently they said the breeds that are available and meet the standards of the customers in Malta are the following;

Dam lines = Large White x Landrace

Sire Lines = Large White, Pietrain, Duroc

Having got this information, the author decided to do a little bit of research regarding these pig breeds and how they compare to foreign breeds. The results of this research were surprising that dam lines and sire lines breeds are the most productive. The benefits of having these breeds in the herd are endless, firstly as explained by the producers here in Malta we have created two cross breeds. The cross breeds do actually differ slightly in every country and although this breed of pig is used all over the world it comes down once again to the customer preference of each country. With the crossing of Large white with Landrace for Dam Lines and large white with pietrain and duroc, we have created what the Maltese want. A pig breed that is lean, has little back fat and can reproduce successfully, on average 13 successful growths every time, with no changes to the pig characteristics itself. Feed efficiency is also a big thing since these are lean pigs and there days required to reach 110kg which is the weight required for slaughter.

The demand depends a lot on what customers want, as a Maltese nation and also as a result of the survey it went to show that out of 83 respondents, 65% choose to have lean piece of pork, while 35% want a more marbled piece of pork. This is shown in the diagram below. Also a very interesting point brought up was that there are no funds to subsidize small scale farming on a small island without local cereal production.

Having Spoken in depth with Chef Roderick, Benjamin discussed a multitude of subjects, Firstly, we went through the history of Malta and unfortunately not having enough space in the long essay the investigator plans on continuing research on the African Swine flu in Malta. Having explained to the author the history of the pork in Malta according to his research, Roderick then started explaining the differences that foreign competitors have on us. From what he said there is no comparison what so ever with regards to quality and effectiveness of snout to tail. The fact that the Italian market when compared to the Maltese one is so different is shocking. In Malta as explained before, a pig is killed at 65-90kg. The pig usually reaches this weight at the 6-month period. To the contrary of this the Italian foreign pigs are grown to about 220 kilos. This means that the meat is more marbled and has a more in-depth flavour. Also, you get much more out of one pig. This takes approximately 11 months depending on the feed given to the pig. Foreign pigs are also given different feeds to get different flavour profiles, something that in malta is inexesistant unless a domestic pig is brought up.

Another Big point is Wastages, Wastages in Malta are shocking as seen before, in a country like Italy every part of the pig is used to make different products, whether salamis or cold cuts, and also everyday fresh pork. Roderick did actually express to the author about how for his thesis at the University of Malta he brought up his own pig to show what the possibilities could be, he also compared this to the half pigs that were hanging in his dry aging cabinet. He

also stated that since the maltese pigs are slaughtered at a very young age, the meat itself looses around 50% of its weight after being dry aged. This is loss of water.

After having taken everything into conclusion, and balancing out at this early stage of research, Benjamin does not think that Maltese pork is being sustainably produced. Chances are that the industry will not change because of the Maltese mentality. Perfection and flavour profiles are not sought for in Malta. This leaves us with a product which although is good, cannot be improved or changed. Production and money making has beaten quality and customer satisfaction.

As a recommendation , the Maltese farmers should be involved in the chain to reduce added costs by the value chain. A farmer would be able to breed, slaughter, butcher and process all in his own area making him self sufficient.

Chapter 4

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